

**AN AGROCLIMATIC CHARACTERIZATION  
OF  
MADAGASCAR**

L.R. Oldeman

ISRIC Technical Paper 21

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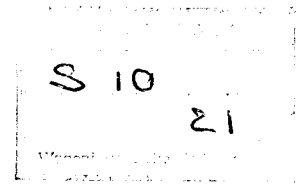
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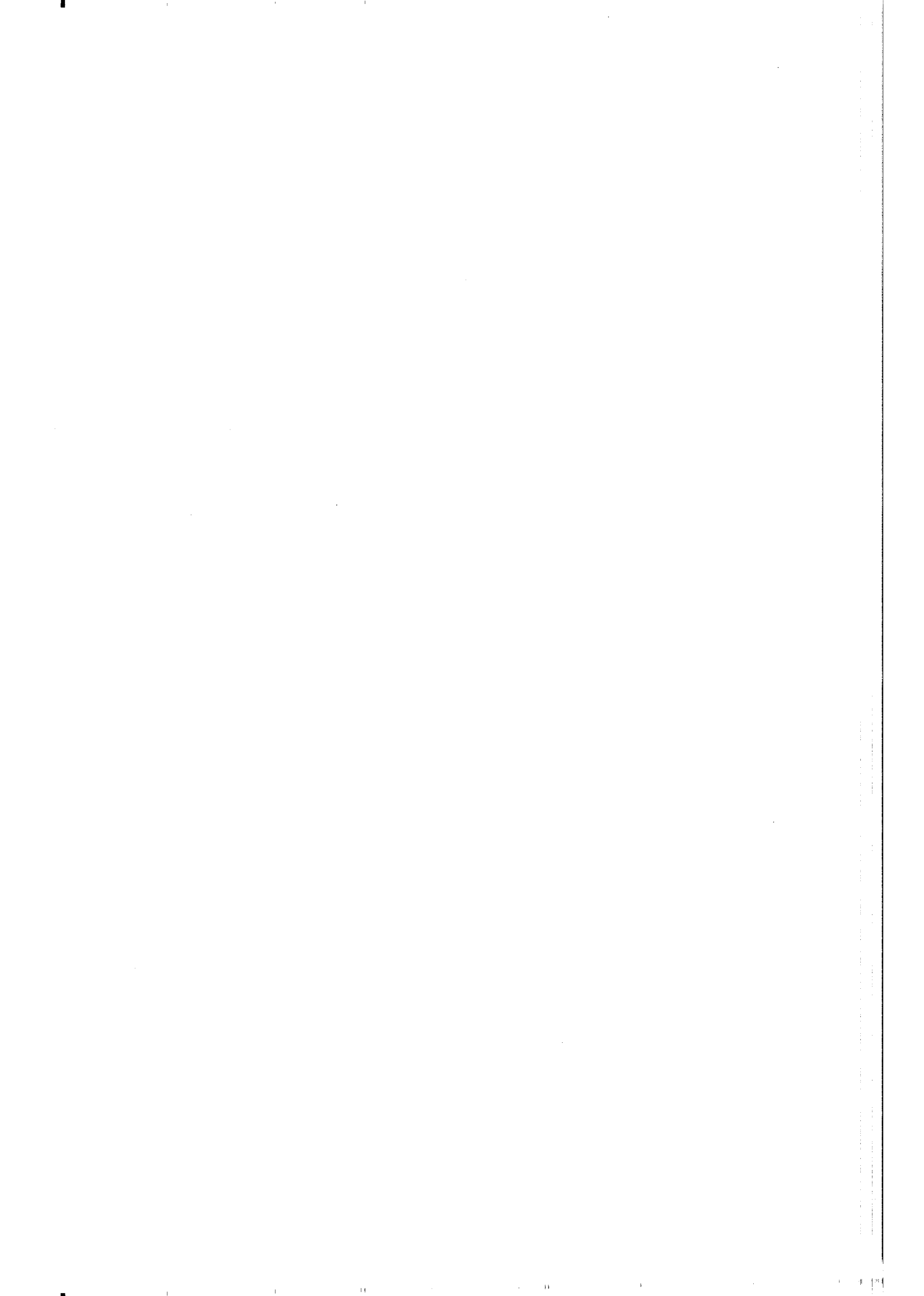
**IRRI-Madagascar Rice Research Project**  
**Technical Report on**  
**Agroclimatic Characterization of Madagascar**

by  
**L.R. Oldeman**  
**(ISRIC, Wageningen)**

**International Soil Reference and Information Centre**  
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## Foreword

In the framework of a cooperative rice research project between the "Centre National de la Recherche Appliquée au Développement Rural" (FOFIFA) of Madagascar, and the International Rice Research Institute (IRRI) in the Philippines, a consultancy was carried out for an agroclimatic characterization of Madagascar with the following terms of reference:

- To assemble and evaluate previously collected agroclimatic data of Madagascar for the purpose of developing an agroclimatic map to be used by breeders, cropping system agronomists, and other agronomists for determining major rice growing environments in Madagascar.
- To select instruments and provide appropriate assistance for the installation of six agrometeorological stations in Madagascar and to train FOFIFA staff to observe, process, and analyze the meteorological data.

Two visits were made to Madagascar. An orientation visit took place from 27 September to 13 October 1986 to discuss the scope and possibilities of this consultancy. Instructions were given for the lay-out of an agrometeorological site; the tentative locations for the six agrometeorological stations were determined; and a list of meteorological instruments was prepared.

The second mission took place from 8 March to 22 July 1987. During this period the agrometeorological stations were established. Because of problems with the search for construction materials for the preparation of the weather huts and fences and in view of the great distances between the sites where these agrometeorological stations should be installed, the majority of time available was used for this activity. The six agrometeorological stations were located at the following experimental research sites of FOFIFA (for their locations see figure 3):

- 1: Tsararano (near Marovoay), at 16°10'S and 46°20'E; altitude 20m; operational on 17 June 1987
- 2: Ambohitsilaozana (Lac Alaotra), at 17°42'S and 48°28'E; altitude 759m; operational on 3 July 1987.
3. Mahitsy (near Antananarivo), at 18°45'S and 47°20'E; altitude 1250m; operational on 20 April 1987
4. Kianjasoa (Moyen Ouest), at 19°03'S and 46°23'E; altitude 949m; operational on 8 July 1987
5. Sahambavy (near Fianarantsoa), at 21°26'S and 47°16'E.; altitude 1120m; operational on 23 June 1987
6. Tanandava (near Morombe), at 21°43'S and 46°05'E; altitude 25m; operational on 20 May 1987

Each agrometeorological station is equipped with the following instruments;

- a maximum-minimum-thermometer (liquid-in-glass)
- an aspirator driven wet- and dry bulb thermometer
- a radiator integrator, type Gunn-Bellani
- a digital cup anemometer.

In addition an electronic integrating digital pyranometer, Rimco, type R/E1P was installed at Mahitsy to calibrate the Gunn-Bellani radiation integrators. (The original plan to install the Rimco at other sites as well could not be carried out, since the manufacturer had temporarily stopped the production of these instruments). Meteorological observers were trained on the spot at each site. FOFIFA staff was instructed to process the recorded information, analyze the data and prepare monthly weather reports for the FOFIFA research staff. A conceptual model for a climate unit within FOFIFA was prepared with job descriptions and an outline for agroclimatic research activities.

Meanwhile agroclimatic data of Madagascar were collected from sources in Madagascar, at IRAT in Montpellier and Paris, and ORSTOM in Bondy (France). The information was complemented with data from the agroclimatic databank of FAO for Africa South of the equator (FAO 1984). This resulted in an agroclimatic databank of Madagascar. All data were

computer stored by the Climate Unit of IRRI, Los Baños, and a hard copy is attached to this technical report.

The technical report discusses the climatic conditions of Madagascar in the light of the feasibility to increase rice production through the introduction of new technology. The ultimate objective of this consultancy is the preparation of an agroclimatic map of Madagascar. It is hoped that this map will directly assist breeders and agronomists with the selection of appropriate location specific rice genotypes and in the determination of rice based cropping systems.

This study and the report were made possible through funding of the United States Agency for International Development (USAID).

L.R. Oldeman  
Wageningen, 1988

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The hospitality and technical assistance of the "Centre National de la Recherche Appliquée au Développement Rural" (FOFIFA) in Antananarivo, and in particular the Pedology Division of the Agronomy Department of this institute for providing working space during the mission in Madagascar are acknowledged.

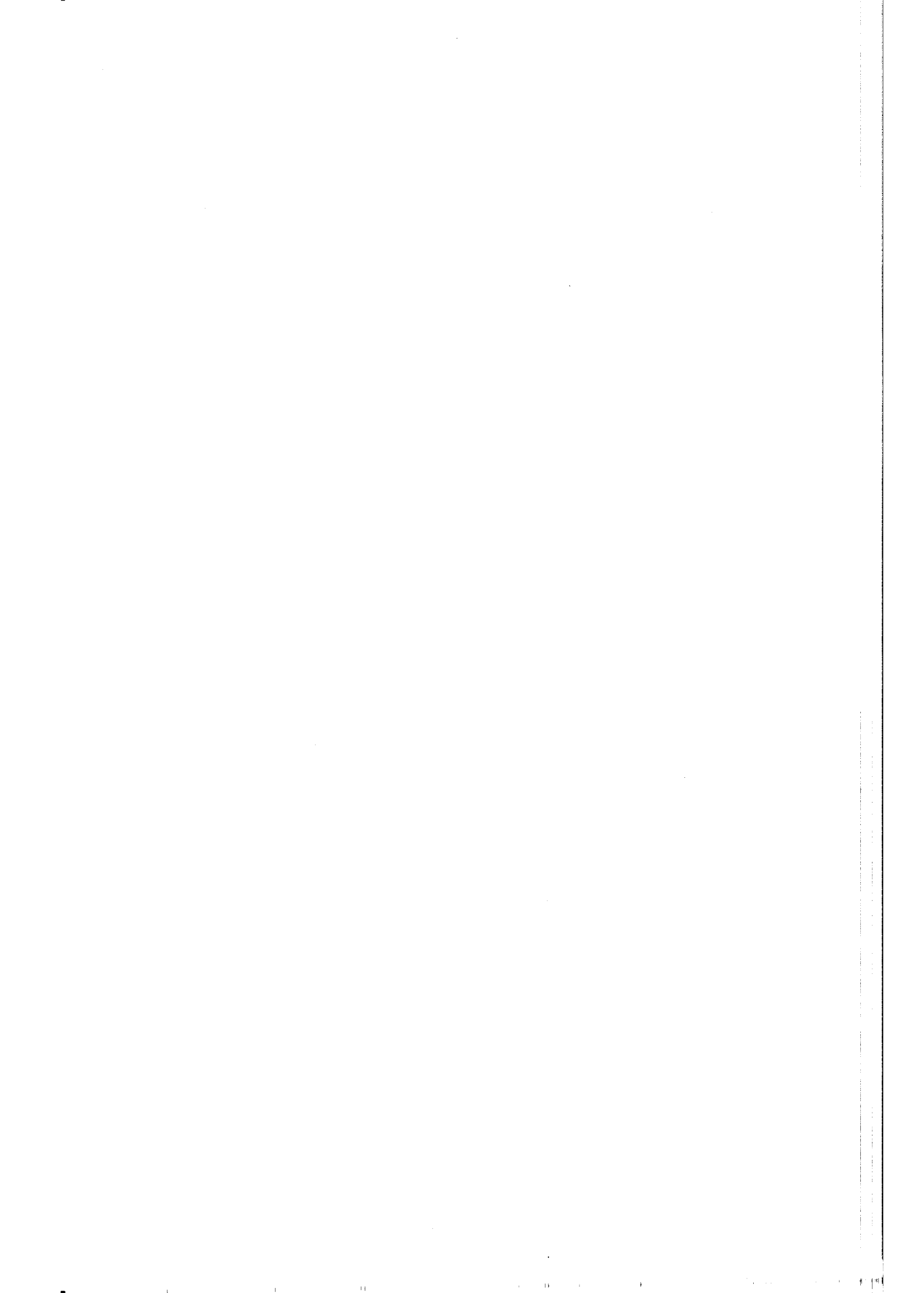
The Madagascar-IRRI rice research project provided the necessary logistics and the assistance of the IRRI drivers is especially appreciated.

The Climate Unit of IRRI in Los Baños is commended for their very cooperative effort to store all the climatic records and their assistance in the preparation of the climatic databank of Madagascar.

The International Soil Reference and Information Centre (ISRIC) at Wageningen is acknowledged for their efforts to draft the agroclimatic map of Madagascar, and to assist in the preparation of this technical report.

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## 1 INTRODUCTION

Natural environments include components from the systems: climate (weather), soils and physiography (landform). These components are sources of water, energy, nutrients and physical support for agricultural systems, which may be supplied in excess or in deficit, and which also affect the occurrence of weeds, insects and diseases. Farmers attempt to manage these components by either adapting crops, animals or production systems appropriately, or by adjusting those components which they are able to control. Correspondingly, research is essentially concerned with adapting germplasm and methods of production more precisely to specific environments. It is therefore essential to describe, synthesize, inventorize and classify the physical components of environments in order to guide the choice of research topics, to identify comparable environments in which technological innovations might prove useful, and to help in the interpretation and analysis of results from trial networks (Oldeman, 1987).

Characterization of the agroclimatic environments involves two types of inventories. The first contains the long term historic records of climatic elements. This set assists extrapolation to comparable areas. The second set contains the elements which vary during the trial periods, also called real-time weather variables. This set helps to interpret results of particular trials and to compare the actual weather observations with long term historic records. This technical report will only deal with the first set of inventories.

Climatic components of the physical environment (rainfall, radiation, temperature, wind, humidity and rate of potential evapotranspiration) supply energy and water to the crop and indirectly influence the nutrient supply. Inventorization and collection of climatic data have resulted in often impressive, long term records of information, that is available - although unfortunately sometimes not easily retrievable - in many places. It should be realized that it is not enough just to collect this set of data, if they are not analyzed and made available to the users. For this purpose this technical report has two parts. The climatic information of Madagascar, that was retrieved during the period of this consultancy has been arranged in such a form that it can be readily used by the agricultural research community. The agroclimatic databank, added as an annex to this report contains long term climatic data for 178 sites in Madagascar, having a minimum of 20 years recorded rainfall data and a minimum of 10 years recorded temperature data. The technical report itself describes the variability of the various climatic components in space and time leading to the preparation eventually of an agroclimatic map of Madagascar for rice and rice based cropping systems.



## 2 CLIMATE AND AGRICULTURE IN MADAGASCAR

The climate of Madagascar is characterized by a great variability of rainfall and temperature regimes. While a humid tropical climate prevails along major parts of the East coast, the Southwest portion of the island is extremely dry throughout the year. The Northwest section of the island is on the other hand characterized by a typical monsoon climate with a long dry period followed by a rainy season with extremely heavy precipitation. A major part of the country is at elevations over 1000 m: temperatures on this high plateau are therefore significantly lower compared to the coastal regions, particularly during the dry winter season. Seasonal temperature fluctuations become more pronounced in the southern part of the country. This great range of climatic conditions poses innumerable problems and opportunities for agriculture in Madagascar. Under rainfed conditions the length of the growing season and in particular the onset of the rainy season is important. In areas where additional water is available to irrigate the crop temperature conditions and their seasonal fluctuations determine the length of the growing season, particularly on the high plateau.

Agriculture in Madagascar is rice-based. The rice-eating population increased from 5.5 million in 1960 to around 9.4 million in 1984. Over the same period the harvested rice area increased from 782.000 ha to 1.163.000 ha, while the productivity of the rice land did not increase: the mean average yield was 1.6 ton/ha in the early sixties and 1.8 ton/ha in the early eighties (Palacpac 1982, FAO 1984). This implies that the available paddy rice per capita decreased from an average of 235 kg to 225 kg per capita (figure 1).

In order to meet the ever increasing demands for rice by an ever increasing population total rice production must increase either by increasing the harvested area or by increasing crop yields. Expansion of the harvested area can be achieved by bringing more land into cultivation for rice or by cultivating a second crop of rice on the same land. Both alternatives are strongly dependent on the conditions of the physical environment. There is a great risk of reclaiming new land presently under natural vegetation. The practice of "slash and burn" on the climatically suitable eastern slopes of the country creates an imbalance between the aggressivity of climate and the natural resistance of the ecosystem leading to terrain degradation either caused by water erosion or by biological degradation of the soil cover. The top soil is rapidly exhausted or washed away, resulting in disappointing yields. The possibilities of cultivating more than one rice crop on the same land depends strongly on the prevailing climatic conditions, in particular the water balance and the temperature regime.

Increasing crop yields is possible through introduction of new improved technology; introduction of high yielding varieties in combination with the application of well-balanced amounts of chemical fertilizers; better water management to ensure availability of water for the crop throughout its growth cycle; introduction of rice varieties with short duration and built-in cold tolerance. Finally it is possible to increase food production by selecting the proper crop or crop genotype appropriate to the existing physical environment. An inventory of the agroclimatic environment will help breeders and agronomists to assist the farming community to make the right decisions in their efforts to increase food production in Madagascar.

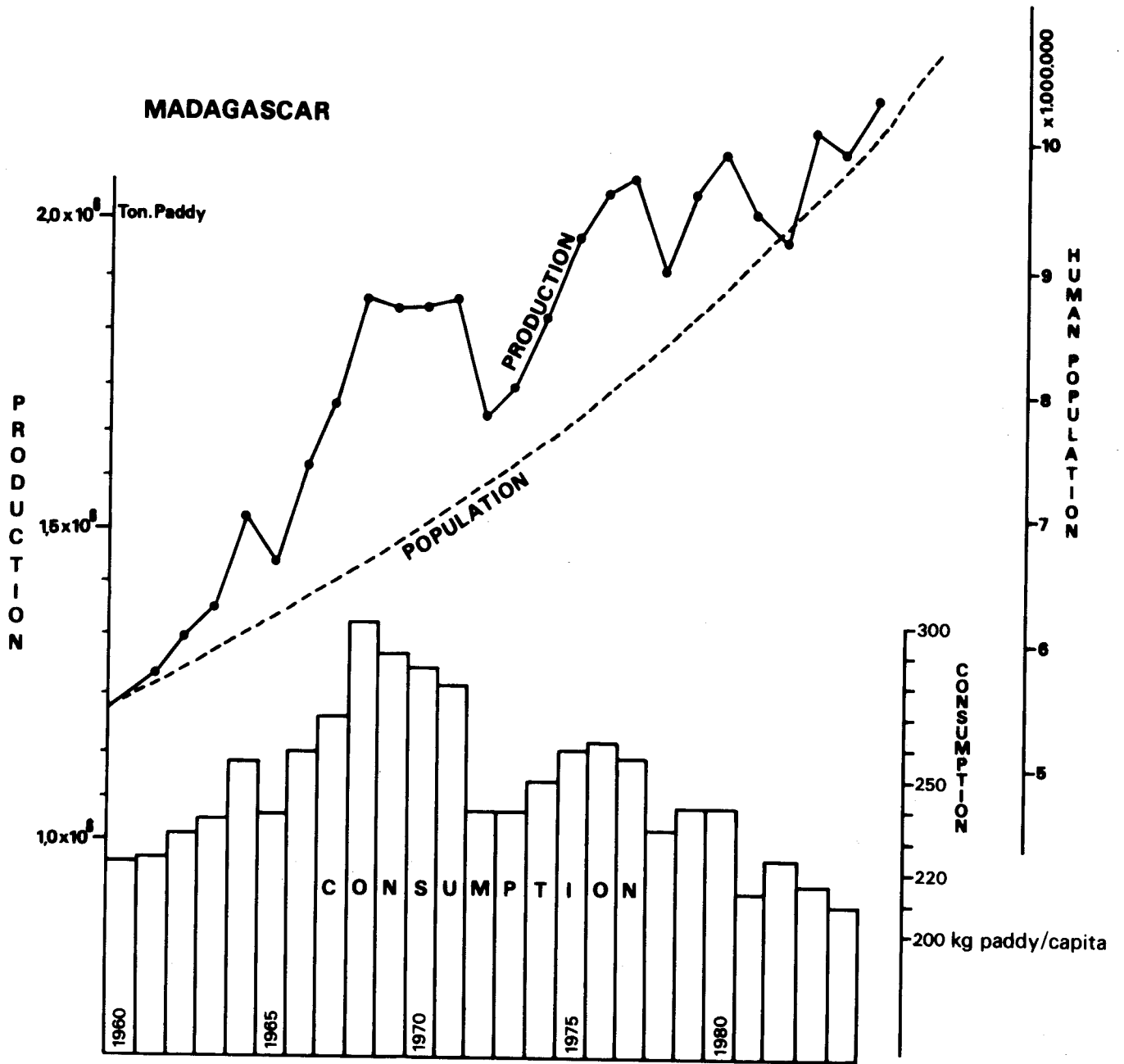


Figure 1 Rice production, human population and available paddy per capita in Madagascar between 1960 and 1984.  
Sources: IRRI 1982, FAO 1984.

### 3 THE AGROCLIMATIC ENVIRONMENT OF MADAGASCAR

The climatic conditions on Madagascar are closely related to its geographic position, the topography of the country and the general atmospheric circulation over Madagascar during the year.

#### 3.1 Geography and Topography of Madagascar

Madagascar is located East of the African continent between latitudes 11°57'S and 25°39'S. Being an island it is surrounded by water: the Mozambique channel, varying in width from 380 km to 830 km separates Madagascar from Africa, while the East coast faces the Indian Ocean. Both water systems have a relatively warm surface temperature: in winter time ranging from 22°C in the South to 25°C in the North; in summer time from 25°C in the South to 28°C in the North (Dongue, 1973).

The total land surface is 592.000 km<sup>2</sup>, of which about 50% is over 500 m altitude and 20% even over 1000 m above sea level. The island is 1580 km long and 560 km wide at its widest point. It is stretched in a NNE-SSW direction. The island is characterized by a dorsal crystalline mountain range with three isolated massifs; Tsaratanana in the North with its highest peak at 2876 m; Ankaratra in the central part of the island (2643 m), and Andringitra in the South (2658 m). The shape of this ridge is asymmetrical in the centre and South of the island: steep slopes and escarpments (such as the Angavo escarpment) East of this ridge, and a relatively small coastal area. The western side of the mountain chain is gently sloping, severely dissected in many places due to water erosion and having a relatively wide sedimentary coastal plain. Several minor mountain chains can be recognized in the West, such as Bongalava, Plateau du Bemaraha, Massif de l'Isalo, Plateau de l'Horombe, all stretching parallel to the dorsal ridge.

Several basins can be recognized, such as the Alaotra basin, and the smaller basins around Antananarivo, Antsirabe and Ambalavao. These depressions were former lakes, gradually filled up with peat and colluvial material, washed away from surrounding hills. In Alaotra a small shallow lake still exists, while the Antananarivo basin is annually flooded. Major river systems have developed, particularly in the western section of the country, such as the Sofia, originating in the northern massif, the Betsiboka and the Ikopa, originating in the central highlands, while the Tsiribirina, Mangoky and Onilay have the southern highlands as their catchment area. Most of these rivers have formed large deltas and relatively fertile plains. Their discharge is highly seasonal causing floods in the low lying areas during the rainy season, while they reduce to minor streams during the dry season. They have severely dissected the landscape. The erosional forces are augmented by human induced forces as a result of deforestation of the mountain sides and annually returning bush fires and overgrazing. Rivers on the East side are much shorter with a more regular discharge because rainfall is more continuous throughout the year.

The major geographic and topographic features of Madagascar are illustrated in figure 2 and 3.

##### 3.1.1 Soils of Madagascar

The soils of Madagascar were systematically mapped by ORSTOM at a scale of 1:200.000 and numerous map sheets were published. Riquier (1968) published a reconnaissance soil map at a scale of 1:1.000.000. A simplified version was then prepared by Roederer and Bourgeat (1971), published in "The Atlas of Madagascar" at a scale of 1:4.000.000. This map was used to prepare the FAO/Unesco soil map of Madagascar at a scale of 1:5.000.000 - Sheet VI-3 (1977). Figure 3<sup>a</sup> was adapted from this latest report, showing the major orders and suborders occurring in Madagascar.

*Ferralsols (Sols ferrallitiques)*. The largest proportion of soils of Madagascar belong to this order. They were formed on the basal crystalline complex under a much more humid climate than prevailing today. These soils are very deep and may reach a thickness of up to 30 m when not eroded. They are characterized by an oxic horizon, have a very low absorbing complex, are highly desaturated and have little or no mineral reserves.

Figure 2 Geographic position of Madagascar

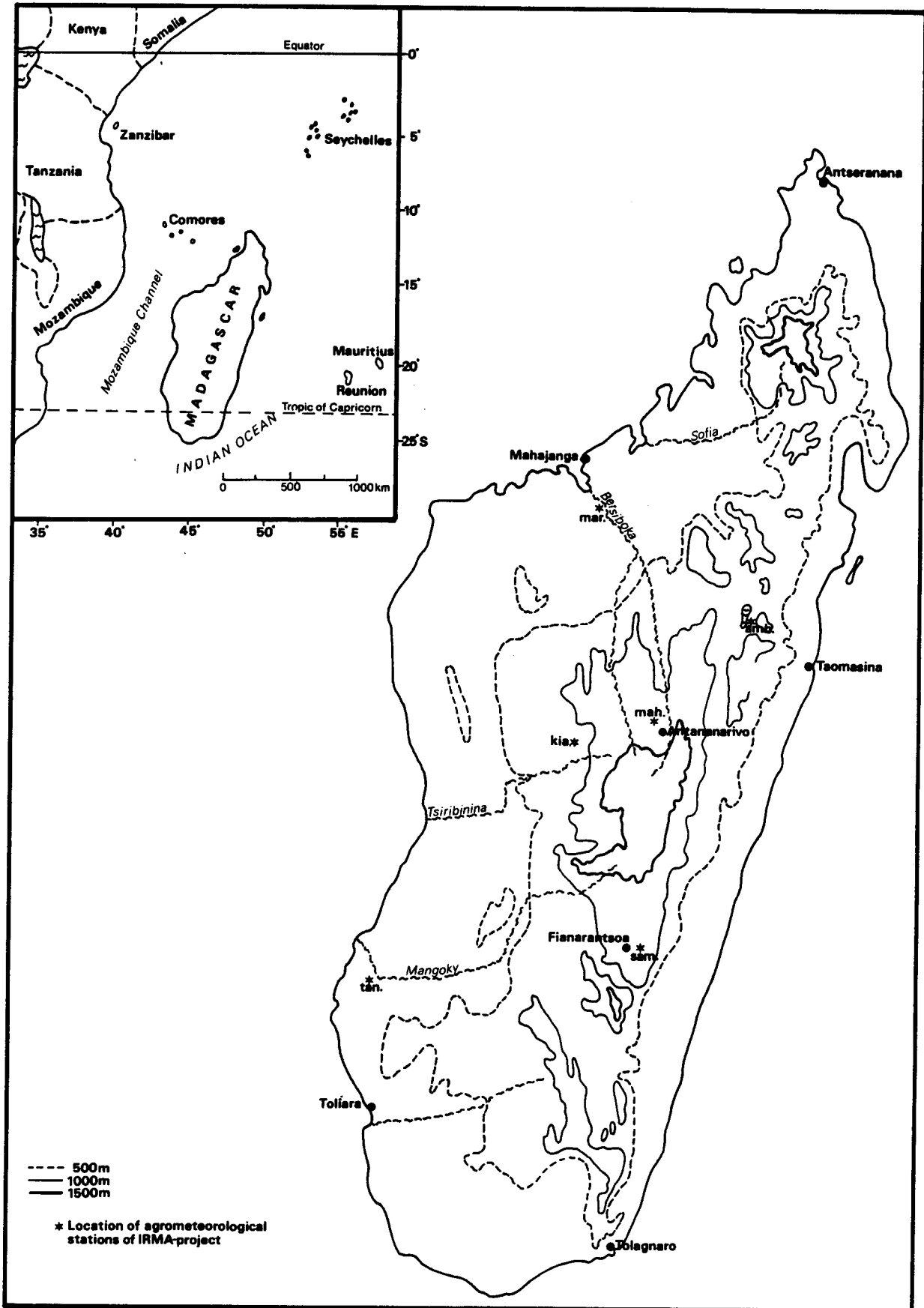


Figure 3 Some topographic features of Madagascar

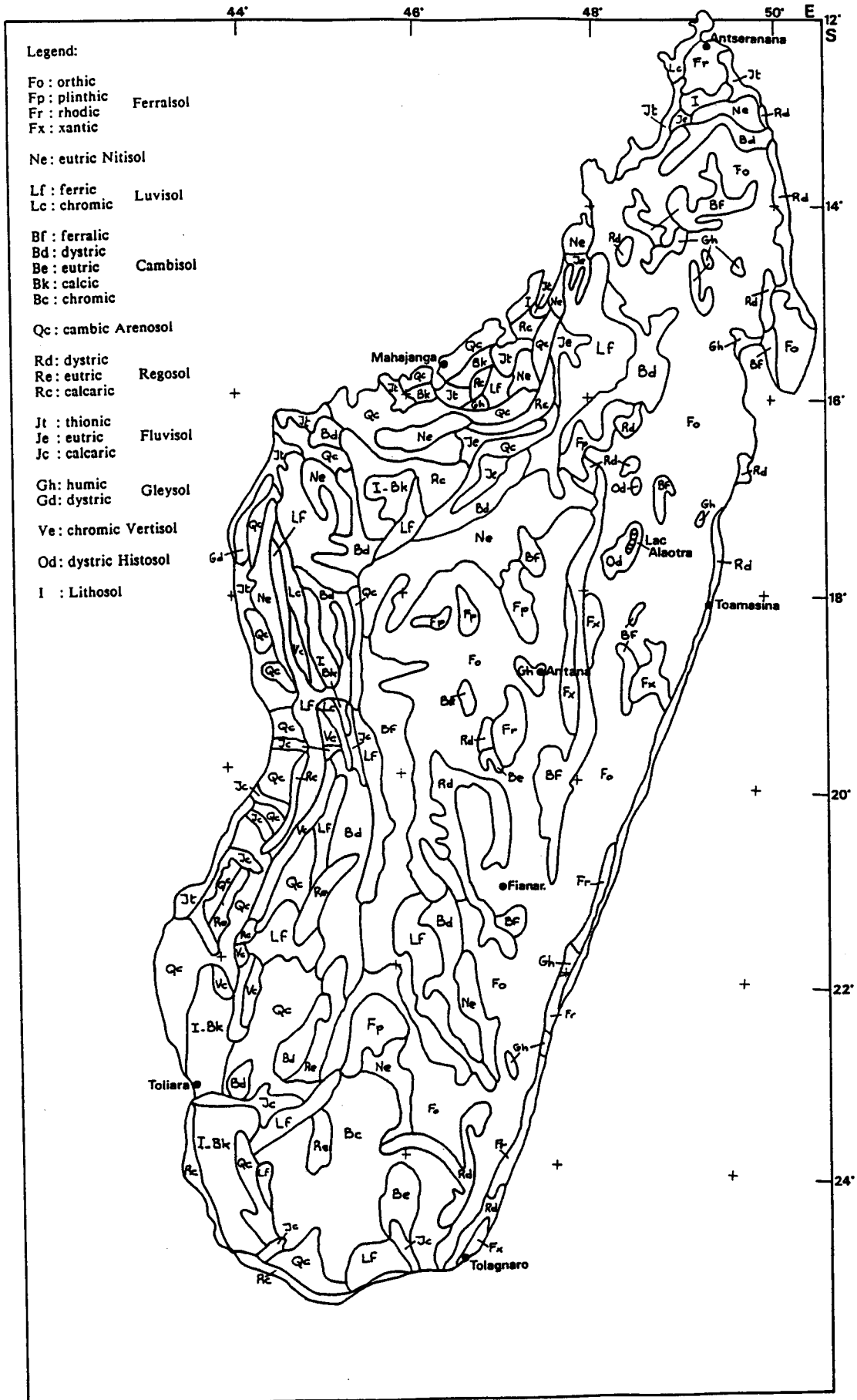


Figure 3<sup>a</sup> Generalized Soil Map of Madagascar, adapted from FAO/Unesco Soil map of the World (Sheet VI-3). FAO, 1977.

- Orthic Ferralsols occupy about 32% of the country. On the eastern part of the crystalline complex they are covered by natural forest, which is rapidly declining in extent (Soils ferrallitiques forestiers de l'Est, Sols ferrallitiques jaunes sur rouges). On the central and western part of the crystalline complex the soils are covered with grass (Soils ferrallitiques de prairie). The topsoil - A horizon - is very thin and if removed (by overgrazing or cultivation) these soils are very erosive. Deep gullies are rapidly formed - locally called lavakas - cutting very deep and eventually forming new valleys filled with colluvial material. Many valleys in the Central Highlands, formed by ancient erosion, are now used for rice cultivation.
- Plinthic Ferralsols (Sols ferrallitiques à cuirasse) occupy about 2% of the country, mainly on the western and southwestern slopes of the Central Highlands. Plinthite occurs between 5 cm and 90 cm from the surface.
- Rhodic Ferralsols (Sols rouges ferrallitiques) and
- Xanthic Ferralsols (Sols rouges-jaunes ferrallitiques) occupy together about 2% of the land surface, mainly located as narrow bands along major faults and along the southeastern coast.

*Nitisols (Sols faiblement ferrallitiques).* Soils belonging to this order are characterized by an argillic horizon with a clay distribution where the percentage of clay does not decrease from its maximum amount by as much as 20% within 150 cm of the surface. These soils are typical of the intermediate stage of ferrallitic weathering on materials of fine to medium texture. Only one suborder is recognized on Madagascar:

- Eutric Nitisols. These soils occupy about 7% of the land surface and are characterized by a base saturation of 50% or more throughout the argillic B horizon. They have a relatively high potential fertility and rank among the best soils of the tropics. A major area of these soils are located on the north western edge of the crystalline complex.

*Luvisols (Sols ferrugineux tropicaux).* They are characterized by an argillic horizon but lack the distribution pattern which is characteristic for Nitisols. They have a base saturation of 50% or more at least in the lower part of the B horizon.

- Ferric Luvisols occupy about 9% of the land surface of Madagascar. These soils are strongly weathered and the clay fraction has a low exchange capacity. They are poor in organic matter. They are found on the western part of the country on consolidated sedimentary rock.

*Cambisols.* These soils are characteristic of a more recent stage of soil formation. They therefore generally possess a fairly high potential fertility. They have a cambic B horizon. Several suborders are found on Madagascar:

- Ferrallic Cambisols (Sols peu évolués à tendance ferrallitique). The cambic horizon has ferrallic properties. They occupy about 6% of the land surface, located adjacent to the orthic ferralsols.
- Dystric Cambisols occupy about 7% of Madagascar and are characterized by a base saturation of less than 50% at least between 20 and 50 cm from the surface. They are mainly located in the western part of the country on relatively flat terrain and are subject to dry climatic conditions under which they have developed from a poor substratum.
- Eutric Cambisols (Sols bruns eutrophes) have a base saturation of more than 50% at least between 20 and 50 cm from the surface. These soils, occupying less than 1% of the land surface of Madagascar are formed on volcanic ash. They belong to the best agricultural land and are located near Itasy and Betafo.
- Calcic Cambisols have a calcic horizon or concentration of soft powdery lime within 125 cm from the surface. They occupy narrow strips in the northwestern part of Madagascar, often associated with Lithisol. They occupy less than 1% of the land surface.
- Chromic Cambisols. These soils, occupying about 5% of Madagascar are located in the very dry southern section of the country. They are comparable to the eutric Cambisols but have a strong brown to reddish Cambic B horizon. They have a high agricultural potential, but the hilly relief and stoniness of the surface constitute limiting factors for its use.

*Arenosols and Regosols* are formed on coarse textured unconsolidated parent material exclusive of recent alluvial deposits. Arenosols have albic material over a depth of at least 50 cm from the surface, while regosols have no other diagnostic horizon than an ochric A

horizon. The various suborders occurring on Madagascar - cambic Arenosols, Dystric Regosols, Eutric Regosols, Calcaric Regosols - occupy together about 20% of the total land surface. While the dystric Regosols occupy fairly large areas in the central Highlands, all other suborders are located in the western sedimentary zone, and as dune formations along the East coast. Only the eutric Regosols (2% of the land surface) have agricultural potential.

*Fluvisols* are soils developed from recent alluvial deposits having no other diagnostic horizon than an ochric or umbric A-horizon. They occur mainly in the western coastal zone.

- Thionic Fluvisols occupy 2% of the land surface and are characterized by a sulfuric horizon or having sulfidic material within 125 cm from the surface. They are of marine origin, located along the West coast.
- Eutric Fluvisols are located at the mouth of major rivers along the West coast. These soils are very suitable for agriculture and mainly used for rice. They have a base saturation of 50% or more. They occupy only 1% of the land surface.

*Vertisols* occupy only around 1% of the land surface and are found in narrow depressions parallel to the West coast.

*Gleysols* (*Sols hydromorphes*) are formed from unconsolidated materials exclusive of recent alluvial deposits showing hydromorphic characteristics. The Gleysols in Madagascar all belong to the humic suborder occupying about 1% of the land surface, mainly in depressions in the Central Highlands. They are used for wetland rice.

*Histosols* are organic soils occupying only a very small surface area but are of local importance for rice cultivation along Lac Alaotra.

### 3.2 Atmosphere circulation

The general circulation of the atmosphere over Madagascar is dominated by a belt of high pressure cells located over the southwestern part of the Indian Ocean. During austral winter (June-September) this high pressure area is connected with the high pressure belt over the southeastern part of the Atlantic Ocean when another high pressure cell develops over Southern Africa. During this period polar depressions which develop South of this continuous high pressure belt cannot penetrate in northerly direction. A more or less continuous tradewind from the Southeast affects the East coast of Madagascar, while cool, dry southerly winds governs the Southwestern section of the island.

During the austral summer (January-March) a low pressure area develops over Southern Africa. This low pressure area is connected with another low pressure area which develops over the Mozambique Channel. At the same time the intertropical convergence zone has moved Southwards, frequently reaching latitudes of 15° to 20° South. As a consequence north to northwesterly winds gain momentum along the Northwest coast. These air streams carry very humid air from the equatorial regions causing heavy precipitation along the Northwest coast penetrating the island up to the central highlands.

The atmospheric conditions as well as the higher surface water temperature of the Indian Ocean during summertime favour the development of tropical depressions at latitudes between 5°S and 25°S. They move in easterly direction, deviating to the South and frequently developing into storms or even typhoons (cyclones), reaching Mauritius, La Réunion and also the East coast of Madagascar, often causing severe destruction.

This very simplified description of the atmospheric circulation is described in detail by Dongue (1973), and is summarized by Williams (1985) as follows: "Three main weather systems affect Madagascar: the trade winds blowing from the Southeast; the monsoons, moving in from the Northwest when the tradewinds are weak; the West to East moving anticyclones, which pass to the South of the island, pushing fronts northwards toward Madagascar". Therefore Madagascar is usually divided into four grand regions:

- I East:** dominated by the presence/absence and strength of the trade winds. Usually a wet and warm climate throughout the year.
- II Northwest:** dominated by the presence/absence and strength of the monsoons. The climate is distinctly characterized by wet and dry seasons and hot.
- III South:** governed by the frequency and characteristics of southerly fronts, and trade wind strength. The climate is dry with a less distinct wet season and a greater seasonal temperature difference.
- IV Central Highlands:** a dynamic interaction of all three weather systems. The climate is characterized by wet/dry seasons, and cool.

### **3.3 Climatic patterns in Madagascar**

The local topography of the island, its geographic position and the three weather systems cause a wide variety of climatic patterns in Madagascar. Of particular importance is the rainfall distribution and the temperature regime. These two climatic components determine by and large the agricultural potential of the island. Global total radiation is closely related to the degree of cloud cover and the solar position. Humidity and wind speed are important climatic components, but its seasonal variability is much less pronounced. These elements determine the potential evapotranspiration. In this section the various components will be discussed in detail. Reference is made to the climatic databank of Madagascar in the annex of this report. The location names are followed either by a letter (capital A through Y) when they refer to synoptic stations or by a number, referring to a rainfall or simple climatic station. The letters and numbers are all inserted in the agroclimatic map of Madagascar, attached to this report as annex 2.

#### **3.3.1 Precipitation**

The annual precipitation in Madagascar varies from a low 275 mm in Toliara (X) on the Southwest coast to 3705 mm in Maroantsetra (17) on the East coast. If we travel from Antsiranana (A) in the North along the East coast towards Tolagnaro in the South (Y) we observe a gradual increase in total annual rainfall from 915 in Antsiranana to 2151 mm in Antalaha (E). The moderate rainfall along the Northeast coast is mainly caused by a weak trade wind effect: weak because the coastline is almost N-S and thus almost parallel to the direction of the tradewinds. But beyond Antalaha we observe a sharp increase to 3705 mm in Maroantsetra (17), where the mountains are facing the tradewinds. Rainfall remains around 3000 mm annually further South although gradually decreasing, because the effect of the intertropical convergence zone is decreasing southwards, while on the other hand the dorsal mountain chain which causes orographic rainfall is further away from the coastline. Around Farafangana (W) and Vagaindrano (126) annual rainfall is below 2500 mm. But beyond Farafangana (W) annual rainfall increases again as the mountain massif of Annosyennes approaches the coastline. Annual rainfall in Manantenina (138) is again 3218 mm. The South point of the East coast at Tolagnaro (Y) is much drier with only 1539 mm.

Travelling along the West coast from the northern point we observe first a sharp increase in rainfall as the Tsaratana massif approaches the NW coast. In Ambanja (4) rainfall has increased to 2150 mm. However beyond this mountain massif further South rainfall decreases rapidly to 1569 mm in Mahajanga (F), 1272 mm in Besalampy (I), 745 mm in Morondava (R) and 275 mm in Toliara (X). This decrease in rainfall is mainly a result from the diminishing influence of the Northwest monsoon. Along the South coast annual rainfall remains very low. In Ampasipolaka (148) annual rainfall is only 500 mm, compared to Tolagnaro (Y) with 1539 mm (less than 50 km East). The Central highlands receive between 1200 and 1500 mm annually from Bealanana (10) in the North to Iakora (123) in the South.

The seasonal variation of rainfall is more pronounced along the West coast and central highlands than along the East coast. The driest month on the East coast is October. In this time of the year the trade winds have become weak, while the influence of the air streams from the North have not yet developed. But even in October rainfall is more than 50 mm. In Farafangana (W) rainfall is around 50 mm in September and October. In all other months of the year rainfall along the East



coast from Sambava (9) in the North to Manantenina (138) in the South is more than 100 mm. The high rainfall months are January through April with more than 300 mm per month. North of Sambava (9) monthly rainfall diminishes rapidly. In Vohemar (B) monthly rainfall in January is just 200 mm, while rainfall from May through November is around 75 mm. Figure 4 illustrates the various rainfall regimes along the East coast.

The West coast can be divided into three portions. From Antsiranana (A) to Besalampy (I) the coastline is directed NE-SW and thus almost facing the NW monsoon. In the North the dorsal mountain is close to the coastline, therefore enhancing the effect of the NW monsoon. Between the northern and the central mountain massifs (Tsaratanana and Ankaratra) the NW monsoon can penetrate furtherly East as far as Alaotra (L) and Antananarivo (O) in the central highlands. From Besalampy (I) to Morombe (V) the coastline is almost N-S. Here the NW monsoon has much less influence and also the inland area on the leeward side of the Ankaratra massif has a much drier climate. From Morombe (V) to Betonty (152) the coastline faces the Southeast airstreams which are generally dry throughout the year. These geographical aspects are reflected in the rainfall patterns.

Ananalava (D) in the Northwestern section along the coast has a dry period with monthly rainfall less than 25 mm from May through September. But after October when the N-W monsoon gains strength monthly rainfall increases sharply to over 500 mm in January. Besalampy (I) further South shows a similar pattern. October is still very dry and rainfall in January is just over 400 mm. Similar patterns are found more inland on the windward side of the central massif. In Tsaratanana (28) monthly rainfall increases from October (45 mm) to January (544 mm.) In the Antananarivo basin (O) the January rainfall is still more than 300 mm and the dry season with monthly rainfall less than 25 mm is from May through September.

Further South along the West coast the dry season becomes longer (from April to November in Morondava (R)), while rainfall in January is just above 200 mm. A similar pattern is also found further inland. At Tsitondroina (102) located at 1100 m elevation on the leeward (South) side of the central massif only December and January have monthly rainfall of more than 200 mm. From Morombe (V) southwards the monsoonal effect has completely disappeared. Rainfall in the wettest month is 100-150 mm and further South (Toliara, X) the January rainfall is reduced to 71 mm. Figure 4 illustrates several rainfall patterns along the West coast.

Rainfall in the Central Highlands is influenced by all three weather systems that are recognized over Madagascar. Depending whether located on the windward side or leeward side of the dorsal mountain chain one may find pronounced dry and wet seasons or seasons with less pronounced dry periods. Andapa (11) is located East of the Tsaratanana massif and therefore the dry season is less pronounced. Ankiabe (12) is located on the West side of the dorsal mountain chain, but also South of the Tsaratanana massif. It is characterized by a long dry season, but at the same time it does not experience the heavy rainfall characteristic of the Northwest coast. The Alaotra basin is protected by mountains on the East and West. As a consequence one finds here a long dry season and only moderately heavy rainfall during the rainy season.

In the South we find similar differences but here the rainfall during the rainy season is even lower. In Sakalalina (115) West of the chain of mountains, rainfall is just over 200 mm in January with a long pronounced dry season, while in Karianga (117) East of this chain the rainfall during the rainy season is heavy, increasing from more than 300 mm in December to almost 500 mm in March. Various rainfall regimes are illustrated in Figure 4. Obviously this sharp boundary, formed by the dorsal mountain range will have a large impact in the delineation of agroclimatic zones, as will be discussed later.

Precipitation is usually in the form of rainfall. But hailstorms are not a rare phenomenon in the central highlands. Ravet (1952) reports the occurrence of more than 3000 hailstorms during a 17 year period (1932-1949). November has the highest amount of hailstorm occurrences (27%), followed by October (20%), April (18%) and December (14%). Other months had a much lower hailstorm occurrence. These hailstorms may cause severe damage to the rice crop, particularly if they occur during the ripening phase of the crop in April.

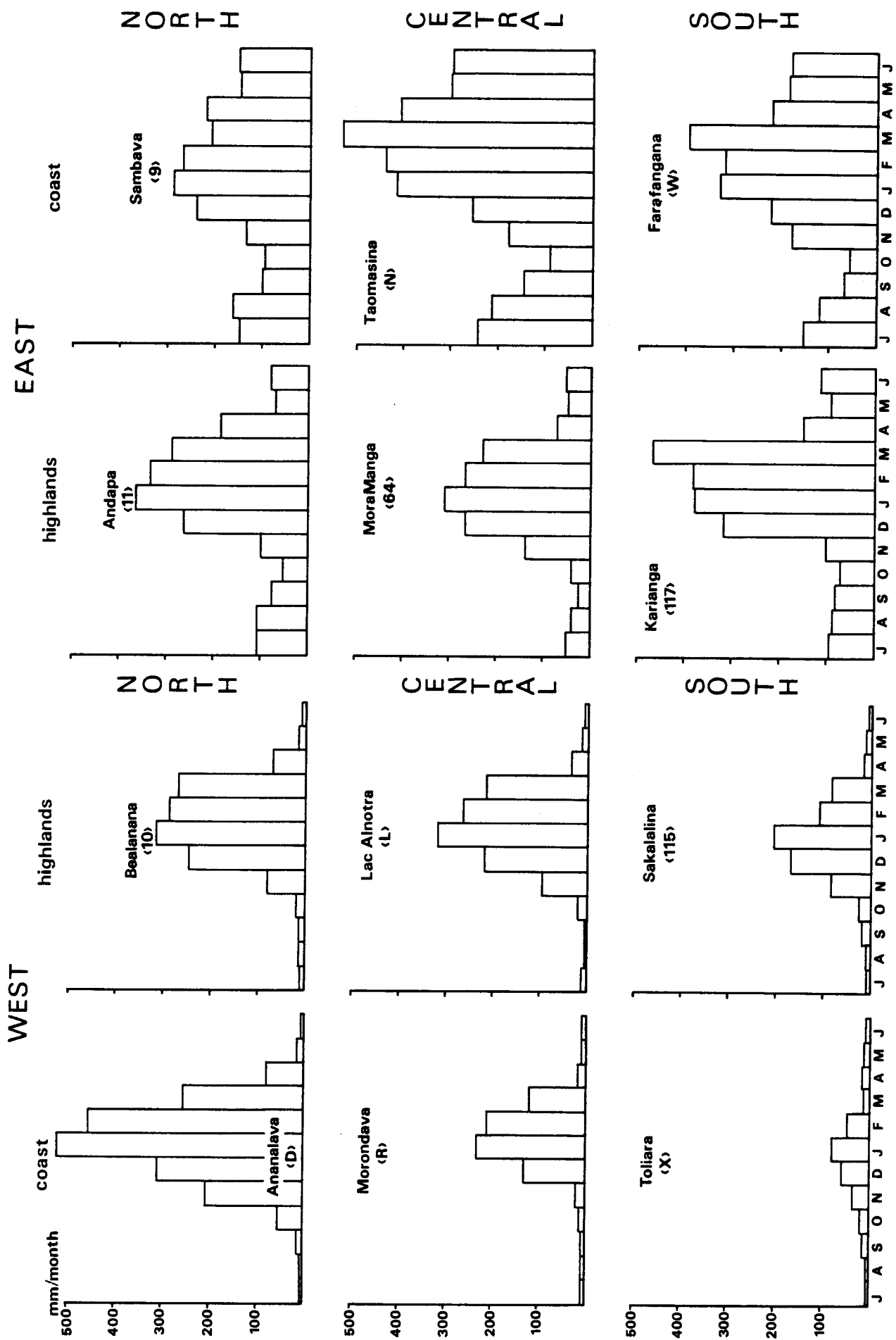


Figure 4 Some typical monthly rainfall patterns in Madagascar, West and East of dorsal mountain chain; along the coast and in the central highlands; in the North, Central and South of the island.

### 3.3.2 Temperature

The temperature patterns in Madagascar also show large differences, related to the latitude - the island stretches from 12° South to 25° South -, and related to the altitude, ranging from sealevel to 2500 m. Also the influence of the hot, humid monsoonal airstreams in summer and the cool, dry tradewinds from the Southeast have a marked effect on the temperature regime in Madagascar.

#### 3.3.2.1 Effect of Latitude on the Temperature

The mean annual air temperature decreases from 27°C in the northern tip of the island to 23 °C in the South. But there are marked differences between the West coast and the East coast. Along the West coast between Antseranana (A) and Besalampy (I) the annual mean temperature remains relatively constant between 26°C and 27°C. Further South the mean annual temperature drops gradually to 23.8°C at Tsihombe (151). Along the East coast form Antseranana (A) to Antalaha (E) there is a sharp drop in temperature from 27°C to 24.5°C. Further South the temperature drops very gradually to 22.9°C at Tolagnaro (Y). Figure 5 illustrates the relationship between air temperature and latitude along both coastlines.

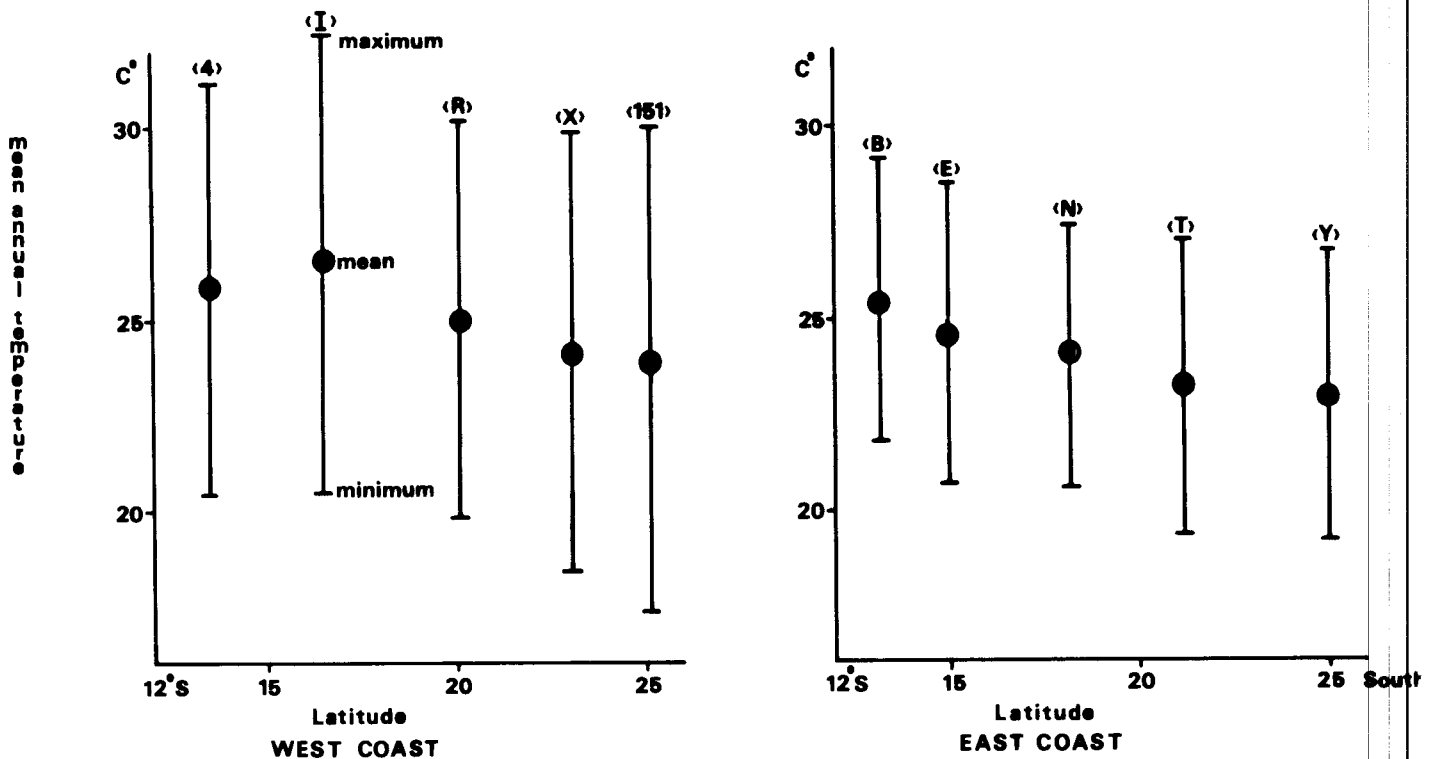


Figure 5 Annual maximum, mean, and minimum temperatures between 12° and 25° South on the West coast and East coast of Madagascar.

(4): Ambanja	(X): Toliara	(B): Vohemar	(T): Mananjary
(I): Besalampy	(151): Tsihombe	(E): Antalaha	(Y): Tolagnaro
(R): Morondava		(N): Toamasina	

The drop in temperature along the West coast is mainly caused by the lower minimum temperatures towards the South (21°C in Tambohorano (37) at 17°31' South and 18.3°C at Toliara (X)), while the maximum temperature remains between 30° and 31°C. These low night temperatures in the Southwest are clearly a result of a very dry climate. Along the East coast the night temperatures are less cold ranging from 21.8°C in Vohemar (B) to 19.7°C in Farafangana (W) mainly because the climate is more humid. On the other hand maximum temperatures along the East coast are much lower compared to the West coast. The mean annual maximum temperature along the East coast is always below 30°C, generally fluctuating between 26°C and

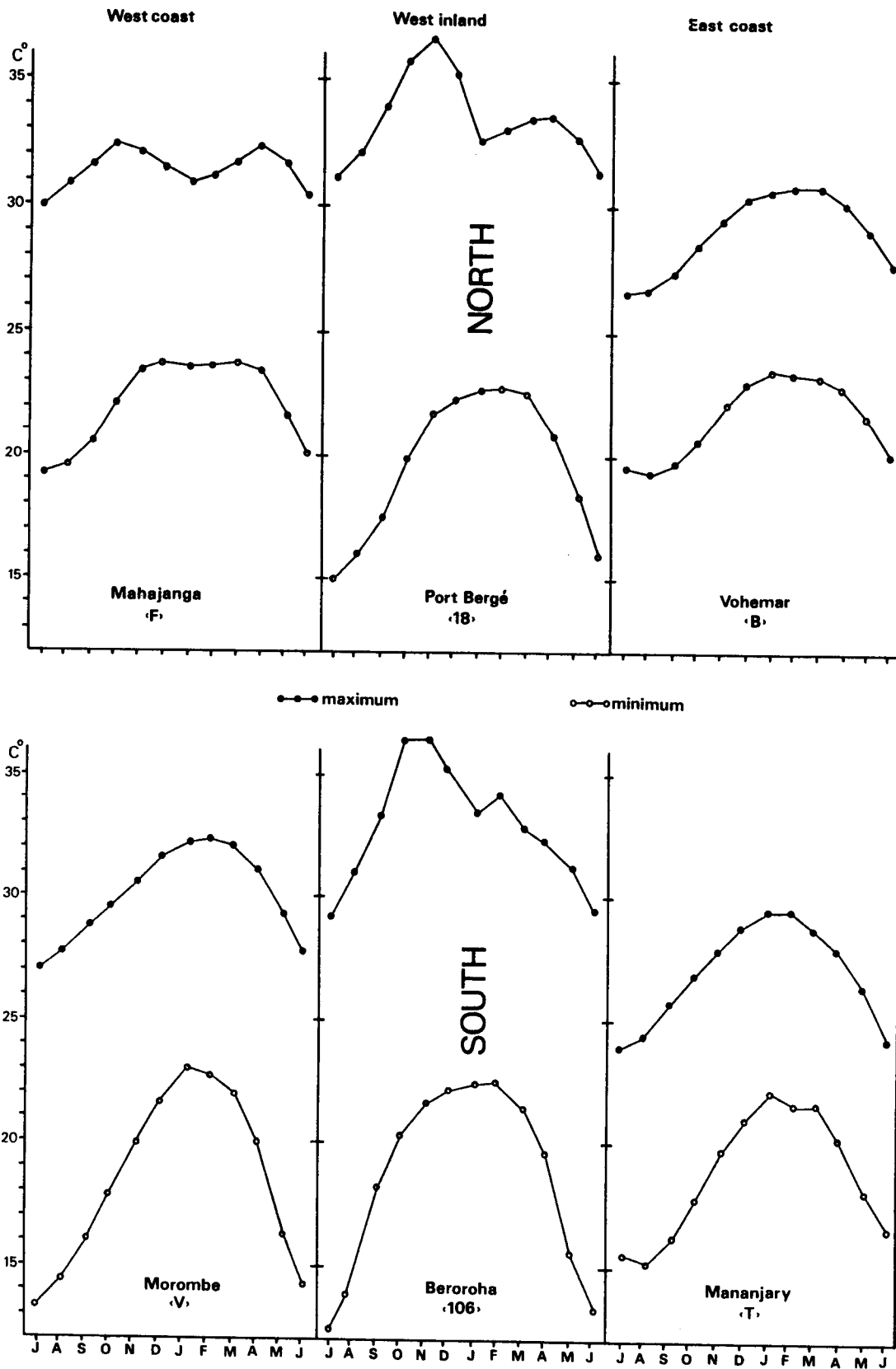


Figure 6 Monthly maximum and minimum temperature at sealevel locations in Madagascar.

28°C (except in the much drier Northeast coast), while maximum temperatures along the West coast are more than 31 °C in the northern section and around 30°C in the southern part.

The seasonal fluctuations of the maximum and minimum temperature are even more affected by the latitude. In Mahajanga (F) on the Northwest coast the maximum temperature fluctuates between 30.1 °C in July to 32.4°C in October. With the onset of the rainy season the maximum temperature then drops to 30.7°C, but increases again to 32.4°C in April when the rainy season ends. The minimum temperature increases from 19.4°C in July to 23.8°C in December, and remains at that level during the rainy season. After April the minimum temperature decreases sharply. In Morombe (V) on the Southwest coast there is only one peak of the maximum temperature. It increases gradually from 27.2°C in July to 32.4°C in January, February. After March the maximum temperature drops rapidly to its July value. The minimum temperature shows a similar pattern: it increases from 13.5°C in July to 23.1°C in January. After February it decreases again to its July value.

While coastal temperatures on the West coast are somewhat tempered by a seabreeze, more inland maximum temperatures increase to much higher values. In Vao Vao (Port Berge, 18) in the northwestern plain the maximum temperature increases to values of more than 36°C in November. The onset of the rainy season causes a drop in temperature to 32.8°C. The second peak at the end of the rainy season is much less pronounced (33.8°C in April) compared to its first peak. The minimum temperature on the other hand is much lower in the cool season compared to the coastal region. It is only 15°C in July. In Beroroha (106) in the Southwest inland lower hills (180 m elevation) the maximum temperature increases sharply from 29.4°C in July to 36.6°C in October. The temperature then drops to 33.6°C in January, increasing somewhat in February(34.5°C) before dropping gradually to its July value. The minimum temperature increases from 12.6°C in July to 22.6°C in January, February.

Along the East coast the temperature pattern of both maximum and minimum temperature is monomodal. In Vohemar (B) the maximum temperature increases from 26.7°C in July to 30.9°C in the latter part of the rainy season, while the minimum temperature ranges from 19.5°C to 23.8°C. In the southeastern section of the East coast the maximum temperature in July is around 24°C, increasing to 29.8°C in January and February. The minimum temperature increases from 15.6°C in August to 22.4°C in January. Because the East coast has a much wetter climate, seasonal temperature fluctuations are less pronounced and maximum temperatures are at a lower level compared to the West coast, while minimum temperatures are somewhat higher. The mean monthly maximum and minimum temperature regimes for the above discussed locations are illustrated in Figure 6.

### 3.3.2.2 *Effect of altitude on the air temperature*

The well known drop in temperature with increasing altitude is a very important aspect for agriculture in Madagascar. Rice is cultivated in the lowlands on both West and East coast, but also in the central highlands at elevations up to 1500 m, where particularly during the winter season night temperatures at these high elevations drop well below 10°C. In Ambatolampy (78) the minimum temperature is below 10°C from May through October, in Antananarivo temperatures at night are around or below 10°C from June until September. Figure 7 illustrates these effects of altitude on the seasonal temperature regime clearly. Since the temperatures at sealevel on the dry West coast are a few degrees higher than on the rainy East coast, the decrease in temperature with increasing elevation is more pronounced on the West coast compared to the East coast. For the mean annual maximum and minimum temperatures the following estimated regressions were calculated:

$$\begin{aligned} \text{West coast: } T_{\max} &= 34.7^{\circ}\text{C} - 0.74 X \text{ and } T_{\min} = 20.4^{\circ}\text{C} - 0.63 X \\ \text{East coast: } T_{\max} &= 29.5^{\circ}\text{C} - 0.47 X \text{ and } T_{\min} = 18.6^{\circ}\text{C} - 0.54 X \\ & \text{(X is expressed in hectometers = 100 meters).} \end{aligned}$$

It should be noted that these equations should not be used for the coastal locations itself as was discussed in section 3.3.2.1. The estimated temperatures are generally within 1°C from the actual temperatures as reported. Therefore these equations could be used if no actual values are available. Figure 8 compares actual and calculated annual values of the maximum and minimum temperature for various locations.

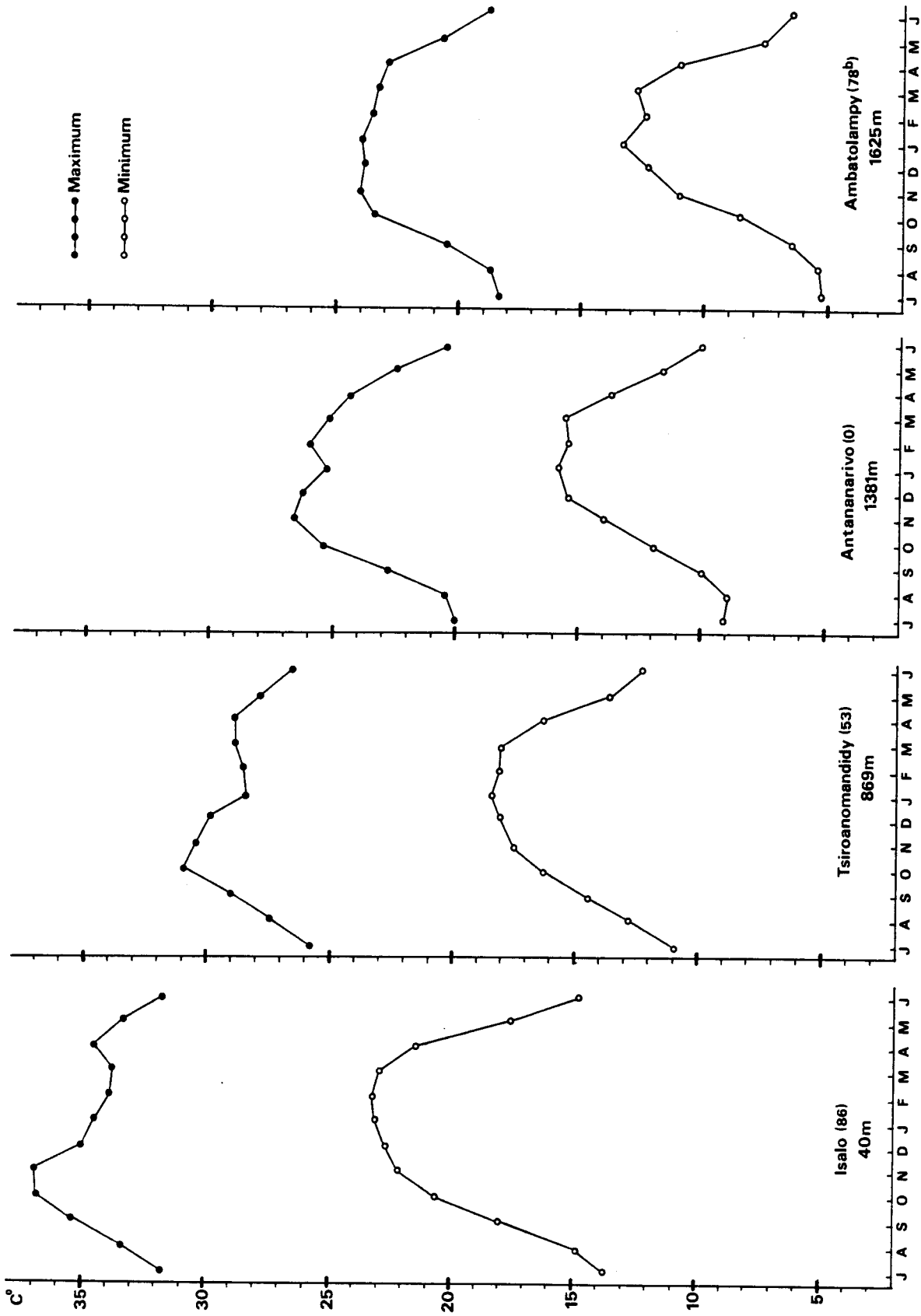


Figure 7 Mean monthly maximum and minimum temperature at different altitudes in Madagascar.

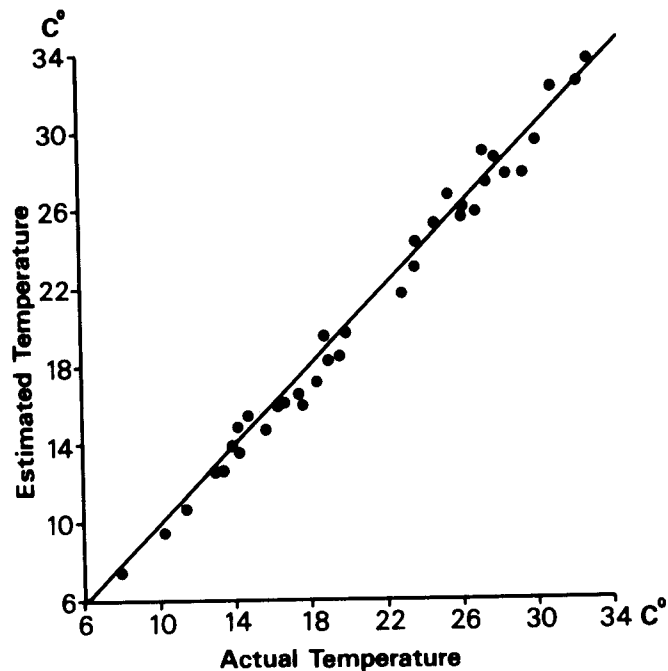


Figure 8 Comparison between actual and estimated annual maximum and minimum temperature for locations 8, 10, 11, 16, 23, 42, 79, 80, 81, U, 106, 136, 88, 64.

### 3.3.3 Insolation

The importance of solar radiation in agriculture is manifold. Light is the source of energy that green plants can convert into chemical energy through the process of photosynthesis. It has been established that the total radiation received by the rice canopy during its ripening period is positively related to the grain yield (Oldeman et al., 1985). But secondly radiation plays also a major role as a source of energy in the process of evaporation, which in turn determines crop water requirements.

Solar radiation can be measured by a variety of instruments with varying degrees of accuracy. Direct measurements of radiation are unfortunately very scarce mainly because reliable equipment is very expensive to purchase and difficult to maintain in good operational conditions. Radiation can be estimated from measurements of hours of bright sunshine ( $n$ ) or from degrees of cloudiness, expressed in octa's. Before we discuss the radiation variability in Madagascar, a few words will be devoted to the estimation of total radiation.

#### 3.3.3.1 Total radiation estimation in Madagascar

Most measurements of insolation are made in terms of bright sunshine or as degree of cloud cover in Madagascar. The agroclimatic databank of FAO (1984) provides estimates of total radiation, based on hours of bright sunshine for 13 synoptic stations (A,C,D,E,F,L,N,O,R,T,U,X,Y), using the following relationship (Frère and Popov, 1979):

$$R_g = R_a (0.29 + 0.42 n/N) \text{ for humid tropical locations, and}$$

$$R_g = R_a (0.25 + 0.45 n/N) \text{ for dry tropical locations.}$$

In these equations:

- $R_g$  = total radiation expressed in mm evaporable water;
- $R_a$  = total radiation on a horizontal surface at the limit of the atmosphere expressed as mm of evaporable water and for a solar constant of  $2.00 \text{ cal cm}^{-2} \text{ min}^{-1}$  (see Table 1<sup>a</sup>);
- $n$  = actual hours of bright sunshine in hours and tenth of hours;
- $N$  = daily average of the astronomically possible sunshine duration, expressed in hours and tenth (see Table 1<sup>b</sup>).

Table 1a Daily average month by month solar radiation on a horizontal surface at the limit of the atmosphere expressed as mm evaporable water and for a solar constant of  $2 \text{ cal.cm}^{-2}\text{min}^{-1}$  (Ra) for latitudes 12°S to 25°S (from Oldeman and Frère, 1982).

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
12°S	12.0	13.2	14.7	15.8	16.4	16.5	16.6	16.3	15.4	14.0	12.5	11.6
13°S	11.8	13.0	14.6	15.8	16.4	16.6	16.7	16.4	15.4	13.9	12.3	11.4
14°S	11.6	12.9	14.5	15.8	16.5	16.6	16.7	16.4	15.3	13.7	12.1	11.2
15°S	11.4	12.7	14.4	15.8	16.6	16.7	16.8	16.4	15.3	13.6	11.9	11.0
16°S	11.2	12.6	14.3	15.8	16.7	16.8	16.9	16.4	15.2	13.5	11.7	10.8
17°S	11.0	12.4	14.2	15.8	16.7	17.0	17.0	16.5	15.2	13.4	11.6	10.6
18°S	10.8	12.3	14.1	15.8	16.8	17.1	17.1	16.5	15.1	13.2	11.4	10.4
19°S	10.6	12.1	14.0	15.8	16.9	17.2	17.2	16.5	15.1	13.1	11.2	10.2
20°S	10.4	12.0	13.9	15.8	17.0	17.4	17.3	16.5	15.0	13.0	11.0	10.0
21°S	10.2	11.8	13.8	15.7	17.0	17.4	17.4	16.5	14.9	12.8	10.8	9.8
22°S	10.0	11.6	13.7	15.7	17.0	17.5	17.4	16.5	14.8	12.6	10.6	9.6
23°S	9.8	11.4	13.6	15.6	17.1	17.6	17.5	16.5	14.7	12.5	10.4	9.3
24°S	9.5	11.2	13.4	15.6	17.1	17.7	17.5	16.5	14.6	12.3	10.2	9.1
25°S	9.3	11.0	13.3	15.5	17.1	17.7	17.6	16.5	14.5	12.1	10.0	8.9

Table 1b daily average month by month of the astronomically possible sunshine duration in hours and tenths for latitudes 12°S to 25°S (from Oldeman and Frère, 1982).

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
12°S	11.5	11.7	12.0	12.4	12.7	12.8	12.7	12.5	12.1	11.8	11.5	11.4
13°S	11.4	11.7	12.0	12.4	12.7	12.9	12.8	12.5	12.2	11.8	11.5	11.3
14°S	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2
15°S	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2
16°S	11.3	11.6	12.0	12.5	12.9	13.1	13.0	12.6	12.2	11.8	11.4	11.2
17°S	11.2	11.5	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.7	11.3	11.1
18°S	11.2	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.1
19°S	11.1	11.5	12.0	12.6	13.0	13.3	13.2	12.8	12.3	11.7	11.2	11.0
20°S	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9
21°S	10.9	11.5	12.0	12.6	13.1	13.4	13.3	12.8	12.3	11.7	11.1	10.8
22°S	10.9	11.4	12.0	12.6	13.2	13.4	13.3	12.9	12.3	11.7	11.1	10.8
23°S	10.8	11.4	12.0	12.7	13.2	13.5	13.4	12.9	12.3	11.6	11.0	10.7
24°S	10.8	11.3	12.0	12.7	13.3	13.6	13.4	13.0	12.3	11.6	11.0	10.7
25°S	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6

For the same synoptic stations data on monthly cloud cover were retrieved from "Tableaux climatologiques des Territoires français de l'Océan Indien" (1958). A relationship was found between degree of cloud cover and the ratio  $R_g/R_a$ , as illustrated in Figure 9. This relationship was also observed in Thailand and Malaysia (Oldeman and Frère, 1982). Cloud cover information was also available for an additional 12 locations in Madagascar (sites B,G,I,J, K,M,P,Q,S,V,W). Using the established relationship between  $R_g/R_a$  and cloudiness degree, total radiation was estimated for these 12 additional sites in Madagascar. Williams (1985) reports values for mean monthly sunshine hours for 24 stations. His sunshine values were converted to total radiation estimates and then compared with total radiation estimates based on cloud cover for 5 locations not previously used to establish the relationship between cloud cover and total radiation (sites B,I,M,V,Q). Figure 10 illustrates that cloud cover data give a very reasonable estimate of total radiation.



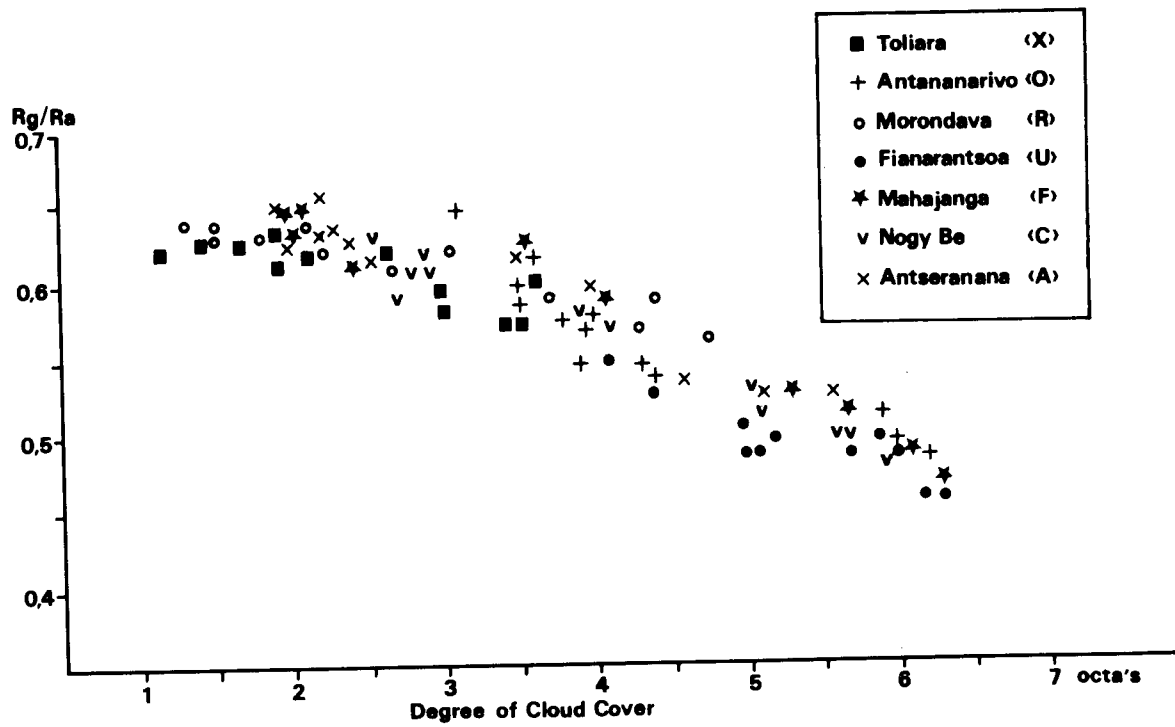


Figure 9 Relation between cloudiness and theration  $R_g/R_a$  for 7 locations in Madagascar.

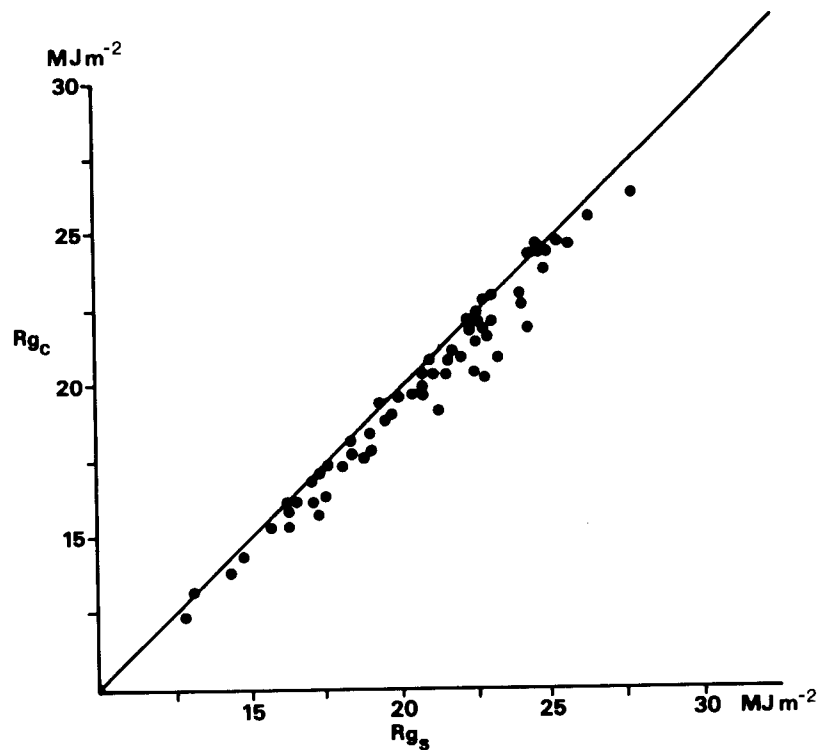


Figure 10 Relation between total radiation estimated with sunshine records ( $R_{gs}$ ) and with cloud cover degree ( $R_{gc}$ ) for Vohemar (B), Besalampy (I), Maintirano (M), Morombe (V) and Mahanoro (Q).

Table 2 gives some additional radiation estimates (from sunshine records) as reported by Williams (1985), which are not included in the agroclimatic data bank of Madagascar.

Table 2 Total radiation (in MJm<sup>-2</sup>), not included in the agroclimatic data bank for 7 locations in Madagascar (Source: Williams, 1985).

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Ambilobe(3)	17.3	20.1	23.6	25.9	26.2	24.2	21.7	21.5	22.0	21.2	19.0	16.8
Sambava(9)	14.6	16.5	19.3	21.5	22.0	22.5	21.7	22.2	20.0	18.5	16.3	14.6
Andapa (11)	11.6	13.3	16.5	19.0	19.8	19.8	18.8	19.3	17.5	15.6	14.3	11.9
Kandreho (36)	16.3	19.3	21.5	22.7	24.2	21.2	21.5	21.5	20.2	20.5	17.3	16.5
Antsirabe (87)	14.6	17.3	20.7	22.7	22.5	21.0	21.0	20.5	18.5	18.0	16.0	14.3
Ranohira (120)	14.8	17.3	20.2	22.7	24.0	22.7	23.2	19.8	20.7	18.3	15.8	14.1
Sahambavy (East of Fianarantsoa)	11.9	13.8	18.0	20.5	21.0	20.0	19.5	19.5	17.3	16.3	13.6	11.6

### 3.3.3.2 Seasonal Fluctuation of Radiation in Madagascar

As discussed in the previous section the radiation regimes in Madagascar are influenced by the extraterrestrial solar radiation, which is a function of the latitude and the month of the year, and by the degree of cloud cover, which is to a large extent reflected by the precipitation. Despite the fact that cloud cover during June, July, August in most locations in Madagascar is low, total radiation at the earth's surface is also low because of the low extraterrestrial radiation in the southern hemisphere at this time of the year. Total radiation increases from June until the onset of the rainy season (October, November). Although the extraterrestrial radiation reaches its highest values around January, the intense cloud cover reduces the total radiation at the earth's surface. Towards the end of the rainy season total radiation increases sometimes slightly (around March) before it decreases rapidly to its low winter values. This pattern is illustrated for four typical locations in Figure 11.

Along the Northwest coast (Mahajanga, F) total radiation increases from a low 17.0 MJm<sup>-2</sup> in the dry season during austral winter (June) to around 25 MJm<sup>-2</sup> at the end of the dry season (October). With the onset of the rainy season total radiation drops to values just below 20 MJm<sup>-2</sup> from January to March. In April there is a slight increase in radiation (clear skies but rapidly decreasing extraterrestrial radiation), followed by a decrease in total radiation towards June.

Along the East coast (Toamasina, N) total radiation is much lower compared to the West coast particularly from June to November, mainly because of the moderate rainfall during this period. The radiation regime follows the curve of the extraterrestrial radiation and the cloud cover has a more permanent reduction effect on the total radiation.

In Toliara (X) on the Southwest coast total radiation in the austral winter month (June) is less than 15 MJm<sup>-2</sup> increasing in a curve parallel to the extraterrestrial radiation until October. Although rainfall in the austral summer is very modest there is a relatively high degree of cloud cover, thus keeping radiation at the earth's surface at the same level of 24.5 MJm<sup>-2</sup> from November to February. The decrease of extraterrestrial radiation is also reflected in a decrease of total radiation at the surface after February.

In the central highlands the total radiation curve is very similar to the pattern along the East coast. Despite low rainfall from April to October total radiation is considerably lower compared to the West coast during that period. During this period of the year Southeast trade winds prevail. The humid air is pushed against the mountain range, causing dense clouds and heavy precipitation on the eastern slopes, but the clouds move over the mountains towards the central highlands. Although rainfall is considerably reduced in the central highlands the temperature at the same time is low and clouds do not dissolve. Frequently the weather during the dry winter months is characterized by fog, or drizzling rain. Further West temperatures increase rapidly and the clouds disappear, resulting in higher radiation. Similar patterns are observed in Antananarivo (O), Ambohitsilaozana (Lac Alaotra, L) as well as in Fianarantsoa (U).

### 3.3.3.3 Total radiation units

Formerly total radiation was expressed in Langleys or cal cm<sup>-2</sup>. Later radiation units were expressed in milliwatt hours per cm<sup>2</sup>. More recently it was agreed internationally to use megajoules per m<sup>2</sup> as standard units to express irradiant energy. Another common way to express radiation is in mm evaporable water. To facilitate the reader with the various conversion factors

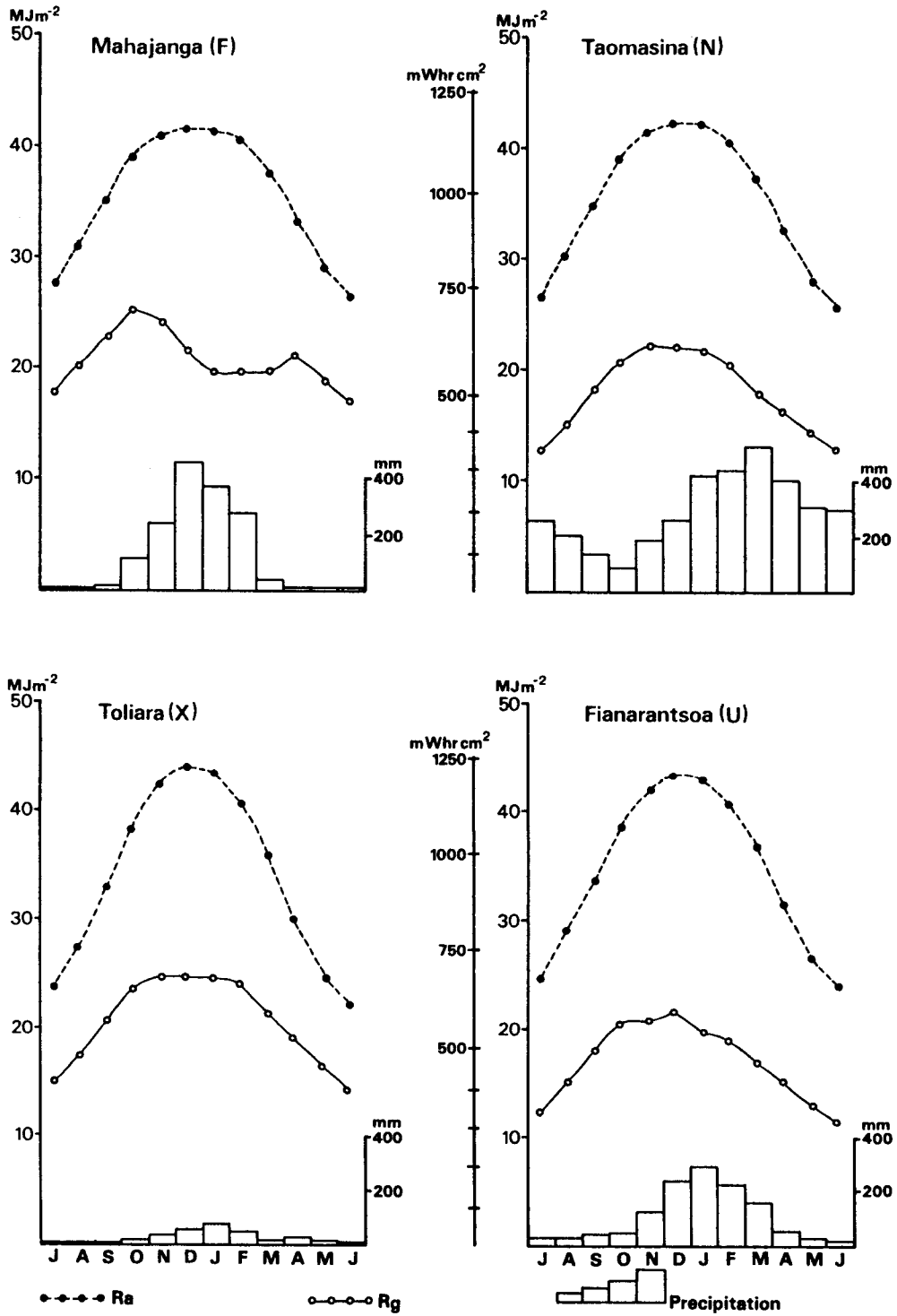


Figure 11 Total radiation on earth's surface (Rg), total extraterrestrial radiation (Ra) and rainfall at four locations in Madagascar.

the central bar in Figure 11 gives radiation values also in  $\text{mWhrcm}^{-2}$ . The following conversion factors should be applied:

$1\text{MJm}^{-2}$	$= 27.78 \text{ mWhrcm}^{-2}$	$= 23.89 \text{ calcm}^{-2}$	$= 0.405 \text{ mm water}$
$1\text{mm water}$	$= 2.469 \text{ MJm}^{-2}$	$= 68.59 \text{ mWhrcm}^{-2}$	$= 59 \text{ calcm}^{-2}$
$100 \text{ mWhrcm}^{-2}$	$= 1.46 \text{ mm water}$	$= 3.60 \text{ MJm}^{-2}$	$= 86.02 \text{ calcm}^{-2}$
$100 \text{ calcm}^{-2}$	$= 1.69 \text{ mm water}$	$= 4.18 \text{ MJm}^{-2}$	$= 116.25 \text{ mWhrcm}^{-2}$

### 3.3.4 Humidity of the air

The humidity of the air is usually expressed as a percentage (relative humidity, Rh). If the relative humidity is 100% the air is saturated with moisture. The saturated vapour pressure ( $e_s$ ) is higher at higher temperature of the air. (It ranges from 6.11 mbar at  $0^\circ\text{C}$  to 42.43 mbar at  $30^\circ\text{C}$  as illustrated in figure 12). This implies that information on relative humidity should always be accompanied by the prevailing temperature. It is then possible to calculate the actual vapour pressure ( $e_a$ ) as follows:  $e_a = (\text{Rh} \times e_s)/100$ . Knowing the actual vapour pressure one can calculate the vapour pressure deficit ( $e_s - e_a$ ), which is an important component in the calculation of the evaporative demand of the air. In Mahajanga (F) the relative humidity ranges from less than 60% at an air temperature of  $24.8^\circ\text{C}$  in July to 84% at an air temperature of  $27.5^\circ\text{C}$  in February. Using the information from figure 12 one can calculate that the vapour pressure deficit in July equals 12.6 mbar, while this deficit is only 6.0 mbar in February. In Toliara (X) the relative humidity ranges from 75% in July (temperature of  $20.1^\circ\text{C}$ ) to 77% in February at an air temperature of  $27.6^\circ\text{C}$ . This implies a vapour pressure deficit ranging from 5.8 mbar in July to 8.4 mbar in February.

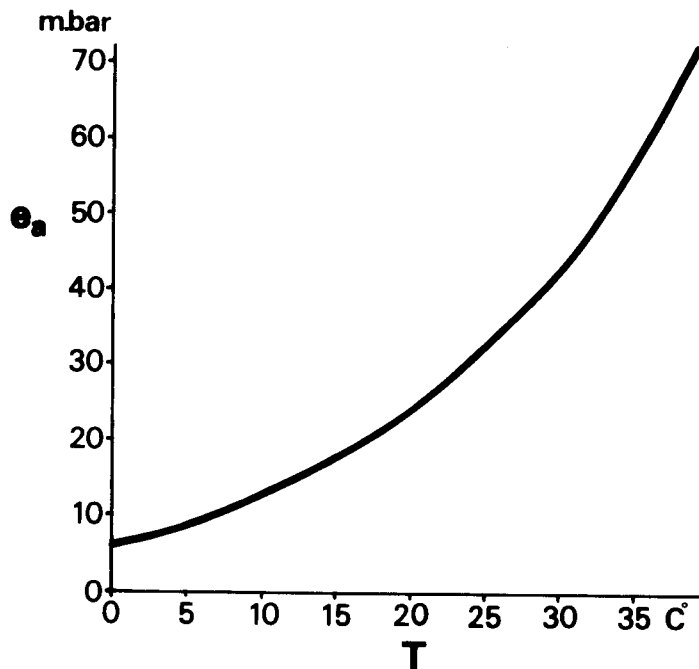


Figure 12 Relation between air temperature (T) and saturated vapour pressure ( $e_s$ ).

Along the East coast the relative humidity is usually above 80% at temperatures ranging from  $21^\circ\text{C}$  in wintertime to  $27^\circ\text{C}$  in summertime. The vapour pressure deficit varies from 3.9 mbar in August to 6.2 mbar in February. In the central highlands the relative humidity is between 70% and 80%, at temperatures ranging from  $15^\circ\text{C}$  in wintertime to  $21^\circ\text{C}$  in summertime. Because of these relatively cool temperatures the vapour pressure deficit is low: from 3.4 mbar to 6.8 mbar. Figure 13 illustrates the seasonal variation of the relative humidity and vapour pressure deficit at Mahajanga, Toliara, Taomasina and Antananarivo.

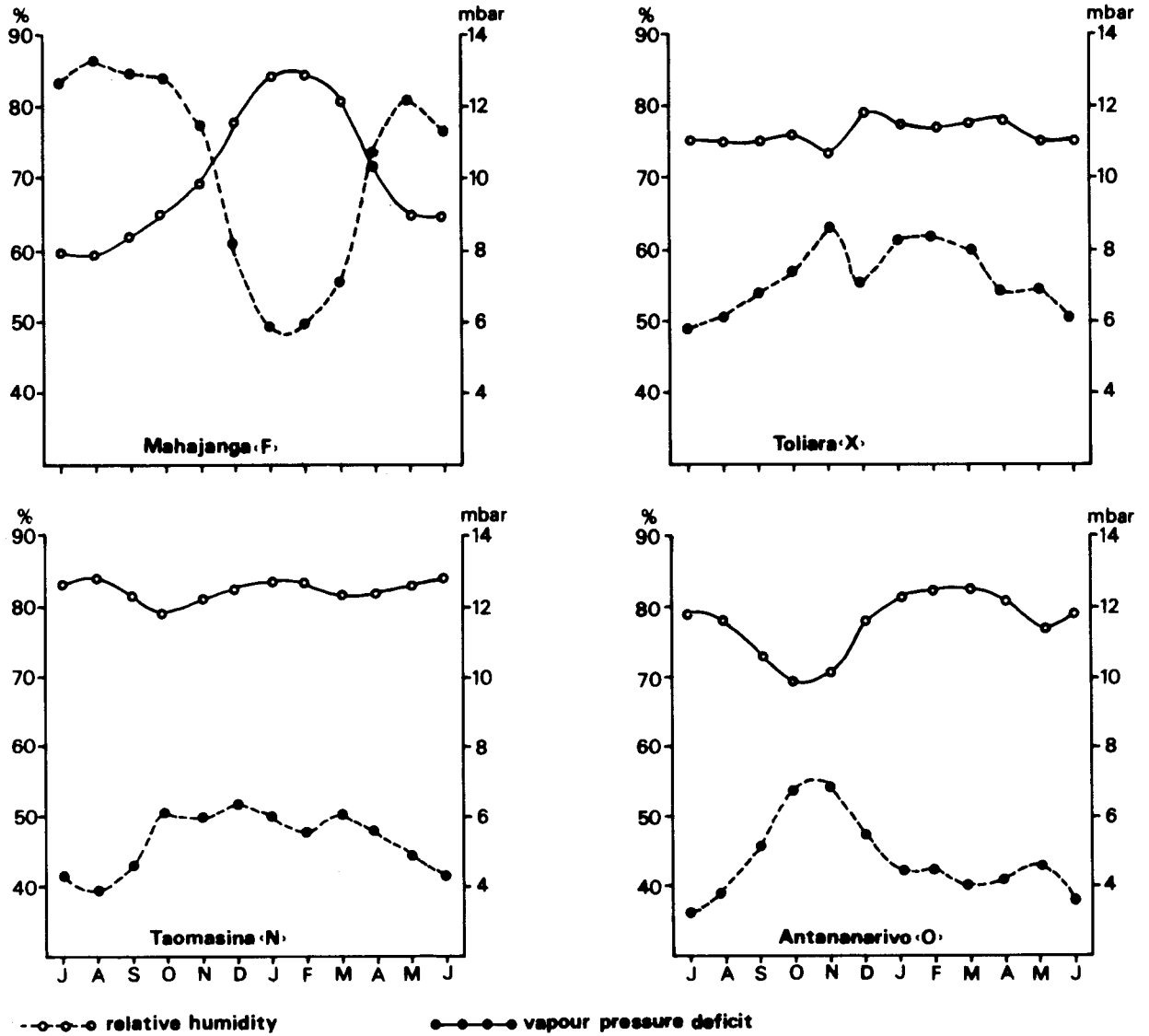


Figure 13 Seasonal variation of the relative humidity and the vapour pressure deficit at four locations in Madagascar.

### 3.3.5 Wind Speed

The predominant air mass movement over Madagascar is governed by the Southeast tradewinds, particularly strong when the air pressure gradient is high, such as during the austral winter season. Since there is usually a temperature inversion layer inhibiting vertical movement of air masses when the tradewinds blow, the quantity of precipitation carried by the Southeast trades is usually limited, bringing moderate winter showers on the East coast and a low cloud cover over the central highlands. Further West the air in trade wind subsides resulting in a warm, dry wind in the western half of the country. The windiest locations are just North (Antseranana) and South (Tolagnaro) of the dorsal mountain chain. When the high pressure cells weaken and recede to the South around October–November, air moves in from the Northwest. This monsoonal air stream is not very strong but carries heavy precipitation particularly on the northwestern and central part of the country. Finally one recognizes a sea breeze which may interact with other large scale air movements. This sea breeze can be particularly strong during the dry hot season when the land surface diurnal temperature variation is large.

The available data on wind velocity, corrected for 2 m above the surface show a small seasonal variability only. Table 3 gives some wind velocity information on a mean monthly basis.

Table 3 Wind velocity in meter/second for various locations in Madagascar

		J	A	S	O	N	D	J	F	M	A	M	J
North point	(A)	5.0	5.4	5.6	5.8	4.8	3.2	2.8	2.6	3.0	3.8	4.2	4.6
North West coast	(F)	2.8	2.8	3.2	3.2	3.0	2.4	2.4	2.4	2.4	2.2	2.4	2.4
North East coast	(E)	2.6	2.6	2.6	2.6	2.2	2.0	2.0	2.0	1.8	2.4	2.4	2.4
Central West coast	(R)	1.5	1.8	2.1	2.1	2.1	2.1	1.8	2.1	1.7	1.6	1.5	1.4
Central Highlands	(O)	1.4	1.4	1.4	1.4	1.2	1.4	1.4	1.2	1.4	1.4	1.4	1.4
Central East coast	(N)	2.8	2.4	2.4	2.2	2.4	2.2	2.8	2.6	2.8	2.8	2.8	2.8
South West coast	(X)	2.6	2.8	3.0	3.0	3.0	2.8	2.8	2.6	2.8	2.6	2.6	2.6
South East coast	(W)	2.3	2.8	3.8	3.4	3.8	3.8	3.0	3.0	2.3	2.3	1.9	2.3
South point	(Y)	3.4	4.0	4.6	5.2	4.6	4.2	4.0	4.0	4.0	4.0	3.4	3.2

Wind speeds are generally strong at both ends of the island but its strength is reduced towards the central part of the country. In the central highlands wind velocity is often less than  $2 \text{ ms}^{-1}$ . Wind speed tends to increase towards the end of the dry season and is relatively weak in the later part of the rainy season.

Not reflected in these mean monthly wind velocities are the severe tropical storms, that develop during the humid austral summer over the Indian Ocean or sometimes over the Mozambique channel. They are most violent in the Northeast coastal region, but diminish rapidly in strength when they reach the land. Ravet (1952) indicates that of the 200 cyclones which have affected Madagascar between 1848 and 1951, 15% occurred in December, 28% in January, 30% in February, 18% in March, 7% in April and 2% from May to November.

### 3.3.6 Potential Evapotranspiration (PET)

Evaporation is a physical process by which a liquid is transferred to the gaseous state. Evaporation of water that has passed through the stomatae of the leaves into the air is called transpiration. Evapotranspiration describes the combined processes of evaporation from the soil or water surfaces and transpiration. The rate by which water evaporates from these combined surfaces - the actual rate of evapotranspiration - depends on one hand on the moisture conditions of the soil surface and on the other hand on the special plant characteristics and phenological phase of the crop canopy. Therefore Penman (1948) introduced the term "potential evapotranspiration", which is defined as the maximum quantity of water which may evaporate from a uniform cover of dense, short grass when water supply from the soil is not limited.

The process of converting water to vapour requires energy:  $59 \text{ calcm}^{-2}$  (or  $2.46 \text{ gMJm}^{-2}$ ) are required to evaporate 1 mm water. This energy is provided by radiation on one hand and by the air movement and temperature difference between the air and the evaporating surface - advected

energy - on the other hand. While this aerodynamic term might be of secondary importance in the humid tropics, it is prominent in the semiaridic environments.

Evaporation from open water surfaces can be measured directly using a standardized instrument. The class A evaporation pan is recommended, but despite sufficiently clear instructions for installation, recording and maintenance of the pan (and the water in it!), the results are generally not very reliable. A very simple method to measure evaporation is the Piche evaporimeter. It was frequently used in the past in Madagascar, but data from this instrument give only a very rough indication of evaporation. Therefore more often empirical formulas are employed to estimate potential evapotranspiration. Riquier (1963) discussed the various formulas that have possibilities for Madagascar. The most frequently utilized methods developed by Thornthwaite and Blaney-Criddle are primarily based on the air temperature and do not express the monthly variations of potential evapotranspiration very well. Riquier discourages the use of these methods and recommends the formula developed by Walker, which is a simplification of the method of Penman. Walkers formula reads as follows:

$$E_t = 0.77 R_a (0.20 + 0.48 n/N) (32 + 1.8 T_m)^{-1}, \text{ in which}$$

$E_t$  = potential evapotranspiration in mm per month

$R_a$  = extraterrestrial radiation in mm per month

$n/N$  = ratio between actual and astronomically possible sunshine duration

$T_m$  = mean monthly temperature

This formulæ estimates  $E_t$  reasonably well under conditions of low wind speed and when the actual vapour pressure is not too high.

In the agroclimatic databank of Madagascar, given in the annex of this report, potential evapotranspiration (PET) is estimated by the modified Penman method, developed by Frère and Popov (1979), which represents the experience acquired by FAO with the Penman formula over the previous ten years. It is based on the calculation of the net radiation term ( $H_n$ ), the aerodynamic term ( $A_n$ ) and a correction term (C) related to the product of the ratio of atmospheric pressure at sealevel and the atmospheric pressure at the altitude of the location and related to the slope of the saturated vapour pressure curve, divided by the psychrometric constant. The method of step by step calculation is described in detail elsewhere (Oldeman and Frère, 1982). Potential evapotranspiration data for Madagascar were directly available from the Agroclimatic databank of Africa, South of the equator (FAO, 1984) for 13 locations. Using the same approach monthly potential evapotranspiration was estimated for another 12 locations, after an estimated value of total radiation was obtained (see 3.3.3.1)

The potential evapotranspiration patterns in Madagascar reflect both the monthly temperature and radiation patterns as illustrated in Figure 14. Along the West coast one observes the bimodal pattern in the northwestern part, becoming monomodal in the southwestern section of the island. PET in Analalava (D) on the Northwest coast increases from 3.3 mm/day in June to a maximum of 5.7 mm/day in October, November, then rapidly dropping to 4.5 mm/day during the wet season (January-April). In Toliara (X) on the southwestern section, PET in June is only 2.3 mm/day, but its value increases gradually to 5.9 mm/day in January, before dropping at the same rate towards its June value. Very high PET values are observed more inland during October, November, such as in Maevatanana (J), when PET reaches 6.7 mm/day in October. This is caused by the very high temperatures at these inland locations. PET is also very high in Antseranana (A), reaching 7.1 mm/day in October. Dry weather and very strong winds at this northern point are the main reasons for such high PET values. Along the East coast PET values are significantly lower than along the West coast, mainly as a result of much lower radiation. In Toamasina (N) PET varies from 2.4 mm/day in June to 4.8 mm/day during the wet summer season.

In the central highlands temperatures are much lower. As a consequence PET values in Antananarivo (O) range from 1.8 mm/day in June, July to 4.1 mm/day in November. They remain around 4 mm/day until February after which PET values drop to its June value. Ambohitsilaozana (L) at the Lac Alaotra region shows a somewhat different pattern. The June-July values are around 2.4 mm/day. After July there is a rapid increase in PET until it reaches values of 5 mm/day in October. After October there is a gradual drop in PET until it reaches its June value. The lowest values are calculated for Fianarantsoa in June and July. The low

temperature and radiation, combined with a high relative humidity and low wind velocity leads to PET values of 1.5 mm/day.

Potential evapotranspiration values are important in establishing crop water requirements. The balance between precipitation and potential evapotranspiration indicates whether there is a surplus or deficit in water from atmospheric sources. In the next section we will discuss this water balance and use the ratio of precipitation and potential evapotranspiration as keys to classify agroclimatic zones.

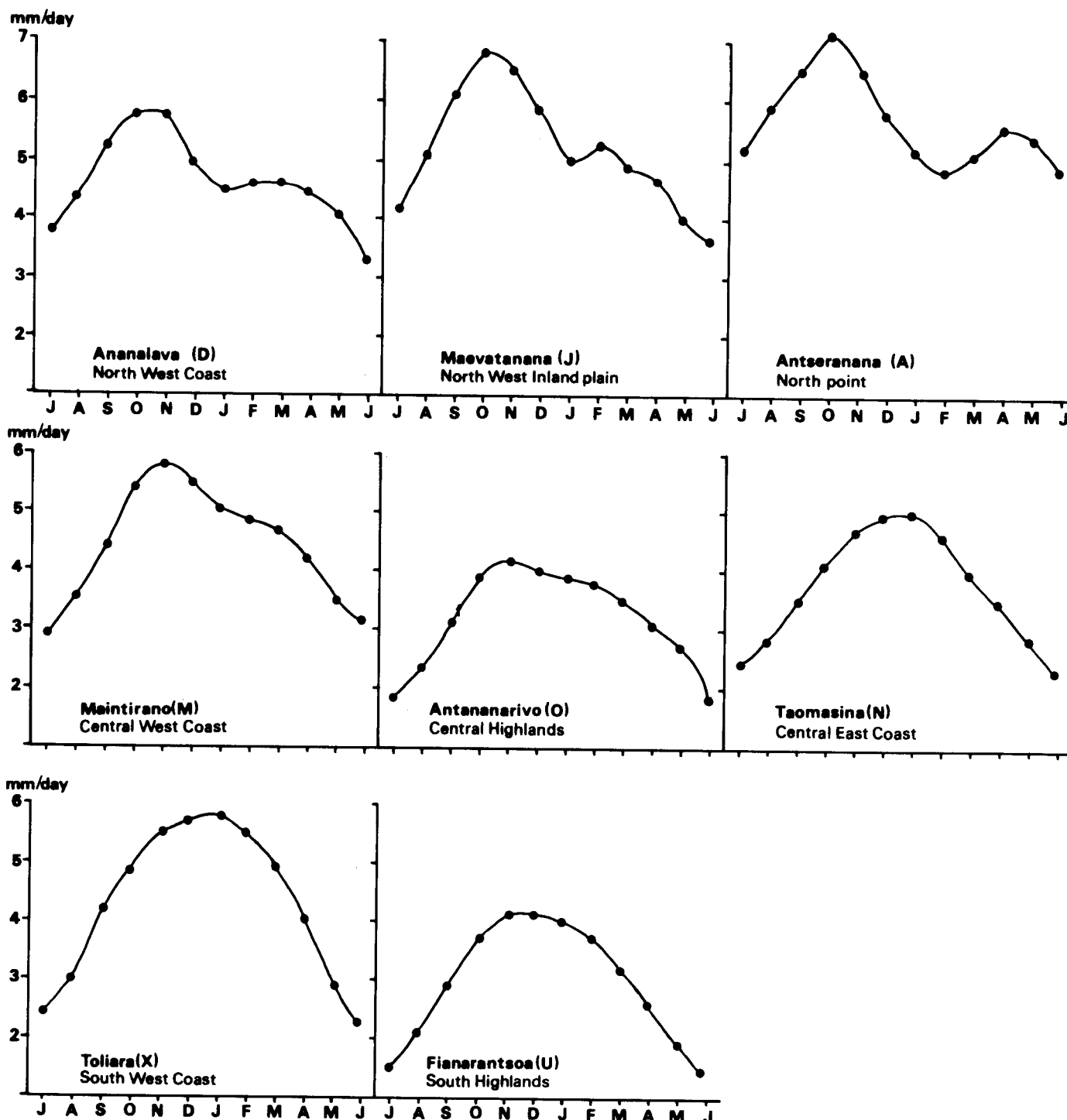


Figure 14 Mean monthly evapotranspiration in mm/day for various locations in Madagascar.



#### 4 Agroclimatic Classification

The most commonly used global climatic classification system is developed by Köppen (1931). Numerical values of temperature and precipitation are mainly selected as they affect plant growth. In his philosophy the heat during the summer period in temperate climates is more important than the low winter temperatures values, while at lower latitudes the dryness has a similar effect on the vegetation as a season of low temperatures at higher latitudes. The Köppen classification is based on mean monthly and mean annual temperatures to distinguish between major groupings, and on total monthly and total annual precipitation to determine major divisions within the major groupings. Dongue (1971) used Köppen's classification system for Madagascar.

Thornthwaite (1948) computed the "precipitation effectiveness ratio" in order to obtain a better expression for that part of the precipitation which is effective in furthering plant growth. The ratio is the total monthly precipitation (P), divided by the total monthly evaporation (E). The sum of these twelve monthly ratio's is called "P-E index". Since observations on E are often lacking he studied the relationship between P, E, and mean temperature (T) at 21 stations in the western United States and found the following relationship:  $P/E = 11.5 (P / T - 10)^{10/9}$ ; (P in inches and T in degrees Fahrenheit).

Thornthwaite recognized various humidity provinces, based on the P-E index which he characterized with specific vegetation groups (the "wet" province has a P-E index between 32 and 63, the semi-arid province (steppe) has a P-E index between 16 and 31, while the arid province (desert) has a P-E index less than 16. The major weakness of this system is that the empirical relationship between evaporation and temperature has to be established for different regions of the world.

Perhaps the first climatic classification for the humid tropics was proposed by Mohr (1933), who based his system on the total number of wet and dry months in a calendar year. A wet month was defined as a month when rainfall exceeded monthly evaporation, or was more than 100 mm, while a dry month received less than 60 mm. Macro climate zones for the rice growing environment of Southeast Asia were defined by IRRI (1974) and based at the highest level on the number of consecutive wet months, set at 200 mm monthly precipitation. These zones were subdivided according to the length of the dry period. A dry month was set at any month receiving less than 100 mm rain. Oldeman (1979) and Oldeman and Frère (1982) calculated that for tropical environments with mean air temperatures around 25°C a minimum of 95 mm water per month from precipitation is required for dry land crops during full canopy stage, on soils having a water holding capacity of 20%. A minimum of 175 mm water per month from precipitation is needed for wetland rice, assuming a net seepage and percolation loss of around 1 mm per day. These classification criteria were used to prepare agroclimatic maps for Indonesia (Oldeman 1975, 1977, 1979, 1981). The length of the wet period and the length of the dry period were related to possible rice-based cropping systems under rainfed conditions.

The FAO agro-ecological zones project makes use of the concept of the length of the growing season, which characterizes the period during the year when water availability allows crop growth and when temperature is not limiting crop growth. The growing period is defined as: "the period in days during a year when precipitation exceeds half the potential evapotranspiration plus a period required to evapotranspire an assumed 100 mm of water (or less if not available) from excess precipitation stored in the soil profile at the rate of potential evapotranspiration" (FAO, 1978).

Nieuwolt (1981) defined the length of the growing season as the number of consecutive months when the ratio  $P'/PET$  is more than 1, in which  $P'$  is the dependable rainfall (80% probability rainfall). A similar approach is used by Cochrane and Jones (1984).

##### 4.1 Selection criteria for an agroclimatic classification for Madagascar

An agroclimatic classification aims to group climatic parameters in class units that have agricultural significance. The crop growth factors related to climate, that may become critically low during a certain part of the year are water and heat. Crops have specific water and

temperature requirements. Water is supplied by rainfall, but can be supplemented by groundwater sources or by irrigation. The air temperature can - in practice - not be corrected by management practices. Therefore the length of the growing season is in first instance determined by the prevailing temperature regime. As discussed in previous sections the air temperature is closely related to the altitude and the latitude. Temperature zones in Madagascar are therefore strongly correlated with elevation contour lines.

Rainfall variability shows a much more complicated pattern in Madagascar. Water availability depends on the rainfall/potential evapotranspiration ratio. This ratio was used as selection criteria for the preparation of an agroclimatic classification and delineation of agroclimatic zones. In this section we will first briefly discuss the length of the growing season in relation to temperature - and thus to elevation. This is followed by a section to estimate the P/PET ratio based on available climatic information.

#### 4.1.1 Length of growing season and temperature in Madagascar

The elevation above sea level and the latitude are closely related to the annual and seasonal temperature regime in Madagascar (see 3.3.2). The mean monthly maximum temperature is always above 16°C even at elevations of 2000m. At Nanokely (81), located at 2020m above sea level, the lowest mean monthly maximum temperature is 16.7°C. The mean monthly minimum temperature however drops to values during the cool season that may be critical for crop growth. A simple linear relationship between the altitude and the number of months with monthly minimum temperatures of less than 21°C, 18°C, 15°C, 12°C, and 9°C was constructed based on available temperature data for various locations in Madagascar at different altitudes. The country was divided in a northern section (12°-18°S) and a southern section (19°-25°S) to account for latitudinal effects (see figure 14\*). This figure enables us to determine the length of the growing period when the crop is not affected by low night temperature. If for a certain variety a minimum temperature of 12°C severely limits crop growth this figure tells us that in the northern section of the country there are about 10 months with a minimum temperature of less than 12°C at 1500 m elevation, about 5 months with less than 12°C at 1000m, and 1 month having a mean monthly temperature below 12°C at 500m. In the southern part of Madagascar there are about 3 months having a mean monthly temperature below 12°C at 500m. If we want to grow a rice variety in the Antananarivo basin with a critical temperature of 15°C, this figure tells us that at that elevation (1400m) there are about 10 months with a minimum temperature below 15°C or only 2 months during the year when the mean monthly minimum temperature is more than 15°C. If the variety has a critical temperature limit of 12°C, there are approximately 5 months suitable for growing such a variety. These critical temperatures, elevations, and length of season can be summarized in the following table.

Table 3<sup>a</sup> Effect of elevation on the length of the growing period as determined by critical minimum temperature limits.

Elevation zone	Critical minimum temperature				
	9°C	12°C	15°C	18°C	21°C
0 - 500 m.a.s.	12 months	9-12 months	7-12 months	4-8 months	0-5 months
500 - 1000 m.a.s.	12 months	7-9 months	4-7 months	0-4 months	0
1000 - 1500 m.a.s.	9-12 months	4-7 months	1-4 months	0	0
> 1500 m.a.s.	< 9 months	< 4 months	< 1 months	0	0

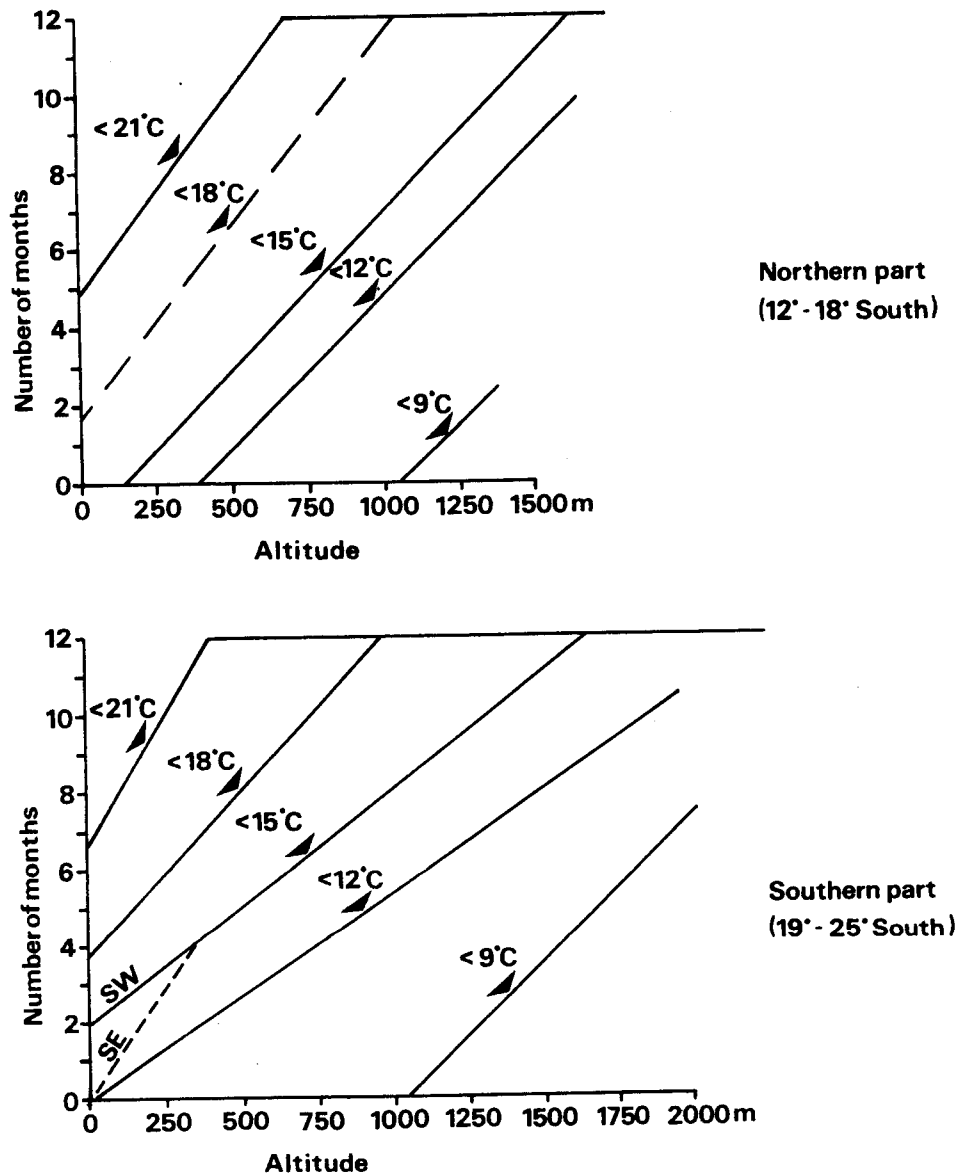


Figure 14<sup>a</sup> Approximate number of months with monthly minimum temperature of less than 21°C, 18°C, 15°C, 12°C and 9°C in relation to altitude in the northern and southern part of Madagascar.

#### 4.1.2 Length of growing season and water availability in Madagascar.

The second criteria for defining the length of the growing season is determined by the period of sufficient availability of water from atmospheric sources to cultivate a crop without supplemental water from other sources. Since the major food crop in Madagascar is wetland rice a wet month is defined as a month with sufficient water to cultivate a wetland rice crop. For the lowland humid tropics 200 mm water per month is considered sufficient for wetland cultivation. Under those conditions the monthly potential evapotranspiration is around 130 mm (Oldeman, 1984), equivalent to a P/PET ratio of 1.5. In regions where the temperature is lower compared to the humid tropics the potential evapotranspiration is lower and thus monthly precipitation requirements are lower. (At a mean monthly temperature of 20.0°C for example, P and PET are respectively 110 mm and 73 mm). We therefore define a wet month as a month having a P/PET ratio of at least 1.5, while a dry month is defined as a month having a P/PET ratio of less than 0.5. For regions where temperature fluctuations are variable over short distances such as in Madagascar, this approach seems suitable.

#### 4.1.2.1 Estimation of P/PET ratio

In previous sections it became apparent that for a good estimate of the potential evapotranspiration, knowledge is needed on the mean monthly air temperature and mean monthly radiation.

Hargreaves (1977) developed a relationship to estimate PET, based on total radiation, expressed in mm evaporable water ( $R_g$ ) and the mean air temperature expressed in degrees celsius ( $T_m$ ). For major regions throughout the America's he found that the following equation closely estimates PET:

$$PET = R_g (0.0135 T_m + 0.24)$$

Based on  $R_g$  and  $T_m$  values for randomly chosen sets of data for various sites in Madagascar we found the following equation for Madagascar conditions:

$$PET = R_g (0.015 T_m + 0.27) - 0.83$$

Figure 15 illustrates that the PET values based on the Penman method are closely related to the PET values based on the simplified equation above. A total of 50 monthly values from all 25 synoptic sites were chosen randomly for this comparison. Only for the windy location at Antsiranana (A) did the new formula underestimate PET in the dry season. Wind speed is not taken into account in the simplified approach, but as was discussed before wind speed in general does not vary too much throughout the year. This result implies that radiation and temperature together estimate PET fairly well. Mean air temperature data are available for many sites and can be estimated reasonable well if latitude and altitude are known. However total radiation values are available for only 25 sites. We have seen that total radiation is related on one hand to the extraterrestrial radiation ( $R_s$ ), and on the other hand to the radiation reaching the earth's surface, which is reduced by the degree of cloud cover, which in turn is related to precipitation, although the high proportion of cloud cover in the central highlands does not always lead to high precipitation.

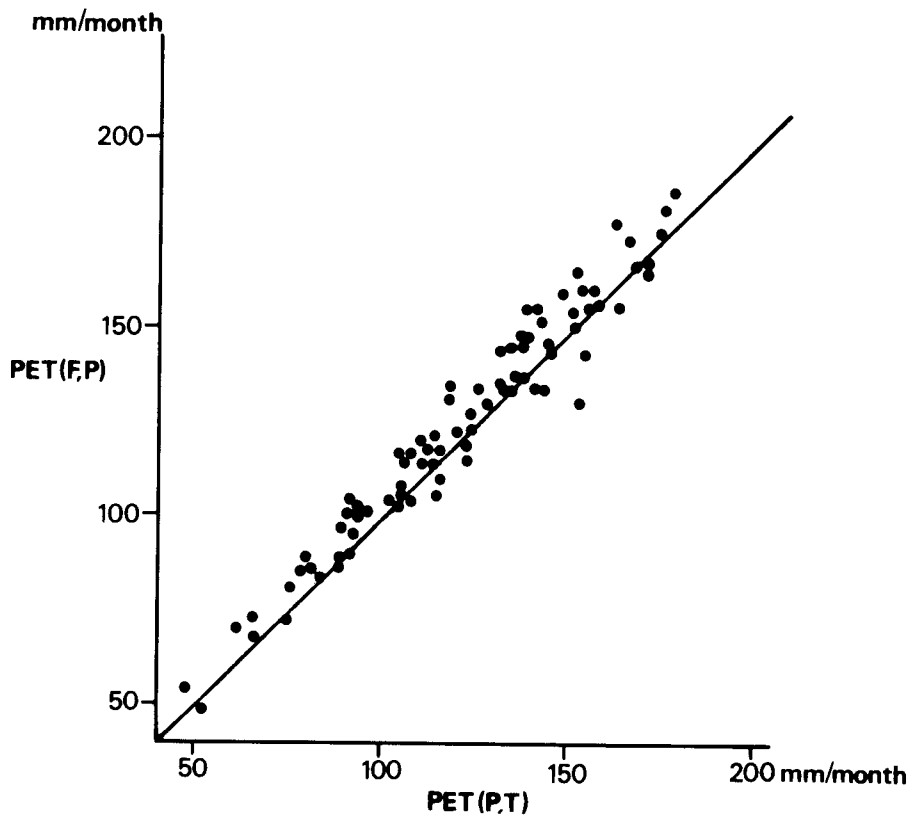


Figure 15 Comparison between PET values based on modified Penman method ( $PET_{F,P}$ ) and PET values, based on relationship:  $PET = R_g(0.015 T_m + 0.27) - 0.83$ .

In Figure 16 the relationship between precipitation and the ratio  $R_g/R_a$  is illustrated for four typical locations. High rainfall corresponds to low  $R_g/R_a$  values but low rainfall does not always result in high  $R_g/R_a$  values. While  $R_g/R_a$  values along the Northwest coast are 0.64 when rainfall is less than 20 mm, the  $R_g/R_a$  value along the Southwest coast is around 0.62, but in the central highlands the same monthly rainfall gives  $R_g/R_a$  values of 0.56. Figure 17 illustrates the  $R_g/R_a$  versus precipitation relationship that was observed for the Northwest and "moyen-ouest" section of Madagascar, for the South and Southwestern section, for the Central Highlands, and for the East coast of Madagascar.

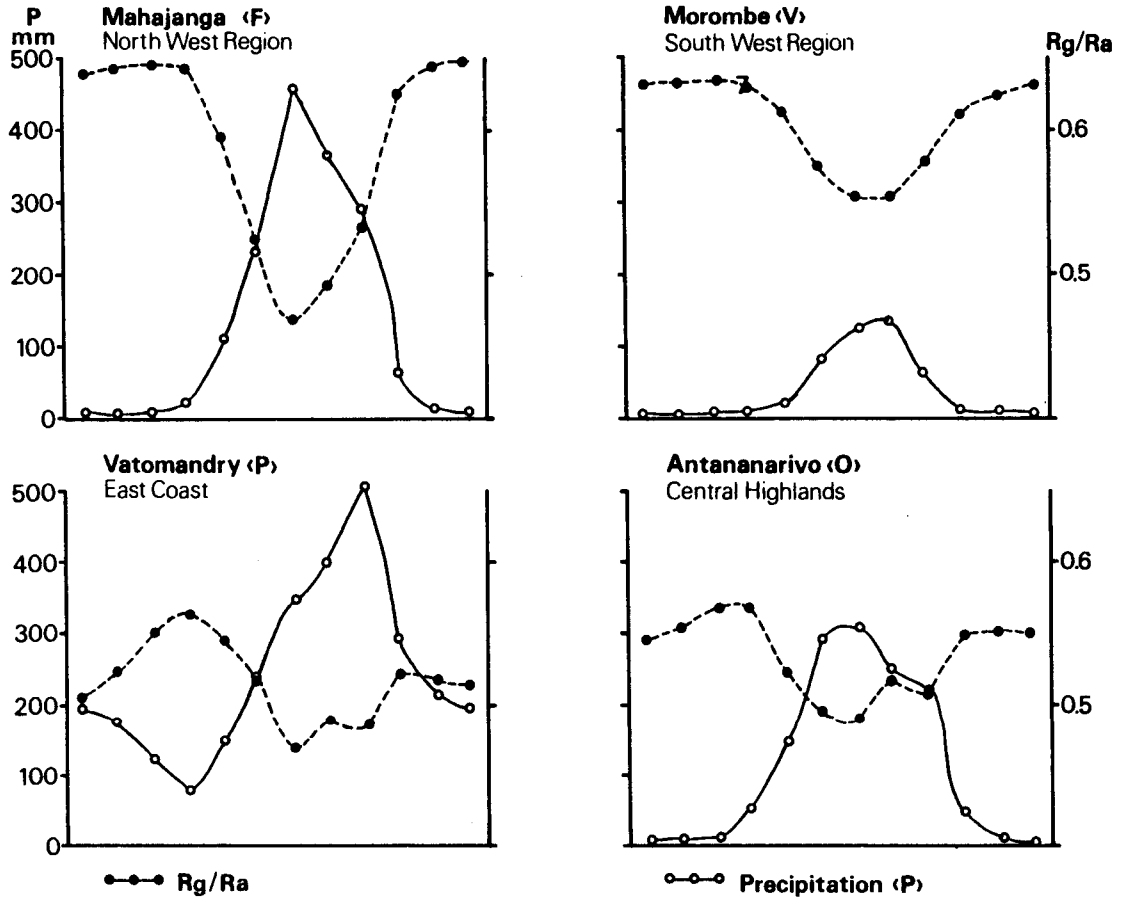


Figure 16 Monthly precipitation and  $R_g/R_a$  ratio for Mahajanga (F), Morombe (V), Vatomandry (P) and Antananarivo (O).

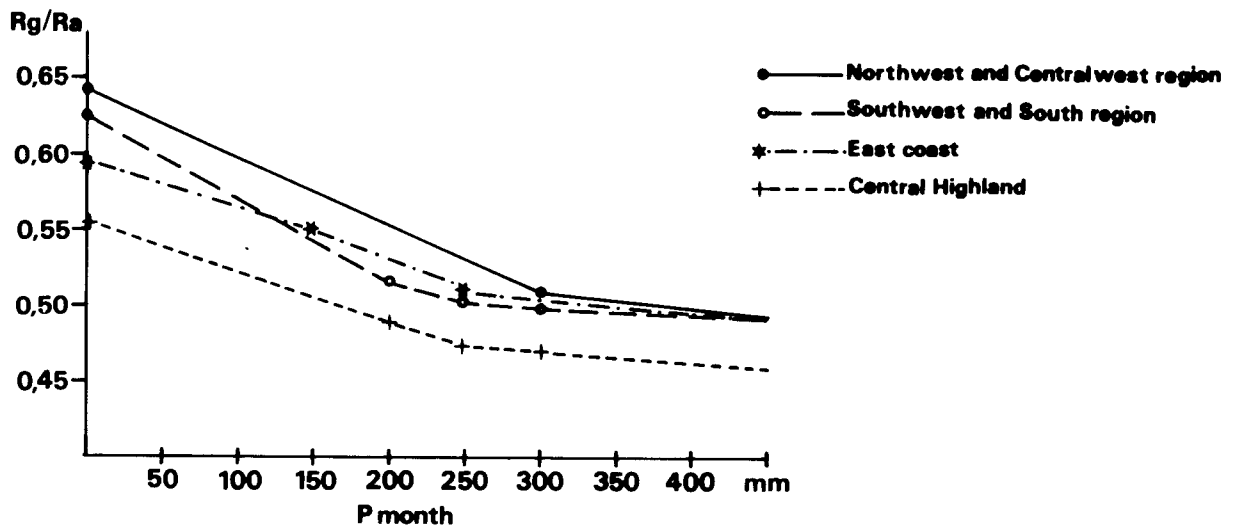


Figure 17 Relationship between precipitation and  $R_g/R_a$  ratio for 4 grand regions of Madagascar.

Table 4 illustrates for two locations a step by step calculation to estimate monthly potential evapotranspiration, based on monthly precipitation and monthly mean air temperature. The bottom lines for these two locations indicate PET and P/PET ratio's when PET was calculated by the Penman method of Frère and Popov (1979).

- Step 1: find total monthly precipitation value from databank.  
 Step 2: find Ra value for that month from table 1a (page 19)  
 Step 3: estimate Rg/Ra value using figure 17 (page 33)  
 Step 4: calculate Rg using results from Step 2 and Step 3.  
 Step 5: find mean monthly temperature (T) from databank. If no temperature data available use formulas in section 3.3.2.2 to estimate T.  
 Step 6: calculate PET using result of step 4 and 5 according to equation:  

$$\text{PET} = R_g (0.015 T + 0.27) - 0.83.$$
 Multiply with number of days per month.  
 Step 7: calculate ratio P/PET using results from step 1 and step 7.

Table 4a: Estimation of P/PET ratio for Maintirano (18°03'S; 44°02'E. Southwest coast).

Step	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1: P	4	4	9	17	63	177	302	220	158	32	9	4
2: Ra	10.8	12.3	14.1	15.8	16.8	17.1	17.1	16.5	151	13.2	11.4	10.4
3: Rg/Ra	.62	.62	.62	.62	.59	.53	.50	.51	.54	.61	.62	.62
4: Rg	6.7	7.6	8.7	9.8	9.9	9.1	8.6	8.4	8.2	8.1	7.1	6.4
5: T	22.4	23.0	24.7	25.9	26.9	27.4	27.0	27.4	27.2	26.9	25.1	23.1
6: PET	100	119	142	174	175	166	154	138	147	139	117	93
7: P/PET	0.04	0.03	0.06	0.10	0.36	1.07	1.96	1.59	1.07	0.23	0.08	0.04
PET*	91	110	133	166	175	171	156	137	144	126	105	92
P/PET*	0.04	0.04	0.07	0.10	0.36	1.04	1.93	1.61	1.10	0.25	0.09	0.04

\* PET values estimated according to the method of Frère and Popov (1979).

Table 4b: Estimation of P/PET ratio for Antananarivo (18°55'S; 47°33'E. Highlands)

Step	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
1: P	9	9	14	49	154	292	305	235	221	47	16	9
2: Ra	10.6	12.1	14.0	15.8	16.9	17.2	17.2	16.5	15.1	13.1	11.2	10.2
3: Rg/Ra	.56	.56	.55	.54	.51	.47	.47	.48	.48	.54	.55	.56
4: Rg	5.9	6.8	7.7	8.5	8.6	8.1	8.1	7.9	7.2	7.1	6.2	5.7
5: T	14.6	14.7	16.4	18.8	20.3	20.9	20.5	20.7	20.4	19.1	17.1	15.3
6: PET	64	78	94	120	123	121	109	106	103	94	75	61
7: P/PET	0.14	0.12	0.15	0.41	1.25	2.41	2.56	2.22	2.15	0.50	0.21	0.15
PET*	57	71	93	121	125	125	123	117	107	89	68	53
P/PET*	0.16	0.13	0.15	0.40	1.23	2.33	2.48	2.12	2.07	0.53	0.23	0.17

\* PET values estimated according to the method of Frère and Popov (1979).

Figure 18 illustrates the PET values using the two methods of estimation. Except for Antsiranana where PET values are strongly underestimated (high wind speeds) and for Maevatanana (J) where PET values are underestimated during the dry season (very low humidity and extremely high temperatures) the simplified method appears to give very useful information on potential evapotranspiration, particularly for the purpose of grouping stations into agroclimatic zones, based on P/PET ratio. This method was therefore used to estimate P/PET ratio's for all locations in Madagascar.

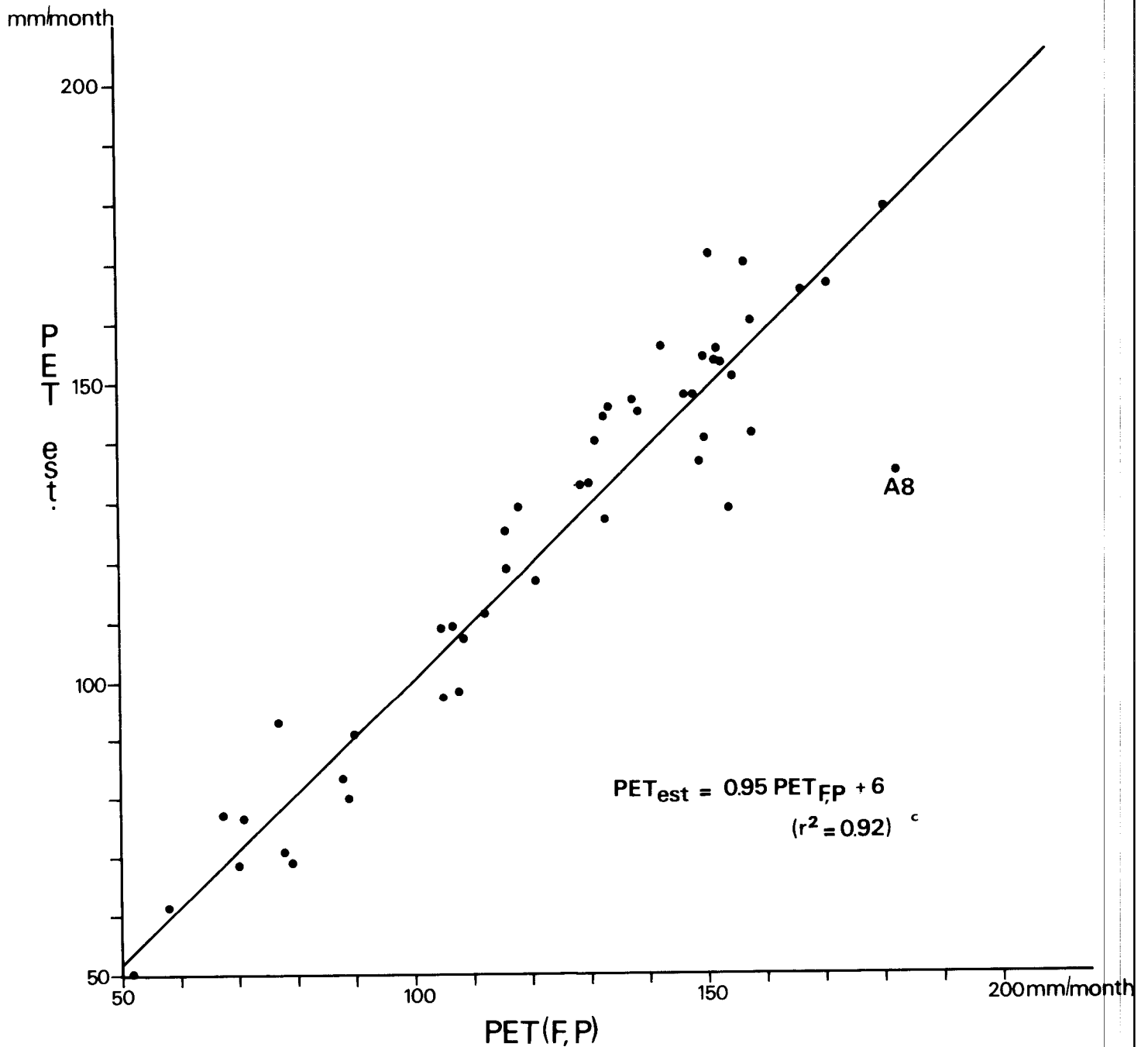


Figure 18 Comparison of estimated PET values using simplified approach based on rainfall and temperature ( $PET_{P,T}$ ) versus PET values using modified Penman approach ( $PET_{F,P}$ ). Data points for monthly values from Vohemar (B), Antalaha (E), Mandritsara (G), Maintirano (M), Ambotsilaozana (Z), Ambositra (S), and Morombe (V).

#### 4.1.2.2 Definition of agroclimatic zones of Madagascar

We have now defined a wet month and a dry month based on P/PET ratio and discussed a shortcut method to estimate these monthly ratios. Analogous to the system of agroclimatic zone classification of rice-based cropping systems for Southeast Asia, we can now group agroclimatic zones according to the length of wet respectively dry periods. The main grouping is done according to the length of the wet period.

- Zone A: more than 255 wet days. These zones are suitable for rice cultivation throughout the year.
- Zone B: 165-255 wet days. Two rice crops per year are possible.
- Zone C: 110-165 wet days. At least one rice crop per year possible.
- Zone D: 75-109 wet days. One short duration rice crop possible.
- Zone E: less than 75 wet days. Not suitable for rainfed wetland rice.

These zones are then subdivided according to the length of the dry period.

- sub 1: less than 60 dry days. Area can be cultivated throughout the year.
- sub 2: 60-135 dry days. A short fallow period under rainfed conditions.
- sub 3: 136-185 dry days. A major fallow period under rainfed conditions.
- sub 4: 186-255 dry days: Only one crop possible (rice or dryland crop).
- sub 5: more than 255 dry days: not suitable for agriculture without other water sources.

In Madagascar the following zones cover 95% of the country:

A1; C1; C2; C3; C4; D4; E4; E5. Because of the abrupt changes of climate on the eastern and western slopes of the dorsal mountain chain zone B covers only a very small proportion of Madagascar.

#### 4.2 Delineation of Agroclimatic Zones of Madagascar

Each location for which rainfall and temperature data were known is included in our best estimate to establish the agroclimatic zones. It should be realized that the density of the network determine the scale of the final map. As base map we used the 1:1 million "Carte Internationale du Monde", sheets SD-38-39 (Antsiranana); SE-38-39 (Antananarivo); SF-38-39 (Fianarantsoa); SG-38-39 (Tolagnaro). These maps were compiled in 1965, drawn and published by the National Institute of Geodesy and Cartography in 1985. The base map provides excellent detail of topographic features and geographic names. The 500 m, 1000 m, 1500 m, 2000 m contour lines, major hydrological systems, main through roads and areas of wetland rice that were delineated on the topographic map were transferred to a simplified working map. The 176 locations for which climatic information was collected are also indicated on this working map. For each location the monthly P/PET ratio was calculated. By plotting these values the length of the wet and dry period could be established for each location. Sites belonging to the same agroclimatic zone were grouped. Finally boundaries between various zones were drawn taking into account that two joining zones should form a logical sequence, and making maximum use of topographic features, such as the contour lines. Obviously not all units, delineated on the final map are identified by a location with climate information, particularly in the northeastern section of the country.

The final agroclimatic map of Madagascar, which accompanies this report as Annex II is printed at a scale of 1:2.300.000. In addition to the various agroclimatic zones, discussed below in detail, the map shows major river systems, national roads, contour lines at 500m intervals and important rice growing areas. All synoptic stations (A through Y) and rainfall/temperature observation sites, that are given in the agroclimatic databank, are indicated on the map. At several stations we also inserted the length of the wet and dry period, and the summation of the mean temperature during the wet period. Ambanja (4) for example is characterized by a wet period of 120 days during which period the temperature sum is 3200°C, while the dry period lasts 175 days. Finally we have indicated a region on the map having a rainfall aggressivity index (R) of more than 250. This R factor is calculated as the sums of squares of monthly precipitations divided by the annual precipitation (FAO, 1979). Ambanja has for example a R factor of 336. A high rainfall aggressivity index implies a high water erosion hazard.

#### 4.3 Major Agroclimatic Zones of Madagascar

Out of a total of 19 possible zones, we have delineated 15 different zones, but only 9 zones have sufficient surface area to be recognized.



#### 4.3.1 Zone A1

This zone is characterized by more than 255 wet days and less than 60 consecutive dry days. It is typical for the East coast of Madagascar from Sambava (9) in the North to - but not including - Tolagnaro (Y) in the South. The total length of the wet period is generally around 275-280 days, while there is hardly a dry period except near Farafangana (W), where the P/PET ratio in October is 0.45. During September, October, and November the P/PET ratio is between 0.5 and 1.5. Ratios of more than 3 occur from February to July in the central part of the East coast (Taomasina, N). A somewhat drier area stretches from Mananjary (T) to Vangaindrano (126) with a wet period of 260 days. This zone is suitable for continuous rice cropping if the topography is suitable. The area has a warm, humid climate but because of high rainfall total radiation is reduced and this in turn will reduce rice yields to some extent. This zone occupies roughly 9% of the country.

#### 4.3.2 Zone B.

Logically zone B should be found on the drier side of zone A (or the wetter side of zone C). We only delineated a small area of zone B at the highest slopes of the Ankaratra massif. Nanokely (81) at an altitude of 2020 m has a wet period of about 6 months (180 days) and a dry period of 4 months (120 days), making it a B2 zone.

#### 4.3.3 Zone C

This zone is characterized by 110 to 165 wet days. It occupies a total land surface of 36%, and is the most important zone in Madagascar.

*Zone C1* has less than 60 dry days. It is located along the eastern slopes of the dorsal mountain chain, generally at elevations over 500 m. Where this dorsal mountain range approaches the East coast this zone is narrow. It is located between the A1 zone along the East coast and the C2 zone on the western edge of the dorsal mountain chain.

In Andapa (11) located East of the Tsaratanana massif the length of the wet period is about 145 days, while in October the P/PET ratio is close to 0.5. The wet period is from December to April with mean monthly temperatures of 23.6°C to 23.9°C, giving a total temperature sum of 3500°C. With no supplementary irrigation, this region, located at 500 m elevation is well suited for growing one rice crop per year, followed by an upland crop. With some additional water two rice crops are possible.

In Ambohimahaso (101) located at an altitude of 1400 m the wet period is 125 days with a short 40-50 days dry period during September, October. Total temperature sum for the wet period at this location is only 2500°C with mean monthly temperatures of 20.5°C during the wet season. Rice genotypes for such a location should be of short duration. The wet period here starts early December and ends abruptly early April. Total area of zone C1 occupies around 9% of the country.

*Zone C2* forms the transition zone between C1 and C3. The only sizeable area with some representative sites is found East of the Ankaratra massif in the central highlands generally at elevations above 1500 m, South of Antananarivo. Tsinjoarivo (85) is characteristic for this agroclimatic zone. The wet period is from mid November to early April (130 days). The mean monthly temperature during this period is only around 18.5°C with minimum temperatures between 12 and 14°C. The temperature sum is around 2400°C, barely enough for a short duration wetland rice crop.

Rice varieties growing in these areas should preferably have cold resistance. It should also be realized that nutrient uptake at these relatively low temperatures will be another constraint for high production. The dry season lasts for around 80 days. Temperatures during the dry season are between 12 and 15°C with minimum temperatures as low as 5.7°C in July. This region is therefore well suited for the cultivation of crops from the temperate zone, such as wheat, Irish potatoes or highland vegetables. This zone occupies almost 3% of the country.

*Zone C3* is characterized by a continuous dry period of 135 to 185 days and a wet period of 110 to 165 days and occupies around 13% of the country. Two regions of major importance are delineated on the map. Firstly an area on the western side of the Tsaratanana massif in the North

from the coastline up to elevations above 1000m. Ambanja (4) along the coast is characterized by 120 wet days and 175 dry days. Located on the windward side the effect of the Northwest monsoon is enhanced. The wet season is therefore characterized by extremely heavy rainfall (more than 500 mm in January). Despite a relatively short wet season the temperature sum for the 120 day wet period is around 3200°C, making the area highly suitable for wetland rice. The temperature even during the dry cool season does not drop below 17°C at night. With additional water sources two rice crops per year are possible.

In the same zone, but at high elevations one finds Bealanana (10). This town is located in an area protected by higher mountains in the North and West. A wide valley stretches from Ambatoria all the way up to Mangindrano (8). The bottom of this valley is swampy, but at many places rice is cultivated. The area is characterized by a four months wet season and a 180 day dry period. Due to its high location (1125m) the temperature sum for the 120 day wet period is only 2600°C and minimum temperatures are below 15°C from mid April to early December. Although surplus water from the neighbouring mountains might guarantee water supply throughout the year the low winter temperatures do not allow the cultivation of a second rice crop. Since the valley is protected from the forces of the Northwest monsoon, rainfall in the wet season is not extremely high.

The second major region of zone C3 is found in the central highlands around the capital city Antananarivo (0) and stretching westward in the middle western area of Madagascar as far West as Tsiroanomandidy (53) and Southwest of the Ankaratra massif (Mandoto, 83). Major parts of this zone are located at elevations over 1000m. At Antananarivo (0) the wet season is from late November until early April, while the dry season is from late April until the second half of October. The wet season temperature sum is 2500°C, and minimum temperatures at this altitude are below 15°C from April to late November.

The Antananarivo basin is a major rice growing area. The swampy basin has been converted to riceland and suffers in its lower portions from severe flooding since drainage is extremely poor. As a consequence the riceland is inundated to depth frequently over 1m. Farmers traditionally try to have their rice crop well established before this flooding period commences. They start their seedbed preparation at the end of the rainy season and rice seed is sown as early as April, May. The length of the seedbed period depends on the temperature. If the winter season is mild or starts late, seedlings are transplanted in July, but often transplanting is postponed until September. The seedlings develop poorly, are yellowish but they survive. Harvesting is generally in the rainy season (December, January). During the major part of the wet season the rice fields are not cultivated because of the high water depth. Deep water rice genotypes with some cold resistance characteristics should be tried. One also wonders whether the prolonged seedbed period during the winter months could be changed. Seedlings suffer seriously from the cold temperatures during July, August.

In the better drained areas outside the Antananarivo basin the growing season coincides with the wet season. At Tsiroanomandidy (53) at an altitude of 869m the temperature sum is 2860°C. (December–April) and the minimum temperature is below 15°C from May through September, the lowest night temperature occurring in July (11°C). Although rainfall rapidly decreases in April the valleys where wetland rice is cultivated seem to have sufficient water through May. Considering the fact that radiation increases somewhat in April, May, these months are favorable for ripening. Radiation levels increase in western direction as the cloud cover normally disappears West of Antananarivo. Therefore higher yields are to be expected in the Moyen Ouest compared to the central highlands. Major constraints in the Central Highlands include poor soil fertility, and high iron and aluminium content of the soil.

*Zone C4* is characterized by 185–255 dry days and a wet period of 110–165 days. It occupies about 11% of Madagascar. This zone forms a transition zone between the C3 zone on its eastern border and the D4 zone to the West. Major areas characterized by a C4 climate are found in the severely dissected highlands between the Tsaratanana and Ankaratra massives at elevations between 500 and 1000m. This region has a wet season from early December to late March, generally lasting about 115 to 120 days. The onset and in particular the end of the wet season is very abrupt. While rainfall in March in Tsaratanana (28) is 315 mm, April rainfall is only 57 mm. Since this region is facing the Northwest monsoon (windward side of Ankaratra) the wet season rainfall, particularly in January is extremely heavy (544 mm in Tsaratanana; 458 mm in

Maevatanana (J). Temperature sum in the wet season is 3200°C in Maevatanana, bordering the D4 zone, but at low elevation, and 3000°C in Tsaratanana. Because of its rough, highly eroded landscape, agricultural activities in this region are restricted to the widely dispersed valleys. Major activity is cattle raising.

#### 4.3.4 Zone D

This agroclimatic zone is characterized by a short wet season, lasting 75 to 110 days. It is logically located between the wetter C zones and the drier E zones. Although we have delineated a small D1 and D2 zone in the complex climatic region Northeast of the Tsaratanana massif there are no rainfall stations located there to verify this zone. A slightly larger zone D3, but still occupying less than 1% of Madagascar is found North of the Tsaratanana massif. Ambilobe (3) is on the border line between D3 and D4. It has 90 wet days - from mid December to the second half of March, while the dry period lasts from early May to the first half of November. Since it is located on the windward side of the Tsaratanana facing the NW monsoon it has extremely heavy rainfall in January and February. This D3 zone is further found in the South as a narrow band between the drier zones on the West (D4 and E4) and the wetter zones on the East (C2). The climatic D zone is mainly determined by a long dry season of at least 185 days (zone D4).

*Zone D4.* This agroclimatic zone occupies 22% of the country and characterizes the northwestern section of the country between Analalava (D) and Besalampy (I). From Besalampy southward the coastal regions become even drier, but the D4 zone still forms a relatively wide transition zone between the C climate on its eastern side and the E climate on its western side. Zone D4 characterizes also the Alaotra region which forms a N-S stretched basin between two mountain formations and thus being on the leeward side of both air streams. Finally zone D4 is found in the northern tip of the country. The length of the wet season ranges in general from 80 to 100 days, while the dry period ranges from 205 to 235 days.

Marovoay (22) is located in the alluvial plain of the Betsiboka river; a major rice growing region. The wet period commences in the second half of December and lasts until the second half of March. By the middle of April the dry period commences which lasts until the middle of November. The region has extremely heavy rainfall in January and February. Since the Betsiboka river and its catchment area are in the zone with extremely high rainfall, serious flooding occurs in the Marovay plain year after year, making rice cultivation during this season risky or impossible. Farmers generally cultivate their rice crop in the dry season. In areas that have access to irrigation transplanting is around May-June. Because of the very dry conditions, the somewhat higher located parts in this plain have severe salinity problems. If water management could be improved and/or adapted deep water rice varieties could be grown during the deep flooding of the wet season two rice crops could be cultivated. Flooding in the wet season and salinity hazards in the dry season appear to be major constraints. Temperatures never drop below 17°C at night. Minimum temperatures are around 18°C and high radiation levels (over 600 mWhrcm<sup>-2</sup>) in September indicate this month to be optimal for the ripening period, provided that water supply is not a constraint during the crop growing period.

The Alaotra basin is another very important rice bowl of Madagascar. This wide swampy basin is protected from the direct impact of the NW monsoon, while it is only indirectly affected by the air streams of the SE trades. A cloud cover often obscures the sun during the dry season. In winter time the cool atmosphere causes fog over the relatively warm water surface of Lac Alaotra. Therefore radiation levels are much lower compared to the lowlands with similar rainfall regime. The wet period generally starts by the middle of December and ends sharply by late March. Total number of wet days is around 95 to 100 days and the temperature sum at this elevated basin during the wet period is only 2200°C. (Compare Marovoay with 2500°C during the same wet period of 95 days). During the dry period from May through October the minimum temperature is below 15°, dropping to 11°C (July, August). The rainfall and temperature regime do not make this region a typical rice growing area. The lake itself is very shallow (1.5 - 2.0 m deep), and reed growth and swampy conditions prevail in the southern part. The lake is gradually filling up with organic debris and sedimentary material from the surrounding hills.

The most important rice lands are on the western and southern border of the lake. According to the farmers proper water management is the major constraint. They cultivate the land with a small plough drawn by zebus at the onset of the first rains around October, November. Rice

is directly seeded in areas without proper water control. The irregular onset of the rainy season is a major problem. If the rain is delayed, then they have a serious weed problem, but if rainfall is too heavy the young emerging rice seedlings are submerged. Leveling of the gentle sloping terrain would help the farmers to control the water. They use traditional indica varieties without any fertilizers. According to them Japonica varieties are too sensitive for occasional droughts, while straw is too short. Harvesting takes place in May, which is too late for the fields located on the higher areas of the toposequence as they dry out more rapidly. Short duration varieties with some drought resistance may give better results. Yields vary from less than 2 ton/ha to around 4 ton/ha occasionally.

Another important region with a D4 climate is located East of the Plateau du Bemaraha and West of the Bongolava hills. In Miandrivazo (82) the 90 day wet period is also from the middle of December to the second half of March with a temperature sum of 2600°C. There appears to be sufficient precipitation for a single rainfed rice crop although the very abrupt end of the wet season poses serious problems for rainfed rice farmers.

#### 4.3.5 Zone E

This agroclimatic zone is characterized by a wet period of less than 75 days. Without additional water sources these regions are not suitable for wetland rainfed rice. Within zone E a small area is recognized having a E2 climate, with a dry period of less than 60 days. It can be found along the Northeast shore near Vohemar (B). While the PET ratio never exceeds 1.5, it is only less than 0.5 during about 40 days in September and October. Year round cultivation of many dryland crops is possible. The largest agroclimatic zone on Madagascar is zone E4.

*Zone E4* covers almost 25% of the island and is characterized by less than 75 wet days and 185 to 265 dry days. It is found along the West coast from Besalampy (I) until Morombe (V). It occupies most of the southwestern section of the island from the West coast till the Andringitra massif. It is bordered on its eastern side by D4 climate and on its southern side by the even drier E5 climate. The northeastern section of this zone (from Besalampy (I) in the North to Fenoarivo S (107) in the East) has a short wet season of 45-65 days. In Tambohorano (37) the wet season is from late December to late February, while the dry season commences in late March and lasts until November. In Fenoarivo Sud (107) located at an altitude of 750m in the eastern section of this climate unit there are only 45 wet days. In Morondava (R) on the west coast no month has a P/PET ratio of more than 1.5. The dry period is from late March until early December. This implies that there is a growing season for upland crops of around 100 days. Wetland rice cultivation is possible only near river systems during the rainy season, such as along the Mangoky River, and the Tsiribirina River. Because rainfall is low, total radiation in these areas is high and yields may be high if there is good water management.

In the Tanandava region along the Mangoky River an irrigation scheme was developed (Samangoky). Problems here are not the water supply, but water drainage. Due to the very high evaporation in the later part of the dry season there is a salinity problem. Almost all farmers in this region use variety IR8. After a seedbed period of 21-30 days seedlings are transplanted in rows (not at random as is often observed elsewhere). There are two rice crops per year. The first wet season crop is transplanted in December-January and harvested in May with yields up to 4 ton/ha. The second transplanting takes place in July-August and is harvested in November with yields up to 5 ton/ha. Both crops depend heavily on proper irrigation. Those farmers farthest away from the primary irrigation channel do not get enough water and may have a serious weed problem. There is a great need for diversity of rice genotypes since all farmers cultivate a single genotype IR8.

*Zone E5*. This zone, characterized by more than 265 dry days and no wet days, is the driest zone in Madagascar. It stretches from Morombe (V) with 285 dry days along the Southwest and South coast with increasing number of dry days. Toliara (X) has 335 dry days. Agriculture seems to be impossible in this region although the area is crossed by several rivers such as the Onilahy river and the Menaranara River in the South and the Mandrare River in the eastern section of this zone. They bring water during the rainy season to this area and allow the cultivation of crops along its border. In Ampanihy (140) P/PET ratio is around 0.75 in December and January, which leads to a short 90 day growing season for drought resistant upland crops. In Ambovombe (150) the P/PET ratio even during December and January is not more than 0.5. It should finally be

noted that this extremely dry zone extends along the South coast until it reaches the mountain formation (Chaines Anosyennes). Within a distance of less than 20 km the climatic regime changes from a very dry aridic type (E5) to a humid tropical A1 climate.

## 5 CONCLUDING REMARKS

In our presentation and discussion of the agroclimatic characterization of Madagascar, the great variability of the climatic conditions and the abrupt changes over short distances from very wet regions to dry regions have been emphasized. Each unit of land and practically each single valley appears to have its own agroclimatic conditions. The agroclimatic map should be considered as an attempt to organize, characterize and delineate zones of a certain homogeneity of climatic regime. Climatic zones usually reflect vegetation zones, but not necessarily agricultural zones. This is well illustrated in Madagascar. The bulk of rice land is located outside the most suitable humid tropical A1 zone. The majority of the rice lands are located in the Central highlands (39% of the total area), where climatic conditions are not highly favorable for rice cultivation, and where also soil conditions are not optimal. Suitable adaptations and improvements to adjust the actual environmental conditions to the crop requirements - in particular water management improvements and use of fertilizers -, are needed to further improve rice production. On the other hand an adjustment of the rice genotypes to the existing environmental conditions - cold tolerance in the central highlands; drought resistance in the regions with short wet seasons; adaptation to irregular water depths; salinity tolerance - is also needed. Cropping patterns should also be adjusted and related to the variations of the natural environment. In conclusion it can be said that agricultural research should be geared towards the components of the environment. The role of agricultural research is to identify the most suitable package of technology based among others on the characteristics of the site specific environment. This was stressed recently during an international workshop on agro-ecological characterization, classification and mapping, organized by the International Agricultural Research Centers and the Food and Agricultural Organization FAO: "The need to define agroclimatic conditions is essential 1) for the setting of research priorities; 2) for the allocation of research resources; 3) for the definition of specific constraints to focus research efforts; and 4) for recognizing climatic homologues for technology transfer" (Harris and Goebels, 1986).

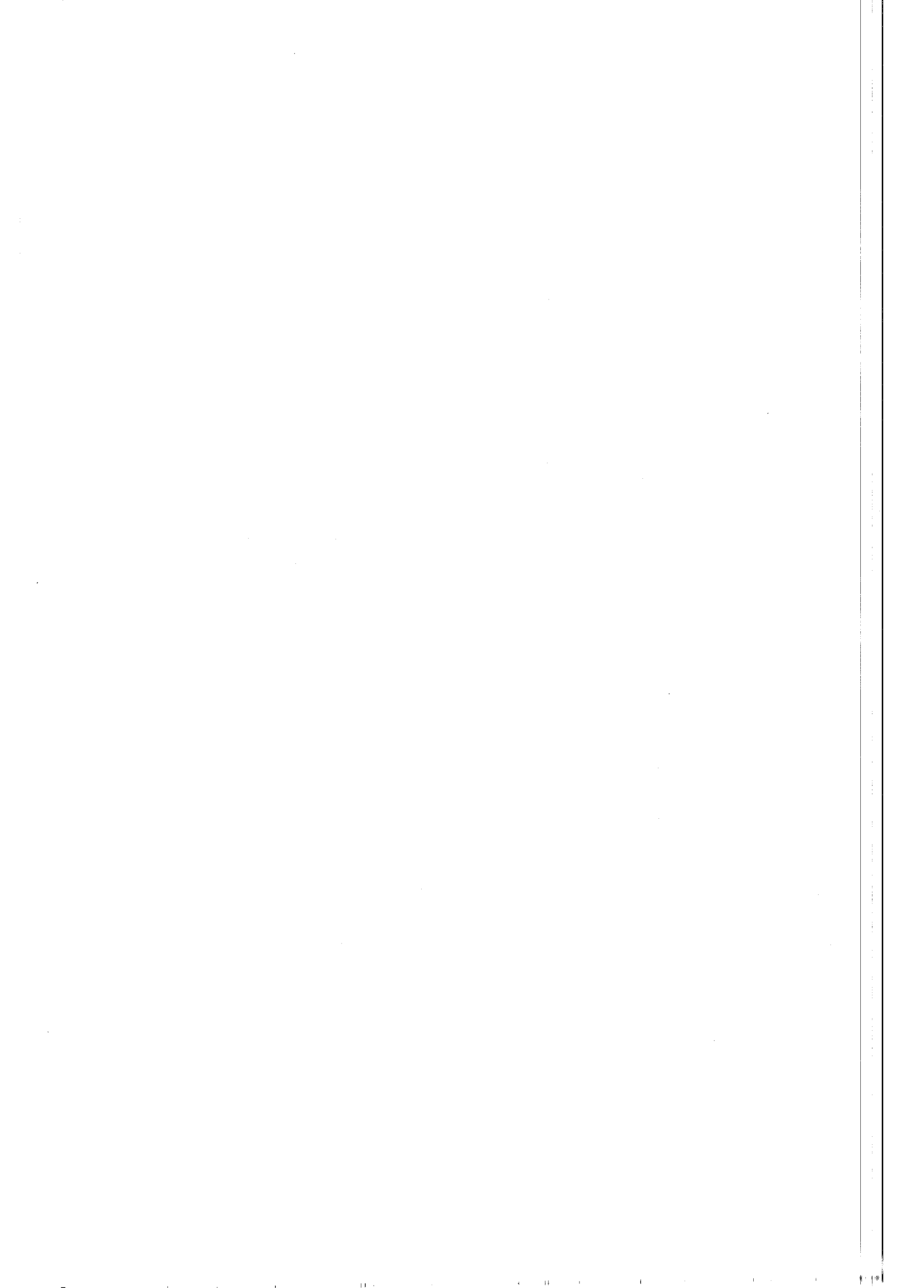
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## **Annex I**

### **Agroclimatic Databank of Madagascar**





## Annex I Agroclimatic Databank of Madagascar

Climatic data for a total of 178 sites in Madagascar have been collected and stored on diskettes. The climatic information was retrieved from different sources, indicated below. All data are monthly means of various lengths of record. The sites are arranged according to latitude from the most northern latitude to the most southern latitude ("from top to bottom and from left to right"). The first group of stations include synoptic stations. They were given IRMA codes from A through Y. The second group includes other climatic and rainfall stations. They were given IRMA code from 1 to 152. The stations are listed (page I to V) according to their latitude - longitude coordinates. They are also listed in alphabetical order for easy search (page VI to X). The listing include the following columns:

- Station name: The commonly used station name is given with the french name sometimes followed in brackets: Antseranana (Diego-Suarez)
- Coordinates: Latitude in degrees and minutes: 1217S means 12°17'South  
Longitude in degrees and minutes: 04918E means 49°18'East
- Altitude: in meters: 29 means 29 meters above sealevel
- IRMA: (IRRI-Madagascar code): these letters and numbers are also inserted on the agroclimatic map of Madagascar.
- Station number: number of station given by the Service Météorologique de Madagascar
- Period: historic period of observation
- ANS: number of years on which the average monthly rainfall is based. Only sites with a minimum of 10 years of observation are included. Out of 178 sites, 131 sites have at least 25 years of observation record; 16 sites have 20-24 years of record and 31 sites 10-15 years of record.

The data sheets per synoptic station include the following information. The first four lines give general information on the sites. There is one additional number code: CUIRRI. This is a code number assigned by the Climate Unit of IRRI.

e.g. Anteranana has code 1228049303. The first four numbers give the latitude in degrees and tenth of degrees: 12.28° (= 12°17'). The following five numbers indicate the longitude in degrees and tenth of degrees: 049.30° (= 49°18'). The last number indicate the global quadrant:

- 1 = northern latitude, eastern longitude
- 2 = northern latitude, western longitude
- 3 = southern latitude, eastern longitude
- 4 = southern latitude, western longitude

Finally sources of information are given:

- 1: Dufournet R., J. Marquette, and A. Courant. Atlas Météorologique, Institut de Recherches Agronomiques de Madagascar, ORSTOM. 94p.
- 2: Anonymous 1979. Liste des Stations météorologiques. A mimeograph of the Service Météorologique.
- 3: Dufournet, R., 1972. Régimes thermiques et pluviométriques des différents domaines climatiques de Madagascar. Revue de Géographie de l'Université de Madagascar. no. 340.
- 4: Haut Commissariat de la République Française à Madagascar et Dépendances, 1956. Publication du Service Météorologique. Température de l'air sous abri à Madagascar, aux Comores et à la Réunion, n° 25.
- 5: FAO, 1984. Agroclimatic databank of Africa, South of the equator.
- 6: Anonymous, 1958. Tableau climatologiques des Territoires Français de l'Océan Indien.
- 7: This numbers refers to computed values or estimated parameters such as daytime temperature, nighttime temperature, actual vapour pressure deficit, wind speed, total radiation, and potential evapotranspiration. (Methods of estimation are given in the technical report).

The databank gives monthly values of the following climatic parameters:

Période diurne (N)	Daylength in hours and tenths
Précipitations totales	Total monthly rainfall in mm
Jours de pluie => 1mm	Number of rainy days in excess of 1mm
Température maximum	Maximum temperature (average of the month) in °C
Température minimum	Minimum temperature (average of the month) in °C
Température moyenne	Mean temperature (average of the month) in °C
Température diurne	Daytime temperature (average of the month) in °C
Température nocturne	Nighttime temperature (average of the month) in °C
Rayonnement total	Total radiation expressed in megajoules per m <sup>2</sup>
Humidité rel. moyenne	Relative humidity expressed in percentage (mean 24 hours rel. hum.)
Pression de vapeur act.	Actual vapour pressure, expressed in millibar
Pression de vapeur def.	Vapour pressure deficit, expressed in millibar
Vitesse du vent	Wind velocity expressed in m per s. at 2m above ground surface.
Evapotranspiration pot.	Potential evapotranspiration, expressed in mm per month.

These climatic parameters were collected and estimated for all 25 synoptic stations. For the climatic and precipitation stations only daylength, rainfall, rainy days, and temperature values are given.

The agroclimatic databank of Madagascar is available as hard copy or as diskette at the Climate Unit of the International Rice Research Institute in Los Baños, Philippines.

LISTE DES STATIONS CLIMATOLOGIQUES DE MADAGASCAR  
(ARRANGEMENT SELON LES COORDINATES)  
STATIONS SYNOPTIQUES

NB.	STATION	COORDINATES	ALT.	IRMA	STA.NB.	PERIODE	ANS.
001	ANTSERANANA(DIEGO-SUAREZ)	1217S 04918E	29	A	67009	1931-60	30
002	IHARANA (VOHEMAR)	1322S 05000E	5	B	67017	1931-60	30
003	ANDOANY(HELL-VILLE)NOSY-BE	1324S 04817E	11	C	67012	1931-60	30
004	ANALALAVA	1438S 04746E	57	D	67019	1931-60	30
005	ANTALAHA	1500S 05020E	24	E	67025	1931-60	30
006	MAHAJANGA (MAJUNGA)	1540S 04621E	22	F	67027	1931-60	30
007	MANDRITSARA	1550S 04849E	350	G	67033	1931-60	30
008	MANANARA NRD.	1610S 04946E	5	H	XXXXX	1936-60	25
009	BESALAMPY	1645S 04429E	36	I	67037	1931-60	30
010	MAEVATANANA	1657S 04650E	77	J	67045	1931-60	30
011	AMBODIFOTATRA	1705S 04949E	10	K	67072	1931-60	30
012	AMBOHITSILAOZANA(ALAOTRA)	1738S 04830E	786	L	67067	1931-60	30
013	MAINTIRANO	1803S 04402E	25	M	XXXXX	1931-60	30
014	TAOMASINA (TAMATAVE)	1807S 04924E	3	N	67095	1931-60	30
015	ANTANANARIVO(OBSERVATOIRE)	1855S 04733E	1381	O	67085	1931-60	30
016	VATOMANDRY	1920S 04858E	3	P	67115	1931-60	30
017	MAHANORO	1950S 04848E	5	Q	67113	1931-60	30
018	MORONDAVA	2017S 04419E	8	R	67117	1931-60	30
019	AMBOSITRA	2032S 04714E	1245	S	67123	1931-60	30
020	MANANJARY	2112S 04822E	5	T	67143	1931-60	30
021	FIANARANTSOA	2127S 04708E	1106	U	67137	1931-60	30
022	MOROMBE	2145S 04322E	5	V	67131	1931-60	30
023	FARAFANGANA	2248S 04750E	6	W	67157	1931-60	30
024	TOLIARA (TULEAR)	2321S 04344E	8	X	67161	1931-60	30
025	TOLANARO-FORT DAUPHIN	2502S 04657E	8	Y	67197	1931-60	30

## II

LISTE DES STATIONS CLIMATOLOGIQUES DE MADAGASCAR  
(ARRANGEMENT SELON LES COORDINATES)  
STATIONS CLIMATOLOGIQUES ET PLUVIOMETRIQUES

NB.	STATION	COORDINATES	ALT.	IRMA	STA.NB.	PERIODE	ANS.
026	AMBAHIVAHIBE	1235S 04916E	370	1	XXXXX	1936-60	25
027	NOSY AKAO	1248S 04950E	25	2	XXXXX	1945-70	25
028	AMBILOBE	1312S 04909E	30	3	67015	1931-60	30
029	AMBANJA	1340S 04827E	40	4	67013	1931-60	30
030	MANAMBATO	1342S 04906E	400	5	XXXXX	1950-70	20
031	MANAKANA	1345S 05005E	150	6	XXXXX	1950-70	20
032	MAROMANDIA	1411S 04805E	38	7	XXXXX	1936-60	25
033	MANGINDRANO	1417S 04856E	1200	8	XXXXX	Avant 1950	+10
034	SAMBAVA	1417S 05010E	7	9	67023	1936-60	25
035	BEALANANA-BETAINKANKANA	1433S 04833E	1125	10	XXXXX	1936-60	25
036	ANDAPA	1439S 04937E	471	11	67022	1936-60	25
037	ANKIABE	1452S 04857E	1150	12	XXXXX	1957-70	14
038	ANTSOHIHY	1453S 04758E	28	13	XXXXX	1931-60	30
039	ANTSAKABARY	1502S 04857E	550	14	XXXXX	XXXX-XX	+10
040	ANTONIBE	1507S 04723E	5	15	XXXXX	1936-60	25
041	BEFANDRIANA NRD.	1513S 04832E	315	16	XXXXX	1931-60	30
042	MAROANTSETRA	1526S 04944E	2	17	67035	1931-60	30
043	PORT BERGE (VAOVAO)	1534S 04741E	22	18	XXXXX	1936-60	25
044	MAHAJAMBA	1542S 04705E	6	19	XXXXX	1931-60	30
045	SOALALA	1604S 04520E	4	20	67039	1931-60	30
046	MAMPIKONY	1606S 04738E	54	21	XXXXX	1936-70	35
047	MAROVOAY - MADIROKELY	1607S 04635E	20	22	67041	1931-60	30
048	MAROTANDRANO	1611S 04850E	500	23	XXXXX	XXXX-XX	+10
049	TSARAMANDROSO	1622S 04703E	100	24	XXXXX	XXXX-XX	+10
050	AMBATO - BOENI	1628S 04643E	40	25	67043	1941-70	30
051	AMPATAKAMARENY	1630S 04847E	850	26	XXXXX	XXXX-XX	+10
052	SITAMPIKY	1639S 04604E	200	27	XXXXX	1936-60	25
053	TSARATANANA	1647S 04739E	380	28	67047	1931-60	30
054	SOANIERANA-IVONGO	1655S 04935E	10	29	XXXXX	1936-60	25
055	ANTANIMENABAKA	1656S 04830E	1000	30	XXXXX	1956-70	15
056	BEKODOKA	1658S 04506E	300	31	XXXXX	1931-60	30
057	ANDILAMENA	1701S 04834E	935	32	67068	1936-70	35
058	MAHABE	1720S 04530E	500	33	XXXXX	1950-70	21
059	FENOARIVO (FENERIVE EST)	1723S 04925E	5	34	67069	1931-60	30
060	ANDRIAMENA	1726S 04727E	750	35	XXXXX	1936-60	25
061	KANDREHO	1728S 04605E	285	36	67057	1936-60	25
062	TAMBOHORANO	1731S 04358E	20	37	XXXXX	1931-60	30
063	ANDRIBA	1736S 04655E	625	38	67059	1936-60	25
064	ANTOKAZO	1736S 04833E	1050	39	XXXXX	XXXX-XX	+14
065	AMBATOMAINTY	1741S 04540E	350	40	XXXXX	1936-60	25

### III

LISTE DES STATIONS ....

NB.	STATION	COORDINATES	ALT.	IRMA	STA.NB.	PERIODE	ANS.
066	MANAKAMBAHINY-EST	1746S 04839E	990	41	XXXXX	XXXX-XX	+10
067	AMBATONDRAZAKA	1748S 04826E	767	42	67065	1941-69	29
068	MOROFENOBE	1749S 04456E	147	43	XXXXX	1936-60	25
069	VOHIDIALA	1751S 04815E	773	44	XXXXX	XXXX-XX	13
070	RENDRIRENDRY	1757S 04913E	550	45	XXXXX	XXXX-XX	+10
071	KIANGARA	1758S 04702E	900	46	XXXXX	1936-70	35
072	IVOLOINA	1803S 04919E	20	47	XXXXX	1931-60	30
073	KINANOMENA	1816S 04603E	800	48	XXXXX	1938-70	33
074	ANKAZOBE	1819S 04707E	1225	49	67081	1931-60	30
075	ANJOZOROBE	1823S 04753E	1550	50	XXXXX	1936-60	25
076	FENOARIVO OUEST	1828S 04632E	1100	51	XXXXX	1936-60	25
077	AMPANGABE	1828S 04817E	905	52	XXXXX	XXXX-XX	+10
078	TSIROANOMANDIDY	1846S 04603E	869	53	67079	1931-60	30
079	AMBODIRANO	1846S 04827E	923	54	XXXXX	XXXX-XX	+10
080	ANIVORANO - EST	1846S 04858E	15	55	XXXXX	1936-60	25
081	BRICKAVILLE(AMPASIMANOLOTRA	1848S 04904E	19	56	67091	1936-60	25
082	AMBOHIDRATRIMO	1849S 04727E	1300	57	XXXXX	1936-60	25
083	MAROVITSIKA	1850S 04805E	923	58	XXXXX	XXXX-XX	+10
084	NANISANA	1853S 04733E	1259	59	XXXXX	1936-60	25
085	ANJIRO	1853S 04757E	960	60	XXXXX	1936-60	25
086	MANJAKANDRIANA	1854S 04744E	1383	61	XXXXX	XXXX-XX	13
087	FANOVANA	1854S 04831E	720	62	XXXXX	1936-60	25
088	ANALAMAZAOTRA-PERINET	1855S 04824E	928	63	XXXXX	1931-60	30
089	MORAMANGA	1857S 04813E	912	64	67089	1931-60	30
090	MIARINARIVO	1858S 04653E	1330	65	XXXXX	XXXX-XX	19
091	ANTANAMALAZA	1859S 04751E	1515	66	XXXXX	1936-60	25
092	BABETVILLE-SAKAY	1901S 04627E	940	67	XXXXX	XXXX-XX	+5
093	MIADANIMERINA	1901S 04727E	1325	68	XXXXX	1936-60	25
094	MANTASOA	1901S 04750E	1400	69	XXXXX	XXXX-XX	23
095	MERIKANJAKA	1902S 04745E	1450	70	XXXXX	1936-60	25
096	MASOARIVO	1903S 04420E	40	71	XXXXX	1950-70	21
097	FIHASINANA	1904S 04742E	1600	72	XXXXX	1936-60	25
098	AMBALAVAO-CENTRE	1905S 04732E	1367	73	XXXXX	1936-60	25
099	SOAVINANDRIANA	1910S 04645E	1575	74	67103	1931-60	30
100	BEHENJY	1912S 04730E	1427	75	XXXXX	1936-60	25
101	ANDRAMASINA	1912S 04736E	1350	76	XXXXX	1936-60	25
102	AMBOHIMIADANA	1914S 04745E	1525	77	XXXXX	1931-60	30
103	AMBATOLAMPY-MANJAKATOMPA	1922S 04718E	1625	78	XXXXX	1936-60	25
104	AMBATOLAMPY	1922S 04726E	1555	78	67111	1936-70	35
105	FARATSIHO	1924S 04657E	1750	79	67106	1936-60	25

IV

LISTE DES STATIONS ....

NB.	STATION	COORDINATES	ALT.	IRMA	STA.NB.	PERIODE	ANS.
106	ANOSIBE	1926S 04812E	750	80	XXXXX	1931-60	30
107	NANOKELY	1931S 04702E	2020	81	XXXXX	XXXX-XX	+10
108	MIANDRIVAZO	1932S 04528E	71	82	XXXXX	1931-60	30
109	MANDOTO	1934S 04617E	915	83	XXXXX	1936-60	25
110	AMBOHIBARY	1937S 04707E	1640	84	67108	1931-60	30
111	TSINJOARIVO	1937S 04742E	1640	85	XXXXX	1931-60	30
112	ISALO	1943S 04527E	40	86	XXXXX	XXXX-XX	+10
113	ANTSIRABE	1952S 04701E	1506	87	67107	1931-60	30
114	BEREVO	1955S 04459E	23	88	XXXXX	1936-60	25
115	AMBATOLAMY	2001S 04532E	75	89	XXXXX	1941-70	30
116	MAROLAMBO	2003S 04808E	400	90	XXXXX	1931-60	30
117	MALAIMBANDY	2021S 04536E	162	91	67119	1936-60	25
118	MAHABO	2022S 04439E	75	92	XXXXX	XXXX-XX	12
119	ANKILIZATO	2025S 04502E	200	93	XXXXX	1949-70	22
120	AMPASINAMBO	2031S 04800E	480	94	XXXXX	1936-70	35
121	NOSY-VARIKA	2034S 04832E	16	95	67127	1931-60	30
122	MANDROSONORO	2035S 04600E	1050	96	XXXXX	1950-70	21
123	TSIMAZAVA	2041S 04542E	350	97	XXXXX	1949-70	22
124	AMBOROMPOTSY	2041S 04611E	1386	98	XXXXX	1936-60	25
125	AMBOHIMANGA DU SUD	2052S 04735E	610	99	XXXXX	XXXX-XX	7
126	IALATSARA	2102S 04711E	1400	100	XXXXX	1944-70	27
127	AMBOHIMAHASOA	2106S 04711E	1200	101	67139	1936-60	25
128	TSITONDROINA	2118S 04601E	1100	102	XXXXX	1932-70	39
129	IFANADIANA	2118S 04737E	450	103	67140	1931-60	30
130	KIANJAVATO	2122S 04753E	0	104	XXXXX	1955-70	16
131	MANJA	2126S 04420E	267	105	XXXXX	1936-60	25
132	BEROROHA	2140S 04510E	180	106	XXXXX	1936-60	25
133	FENOARIVO-SUD.	2143S 04623E	750	107	XXXXX	1950-70	21
134	BEMARIVO	2147S 04426E	80	108	XXXXX	1950-70	21
135	AMBALAVAO-SUD	2149S 04656E	1000	109	XXXXX	1936-60	25
136	SENDRISOA-BEANANA	2200S 04657E	1100	110	XXXXX	1950-70	21
137	BEFANDRIANA SUD	2206S 04352E	300	111	67159	XXXX-XX	20
138	ANTANIFOTSY	2206S 04654E	1900	112	XXXXX	1956-70	15
139	MANAKARA	2208S 04802E	4	113	67159	1931-60	30
140	ANKAZOABO-SUD	2217S 04431E	428	114	XXXXX	1931-60	30
141	SAKALALINA	2221S 04629E	400	115	XXXXX	1950-70	21
142	IHOSY	2224S 04608E	800	116	67153	1931-60	30
143	KARIANGA	2226S 04717E	310	117	XXXXX	1936-60	25
144	FOTIVOLO	2228S 04453E	850	118	XXXXX	1957-70	14
145	IVOHIBE	2229S 04651E	700	119	67154	1936-60	25

## LISTE DES STATIONS ....

NB.	STATION	COORDINATES	ALT.	IRMA	STA.NB.	PERIODE	ANS.
146	RANOHIRA	2233S 04524E	833	120	67152	1936-60	25
147	VONDROZO	2248S 04718E	80	121	XXXXX	1936-60	25
148	SAKARAHA	2255S 04432E	460	122	67151	1936-60	25
149	IAKORA	2306S 04639E	950	123	67167	1936-70	35
150	BETROKA	2317S 04605E	795	124	XXXXX	1931-60	30
151	BETANIMENA	2319S 04342E	5	125	XXXXX	1936-60	25
152	VAGAINDRANO	2322S 04735E	25	126	XXXXX	1936-60	25
153	BENENITRA	2326S 04505E	220	127	XXXXX	1936-60	25
154	BEZAHA	2330S 04431E	100	128	XXXXX	XXXX-XX	+10
155	MIDONGY-DU-SUD	2335S 04702E	500	129	67170	1936-60	25
156	BETIOKY SUD.	2343S 04423E	263	130	67162	1931-60	30
157	MANAMBONDRO	2348S 04734E	10	131	XXXXX	1949-70	22
158	BEFOTAKA-SUD	2350S 04658E	740	132	XXXXX	1938-70	33
159	ANTONDABE	2352S 04706E	325	133	XXXXX	1950-73	24
160	AMPARIHY-EST	2358S 04721E	30	134	XXXXX	XXXX-XX	+10
161	TSIVORY	2404S 04605E	399	135	XXXXX	1931-60	30
162	AMPADRANAVA	2407S 04543E	700	136	XXXXX	XXXX-XX	+10
163	BEKILY	2413S 04519E	400	137	XXXXX	1936-60	25
164	MANANTENINA	2417S 04718E	22	138	67189	1943-70	28
165	ESIRA	2418S 04643E	400	139	XXXXX	1936-60	25
166	AMPANIHY-OUEST	2441S 04445E	275	140	XXXXX	1931-60	30
167	TRANOROA	2443S 04503E	208	141	XXXXX	XXXX-XX	+10
168	ANTANIMORA	2450S 04540E	300	142	67181	1931-60	30
169	IFARANTSA	2455S 04651E	10	143	XXXXX	1936-60	25
170	BEHARA	2457S 04623E	55	144	XXXXX	XXXX-XX	+10
171	NAHAMPOANA	2457S 04657E	25	145	XXXXX	1936-60	25
172	ANDROKA	2502S 04404E	4	146	XXXXX	XXXX-XX	+10
173	AMPATOKA	2503S 04624E	67	147	XXXXX	XXXX-XX	+10
174	AMPASIMPOLAKA	2509S 04628E	67	148	XXXXX	1936-60	25
175	BELOHA	2510S 04503E	100	149	67191	1936-60	25
176	AMBOVOMBE	2511S 04606E	135	150	67195	1931-60	30
177	TSIHOMBE	2518S 04530E	64	151	XXXXX	1931-60	30
178	BETONTY (FAUX CAP)	2535S 04532E	22	152	67194	XXXX-XX	24



## VI

LISTE DES STATIONS CLIMATOLOGIQUES DE MADAGASCAR  
(ARRANGEMENT ALPHABETIQUE)

NB.	STATION	COORDINATES	ALT.	IRMA	STA.NB.	PERIODE	ANS.	PAGE
026	AMBAHIVAHIBE	1235S 04916E	370	1	XXXXX	1936-60	25	14
098	AMBALAVAO-CENTRE	1905S 04732E	1367	73	XXXXX	1936-60	25	38
135	AMBALAVAO-SUD	2149S 04656E	1000	109	XXXXX	1936-60	25	50
029	AMBANJA	1340S 04827E	40	4	67013	1931-60	30	15
050	AMBATO - BOENI	1628S 04643E	40	25	67043	1941-70	30	22
104	AMBATOLAMPY	1922S 04726E	1555	78	67111	1936-70	35	39
103	AMBATOLAMPY-MANJAKATOMPA	1922S 04718E	1625	78	XXXXX	1936-60	25	39
115	AMBATOLAMY	2001S 04532E	75	89	XXXXX	1941-70	30	43
065	AMBATOMAINTY	1741S 04540E	350	40	XXXXX	1936-60	25	27
067	AMBATONDRAZAKA	1748S 04826E	767	42	67065	1941-69	29	27
028	AMBILOBE	1312S 04909E	30	3	67015	1931-60	30	14
011	AMBODIFOTATRA	1705S 04949E	10	K	67072	1931-60	30	6
079	AMBODIRANO	1846S 04827E	923	54	XXXXX	XXXX-XX	+10	31
110	AMBOHIBARY	1937S 04707E	1640	84	67108	1931-60	30	41
082	AMBOHIDRATRIMO	1849S 04727E	1300	57	XXXXX	1936-60	25	32
127	AMBOHIMAHASOA	2106S 04711E	1200	101	67139	1936-60	25	47
125	AMBOHIMANGA DU SUD	2052S 04735E	610	99	XXXXX	XXXX-XX	7	46
102	AMBOHIMIADANA	1914S 04745E	1525	77	XXXXX	1931-60	30	39
012	AMBOHITSILAOZANA (ALAO TRA)	1738S 04830E	786	L	67067	1931-60	30	6
124	AMBOROMPOTSY	2041S 04611E	1386	98	XXXXX	1936-60	25	46
019	AMBOSITRA	2032S 04714E	1245	S	67123	1931-60	30	10
176	AMBOVOMBE	2511S 04606E	135	150	67195	1931-60	30	63
162	AMPADRANDAVA	2407S 04543E	700	136	XXXXX	XXXX-XX	+10	59
077	AMPANGABE	1828S 04817E	905	52	XXXXX	XXXX-XX	+10	31
166	AMPANIHY-OUEST	2441S 04445E	275	140	XXXXX	1931-60	30	60
160	AMPARIHY-EST	2358S 04721E	30	134	XXXXX	XXXX-XX	+10	58
174	AMPASIMPOLAKA	2509S 04628E	67	148	XXXXX	1936-60	25	63
120	AMPASINAMBO	2031S 04800E	480	94	XXXXX	1936-70	35	45
051	AMPATAKAMARORENY	1630S 04847E	850	26	XXXXX	XXXX-XX	+10	22
173	AMPATOKA	2503S 04624E	67	147	XXXXX	XXXX-XX	+10	62
004	ANALALAVA	1438S 04746E	57	D	67019	1931-60	30	2
088	ANALAMAZAOTRA-PERINET	1855S 04824E	928	63	XXXXX	1931-60	30	34
036	ANDAPA	1439S 04937E	471	11	67022	1936-60	25	17
057	ANDILAMENA	1701S 04834E	935	32	67068	1936-70	35	24
003	ANDOANY (HELL-VILLE) NOSY-BE	1324S 04817E	11	C	67012	1931-60	30	2
101	ANDRAMASINA	1912S 04736E	1350	76	XXXXX	1936-60	25	39
060	ANDRIAMENA	1726S 04727E	750	35	XXXXX	1936-60	25	25
063	ANDRIBA	1736S 04655E	625	38	67059	1936-60	25	26
172	ANDROKA	2502S 04404E	4	146	XXXXX	XXXX-XX	+10	62
080	ANIVORANO - EST	1846S 04858E	15	55	XXXXX	1936-60	25	32

## VII

## LISTE DES STATIONS....

NB.	STATION	COORDINATES	ALT.	IRMA	STA.NB.	PERIODE	ANS.	PAGE
085	ANJIRO	1853S 04757E	960	60	XXXXX	1936-60	25	33
075	ANJOZOROBE	1823S 04753E	1550	50	XXXXX	1936-60	25	30
140	ANKAZOABO-SUD	2217S 04431E	428	114	XXXXX	1931-60	30	51
074	ANKAZOBE	1819S 04707E	1225	49	67081	1931-60	30	30
097	ANKIABE	1452S 04857E	1150	12	XXXXX	1957-70	14	17
119	ANKILIZATO	2025S 04502E	200	93	XXXXX	1949-70	22	44
106	ANOSIBE	1926S 04812E	750	80	XXXXX	1931-60	30	40
005	ANTALAHA	1500S 05020E	24	E	67025	1931-60	30	3
091	ANTANAMALAZA	1859S 04751E	1515	66	XXXXX	1936-60	25	35
015	ANTANANARIVO (OBSERVATOIRE)	1855S 04733E	1381	0	67085	1931-60	30	8
138	ANTANIFOTSY	2206S 04654E	1900	112	XXXXX	1956-70	15	51
055	ANTANIMENABAKA	1656S 04830E	1000	30	XXXXX	1956-70	15	23
168	ANTANIMORA	2450S 04540E	300	142	67181	1931-60	30	61
064	ANTOKAZO	1736S 04833E	1050	39	XXXXX	XXXX-XX	+14	26
159	ANTONDABE	2352S 04706E	325	133	XXXXX	1950-73	24	58
040	ANTONIBE	1507S 04723E	5	15	XXXXX	1936-60	25	18
039	ANTSAKABARY	1502S 04857E	550	14	XXXXX	XXXX-XX	+10	18
001	ANTSERANANA (DIEGO-SUAREZ)	1217S 04918E	29	A	67009	1931-60	30	1
113	ANTSIRABE	1952S 04701E	1506	87	67107	1931-60	30	42
038	ANTSOHY	1453S 04758E	28	13	XXXXX	1931-60	30	18
092	BABETVILLE-SAKAY	1901S 04627E	940	67	XXXXX	XXXX-XX	+5	36
035	BEALANANA-BETAINKANKANA	1433S 04833E	1125	10	XXXXX	1936-60	25	17
041	BEFANDRIANA NRD.	1513S 04832E	315	16	XXXXX	1931-60	30	19
137	BEFANDRIANA SUD	2206S 04352E	300	111	67159	XXXX-XX	20	50
158	BEFOTAKA-SUD	2350S 04658E	740	132	XXXXX	1938-70	33	57
170	BEHARA	2457S 04623E	55	144	XXXXX	XXXX-XX	+10	61
100	BEHENJY	1912S 04730E	1427	75	XXXXX	1936-60	25	38
163	BEKILY	2413S 04519E	400	137	XXXXX	1936-60	25	59
056	BEKODOKA	1658S 04506E	300	31	XXXXX	1931-60	30	24
175	BELOHA	2510S 04503E	100	149	67191	1936-60	25	63
134	BEMARIVO	2147S 04426E	80	108	XXXXX	1950-70	21	49
153	BENENITRA	2326S 04505E	220	127	XXXXX	1936-60	25	56
114	BEREVO	1955S 04459E	23	88	XXXXX	1936-60	25	43
132	BEROROHA	2140S 04510E	180	106	XXXXX	1936-60	25	49
009	BESALAMPY	1645S 04429E	36	I	67037	1931-60	30	5
151	BETANIMENA	2319S 04342E	5	125	XXXXX	1936-60	25	55
156	BETIOKY SUD.	2343S 04423E	263	130	67162	1931-60	30	57
178	BETONTY (FAUX CAP)	2535S 04532E	22	152	67194	XXXX-XX	24	64
150	BETROKA	2317S 04605E	795	124	XXXXX	1931-60	30	55
154	BEZAHA	2330S 04431E	100	128	XXXXX	XXXX-XX	+10	56

## VIII

## LISTE DES STATIONS....

NB.	STATION	COORDINATES	ALT.	IRMA	STA.NB.	PERIODE	ANS.	PAGE
081	BRICKAVILLE (AMPASIMANOLOTRA)	1848S 04904E	19	56	67091	1936-60	25	32
165	ESIRA	2418S 04643E	400	139	XXXXX	1936-60	25	60
087	FANOVANA	1854S 04831E	720	62	XXXXX	1936-60	25	34
023	FARAFANGANA	2248S 04750E	6	W	67157	1931-60	30	12
105	FARATSIHO	1924S 04657E	1750	79	67106	1936-60	25	40
059	FENOARIVO (FENERIVE EST)	1723S 04925E	5	34	67069	1931-60	30	25
076	FENOARIVO OUEST	1828S 04632E	1100	51	XXXXX	1936-60	25	30
133	FENOARIVO-SUD.	2143S 04623E	750	107	XXXXX	1950-70	21	49
021	FIANARANTSOA	2127S 04708E	1106	U	67137	1931-60	30	11
097	FIHASINANA	1904S 04742E	1600	72	XXXXX	1936-60	25	37
144	FOTIVOLO	2228S 04453E	850	118	XXXXX	1957-70	14	53
149	IAKORA	2306S 04639E	950	123	67167	1936-70	35	54
126	IALATSARA	2102S 04711E	1400	100	XXXXX	1944-70	27	47
129	IFANADIANA	2118S 04737E	450	103	67140	1931-60	30	48
169	IFARANTSA	2455S 04651E	10	143	XXXXX	1936-60	25	61
002	IHARANA (VOHEMAR)	1322S 05000E	5	B	67017	1931-60	30	1
142	IHOSY	2224S 04608E	800	116	67153	1931-60	30	52
112	ISALO	1943S 04527E	40	86	XXXXX	XXXX-XX	+10	42
145	IVOHIBE	2229S 04651E	700	119	67154	1936-60	25	53
072	IVOLOINA	1803S 04919E	20	47	XXXXX	1931-60	30	29
061	KANDREHO	1728S 04605E	285	36	67057	1936-60	25	25
143	KARIANGA	2226S 04717E	310	117	XXXXX	1936-60	25	52
071	KIANGARA	1758S 04702E	900	46	XXXXX	1936-70	35	29
130	KIANJAVATO	2122S 04753E	0	104	XXXXX	1955-70	16	48
073	KINANOMENA	1816S 04603E	800	48	XXXXX	1938-70	33	29
010	MAEVATANANA	1657S 04650E	77	J	67045	1931-60	30	5
058	MAHABE	1720S 04530E	500	33	XXXXX	1950-70	21	24
118	MAHABO	2022S 04439E	75	92	XXXXX	XXXX-XX	12	44
044	MAHAJAMBA	1542S 04705E	6	19	XXXXX	1931-60	30	20
006	MAHAJANGA (MAJUNGA)	1540S 04621E	22	F	67027	1931-60	30	3
017	MAHANORO	1950S 04848E	5	Q	67113	1931-60	30	9
013	MAINTIRANO	1803S 04402E	25	M	XXXXX	1931-60	30	7
117	MALAIMBANDY	2021S 04536E	162	91	67119	1936-60	25	44
046	MAMPIKONY	1606S 04738E	54	21	XXXXX	1936-70	35	20
066	MANAKAMBAHINY-EST	1746S 04839E	990	41	XXXXX	XXXX-XX	+10	27
031	MANAKANA	1345S 05005E	150	6	XXXXX	1950-70	20	15
139	MANAKARA	2208S 04802E	4	113	67159	1931-60	30	51
030	MANAMBATO	1342S 04906E	400	5	XXXXX	1950-70	20	15
157	MANAMBONDRO	2348S 04734E	10	131	XXXXX	1949-70	22	57
008	MANANARA NRD.	1610S 04946E	5	H	XXXXX	1936-60	25	4

## IX

## LISTE DES STATIONS....

NB.	STATION	COORDINATES	ALT.	IRMA	STA.NB.	PERIODE	ANS.	PAGE
020	MANANJARY	2112S 04822E	5	T	67143	1931-60	30	10
164	MANANTENINA	2417S 04718E	22	138	67189	1943-70	28	59
109	MANDOTO	1934S 04617E	915	83	XXXXX	1936-60	25	41
007	MANDRITSARA	1550S 04849E	350	G	67033	1931-60	30	4
122	MANDROSONORO	2035S 04600E	1050	96	XXXXX	1950-70	21	45
033	MANGINDRANO	1417S 04856E	1200	8	XXXXX	Avant1950	+10	16
131	MANJA	2126S 04420E	267	105	XXXXX	1936-60	25	48
086	MANJAKANDRIANA	1854S 04744E	1383	61	XXXXX	XXXX-XX	13	34
094	MANTASOA	1901S 04750E	1400	69	XXXXX	XXXX-XX	23	36
042	MAROANTSETRA	1526S 04944E	2	17	67035	1931-60	30	19
116	MAROLAMBO	2003S 04808E	400	90	XXXXX	1931-60	30	43
032	MAROMANDIA	1411S 04805E	38	7	XXXXX	1936-60	25	16
048	MAROTANDRANO	1611S 04850E	500	23	XXXXX	XXXX-XX	+10	21
083	MAROVITSIKA	1850S 04805E	923	58	XXXXX	XXXX-XX	+10	33
047	MAROVOAY - MADIROKELY	1607S 04635E	20	22	67041	1931-60	30	21
096	MASOARIVO	1903S 04420E	40	71	XXXXX	1950-70	21	37
095	MERIKANJAKA	1902S 04745E	1450	70	XXXXX	1936-60	25	37
093	MIADANIMERINA	1901S 04727E	1325	68	XXXXX	1936-60	25	36
108	MIANDRIVAZO	1932S 04528E	71	82	XXXXX	1931-60	30	41
090	MIARINARIVO	1858S 04653E	1330	65	XXXXX	XXXX-XX	19	35
155	MIDONGY-DU-SUD	2335S 04702E	500	129	67170	1936-60	25	56
089	MORAMANGA	1857S 04813E	912	64	67089	1931-60	30	35
068	MOROFENOBE	1749S 04456E	147	43	XXXXX	1936-60	25	28
022	MOROMBE	2145S 04322E	5	V	67131	1931-60	30	11
018	MORONDAVA	2017S 04419E	8	R	67117	1931-60	30	9
171	NAHAMPOANA	2457S 04657E	25	145	XXXXX	1936-60	25	62
084	NANISANA	1853S 04733E	1259	59	XXXXX	1936-60	25	33
107	NANOKELY	1931S 04702E	2020	81	XXXXX	XXXX-XX	+10	40
027	NOSY AKAO	1248S 04950E	25	2	XXXXX	1945-70	25	14
121	NOSY-VARIKA	2034S 04832E	16	95	67127	1931-60	30	45
043	PORT BERGE (VAOVAO)	1534S 04741E	22	18	XXXXX	1936-60	25	19
146	RANOHIRA	2233S 04524E	833	120	67152	1936-60	25	53
070	RENDRIRENDRY	1757S 04913E	550	45	XXXXX	XXXX-XX	+10	28
141	SAKALALINA	2221S 04629E	400	115	XXXXX	1950-70	21	52
148	SAKARANA	2255S 04432E	460	122	67151	1936-60	25	54
034	SAMBAVA	1417S 05010E	7	9	67023	1936-60	25	16
136	SENDRISOA-BEANANA	2200S 04657E	1100	110	XXXXX	1950-70	21	50
052	SITAMPIKY	1639S 04604E	200	27	XXXXX	1936-60	25	22
045	SOALALA	1604S 04520E	4	20	67039	1931-60	30	20
054	SOANIERANA-IVONGO	1655S 04935E	10	29	XXXXX	1936-60	25	23

## LISTE DES STATIONS....

NB.	STATION	COORDINATES	ALT.	IRMA	STA.NB.	PERIODE	ANS.	PAGE
099	SOAVINANDRIANA	1910S 04645E	1575	74	67103	1931-60	30	38
062	TAMBOHORANO	1731S 04358E	20	37	XXXXX	1931-60	30	26
014	TAOMASINA (TAMATAVE)	1807S 04924E	3	N	67095	1931-60	30	7
025	TOLANARO-FORT DAUPHIN	2502S 04657E	8	Y	67197	1931-60	30	13
024	TOLIARA (TULEAR)	2321S 04344E	8	X	67161	1931-60	30	12
167	TRANOROA	2443S 04503E	208	141	XXXXX	XXXX-XX	+10	60
049	TSARAMANDROSO	1622S 04703E	100	24	XXXXX	XXXX-XX	+10	21
053	TSARATANANA	1647S 04739E	380	28	67047	1931-60	30	23
177	TSIHOMBE	2518S 04530E	64	151	XXXXX	1931-60	30	64
123	TSIMAZAVA	2041S 04542E	350	97	XXXXX	1949-70	22	46
111	TSINJOARIVO	1937S 04742E	1640	85	XXXXX	1931-60	30	42
078	TSIROANOMANDIDY	1846S 04603E	869	53	67079	1931-60	30	31
128	TSITONDROINA	2118S 04601E	1100	102	XXXXX	1932-70	39	47
161	TSIVORY	2404S 04605E	399	135	XXXXX	1931-60	30	58
152	VAGAINDRANO	2322S 04735E	25	126	XXXXX	1936-60	25	55
016	VATOMANDRY	1920S 04858E	3	P	67115	1931-60	30	8
069	VOHIDIALA	1751S 04815E	773	44	XXXXX	XXXX-XX	13	28
147	VONDROZO	2248S 04718E	80	121	XXXXX	1936-60	25	54

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : ANTSERANANA(DIEGO-SUAREZ) LATITUDE : 12 DEG 17 MIN SOUTH PERIODE D'OBSERVATION : 1931-60  
 No. IRMA : A LONGITUDE : 049 DEG 18 MIN EAST Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 1228049303 ALTITUDE : 29 METERS SOURCES : 1,3,5,7  
 No. SERVICE MET: 67009

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.5	11.7	12.0	12.4	12.7	12.8	12.7	12.5	12.1	11.8	11.5	11.4	
PRECIPITATIONS TOTALES	mm	(3)	6	7	5	11	28	111	277	211	187	56	8	8	915
JOURS DE PLUIES =>1 mm		(3)	2	2	1	2	3	9	16	15	11	5	1	2	69
TEMPERATURE MINIMUM	C	(1)	21.5	21.3	21.6	22.6	23.7	24.6	24.4	23.9	24.5	23.9	23.5	22.2	23.1
TEMPERATURE MAXIMUM	C	(1)	29.4	29.2	29.6	30.4	30.8	31.9	31.4	31.1	31.7	31.5	31.4	30.1	30.7
TEMPERATURE MOYENNE	C	(1)	25.5	25.3	25.6	26.5	27.3	28.3	27.9	27.5	28.1	27.7	27.5	26.2	27.0
TEMPERATURE DIURNE	C	(7)	26.9	26.7	27.0	27.9	28.6	29.6	29.1	28.8	29.4	29.1	28.9	27.6	28.3
TEMPERATURE NOCTURNE	C	(7)	24.2	23.9	24.2	25.0	25.9	26.8	26.5	26.1	26.8	26.4	26.2	24.9	25.6
RAYONNEMENT TOTAL	MJ/m2	(5)	17.1	19.7	23.4	25.8	24.2	22.2	19.7	20.5	21.5	22.8	19.0	16.9	21.1
HUMIDITE REL.MOYENNE	%	(7)	62	60	63	64	71	72	75	78	75	74	63	65	69
PRESSION DE VAPEUR ACT.	mbr	(5)	20.2	19.3	20.8	22.1	25.6	27.7	28.3	28.6	28.6	27.5	23.0	22.0	24.5
PRESSION DE VAPEUR DEF.	mbr	(7)	12.4	13.0	12.0	12.5	10.7	10.8	9.3	8.1	9.4	9.7	13.7	12.0	11.1
VITESSE DU VENT	m/s	(5)	5.0	5.4	5.6	5.8	4.8	3.2	2.8	2.6	3.0	3.8	4.2	4.6	4.2
EVAPOTRANSPIRATION POT.	mm	(7)	162	183	196	220	196	180	161	137	162	167	166	145	2075

STATION (SITE) : IHARANA (VOHEMAR) LATITUDE : 13 DEG 22 MIN SOUTH PERIODE D'OBSERVATION : 1931-60  
 No. IRMA : 8 LONGITUDE : 050 DEG 00 MIN EAST Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 1336050003 ALTITUDE : 5 METERS SOURCES : 1,3,6,7  
 No. SERVICE MET: 67017

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.4	11.7	12.0	12.4	12.7	12.9	12.8	12.5	12.2	11.8	11.5	11.3	
PRECIPITATIONS TOTALES	mm	(3)	67	77	58	60	91	194	204	180	175	155	71	80	1412
JOURS DE PLUIES =>1 mm		(3)	10	11	9	8	10	13	14	12	13	11	11	10	132
TEMPERATURE MINIMUM	C	(1)	19.7	19.5	19.9	20.8	22.3	23.2	23.8	23.7	23.5	23.0	21.9	20.3	21.8
TEMPERATURE MAXIMUM	C	(1)	26.7	26.8	27.6	28.7	29.8	30.5	30.8	30.9	30.9	30.3	29.3	27.9	29.2
TEMPERATURE MOYENNE	C	(1)	23.2	23.2	23.8	24.8	26.1	26.4	27.3	27.3	27.2	26.7	25.6	24.1	25.5
TEMPERATURE DIURNE	C	(7)	24.5	24.5	25.2	26.2	27.4	27.7	28.5	28.6	28.5	28.0	26.9	25.5	26.8
TEMPERATURE NOCTURNE	C	(7)	22.0	21.9	22.4	23.3	24.6	24.9	25.9	25.9	25.8	25.4	24.4	22.9	24.1
RAYONNEMENT TOTAL	MJ/m2	(7)	15.9	18.2	20.8	22.8	22.7	22.0	20.7	20.1	19.5	18.9	17.2	16.0	19.6
HUMIDITE REL.MOYENNE	%	(6)	78	77	80	81	82	83	84	84	84	81	79	77	81
PRESSION DE VAPEUR ACT.	mbr	(7)	22.2	21.9	23.6	25.4	27.7	28.6	30.5	30.5	30.3	28.4	25.9	23.1	26.5
PRESSION DE VAPEUR DEF.	mbr	(7)	6.3	6.5	5.9	5.9	6.1	5.9	5.8	5.8	5.8	6.7	6.9	6.9	6.2
VITESSE DU VENT	m/s	(6)	3.8	3.8	3.8	3.8	3.8	3.8	3.0	2.6	2.6	3.8	3.8	3.8	3.5
EVAPOTRANSPIRATION POT.	mm	(7)	108	123	135	155	157	158	155	135	139	135	123	108	1631

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : ANDOANY(HELL-VILLE)NOSY-BE LATITUDE : 13 DEG 24 MIN SOUTH PERIODE D'OBSERVATION : 1931-60  
 No. IRMA : C LONGITUDE : 048 DEG 17 MIN EAST Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 1340048283 ALTITUDE : 11 METERS SOURCES : 1,3,5,7  
 No. SERVICE MET: 67012

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.4	11.7	12.0	12.4	12.7	12.9	12.8	12.5	12.2	11.8	11.5	11.3	
PRECIPITATIONS TOTALES	mm	(3)	33	40	49	96	189	362	466	425	287	141	58	49	2195
JOURS DE PLUIES =>1 mm		(3)	4	6	6	9	12	18	20	18	16	10	5	5	129
TEMPERATURE MINIMUM	C	(1)	19.5	19.7	20.6	21.7	22.6	23.0	23.3	23.3	23.7	23.2	21.9	20.5	21.9
TEMPERATURE MAXIMUM	C	(1)	28.7	29.1	29.9	30.8	31.2	31.3	30.6	30.9	31.4	31.5	30.6	29.2	30.4
TEMPERATURE MOYENNE	C	(1)	24.1	24.4	25.3	26.3	26.9	27.2	27.0	27.1	27.6	27.4	26.3	24.9	26.2
TEMPERATURE DIURNE	C	(7)	25.8	26.1	27.0	27.9	28.4	28.7	28.3	28.4	29.0	28.9	27.9	26.5	27.7
TEMPERATURE NOCTURNE	C	(7)	22.6	22.8	23.6	24.6	25.2	25.5	25.5	25.6	26.2	25.9	24.9	23.5	24.7
RAYONNEMENT TOTAL	MJ/m2	(5)	17.6	19.8	22.4	24.2	23.3	21.4	20.4	20.2	19.8	19.7	18.4	16.5	20.3
HUMIDITE REL.MOYENNE	%	(7)	77	75	74	73	79	84	87	87	85	82	80	79	80
PRESSION DE VAPEUR ACT.	mbr	(5)	23.0	22.8	24.0	25.1	28.1	30.2	31.0	31.3	31.3	30.0	27.3	25.0	27.4
PRESSION DE VAPEUR DEF.	mbr	(7)	7.0	7.8	8.3	9.1	7.3	5.9	4.7	4.6	5.6	6.5	6.9	6.5	6.7
VITESSE DU VENT	m/s	(5)	1.2	1.4	1.4	1.6	1.4	1.2	1.4	1.2	1.2	1.0	1.0	1.0	1.2
EVAPOTRANSPIRATION POT.	mm	(7)	97	115	133	157	150	143	137	123	133	121	108	91	1508

STATION (SITE) : ANALALAVA LATITUDE : 14 DEG 38 MIN SOUTH PERIODE D'OBSERVATION : 1931-60  
 No. IRMA : D LONGITUDE : 047 DEG 46 MIN EAST Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 1463047763 ALTITUDE : 57 METERS SOURCES : 1,3,5,7  
 No. SERVICE MET: 67019

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	5	3	12	55	202	308	522	455	256	77	10	6	1911
JOURS DE PLUIES =>1 mm		(3)	1	0.3	1	4	10	14	20	16	13	5	1	0.4	86
TEMPERATURE MINIMUM	C	(1)	19.5	19.6	20.1	21.4	22.5	23.0	23.0	23.1	23.1	22.7	21.5	20.0	21.6
TEMPERATURE MAXIMUM	C	(1)	30.7	31.4	31.8	31.9	31.5	31.0	30.2	30.4	31.3	32.1	32.2	30.8	31.3
TEMPERATURE MOYENNE	C	(1)	25.1	25.5	26.0	26.7	27.0	27.0	26.6	26.8	27.2	27.4	26.9	25.4	26.5
TEMPERATURE DIURNE	C	(7)	27.1	27.6	28.1	28.6	28.6	28.4	27.9	28.1	28.7	29.1	28.8	27.4	28.2
TEMPERATURE NOCTURNE	C	(7)	23.3	23.5	23.9	24.7	25.2	25.4	25.1	25.4	25.7	25.8	25.1	23.7	24.7
RAYONNEMENT TOTAL	MJ/m2	(5)	18.0	20.5	23.1	25.2	24.5	21.6	20.5	21.3	20.3	20.7	19.1	17.6	21.0
HUMIDITE REL.MOYENNE	%	(7)	57	57	59	65	73	79	81	82	78	71	61	59	69
PRESSION DE VAPEUR ACT.	mbr	(5)	18.1	18.6	19.8	22.6	26.0	28.1	28.2	29.0	28.2	26.0	21.6	19.1	23.8
PRESSION DE VAPEUR DEF.	mbr	(7)	13.8	14.0	13.8	12.4	9.7	7.6	6.6	6.2	7.9	10.5	13.8	13.3	10.8
VITESSE DU VENT	m/s	(5)	2.0	2.2	2.5	2.4	2.2	1.8	1.9	1.8	1.8	1.6	1.7	1.7	2.0
EVAPOTRANSPIRATION POT.	mm	(7)	117	135	158	178	172	153	140	131	143	136	126	100	1689

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : ANTALAHA	LATITUDE : 15 DEG 00 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : E	LONGITUDE : 050 DEG 20 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1500050333	ALTITUDE : 24 METERS	SOURCES : 1,3,5,7
No. SERVICE MET: 67025		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	148	132	104	76	114	211	260	246	267	281	150	162	2151
JOURS DE PLUIES =>1 mm		(3)	18	17	14	11	11	14	15	15	14	15	13	16	173
TEMPERATURE MINIMUM	C	(1)	18.4	18.1	18.5	19.4	21.0	21.9	22.4	22.5	22.4	21.9	20.8	19.3	20.6
TEMPERATURE MAXIMUM	C	(1)	25.6	25.7	26.4	27.6	29.2	29.8	30.6	30.6	30.3	29.4	28.0	26.7	28.3
TEMPERATURE MOYENNE	C	(1)	22.0	21.9	22.5	23.5	25.1	25.9	26.5	27.3	27.9	28.0	27.8	27.1	25.7
TEMPERATURE DIURNE	C	(7)	23.3	23.3	23.9	25.0	26.5	27.3	27.9	28.0	27.8	27.1	25.7	24.4	25.9
TEMPERATURE NOCTURNE	C	(7)	20.8	20.6	21.1	21.9	23.4	24.3	24.8	25.0	24.9	24.4	23.2	21.8	23.0
RAYONNEMENT TOTAL	MJ/m2	(5)	15.3	18.1	21.0	21.9	22.0	20.3	20.6	21.3	18.6	18.8	17.3	15.5	19.2
HUMIDITE REL.MOYENNE	%	(7)	82	83	80	79	81	83	85	82	84	84	83	83	82
PRESSION DE VAPEUR ACT.	mbr	(5)	21.7	21.8	21.8	23.0	25.7	27.6	29.3	28.5	28.8	27.6	25.3	23.3	25.4
PRESSION DE VAPEUR DEF.	mbr	(7)	4.7	4.5	5.5	6.0	6.2	5.8	5.3	6.3	5.6	5.4	5.3	4.8	5.5
VITESSE DU VENT	m/s	(5)	2.6	2.6	2.6	2.6	2.2	2.0	2.0	2.0	1.8	2.4	2.4	2.4	2.3
EVAPOTRANSPIRATION POT.	mm	(7)	89	102	120	139	141	139	143	133	126	116	104	84	1436

STATION (SITE) : MAHAJANGA (MAJUNGA)	LATITUDE : 15 DEG 40 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : F	LONGITUDE : 046 DEG 21 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1566046353	ALTITUDE : 22 METERS	SOURCES : 1,3,5,7
No. SERVICE MET: 67027		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	1	2	3	24	110	243	466	370	282	57	8	3	1569
JOURS DE PLUIES =>1 mm		(3)	0.2	0.5	0.5	2	6	12	18	16	12	4	0.6	0.3	72
TEMPERATURE MINIMUM	C	(1)	19.4	19.6	20.7	22.2	23.6	23.8	23.5	23.7	23.8	23.5	21.7	20.1	22.1
TEMPERATURE MAXIMUM	C	(1)	30.1	31.0	31.6	32.4	32.1	31.5	30.7	31.2	31.5	32.4	31.6	30.3	31.4
TEMPERATURE MOYENNE	C	(1)	24.8	25.3	26.2	27.3	27.9	27.7	27.1	27.5	27.7	28.0	26.7	25.2	26.8
TEMPERATURE DIURNE	C	(7)	26.8	27.4	28.2	29.1	29.4	29.0	28.4	28.8	29.1	29.6	28.5	27.1	28.5
TEMPERATURE NOCTURNE	C	(7)	23.1	23.4	24.2	25.3	26.2	26.1	25.6	26.0	26.3	26.4	25.1	23.6	25.1
RAYONNEMENT TOTAL	MJ/m2	(5)	17.8	20.1	22.9	25.1	24.4	21.7	19.7	19.8	19.8	20.9	18.9	17.3	20.7
HUMIDITE REL.MOYENNE	%	(7)	60	59	62	65	69	78	84	84	81	72	65	65	70
PRESSION DE VAPEUR ACT.	mbr	(5)	18.7	19.0	21.1	23.5	26.1	29.1	30.0	30.7	30.0	27.1	22.8	20.8	24.9
PRESSION DE VAPEUR DEF.	mbr	(7)	12.6	13.3	12.9	12.8	11.5	8.1	5.9	6.0	7.2	10.7	12.2	11.3	10.4
VITESSE DU VENT	m/s	(5)	2.8	2.8	3.2	3.2	3.0	2.4	2.4	2.4	2.4	2.2	2.4	2.4	2.6
EVAPOTRANSPIRATION POT.	mm	(7)	129	138	161	186	181	162	144	133	144	142	129	107	1756



## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MANDRITSARA	LATITUDE : 15 DEG 50 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : G	LONGITUDE : 048 DEG 49 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1583048813	ALTITUDE : 350 METERS	SOURCES : 1,3,6,7
No. SERVICE MET: 67033		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.9	13.1	13.0	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	3	4	3	10	86	199	315	284	223	37	6	2	1172
JOURS DE PLUIES =>1 mm		(3)	1	1	0.5	1	5	10	16	15	12	3	1	1	67
TEMPERATURE MINIMUM	C	(1)	15.4	15.6	16.1	17.6	19.5	20.9	21.3	21.1	21.2	19.9	17.7	16.0	18.5
TEMPERATURE MAXIMUM	C	(1)	26.9	27.0	28.6	30.7	32.8	32.8	31.0	31.6	32.0	31.6	30.1	28.2	30.3
TEMPERATURE MOYENNE	C	(1)	21.2	21.4	22.4	24.0	26.2	26.9	26.2	26.4	26.7	25.8	24.0	22.1	24.4
TEMPERATURE DIURNE	C	(7)	23.3	23.5	24.6	26.3	28.5	29.0	27.9	28.3	28.6	27.9	26.3	24.3	26.5
TEMPERATURE NOCTURNE	C	(7)	19.3	19.5	20.2	21.5	23.5	24.4	24.2	24.3	24.7	23.8	22.0	20.2	22.3
RAYONNEMENT TOTAL	MJ/m2	(7)	14.3	16.3	19.2	21.7	22.2	21.6	20.5	19.8	18.7	17.1	15.7	13.8	18.4
HUMIDITE REL.MOYENNE	%	(6)	63	60	57	54	56	62	72	73	72	68	64	63	64
PRESSION DE VAPEUR ACT.	mbr	(7)	15.9	15.3	15.4	16.1	19.1	22.0	24.5	25.1	25.2	22.6	19.1	16.8	19.8
PRESSION DE VAPEUR DEF.	mbr	(7)	9.3	10.2	11.7	13.7	15.0	13.5	9.5	9.3	9.8	10.6	10.7	9.8	11.1
VITESSE DU VENT	m/s	(7)	2.1	2.3	2.5	2.4	2.1	1.9	1.9	1.8	1.8	1.7	1.8	1.8	2.0
EVAPOTRANSPIRATION POT.	mm	(7)	93	113	138	168	171	164	151	133	138	119	107	89	1584

STATION (SITE) : MANANARA NRD.	LATITUDE : 16 DEG 10 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : H	LONGITUDE : 049 DEG 46 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1616049763	ALTITUDE : 5 METERS	SOURCES : 1,3,6,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.6	12.2	11.8	11.4	11.1	
PRECIPITATIONS TOTALES	mm	(3)	159	156	115	100	126	234	330	309	364	280	161	169	2503
JOURS DE PLUIES =>1 mm		(3)	19	20	16	13	13	16	17	16	17	15	15	16	193
TEMPERATURE MINIMUM	C	(1)	17.7	17.6	18.9	18.5	20.6	22.2	22.7	22.6	22.5	21.6	19.9	19.0	20.3
TEMPERATURE MAXIMUM	C	(1)	25.9	25.9	26.6	27.6	29.1	30.2	30.9	30.6	30.4	29.5	27.9	26.0	28.4
TEMPERATURE MOYENNE	C	(1)	21.8	21.8	22.8	23.1	24.9	26.2	26.8	26.6	26.5	25.6	23.9	22.5	24.4
TEMPERATURE DIURNE	C	(7)	23.3	23.3	24.2	24.7	26.4	27.6	28.2	28.0	27.9	27.0	25.4	23.8	25.8
TEMPERATURE NOCTURNE	C	(7)	20.5	20.4	21.4	21.3	23.2	24.5	25.1	25.0	25.0	24.2	22.6	21.4	22.9
RAYONNEMENT TOTAL	MJ/m2	(7)	14.1	16.1	18.3	21.4	22.6	22.0	21.4	20.7	18.7	17.1	15.1	13.8	18.4
HUMIDITE REL.MOYENNE	%	(6)	80	78	77	75	76	77	78	79	80	80	80	80	78
PRESSION DE VAPEUR ACT.	mbr	(7)	20.9	20.4	21.4	21.2	23.9	26.2	27.5	27.5	27.7	26.3	23.7	21.8	24.0
PRESSION DE VAPEUR DEF.	mbr	(7)	5.2	5.7	6.4	7.1	7.6	7.8	7.8	7.3	6.9	6.6	5.9	5.5	6.7
VITESSE DU VENT	m/s	(6)	2.2	2.6	2.6	3.0	3.4	3.0	3.0	2.6	2.6	2.2	3.0	2.2	2.7
EVAPOTRANSPIRATION POT.	mm	(7)	83	101	114	150	157	160	160	136	135	112	102	80	1490

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : BESALAMPY	LATITUDE : 16 DEG 45 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : I	LONGITUDE : 044 DEG 29 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1675044483	ALTITUDE : 36 METERS	SOURCES : 1,3,6,7
No. SERVICE MET: 67037		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(3)	0.2	2	8	12	72	195	425	322	192	37	5	2	1272
JOURS DE PLUIES =>1 mm		(3)	0.1	0.5	1	1	5	11	16	15	11	4	0.5	0.4	66
TEMPERATURE MINIMUM	C	(1)	16.5	17.4	19.1	20.9	22.1	22.9	22.9	23.1	22.8	22.1	19.2	17.1	20.5
TEMPERATURE MAXIMUM	C	(1)	31.1	31.7	32.4	33.5	33.7	33.1	31.4	31.7	32.3	33.4	32.7	31.3	32.4
TEMPERATURE MOYENNE	C	(1)	23.9	24.6	25.8	27.2	28.0	28.1	27.2	27.4	27.6	27.8	26.0	24.2	26.5
TEMPERATURE DIURNE	C	(7)	26.6	27.2	28.2	29.4	30.0	29.9	28.7	28.9	29.3	29.8	28.5	26.8	28.6
TEMPERATURE NOCTURNE	C	(7)	21.6	22.2	23.4	24.8	25.6	26.0	25.4	25.7	25.8	25.8	23.8	22.0	24.3
RAYONNEMENT TOTAL	MJ/m2	(7)	17.3	18.9	21.7	24.1	23.8	21.7	20.1	20.3	20.2	19.7	17.6	16.4	20.1
HUMIDITE REL.MOYENNE	%	(6)	63	63	64	65	70	75	82	82	80	75	69	65	71
PRESSION DE VAPEUR ACT.	mbr	(7)	18.7	19.5	21.3	23.5	26.5	28.5	29.6	29.9	29.6	28.0	23.2	19.6	24.8
PRESSION DE VAPEUR DEF.	mbr	(7)	11.0	11.4	12.0	12.6	11.3	9.5	6.5	6.6	7.4	9.3	10.4	10.6	9.9
VITESSE DU VENT	m/s	(6)	1.9	2.3	2.3	2.3	2.3	2.3	2.3	2.6	2.6	1.5	0.8	1.2	2.0
EVAPOTRANSPIRATION POT.	mm	(7)	110	136	148	173	173	165	147	136	147	127	102	86	1650

STATION (SITE) : MAEVATANANA	LATITUDE : 16 DEG 57 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : J	LONGITUDE : 046 DEG 50 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1695046833	ALTITUDE : 77 METERS	SOURCES : 3,4,6,7
No. SERVICE MET: 67045		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(3)	2	2	9	32	157	318	458	351	291	72	5	1	1698
JOURS DE PLUIES =>1 mm		(3)	0.3	0.3	0.6	3	8	15	20	17	15	5	0.8	0.2	85
TEMPERATURE MINIMUM	C	(4)	18.3	19.3	20.7	22.2	23.2	23.1	23.0	23.0	23.0	22.7	20.7	18.7	21.5
TEMPERATURE MAXIMUM	C	(4)	31.6	32.6	34.1	35.2	35.0	34.0	32.6	32.5	33.0	34.0	33.3	32.0	33.3
TEMPERATURE MOYENNE	C	(4)	25.0	26.0	27.4	28.7	29.1	28.6	27.8	27.8	28.0	28.4	27.0	25.4	27.4
TEMPERATURE DIURNE	C	(7)	27.4	28.4	29.8	31.0	31.2	30.5	29.5	29.5	29.8	30.4	29.3	27.8	29.5
TEMPERATURE NOCTURNE	C	(7)	22.9	23.8	25.0	26.2	26.7	26.3	25.8	25.9	26.1	26.4	24.9	23.3	25.3
RAYONNEMENT TOTAL	MJ/m2	(7)	17.1	19.0	21.4	23.8	22.6	21.8	19.7	20.4	19.0	18.8	17.2	15.9	19.7
HUMIDITE REL.MOYENNE	%	(6)	45	41	41	46	52	62	73	71	71	59	51	49	55
PRESSION DE VAPEUR ACT.	mbr	(7)	14.3	13.8	15.0	18.1	21.0	24.3	27.3	26.5	26.8	22.8	18.2	15.9	20.3
PRESSION DE VAPEUR DEF.	mbr	(7)	17.4	19.8	21.5	21.3	19.3	14.9	10.1	10.8	11.0	15.9	17.5	16.5	16.3
VITESSE DU VENT	m/s	(7)	2.3	2.5	2.8	2.8	2.7	2.3	2.3	2.5	2.5	1.9	1.6	1.8	2.3
EVAPOTRANSPIRATION POT.	mm	(7)	132	158	184	210	194	179	156	149	152	141	123	109	1887

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMBODIFOTATRA	LATITUDE : 17 DEG 05 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : K	LONGITUDE : 049 DEG 49 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1708049813	ALTITUDE : 10 METERS	SOURCES : 1,3,6,7
No. SERVICE MET: 67072		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(3)	282	188	109	85	131	285	383	444	574	454	321	344	3600
JOURS DE PLUIES =>1 mm		(3)	23	19	14	11	11	16	18	18	22	20	21	21	214
TEMPERATURE MINIMUM	C	(1)	19.4	19.3	20.0	21.2	22.5	23.7	23.9	23.9	23.6	22.9	21.8	20.1	21.9
TEMPERATURE MAXIMUM	C	(1)	23.6	23.7	24.7	26.1	27.7	28.7	29.4	29.1	28.5	27.2	26.1	24.5	26.6
TEMPERATURE MOYENNE	C	(1)	21.5	21.5	22.4	23.7	25.1	26.2	26.7	26.5	26.1	25.1	24.0	22.3	24.3
TEMPERATURE DIURNE	C	(7)	22.3	22.3	23.2	24.6	26.0	27.1	27.7	27.4	27.0	25.9	24.8	23.1	25.1
TEMPERATURE NOCTURNE	C	(7)	20.8	20.8	21.6	22.7	24.0	25.1	25.6	25.5	25.2	24.4	23.3	21.6	23.4
RAYONNEMENT TOTAL	MJ/m2	(7)	13.0	15.8	18.6	21.8	23.0	21.4	20.2	20.1	17.8	16.8	14.3	13.3	18.0
HUMIDITE REL.MOYENNE	%	(6)	80	78	77	77	76	80	80	81	83	83	82	81	80
PRESSION DE VAPEUR ACT.	mbr	(7)	20.5	20.0	20.9	22.6	24.2	27.2	28.0	28.1	28.1	26.4	24.5	21.8	24.4
PRESSION DE VAPEUR DEF.	mbr	(7)	5.1	5.6	6.2	6.7	7.6	6.8	7.0	6.6	5.7	5.4	5.4	5.1	6.1
VITESSE DU VENT	m/s	(7)	2.5	2.5	2.5	2.6	2.9	2.6	2.9	2.6	2.7	2.5	2.9	2.5	2.6
EVAPOTRANSPIRATION POT.	mm	(7)	82	96	114	142	155	138	135	133	128	109	96	78	1406

STATION (SITE) : AMBOHITSILAOZANA(ALAOTRA)	LATITUDE : 17 DEG 38 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : L	LONGITUDE : 048 DEG 30 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1763048503	ALTITUDE : 786 METERS	SOURCES : 1,3,5,7
No. SERVICE MET: 67067		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(3)	10	7	3	20	92	211	307	265	206	36	10	8	1175
JOURS DE PLUIES =>1 mm		(3)	2	2	1	2	6	13	15	14	13	4	2	2	76
TEMPERATURE MINIMUM	C	(1)	10.8	10.8	11.8	12.8	15.4	17.1	18.0	17.9	17.6	15.8	13.5	11.5	14.4
TEMPERATURE MAXIMUM	C	(1)	23.3	23.8	25.5	28.0	29.2	29.3	28.7	28.4	28.2	27.2	25.6	23.8	26.8
TEMPERATURE MOYENNE	C	(1)	17.0	17.3	18.6	20.5	22.2	23.1	23.4	23.2	22.9	21.5	19.6	17.7	20.6
TEMPERATURE DIURNE	C	(7)	19.3	19.7	21.1	23.2	24.6	25.2	25.3	25.1	24.8	23.6	21.8	19.9	22.8
TEMPERATURE NOCTURNE	C	(7)	15.0	15.1	16.1	17.5	19.4	20.5	21.2	21.1	20.9	19.5	17.6	15.8	18.3
RAYONNEMENT TOTAL	MJ/m2	(5)	13.0	15.1	18.3	21.4	21.3	19.8	17.9	17.2	16.6	15.2	13.3	12.1	16.8
HUMIDITE REL.MOYENNE	%	(7)	73	73	68	63	68	71	75	76	79	78	77	76	73
PRESSION DE VAPEUR ACT.	mbr	(5)	14.1	14.5	14.6	15.3	18.1	20.0	21.7	21.5	22.1	20.1	17.5	15.3	17.9
PRESSION DE VAPEUR DEF.	mbr	(7)	5.3	5.2	6.8	8.8	8.7	8.3	7.1	6.9	5.8	5.5	5.3	5.0	6.6
VITESSE DU VENT	m/s	(5)	2.2	2.5	2.6	2.5	2.1	2.0	1.9	1.8	1.9	1.9	1.9	1.9	2.1
EVAPOTRANSPIRATION POT.	mm	(5)	75	89	116	154	145	141	129	110	114	93	79	66	1311

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MAINTIRANO	LATITUDE : 18 DEG 03 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : M	LONGITUDE : 044 DEG 02 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1805044033	ALTITUDE : 25 METERS	SOURCES : 1,3,6,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(3)	4	4	9	17	63	177	302	220	158	32	9	4	999
JOURS DE PLUIES =>1 mm		(3)	0.4	0.6	0.9	2	4	10	14	11	10	3	0.8	0.5	57
TEMPERATURE MINIMUM	C	(1)	18.2	19.0	20.8	22.0	22.9	23.4	23.6	23.9	23.6	23.2	20.9	19.0	21.7
TEMPERATURE MAXIMUM	C	(1)	26.5	27.1	28.6	29.9	30.9	31.4	30.4	30.9	30.8	30.3	29.7	27.1	29.5
TEMPERATURE MOYENNE	C	(1)	22.4	23.0	24.7	25.9	26.9	27.4	27.0	27.4	27.2	26.9	25.1	23.1	25.6
TEMPERATURE DIURNE	C	(7)	23.9	24.5	26.1	27.3	28.3	28.8	28.2	28.6	28.5	28.2	26.7	24.6	27.0
TEMPERATURE NOCTURNE	C	(7)	21.1	21.6	23.3	24.4	25.2	25.7	25.6	26.0	25.9	25.7	23.7	21.8	24.2
RAYONNEMENT TOTAL	MJ/m2	(7)	17.1	19.0	21.9	24.1	24.4	22.4	20.7	20.3	19.0	19.6	17.4	16.1	20.2
HUMIDITE REL.MOYENNE	%	(6)	77	78	78	78	77	81	84	84	84	80	78	77	80
PRESSION DE VAPEUR ACT.	mbr	(7)	20.9	21.9	24.3	26.1	27.3	29.6	29.9	30.7	30.3	28.4	24.9	21.8	26.3
PRESSION DE VAPEUR DEF.	mbr	(7)	6.2	6.2	6.8	7.4	8.2	6.9	5.7	5.8	5.8	7.1	7.0	6.5	6.6
VITESSE DU VENT	m/s	(6)	2.6	3.0	3.0	3.8	3.8	3.0	2.6	3.0	2.6	2.6	2.6	2.3	2.9
EVAPOTRANSPIRATION POT.	mm	(7)	91	110	133	166	175	171	156	137	144	126	105	92	1606

STATION (SITE) : TAOMASINA (TAMATAVE)	LATITUDE : 18 DEG 07 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : N	LONGITUDE : 049 DEG 24 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1811049403	ALTITUDE : 3 METERS	SOURCES : 1,3,5,7
No. SERVICE MET: 67095		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(3)	257	208	134	87	184	259	420	441	528	404	302	300	3524
JOURS DE PLUIES =>1 mm		(3)	20	20	14	11	12	16	19	18	19	19	17	20	205
TEMPERATURE MINIMUM	C	(1)	17.9	17.7	18.0	19.4	21.2	22.5	23.2	23.2	23.0	22.0	20.3	18.7	20.6
TEMPERATURE MAXIMUM	C	(1)	24.1	24.3	25.6	27.1	28.6	29.6	30.1	30.0	29.5	28.2	26.6	25.0	27.4
TEMPERATURE MOYENNE	C	(1)	21.0	21.0	21.8	23.3	24.9	26.1	26.7	26.6	26.3	25.1	23.5	21.9	24.0
TEMPERATURE DIURNE	C	(7)	22.1	22.2	23.2	24.7	26.2	27.3	27.9	27.8	27.5	26.2	24.6	23.1	25.2
TEMPERATURE NOCTURNE	C	(7)	20.0	19.9	20.4	21.8	23.4	24.6	25.3	25.2	25.1	24.0	22.5	20.9	22.8
RAYONNEMENT TOTAL	MJ/m2	(5)	12.9	15.1	18.5	20.7	22.4	22.2	21.8	20.4	18.0	16.7	14.5	12.8	18.0
HUMIDITE REL.MOYENNE	%	(7)	83	84	82	79	81	82	83	84	82	83	83	84	83
PRESSION DE VAPEUR ACT.	mbr	(5)	20.6	21.0	21.5	22.5	25.5	27.6	29.0	29.3	28.2	26.3	24.1	22.0	24.8
PRESSION DE VAPEUR DEF.	mbr	(7)	4.3	3.9	4.6	6.1	6.0	6.2	6.0	5.5	6.0	5.6	4.9	4.3	5.3
VITESSE DU VENT	m/s	(5)	2.8	2.4	2.4	2.2	2.4	2.2	2.8	2.6	2.8	2.8	2.8	2.8	2.6
EVAPOTRANSPIRATION POT.	mm	(5)	73	86	104	126	142	149	155	130	124	105	87	70	1351

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : ANTANANARIVO(OBSERVATOIRE) LATITUDE : 18 DEG 55 MIN SOUTH PERIODE D'OBSERVATION : 1931-60  
 No. IRMA : 0 LONGITUDE : 047 DEG 33 MIN EAST Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 1891047553 ALTITUDE : 1381 METERS SOURCES : 1,3,5,7  
 No. SERVICE MET: 67085

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	9	9	14	49	154	292	305	235	221	47	16	9	1360
JOURS DE PLUIES =>1 mm		(3)	2	2	2	4	10	17	18	15	14	5	3	2	94
TEMPERATURE MINIMUM	C	(1)	9.1	8.9	10.0	11.9	14.0	15.5	15.8	15.4	15.6	13.8	11.6	10.1	12.6
TEMPERATURE MAXIMUM	C	(1)	20.0	20.4	22.8	25.6	26.6	26.2	25.2	26.0	25.2	24.4	22.5	20.5	23.8
TEMPERATURE MOYENNE	C	(1)	14.6	14.7	16.4	18.8	20.3	20.9	20.5	20.7	20.4	19.1	17.1	15.3	18.2
TEMPERATURE DIURNE	C	(7)	16.6	16.8	18.7	21.2	22.5	22.8	22.1	22.6	22.1	21.0	19.1	17.2	20.2
TEMPERATURE NOCTURNE	C	(7)	12.9	12.8	14.1	16.1	17.7	18.6	18.5	18.6	18.6	17.3	15.3	13.7	16.2
RAYONNEMENT TOTAL	MJ/m2	(5)	14.2	16.6	19.7	22.3	21.8	21.1	20.9	21.2	18.6	18.1	15.3	13.9	18.6
HUMIDITE REL.MOYENNE	%	(7)	79	78	73	69	71	78	82	82	83	81	77	79	78
PRESSION DE VAPEUR ACT.	mbr	(5)	13.2	13.0	13.6	15.0	17.0	19.3	19.7	20.0	20.0	18.0	15.0	13.8	16.5
PRESSION DE VAPEUR DEF.	mbr	(7)	3.4	3.7	5.0	6.7	6.8	5.4	4.4	4.4	4.0	4.1	4.5	3.6	4.7
VITESSE DU VENT	m/s	(5)	1.4	1.4	1.4	1.4	1.2	1.4	1.4	1.2	1.4	1.4	1.4	1.4	1.4
EVAPOTRANSPIRATION POT.	mm	(5)	57	71	93	121	125	125	123	111	107	89	68	53	1143

STATION (SITE) : VATOMANDRY LATITUDE : 19 DEG 20 MIN SOUTH PERIODE D'OBSERVATION : 1931-60  
 No. IRMA : P LONGITUDE : 048 DEG 58 MIN EAST Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 1933048963 ALTITUDE : 3 METERS SOURCES : 1,3,6,7  
 No. SERVICE MET: 67115

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	196	180	120	78	149	231	351	395	511	280	226	196	2913
JOURS DE PLUIES =>1 mm		(3)	18	16	12	9	11	14	18	17	19	16	16	17	183
TEMPERATURE MINIMUM	C	(1)	17.0	16.8	17.7	18.6	20.8	21.8	22.8	22.7	22.1	21.3	19.4	17.8	19.9
TEMPERATURE MAXIMUM	C	(1)	24.6	24.7	25.4	26.6	28.0	29.1	29.8	29.8	29.4	28.3	26.7	24.9	27.3
TEMPERATURE MOYENNE	C	(1)	20.8	20.8	21.6	22.6	24.4	25.5	26.3	26.3	25.8	24.8	23.1	21.4	23.6
TEMPERATURE DIURNE	C	(7)	22.2	22.2	23.0	24.0	25.7	26.8	27.5	27.6	27.1	26.1	24.4	22.7	24.9
TEMPERATURE NOCTURNE	C	(7)	19.6	19.5	20.2	21.0	22.9	23.9	24.8	24.9	24.4	23.6	21.9	20.3	22.3
RAYONNEMENT TOTAL	MJ/m2	(7)	13.2	15.6	19.0	22.0	22.8	22.0	19.9	20.1	18.0	16.8	14.1	12.9	18.0
HUMIDITE REL.MOYENNE	%	(6)	82	81	79	78	81	81	82	82	83	82	82	82	81
PRESSION DE VAPEUR ACT.	mbr	(7)	20.1	19.9	20.4	21.4	24.8	26.4	28.1	28.1	27.6	25.7	23.2	20.9	23.9
PRESSION DE VAPEUR DEF.	mbr	(7)	4.4	4.7	5.4	6.0	5.8	6.2	6.2	6.2	5.6	5.6	5.1	4.6	5.5
VITESSE DU VENT	m/s	(7)	2.5	2.5	2.5	2.6	2.9	2.6	2.9	2.6	2.7	2.5	2.8	2.5	2.6
EVAPOTRANSPIRATION POT.	mm	(7)	74	88	109	137	145	152	147	114	127	106	88	70	1357

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MAHANORO	LATITUDE : 19 DEG 50 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : Q	LONGITUDE : 048 DEG 48 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1983048803	ALTITUDE : 5 METERS	SOURCES : 1,3,6,7
No. SERVICE MET: 67113		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	215	160	115	100	148	220	360	396	537	268	223	215	2957
JOURS DE PLUIES =>1 mm		(3)	16	14	11	9	10	13	18	17	20	16	16	17	177
TEMPERATURE MINIMUM	C	(1)	17.0	16.8	17.8	19.3	21.1	22.1	22.8	22.7	22.3	21.3	19.4	17.5	20.0
TEMPERATURE MAXIMUM	C	(1)	24.2	24.5	25.0	26.2	27.2	28.3	29.2	29.3	28.9	28.0	26.4	24.8	26.8
TEMPERATURE MOYENNE	C	(1)	20.6	20.7	21.4	22.8	24.2	25.2	26.0	26.0	25.6	24.7	22.9	21.2	23.4
TEMPERATURE DIURNE	C	(7)	21.9	22.1	22.7	24.0	25.3	26.3	27.1	27.2	26.8	25.9	24.2	22.5	24.7
TEMPERATURE NOCTURNE	C	(7)	19.5	19.4	20.1	21.4	22.9	23.9	24.6	24.7	24.4	23.5	21.8	20.1	22.2
RAYONNEMENT TOTAL	MJ/m2	(7)	13.7	16.0	19.6	22.6	23.8	23.9	21.6	20.8	18.5	17.0	14.7	13.4	18.8
HUMIDITE REL.MOYENNE	%	(6)	81	80	80	80	82	83	83	83	84	83	83	83	82
PRESSION DE VAPEUR ACT.	mbr	(7)	19.7	19.5	20.4	22.2	24.8	26.6	27.9	27.9	27.6	25.8	23.2	20.9	23.9
PRESSION DE VAPEUR DEF.	mbr	(7)	4.6	4.9	5.1	5.6	5.4	5.4	5.7	5.7	5.3	5.3	4.7	4.3	5.2
VITESSE DU VENT	m/s	(6)	2.2	2.6	2.6	3.0	3.4	3.0	3.0	2.6	2.6	2.2	3.0	2.2	2.7
EVAPOTRANSPIRATION POT.	mm	(7)	73	90	108	139	151	157	153	111	125	107	89	67	1370

STATION (SITE) : MORONDAVA	LATITUDE : 20 DEG 17 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : R	LONGITUDE : 044 DEG 19 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2028044313	ALTITUDE : 8 METERS	SOURCES : 1,3,5,7
No. SERVICE MET: 67117		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	1	2	7	9	17	129	228	209	117	13	7	6	745
JOURS DE PLUIES =>1 mm		(3)	0.2	0.2	0.7	0.6	2	7	11	10	6	1	0.7	0.8	40
TEMPERATURE MINIMUM	C	(1)	14.5	15.5	18.0	20.5	22.6	23.4	23.7	23.5	23.1	20.9	17.4	14.9	19.8
TEMPERATURE MAXIMUM	C	(1)	27.5	27.7	28.6	29.5	30.8	31.6	31.8	31.8	31.8	31.5	29.8	27.8	30.0
TEMPERATURE MOYENNE	C	(1)	21.0	21.6	23.3	25.0	26.7	27.5	27.7	27.6	27.4	26.2	23.3	21.3	24.9
TEMPERATURE DIURNE	C	(7)	23.4	23.8	25.2	26.6	28.1	28.9	29.1	29.1	29.0	28.1	25.6	23.7	26.7
TEMPERATURE NOCTURNE	C	(7)	19.0	19.6	21.4	23.2	25.0	25.7	26.0	25.9	25.8	24.4	21.3	19.3	23.0
RAYONNEMENT TOTAL	MJ/m2	(5)	16.2	18.7	21.6	24.3	25.7	24.3	24.0	24.0	21.9	20.0	17.3	15.7	21.1
HUMIDITE REL.MOYENNE	%	(7)	74	78	78	78	76	78	79	81	78	76	75	74	77
PRESSION DE VAPEUR ACT.	mbr	(5)	18.5	20.1	22.3	24.7	26.5	28.8	29.3	29.8	28.5	26.0	21.5	18.7	24.6
PRESSION DE VAPEUR DEF.	mbr	(7)	6.4	5.7	6.3	7.0	8.5	7.9	7.9	7.1	8.0	8.0	7.1	6.6	7.2
VITESSE DU VENT	m/s	(5)	1.5	1.8	2.1	2.1	2.1	1.8	2.1	1.7	1.6	1.5	1.5	1.4	1.8
EVAPOTRANSPIRATION POT.	mm	(5)	77	98	122	151	162	161	161	141	141	112	87	68	1481

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMBOSITRA	LATITUDE : 20 DEG 32 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : S	LONGITUDE : 047 DEG 14 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2053047233	ALTITUDE : 1245 METERS	SOURCES : 1,3,6,7
No. SERVICE MET: 67123		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	26	20	35	57	183	303	314	239	242	79	32	26	1556
JOURS DE PLUIES =>1 mm		(3)	6	4	3	5	13	18	19	15	17	9	5	6	120
TEMPERATURE MINIMUM	C	(1)	8.7	8.5	9.6	11.7	13.9	15.2	15.9	15.4	15.4	13.9	11.1	9.7	12.4
TEMPERATURE MAXIMUM	C	(1)	19.0	20.0	22.1	25.1	26.2	25.8	25.5	25.4	25.0	24.3	22.0	19.9	23.4
TEMPERATURE MOYENNE	C	(1)	13.9	14.3	15.9	18.4	20.1	20.5	20.7	20.4	20.2	19.1	16.6	14.8	17.9
TEMPERATURE DIURNE	C	(7)	15.8	16.4	18.1	20.8	22.2	22.3	22.4	22.2	21.9	21.0	18.6	16.7	19.9
TEMPERATURE NOCTURNE	C	(7)	12.3	12.4	13.7	15.8	17.5	18.2	18.7	18.4	18.4	17.3	14.9	13.3	15.9
RAYONNEMENT TOTAL	MJ/m2	(7)	12.6	16.0	19.0	18.6	20.1	19.3	17.1	18.3	15.8	15.2	12.8	11.6	16.4
HUMIDITE REL.MOYENNE	%	(6)	76	73	69	66	70	75	78	78	80	77	76	77	75
PRESSION DE VAPEUR ACT.	mbr	(7)	12.1	11.9	12.5	14.0	16.5	18.1	19.0	18.7	18.9	17.0	14.4	13.0	15.5
PRESSION DE VAPEUR DEF.	mbr	(7)	3.8	4.4	5.6	7.2	7.1	6.0	5.4	5.3	4.7	5.1	4.5	3.9	5.3
VITESSE DU VENT	m/s	(7)	1.2	1.4	1.6	1.8	1.6	1.4	1.4	1.4	1.0	1.0	1.0	1.0	1.3
EVAPOTRANSPIRATION POT.	mm	(7)	52	66	92	116	124	123	114	105	95	80	62	48	1077

STATION (SITE) : MANANJARY	LATITUDE : 21 DEG 12 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : T	LONGITUDE : 048 DEG 22 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2120048363	ALTITUDE : 5 METERS	SOURCES : 1,3,5,7
No. SERVICE MET: 67143		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.5	12.0	12.6	13.1	13.4	13.3	12.8	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	158	136	103	79	173	210	398	370	498	245	195	230	2795
JOURS DE PLUIES =>1 mm		(3)	14	13	10	8	11	13	17	17	19	15	15	15	167
TEMPERATURE MINIMUM	C	(1)	15.8	15.5	16.3	18.1	20.1	21.3	22.3	21.9	21.8	20.5	18.3	16.7	19.1
TEMPERATURE MAXIMUM	C	(1)	24.1	24.5	25.9	27.1	28.2	28.9	29.8	29.9	29.0	28.4	26.7	24.4	27.2
TEMPERATURE MOYENNE	C	(1)	20.0	20.0	21.1	22.6	24.2	25.1	26.1	25.9	25.4	24.5	22.5	20.6	23.2
TEMPERATURE DIURNE	C	(7)	21.5	21.6	22.8	24.2	25.6	26.4	27.4	27.3	26.7	25.9	24.0	22.0	24.6
TEMPERATURE NOCTURNE	C	(7)	18.7	18.5	19.4	20.8	22.5	23.4	24.5	24.3	24.0	23.1	21.2	19.4	21.7
RAYONNEMENT TOTAL	MJ/m2	(5)	13.0	16.0	19.2	21.1	22.1	22.1	21.4	20.7	17.4	16.8	14.1	12.3	18.0
HUMIDITE REL.MOYENNE	%	(7)	86	86	85	83	85	87	84	86	85	85	83	84	85
PRESSION DE VAPEUR ACT.	mbr	(5)	20.0	20.0	21.2	22.8	25.7	27.7	28.5	28.6	27.6	26.0	22.6	20.5	24.3
PRESSION DE VAPEUR DEF.	mbr	(7)	3.4	3.4	3.8	4.6	4.5	4.2	5.3	4.8	4.8	4.8	4.7	3.8	4.3
VITESSE DU VENT	m/s	(5)	3.1	3.2	3.5	3.7	3.5	3.2	3.4	3.3	3.4	3.4	3.4	3.0	3.3
EVAPOTRANSPIRATION POT.	mm	(5)	64	87	108	137	144	150	152	130	121	100	80	62	1335

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : FIANARANTSOA	LATITUDE : 21 DEG 27 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : U	LONGITUDE : 047 DEG 08 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2145047133	ALTITUDE : 1106 METERS	SOURCES : 1,3,5,7
No. SERVICE MET: 67137		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.4	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	19	17	24	34	131	237	291	206	174	44	27	20	1224
JOURS DE PLUIES =>1 mm		(3)	5	4	4	4	11	16	17	15	15	7	5	5	108
TEMPERATURE MINIMUM	C	(1)	9.5	9.5	10.5	12.7	14.5	16.0	16.8	16.3	16.2	14.7	12.0	10.3	13.3
TEMPERATURE MAXIMUM	C	(1)	19.4	20.7	22.4	25.6	26.9	26.4	26.0	25.7	25.3	24.6	22.3	20.1	23.8
TEMPERATURE MOYENNE	C	(1)	14.5	15.1	16.5	19.2	20.8	21.2	21.4	21.0	20.8	19.7	17.2	15.2	18.6
TEMPERATURE DIURNE	C	(7)	16.3	17.1	18.6	21.5	23.0	23.0	23.0	22.7	22.4	21.5	19.1	17.0	20.4
TEMPERATURE NOCTURNE	C	(7)	13.0	13.2	14.4	16.7	18.2	18.9	19.4	19.1	19.1	18.0	15.6	13.7	16.6
RAYONNEMENT TOTAL	MJ/m2	(5)	12.3	15.2	18.0	20.6	20.9	21.6	19.9	18.9	16.9	15.5	13.1	11.8	17.1
HUMIDITE REL. MOYENNE	%	(7)	88	82	80	76	77	81	83	86	84	83	82	82	82
PRESSION DE VAPEUR ACT.	mbr	(5)	14.5	14.0	15.0	16.8	19.0	20.5	21.2	21.5	20.6	19.0	16.0	14.2	17.7
PRESSION DE VAPEUR DEF.	mbr	(7)	2.0	3.2	3.8	5.4	5.6	4.7	4.3	3.4	4.0	3.9	3.6	3.1	3.9
VITESSE DU VENT	m/s	(5)	1.2	1.4	1.6	1.8	1.6	1.4	1.4	1.4	1.4	1.0	1.0	1.0	1.3
EVAPOTRANSPIRATION POT.	mm	(5)	48	64	88	116	122	128	123	104	99	77	58	44	1071

STATION (SITE) : MOROMBE	LATITUDE : 21 DEG 45 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : V	LONGITUDE : 043 DEG 22 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2175043363	ALTITUDE : 5 METERS	SOURCES : 1,3,6,7
No. SERVICE MET: 67131		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.4	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	2	1	5	4	22	85	123	134	59	5	7	7	454
JOURS DE PLUIES =>1 mm		(3)	0.2	0.1	0.7	0.3	1	4	6	6	3	0.7	1	0.8	24
TEMPERATURE MINIMUM	C	(1)	13.5	14.5	16.3	18.3	20.2	21.7	23.1	22.9	22.2	20.0	16.5	14.5	18.6
TEMPERATURE MAXIMUM	C	(1)	27.3	27.9	28.9	29.7	30.7	31.8	32.4	32.4	32.2	31.4	29.4	27.9	30.2
TEMPERATURE MOYENNE	C	(1)	20.4	21.2	22.6	24.0	25.2	26.8	27.8	27.7	27.2	25.7	23.0	21.2	24.4
TEMPERATURE DIURNE	C	(7)	22.9	23.6	24.9	26.0	27.0	28.5	29.4	29.4	29.0	27.8	25.4	23.7	26.5
TEMPERATURE NOCTURNE	C	(7)	18.3	19.0	20.3	21.8	23.0	24.6	25.8	25.8	25.3	23.7	21.0	19.2	22.3
RAYONNEMENT TOTAL	MJ/m2	(7)	15.7	18.3	21.6	24.4	25.8	25.0	24.0	22.8	21.2	19.3	16.4	15.0	20.8
HUMIDITE REL. MOYENNE	%	(6)	76	68	70	73	70	72	73	73	73	71	69	67	71
PRESSION DE VAPEUR ACT.	mbr	(7)	18.2	17.1	19.2	21.8	22.4	25.4	27.3	27.1	26.3	23.4	19.4	16.9	22.0
PRESSION DE VAPEUR DEF.	mbr	(7)	5.8	8.1	8.2	8.1	9.6	9.9	10.1	10.0	9.7	9.6	8.7	8.3	8.8
VITESSE DU VENT	m/s	(7)	1.9	2.3	2.5	2.5	2.5	2.3	2.4	2.2	2.2	2.1	2.1	2.0	2.3
EVAPOTRANSPIRATION POT.	mm	(7)	81	105	143	151	164	178	177	151	149	118	94	75	1586



## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : FARAFANGANA	LATITUDE : 22 DEG 48 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : W	LONGITUDE : 047 DEG 50 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2280047833	ALTITUDE : 6 METERS	SOURCES : 1,3,6,7
No. SERVICE MET: 67157		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.5	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)	156	115	73	62	180	222	327	309	399	224	178	184	2429
JOURS DE PLUIES =>1 mm		(3)	13	12	9	8	11	14	18	17	19	15	13	14	163
TEMPERATURE MINIMUM	C	(1)	16.4	16.7	17.9	19.6	21.1	22.2	22.2	22.7	22.5	20.8	18.0	16.6	19.7
TEMPERATURE MAXIMUM	C	(1)	23.6	23.3	24.3	25.4	26.9	28.0	28.3	28.4	27.6	27.1	25.4	24.0	26.0
TEMPERATURE MOYENNE	C	(1)	20.0	20.0	21.1	22.5	24.0	25.1	25.1	25.5	25.5	24.0	21.7	20.3	22.9
TEMPERATURE DIURNE	C	(7)	21.3	21.2	22.3	23.5	25.0	26.1	26.2	26.5	26.4	25.1	23.1	21.7	24.0
TEMPERATURE NOCTURNE	C	(7)	18.9	18.9	19.9	21.4	22.8	23.8	23.8	24.3	24.5	22.9	20.5	19.2	21.7
RAYONNEMENT TOTAL	MJ/m2	(7)	13.4	16.3	19.7	22.7	24.0	24.2	24.1	21.1	18.9	17.2	14.0	12.7	19.0
HUMIDITE REL.MOYENNE	%	(6)	86	84	83	83	85	85	85	84	86	85	85	86	85
PRESSION DE VAPEUR ACT.	mbr	(7)	20.1	19.6	20.8	22.6	25.4	27.1	27.1	27.4	28.1	25.4	22.1	20.5	23.9
PRESSION DE VAPEUR DEF.	mbr	(7)	3.3	3.7	4.3	4.6	4.5	4.8	4.8	5.2	4.6	4.5	3.9	3.3	4.3
VITESSE DU VENT	m/s	(6)	2.3	2.6	3.8	3.4	3.8	3.8	3.0	3.0	2.3	2.3	1.9	2.3	2.9
EVAPOTRANSPIRATION POT.	mm	(7)	61	81	109	138	150	162	157	131	122	98	71	57	1337

STATION (SITE) : TOLIARA (TULEAR)	LATITUDE : 23 DEG 21 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : X	LONGITUDE : 043 DEG 44 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2335043733	ALTITUDE : 8 METERS	SOURCES : 1,3,5,7
No. SERVICE MET: 67161		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.6	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)	4	3	10	14	34	57	71	42	7	18	11	4	275
JOURS DE PLUIES =>1 mm		(3)	0.9	0.3	1	0.7	2	4	5	5	3	0.8	2	2	27
TEMPERATURE MINIMUM	C	(1)	13.2	14.0	15.8	17.8	20.5	21.4	22.7	22.4	21.5	19.1	16.3	14.3	18.3
TEMPERATURE MAXIMUM	C	(1)	26.9	27.3	28.7	29.4	30.3	31.1	32.4	32.7	31.9	30.6	29.0	27.2	29.8
TEMPERATURE MOYENNE	C	(1)	20.1	20.7	22.3	23.6	25.4	26.3	27.6	27.6	26.7	24.9	22.7	20.8	24.1
TEMPERATURE DIURNE	C	(7)	22.6	23.1	24.6	25.7	27.1	28.0	29.3	29.4	28.6	27.0	25.0	23.2	26.1
TEMPERATURE NOCTURNE	C	(7)	18.0	18.5	20.0	21.3	23.3	24.1	25.5	25.5	24.7	22.9	20.7	18.9	21.9
RAYONNEMENT TOTAL	MJ/m2	(5)	15.0	17.1	20.6	23.6	24.8	24.6	24.6	24.3	21.2	19.1	16.1	14.4	20.4
HUMIDITE REL.MOYENNE	%	(7)	75	75	75	76	73	79	77	77	77	78	75	75	76
PRESSION DE VAPEUR ACT.	mbr	(5)	17.7	18.3	20.1	22.0	23.7	27.2	28.5	28.5	27.0	24.7	20.7	18.5	23.1
PRESSION DE VAPEUR DEF.	mbr	(7)	5.8	6.1	6.8	7.1	8.7	7.0	8.4	8.4	8.0	6.8	6.9	6.1	7.2
VITESSE DU VENT	m/s	(5)	2.6	2.8	3.0	3.0	3.0	2.8	2.8	2.6	2.8	2.6	2.6	2.6	2.8
EVAPOTRANSPIRATION POT.	mm	(5)	76	94	125	149	164	173	179	155	152	119	90	68	1544

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : TOLANARO-FORT DAUPHIN	LATITUDE : 25 DEG 02 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : Y	LONGITUDE : 046 DEG 57 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. GUIRRI : 2503046953	ALTITUDE : 8 METERS	SOURCES : 1,3,5,7
No. SERVICE MET: 67197		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(3)	109	94	61	73	91	124	202	184	236	113	117	135	1539
JOURS DE PLUIES =>1 mm		(3)	10	8	6	6	9	10	13	13	14	9	9	11	118
TEMPERATURE MINIMUM	C	(1)	15.6	15.7	16.9	18.4	19.9	21.6	22.2	21.9	21.4	20.4	18.0	16.6	19.1
TEMPERATURE MAXIMUM	C	(1)	23.7	23.9	25.1	26.6	28.1	29.1	28.9	29.3	27.9	27.5	25.6	24.2	26.7
TEMPERATURE MOYENNE	C	(1)	19.7	19.8	21.0	22.5	24.0	25.4	25.6	25.6	24.7	24.0	21.8	20.4	22.9
TEMPERATURE DIURNE	C	(7)	21.2	21.3	22.5	23.9	25.4	26.7	26.8	26.9	25.9	25.3	23.2	21.8	24.2
TEMPERATURE NOCTURNE	C	(7)	18.5	18.5	19.5	20.9	22.2	23.7	24.1	24.1	23.5	22.8	20.6	19.3	21.5
RAYONNEMENT TOTAL	MJ/m2	(5)	11.8	14.7	17.3	20.1	21.0	21.3	21.1	21.6	17.0	15.4	13.5	11.7	17.2
HUMIDITE REL. MOYENNE	%	(7)	80	80	80	81	78	81	84	84	84	78	80	78	81
PRESSION DE VAPEUR ACT.	mbr	(5)	18.3	18.5	20.0	22.1	23.3	26.3	27.5	27.6	26.0	23.3	21.0	18.8	22.7
PRESSION DE VAPEUR DEF.	mbr	(7)	4.6	4.6	4.9	5.2	6.5	6.1	5.3	5.2	5.1	6.5	5.1	5.2	5.4
VITESSE DU VENT	m/s	(5)	3.4	4.0	4.6	5.2	4.6	4.2	4.0	4.0	4.0	4.0	3.4	3.2	4.1
EVAPOTRANSPIRATION POT.	mm	(5)	67	90	119	153	154	169	166	152	133	107	83	62	1455

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMBAHIVAHIBE	LATITUDE : 12 DEG 35 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 1	LONGITUDE : 049 DEG 16 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1258049263	ALTITUDE : 370 METERS	SOURCES : 1,3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.4	11.7	12.0	12.4	12.7	12.9	12.8	12.5	12.2	11.8	11.5	11.3	
PRECIPITATIONS TOTALES	mm	(3)	30	32	20	23	60	193	269	283	225	104	21	21	1281
JOURS DE PLUIES =>1 mm		(3)	6	5	4	4	6	13	17	17	15	9	4	5	105
TEMPERATURE MINIMUM	C	(1)	16.8	16.9	17.4	18.4	19.8	20.5	20.8	20.6	20.7	20.4	19.0	17.5	19.1
TEMPERATURE MAXIMUM	C	(1)	26.7	26.8	27.8	29.0	29.7	29.8	29.4	29.5	29.6	29.2	28.9	27.6	28.7
TEMPERATURE MOYENNE	C	(1)	21.7	21.8	22.6	23.7	24.7	25.1	25.1	25.0	25.1	24.8	23.9	22.5	23.8
TEMPERATURE DIURNE	C	(7)	23.5	23.6	24.5	25.6	26.4	26.7	26.6	26.6	26.7	26.4	25.7	24.3	25.6
TEMPERATURE NOCTURNE	C	(7)	20.1	20.1	20.7	21.7	22.7	23.2	23.4	23.3	23.5	23.3	22.2	20.9	22.1

STATION (SITE) : NOSY AKAO	LATITUDE : 12 DEG 48 MIN SOUTH	PERIODE D'OBSERVATION : 1945-70
No. IRMA : 2	LONGITUDE : 049 DEG 50 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1280049833	ALTITUDE : 25 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.4	11.7	12.0	12.4	12.7	12.9	12.8	12.5	12.2	11.8	11.5	11.3	
PRECIPITATIONS TOTALES	mm	(8)	61	67	48	43	79	226	235	189	152	129	62	53	1344
JOURS DE PLUIES =>1 mm		(8)	11	12	9	8	9	13	14	14	12	10	8	9	129

STATION (SITE) : AMBILOBE	LATITUDE : 13 DEG 12 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 3	LONGITUDE : 049 DEG 09 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1320049153	ALTITUDE : 30 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67015		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.4	11.7	12.0	12.4	12.7	12.9	12.8	12.5	12.2	11.8	11.5	11.3	
PRECIPITATIONS TOTALES	mm	(3)	9	11	10	35	109	292	488	464	313	116	18	16	1881
JOURS DE PLUIES =>1 mm		(3)	1	1	1	3	6	13	18	18	16	7	2	2	88
TEMPERATURE MINIMUM	C	(1)	17.9	18.6	19.3	21.0	22.6	22.7	23.0	23.1	23.2	22.6	21.1	18.8	21.2
TEMPERATURE MAXIMUM	C	(1)	31.1	31.6	32.5	33.8	34.2	33.2	31.5	31.8	32.7	33.0	32.7	31.7	32.5
TEMPERATURE MOYENNE	C	(1)	24.5	25.1	25.0	27.4	28.4	28.0	27.3	27.5	28.0	27.8	26.9	25.3	26.8
TEMPERATURE DIURNE	C	(7)	26.9	27.5	27.4	29.7	30.4	29.8	28.8	29.0	29.7	29.7	29.0	27.7	28.8
TEMPERATURE NOCTURNE	C	(7)	22.3	22.9	22.6	25.0	26.1	25.9	25.6	25.8	26.3	26.0	25.0	23.2	24.7

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMBANJA	LATITUDE : 13 DEG 40 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 4	LONGITUDE : 048 DEG 27 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1366048453	ALTITUDE : 40 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67013		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.4	11.7	12.0	12.4	12.7	12.9	12.8	12.5	12.2	11.8	11.5	11.3	
PRECIPITATIONS TOTALES	mm	(3)	24	38	40	65	178	323	518	443	303	145	47	32	2156
JOURS DE PLUIES =>1 mm		(3)	3	5	4	6	11	16	21	18	15	10	4	3	116
TEMPERATURE MINIMUM	C	(1)	17.1	17.9	18.9	20.3	21.8	22.4	22.5	22.6	22.9	22.2	20.4	18.5	20.6
TEMPERATURE MAXIMUM	C	(1)	30.0	30.2	30.8	31.9	32.1	31.8	31.0	31.2	31.7	31.8	31.2	30.5	31.2
TEMPERATURE MOYENNE	C	(1)	23.5	23.8	24.8	26.1	26.9	27.1	26.7	26.9	27.3	27.0	25.8	24.5	25.9
TEMPERATURE DIURNE	C	(7)	25.8	26.0	26.9	28.2	28.7	28.7	28.2	28.4	28.9	28.7	27.8	26.7	27.8
TEMPERATURE NOCTURNE	C	(7)	21.4	21.7	22.7	23.9	24.8	25.2	25.0	25.2	25.7	25.3	24.0	22.6	24.0

STATION (SITE) : MANAMBATO	LATITUDE : 13 DEG 42 MIN SOUTH	PERIODE D'OBSERVATION : 1950-70
No. IRMA : 5	LONGITUDE : 049 DEG 06 MIN EAST	Nb D'ANNEES D'OBS. : 20
No. CUIRRI : 1370049103	ALTITUDE : 400 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.4	11.7	12.0	12.4	12.7	12.9	12.8	12.5	12.2	11.8	11.5	11.3	
PRECIPITATIONS TOTALES	mm	(8)	16	13	10	27	131	296	297	313	232	100	36	22	1493
JOURS DE PLUIES =>1 mm		(8)	2	1	1	3	9	18	19	19	18	8	4	2	104

STATION (SITE) : MANAKANA	LATITUDE : 13 DEG 45 MIN SOUTH	PERIODE D'OBSERVATION : 1950-70
No. IRMA : 6	LONGITUDE : 050 DEG 05 MIN EAST	Nb D'ANNEES D'OBS. : 20
No. CUIRRI : 1375050083	ALTITUDE : 150 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.4	11.7	12.0	12.5	12.8	12.9	12.8	12.6	12.2	11.8	11.5	11.3	
PRECIPITATIONS TOTALES	mm	(8)	98	120	59	90	152	216	201	188	168	87	99	98	1576
JOURS DE PLUIES =>1 mm		(8)	13	15	11	11	11	13	13	12	13	11	10	13	146

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## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MAROMANDIA	LATITUDE : 14 DEG 11 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 7	LONGITUDE : 048 DEG 05 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1418048083	ALTITUDE : 38 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	8	12	16	51	173	280	499	394	273	102	25	7	1840
JOURS DE PLUIES =>1 mm		(3)	1	1	2	4	10	15	19	17	15	7	2	1	94

STATION (SITE) : MANGINDRANO	LATITUDE : 14 DEG 17 MIN SOUTH	PERIODE D'OBSERVATION : Avant 1950
No. IRMA : 8	LONGITUDE : 048 DEG 56 MIN EAST	Nb D'ANNEES D'OBS. : +-10 (Pluvie)
No. CUIRRI : 1428048933	ALTITUDE : 1200 METERS	SOURCES : 1,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(1)	5	9	25	14	107	308	234	252	276	59	26	17	1332
TEMPERATURE MINIMUM	C	(1)	9.5	9.8	9.9	11.7	13.7	15.1	15.9	15.8	15.6	15.2	12.8	10.3	12.9
TEMPERATURE MAXIMUM	C	(1)	23.3	24.1	25.8	28.4	29.7	28.6	28.8	28.2	28.1	27.4	26.4	24.4	26.9
TEMPERATURE MOYENNE	C	(1)	16.4	17.0	17.9	20.1	21.7	21.9	22.4	22.0	21.9	21.3	19.6	17.4	20.0
TEMPERATURE DIURNE	C	(7)	18.9	19.6	20.8	23.1	24.5	24.3	24.7	24.2	24.1	23.5	22.1	20.0	22.5
TEMPERATURE NOCTURNE	C	(7)	14.1	14.6	15.0	16.9	18.5	19.1	19.8	19.6	19.6	19.2	17.4	15.1	17.4

STATION (SITE) : SAMBAVA	LATITUDE : 14 DEG 17 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 9	LONGITUDE : 050 DEG 10 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1428050163	ALTITUDE : 7 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67023		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	145	156	102	98	131	240	296	273	209	230	146	153	2179
JOURS DE PLUIES =>1 mm		(3)	15	15	13	12	12	14	16	15	13	14	12	13	164
TEMPERATURE MINIMUM	C	(1)	17.7	18.0	18.1	19.3	20.9	22.0	22.5	22.6	22.4	21.8	20.4	18.5	20.4
TEMPERATURE MAXIMUM	C	(1)	27.3	27.3	28.1	29.3	30.2	31.1	31.5	32.3	31.9	31.3	30.0	28.4	29.9
TEMPERATURE MOYENNE	C	(1)	22.5	22.7	23.1	24.3	25.6	26.6	27.0	27.5	27.2	26.6	25.2	23.5	25.2
TEMPERATURE DIURNE	C	(7)	24.2	24.4	24.9	26.1	27.2	28.2	28.6	29.2	28.9	28.3	26.9	25.3	26.9
TEMPERATURE NOCTURNE	C	(7)	20.9	21.1	21.3	22.4	23.7	24.7	25.2	25.6	25.4	24.9	23.6	21.9	23.4

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : BEALANANA-BETAINKANKANA      LATITUDE : 14 DEG 33 MIN SOUTH      PERIODE D'OBSERVATION : 1936-60  
 No. IRMA : 10      LONGITUDE : 048 DEG 33 MIN EAST      Nb D'ANNEES D'OBS. : 25  
 No. CUIRRI : 1455048553      ALTITUDE : 1125 METERS      SOURCES : 1,3,7  
 No. SERVICE MET: XXXXX

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	7	12	7	19	80	248	312	286	269	65	11	8	1324
JOURS DE PLUIES =>1 mm		(3)	2	1	1	2	6	14	17	16	17	5	2	2	85
TEMPERATURE MINIMUM	C	(1)	10.5	10.7	10.7	12.3	13.4	15.1	15.8	16.1	15.8	14.9	12.9	12.1	13.4
TEMPERATURE MAXIMUM	C	(1)	23.8	23.2	25.0	27.2	28.2	27.9	26.7	27.3	27.5	26.9	25.3	23.9	26.1
TEMPERATURE MOYENNE	C	(1)	16.7	17.0	17.9	19.8	20.8	21.5	21.3	21.7	21.7	20.9	19.1	18.0	19.7
TEMPERATURE DIURNE	C	(7)	19.1	19.3	20.5	22.4	23.4	23.7	23.2	23.7	23.8	23.1	21.4	20.2	22.0
TEMPERATURE NOCTURNE	C	(7)	14.5	14.9	15.3	16.9	17.8	18.9	19.1	19.5	19.5	18.8	17.1	16.1	17.4

STATION (SITE) : ANDAPA      LATITUDE : 14 DEG 39 MIN SOUTH      PERIODE D'OBSERVATION : 1936-60  
 No. IRMA : 11      LONGITUDE : 049 DEG 37 MIN EAST      Nb D'ANNEES D'OBS. : 25  
 No. CUIRRI : 1465049613      ALTITUDE : 471 METERS      SOURCES : 1,3,6,7  
 No. SERVICE MET: 67022

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	106	102	67	60	98	271	363	339	297	181	75	84	2043
JOURS DE PLUIES =>1 mm		(3)	16	16	11	10	10	16	20	19	18	15	13	14	178
TEMPERATURE MINIMUM	C	(1)	14.0	13.8	14.2	15.1	16.7	18.2	19.4	19.3	19.6	18.8	16.2	15.0	16.7
TEMPERATURE MAXIMUM	C	(1)	23.6	23.5	24.6	26.4	28.4	29.6	29.8	29.3	29.5	28.3	27.1	24.8	27.1
TEMPERATURE MOYENNE	C	(1)	18.8	18.7	19.4	20.8	22.6	23.9	24.6	24.3	24.6	23.6	21.7	19.9	21.9
TEMPERATURE DIURNE	C	(7)	20.5	20.5	21.3	22.8	24.7	25.9	26.4	26.1	26.4	25.3	23.7	21.7	23.8
TEMPERATURE NOCTURNE	C	(7)	17.2	17.1	17.5	18.6	20.2	21.5	22.5	22.3	22.8	21.9	19.9	18.3	20.0
HUMIDITE REL. MOYENNE	%	(6)	79	78	76	73	72	75	77	78	80	80	79	78	77
PRESSION DE VAPEUR ACT.	mbr	(7)	17.1	16.8	17.1	17.9	19.7	22.2	23.8	23.7	24.7	23.3	20.5	18.1	20.4
PRESSION DE VAPEUR DEF.	mbr	(7)	4.6	4.7	5.4	6.6	7.7	7.4	7.1	6.7	6.2	5.8	5.5	5.1	6.1

STATION (SITE) : ANKIABE      LATITUDE : 14 DEG 52 MIN SOUTH      PERIODE D'OBSERVATION : 1957-70  
 No. IRMA : 12      LONGITUDE : 048 DEG 57 MIN EAST      Nb D'ANNEES D'OBS. : 14  
 No. CUIRRI : 1486048953      ALTITUDE : 1150 METERS      SOURCES : 7,8  
 No. SERVICE MET: XXXXX

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(8)	25	35	30	66	143	217	390	339	229	116	41	22	1653
JOURS DE PLUIES =>1 mm		(8)	3	4	4	4	8	13	15	14	13	7	4	3	92

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : ANTSOHIHY	LATITUDE : 14 DEG 53 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 13	LONGITUDE : 047 DEG 58 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1488047963	ALTITUDE : 28 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	4	4	6	28	115	224	433	350	256	66	6	1	1493
JOURS DE PLUIES =>1 mm		(3)	0.4	0.6	0.8	3	8	15	21	17	15	6	0.5	0.3	88
TEMPERATURE MINIMUM	C	(4)	17.6	18.0	19.0	21.0	22.3	22.7	22.9	23.0	22.9	22.1	20.1	18.1	20.8
TEMPERATURE MAXIMUM	C	(4)	31.0	32.0	33.8	35.3	35.1	33.8	32.4	32.2	33.2	33.5	33.0	31.5	33.1
TEMPERATURE MOYENNE	C	(4)	24.3	25.0	26.4	28.2	28.7	28.3	27.7	27.5	28.1	27.8	26.6	24.8	27.0
TEMPERATURE DIURNE	C	(7)	26.7	27.5	29.1	30.7	31.0	30.2	29.4	29.1	29.9	29.9	28.9	27.2	29.1
TEMPERATURE NOCTURNE	C	(7)	22.1	22.6	23.7	25.4	26.1	26.0	25.8	25.7	26.2	25.8	24.5	22.7	24.7

STATION (SITE) : ANTSAKABARY	LATITUDE : 15 DEG 02 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 14	LONGITUDE : 048 DEG 57 MIN EAST	Nb D'ANNEES D'OBS. : +10
No. CUIRRI : 1503048953	ALTITUDE : 550 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
TEMPERATURE MINIMUM	C	(4)	14.9	15.1	15.2	17.2	18.4	19.7	20.1	19.9	20.1	19.2	17.4	15.5	17.7
TEMPERATURE MAXIMUM	C	(4)	24.6	25.6	27.2	30.3	31.9	32.2	30.9	31.4	31.4	30.5	28.5	26.7	29.3
TEMPERATURE MOYENNE	C	(4)	19.8	20.4	21.2	23.8	25.2	26.0	25.5	25.7	25.8	24.9	23.0	21.1	23.5
TEMPERATURE DIURNE	C	(7)	21.6	22.3	23.4	26.1	27.6	28.2	27.4	27.7	27.8	26.9	25.0	23.1	25.6
TEMPERATURE NOCTURNE	C	(7)	18.2	18.6	19.0	21.3	22.5	23.4	23.3	23.4	23.7	22.9	21.2	19.3	21.4

STATION (SITE) : ANTONIBE	LATITUDE : 15 DEG 07 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 15	LONGITUDE : 047 DEG 23 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1511047383	ALTITUDE : 5 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	2	3	4	19	108	205	514	354	281	49	5	1	1545
JOURS DE PLUIES =>1 mm		(3)	0.4	0.5	0.4	2	7	13	17	15	14	3	0.4	0.2	73

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## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : BEFANDRIANA NRD.      LATITUDE : 15 DEG 13 MIN SOUTH      PERIODE D'OBSERVATION : 1931-60  
 No. IRMA : 16      LONGITUDE : 048 DEG 32 MIN EAST      Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 1521048533      ALTITUDE : 315 METERS      SOURCES : 1,3,4,7  
 No. SERVICE MET: XXXXX

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	4	7	2	40	168	361	462	380	337	82	9	4	1856
JOURS DE PLUIES =>1 mm		(3)	1	0.5	0.3	2	8	15	19	18	15	4	1	0.5	84
TEMPERATURE MINIMUM	C	(4)	17.6	17.9	18.4	19.8	20.8	20.7	21.0	21.1	20.9	20.5	18.6	18.3	19.6
TEMPERATURE MAXIMUM	C	(4)	28.1	29.1	30.6	32.9	33.7	33.1	31.6	31.4	31.5	31.7	30.6	28.9	31.1
TEMPERATURE MOYENNE	C	(4)	22.9	23.5	24.5	26.4	27.3	26.9	26.3	26.3	26.2	26.1	24.6	23.6	25.4
TEMPERATURE DIURNE	C	(7)	24.8	25.5	26.7	28.7	29.6	29.1	28.2	28.1	28.1	28.1	26.8	25.5	27.4
TEMPERATURE NOCTURNE	C	(7)	21.2	21.6	22.3	23.9	24.7	24.3	24.1	24.3	24.2	24.1	22.6	21.9	23.3

STATION (SITE) : MAROANTSETRA      LATITUDE : 15 DEG 26 MIN SOUTH      PERIODE D'OBSERVATION : 1931-60  
 No. IRMA : 17      LONGITUDE : 049 DEG 44 MIN EAST      Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 1543049733      ALTITUDE : 2 METERS      SOURCES : 1,3,7  
 No. SERVICE MET: 67035

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	336	243	137	85	137	293	386	421	490	476	368	333	3705
JOURS DE PLUIES =>1 mm		(3)	24	21	14	10	9	16	18	18	19	20	21	22	212
TEMPERATURE MINIMUM	C	(1)	18.1	17.4	18.0	18.7	20.4	21.7	22.7	22.7	22.6	21.8	20.4	18.7	20.3
TEMPERATURE MAXIMUM	C	(1)	23.9	23.7	25.1	26.8	29.4	29.7	30.8	30.8	30.0	28.4	26.8	24.7	27.5
TEMPERATURE MOYENNE	C	(1)	21.0	20.6	21.6	22.8	24.9	25.8	26.8	26.8	26.4	25.2	23.6	21.7	23.9
TEMPERATURE DIURNE	C	(7)	22.1	21.7	22.9	24.2	26.5	27.2	28.2	28.2	27.7	26.4	24.8	22.8	25.2
TEMPERATURE NOCTURNE	C	(7)	20.1	19.5	20.3	21.2	23.1	24.1	25.1	25.2	25.0	24.0	22.5	20.7	22.6

STATION (SITE) : PORT BERGE (VAOVAO)      LATITUDE : 15 DEG 34 MIN SOUTH      PERIODE D'OBSERVATION : 1936-60  
 No. IRMA : 18      LONGITUDE : 047 DEG 41 MIN EAST      Nb D'ANNEES D'OBS. : 25  
 No. CUIRRI : 1556047683      ALTITUDE : 22 METERS      SOURCES : 1,3,7  
 No. SERVICE MET: XXXXX

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	2	4	2	18	110	243	479	407	265	43	5	1	1579
JOURS DE PLUIES =>1 mm		(3)	0.3	0.4	0.2	2	8	14	19	17	13	3	0.5	0.3	78
TEMPERATURE MINIMUM	C	(1)	15.0	16.0	17.6	20.0	21.9	22.3	22.6	23.0	22.8	21.4	18.5	16.1	19.8
TEMPERATURE MAXIMUM	C	(1)	31.2	32.1	34.0	35.8	36.7	35.4	32.6	33.2	33.4	33.5	32.8	31.5	33.5
TEMPERATURE MOYENNE	C	(1)	23.1	24.1	25.8	27.9	29.3	28.9	27.6	28.1	28.2	27.5	25.7	23.8	26.7
TEMPERATURE DIURNE	C	(7)	26.1	27.0	28.8	30.7	31.9	31.2	29.4	29.9	30.1	29.7	28.3	26.6	29.1
TEMPERATURE NOCTURNE	C	(7)	20.5	21.4	22.8	24.8	26.3	26.2	25.6	26.1	26.2	25.4	23.4	21.4	24.2

XXXXX - means unknown data



## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MAHAJAMBA	LATITUDE : 15 DEG 42 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 19	LONGITUDE : 047 DEG 05 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1570047083	ALTITUDE : 6 METERS	SOURCES : 1,3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.3	11.6	12.0	12.5	12.8	13.0	12.9	12.6	12.2	11.8	11.4	11.2	
PRECIPITATIONS TOTALES	mm	(3)	2	2	2	10	106	221	433	369	250	47	2	1	1445
JOURS DE PLUIES =>1 mm		(3)	0.4	0.3	0.3	1	6	12	19	15	13	3	0.3	0.2	71
TEMPERATURE MINIMUM	C	(1)	14.0	15.2	17.3	19.4	22.8	23.2	23.1	22.1	23.6	21.8	20.0	17.2	20.0
TEMPERATURE MAXIMUM	C	(1)	31.8	32.3	33.8	35.6	35.8	33.8	33.1	33.1	34.3	33.8	33.5	32.7	33.6
TEMPERATURE MOYENNE	C	(1)	22.9	23.8	25.6	27.5	29.3	28.5	28.1	27.6	29.0	27.8	26.8	25.0	26.8
TEMPERATURE DIURNE	C	(7)	26.1	26.9	28.6	30.4	31.6	30.4	29.9	29.5	30.9	30.0	29.3	27.8	29.3
TEMPERATURE NOCTURNE	C	(7)	20.0	20.9	22.6	24.4	26.7	26.3	26.0	25.4	27.0	25.7	24.6	22.5	24.3

STATION (SITE) : SOALALA	LATITUDE : 16 DEG 04 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 20	LONGITUDE : 045 DEG 20 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1606045333	ALTITUDE : 4 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67039		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.6	12.2	11.8	11.4	11.1	
PRECIPITATIONS TOTALES	mm	(3)	1	3	2	5	52	166	410	327	223	35	8	0.4	1232
JOURS DE PLUIES =>1 mm		(3)	0.3	0.4	0.4	1	4	9	15	14	11	3	0.7	0.1	59
TEMPERATURE MINIMUM	C	(1)	17.4	18.2	19.9	21.8	23.3	23.9	23.9	23.9	23.8	23.0	20.3	18.2	21.5
TEMPERATURE MAXIMUM	C	(1)	30.2	30.6	31.2	31.9	31.9	31.9	30.8	31.4	31.8	32.8	32.3	30.4	31.4
TEMPERATURE MOYENNE	C	(1)	23.8	24.5	25.6	26.9	27.6	28.0	27.4	27.7	27.8	28.0	26.3	24.4	26.5
TEMPERATURE DIURNE	C	(7)	26.1	26.8	27.6	28.7	29.1	29.4	28.6	29.0	29.2	29.8	28.5	26.6	28.3
TEMPERATURE NOCTURNE	C	(7)	21.7	22.4	23.6	24.9	25.9	26.3	26.0	26.2	26.3	26.3	24.3	22.5	24.7

STATION (SITE) : MAMPIKONY	LATITUDE : 16 DEG 06 MIN SOUTH	PERIODE D'OBSERVATION : 1936-70
No. IRMA : 21	LONGITUDE : 047 DEG 38 MIN EAST	Nb D'ANNEES D'OBS. : 35
No. CUIRRI : 1610047633	ALTITUDE : 54 METERS	SOURCES : 7,8
No. SERVICE MET: 67046		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.6	12.2	11.8	11.4	11.1	
PRECIPITATIONS TOTALES	mm	(8)	2	1	2	28	134	191	445	347	309	53	5	1	1518
JOURS DE PLUIES =>1 mm		(8)	0.4	0.4	0.2	2	8	15	19	17	16	5	0.7	0.4	84

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MAROVOAY - MADIROKELY      LATITUDE : 16 DEG 07 MIN SOUTH      PERIODE D'OBSERVATION : 1931-60  
 No. IRMA : 22      LONGITUDE : 046 DEG 35 MIN EAST      Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 1611046583      ALTITUDE : 20 METERS      SOURCES : 1,3,7  
 No. SERVICE MET: 67041

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.6	12.2	11.8	11.4	11.1	
PRECIPITATIONS TOTALES	mm	(3)	1	5	7	22	97	227	442	343	275	71	4	2	1496
JOURS DE PLUIES =>1 mm		(3)	0.3	0.6	0.8	2	7	12	18	16	13	4	0.7	0.5	75
TEMPERATURE MINIMUM	C	(1)	16.8	17.2	18.5	20.7	22.6	22.9	23.2	23.0	22.9	21.6	19.5	17.4	20.5
TEMPERATURE MAXIMUM	C	(1)	32.1	32.8	34.1	35.5	34.9	34.2	32.4	32.7	32.4	33.6	33.3	32.0	33.3
TEMPERATURE MOYENNE	C	(1)	24.5	25.0	26.3	28.1	28.8	28.6	27.8	27.9	27.7	27.6	26.4	24.7	27.0
TEMPERATURE DIURNE	C	(7)	27.3	27.8	29.1	30.7	31.0	30.6	29.4	29.6	29.4	29.8	28.9	27.4	29.3
TEMPERATURE NOCTURNE	C	(7)	22.0	22.4	23.5	25.2	26.3	26.2	25.9	26.0	25.9	25.5	24.1	22.4	24.6

STATION (SITE) : MAROTANDRANO      LATITUDE : 16 DEG 11 MIN SOUTH      PERIODE D'OBSERVATION : XXXX-XX  
 No. IRMA : 23      LONGITUDE : 048 DEG 50 MIN EAST      Nb D'ANNEES D'OBS. : +-10  
 No. CUIRRI : 1618048833      ALTITUDE : 500 METERS      SOURCES : 4,7  
 No. SERVICE MET: XXXXX

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.6	12.2	11.8	11.4	11.1	
TEMPERATURE MINIMUM	C	(4)	15.8	16.1	16.2	17.3	18.9	20.0	20.6	20.5	20.5	19.7	18.0	16.8	18.4
TEMPERATURE MAXIMUM	C	(4)	24.4	25.0	26.7	29.2	31.2	31.4	30.2	30.4	30.2	29.7	27.8	25.8	28.5
TEMPERATURE MOYENNE	C	(4)	20.1	20.6	21.5	23.3	25.1	25.7	25.4	25.5	25.4	24.7	22.9	21.3	23.5
TEMPERATURE DIURNE	C	(7)	21.7	22.2	23.4	25.4	27.3	27.7	27.1	27.3	27.1	26.5	24.7	22.9	25.3
TEMPERATURE NOCTURNE	C	(7)	18.7	19.1	19.6	21.0	22.6	23.3	23.4	23.5	23.6	23.0	21.3	19.9	21.6

STATION (SITE) : TSARAMANDROSO      LATITUDE : 16 DEG 22 MIN SOUTH      PERIODE D'OBSERVATION : XXXX-XX  
 No. IRMA : 24      LONGITUDE : 047 DEG 03 MIN EAST      Nb D'ANNEES D'OBS. : +-10  
 No. CUIRRI : 1636047053      ALTITUDE : 100 METERS      SOURCES : 4,7  
 No. SERVICE MET: XXXXX

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
TEMPERATURE MINIMUM	C	(4)	17.8	18.4	19.2	20.6	22.0	22.3	22.5	22.5	22.3	21.9	19.9	18.3	20.6
TEMPERATURE MAXIMUM	C	(4)	31.6	32.6	34.1	35.5	34.8	33.9	33.1	32.0	32.7	33.5	33.0	31.9	33.2
TEMPERATURE MOYENNE	C	(4)	24.7	25.5	26.7	28.1	28.4	28.1	27.8	27.3	27.5	27.7	26.5	25.1	27.0
TEMPERATURE DIURNE	C	(7)	27.2	28.1	29.4	30.7	30.6	30.1	29.7	29.0	29.4	29.8	28.9	27.6	29.2
TEMPERATURE NOCTURNE	C	(7)	22.5	23.1	24.0	25.2	25.8	25.7	25.6	25.4	25.6	25.7	24.4	23.0	24.7

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMBATO - BOENI                      LATITUDE : 16 DEG 28 MIN SOUTH                      PERIODE D'OBSERVATION : 1941-70  
 No. IRMA : 25    LONGITUDE : 046 DEG 43 MIN EAST                      Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 1646046713                              ALTITUDE : 40 METERS                                      SOURCES : 7,8  
 No. SERVICE MET: 67043

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(8)	4	3	5	32	113	245	388	296	241	51	3	2	1383
JOURS DE PLUIES =>1 mm		(8)	0.3	0.5	0.6	2	7	13	14	13	11	3	0.7	0.1	65
TEMPERATURE MINIMUM	C	(8)	17.1	17.3	18.9	20.8	22.1	21.9	22.0	22.4	22.1	21.3	19.5	17.3	20.2
TEMPERATURE MAXIMUM	C	(8)	31.4	32.0	33.6	35.6	35.8	33.9	32.2	32.6	32.9	33.2	32.7	31.6	33.1
TEMPERATURE MOYENNE	C	(7)	24.3	24.7	26.3	28.2	29.0	27.9	27.1	27.5	27.5	27.3	26.1	24.5	26.7
TEMPERATURE DIURNE	C	(7)	26.9	27.3	28.9	30.8	31.4	30.0	28.9	29.3	29.4	29.4	28.5	27.1	29.0
TEMPERATURE NOCTURNE	C	(7)	22.0	22.2	23.6	25.3	26.2	25.4	25.0	25.5	25.5	25.2	23.9	22.2	24.3

STATION (SITE) : AMPATAKAMARORENY                      LATITUDE : 16 DEG 30 MIN SOUTH                      PERIODE D'OBSERVATION : XXXX-XX  
 No. IRMA : 26    LONGITUDE : 048 DEG 47 MIN EAST                      Nb D'ANNEES D'OBS. : +10  
 No. CUIRRI : 1650048783                              ALTITUDE : 850 METERS                                      SOURCES : 4,7  
 No. SERVICE MET: XXXXX

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
TEMPERATURE MINIMUM	C	(4)	10.6	11.0	11.4	12.5	14.4	15.6	17.1	16.7	16.9	15.1	13.3	12.3	13.9
TEMPERATURE MAXIMUM	C	(4)	19.9	21.1	22.6	24.3	26.8	28.0	26.7	28.3	27.9	26.9	24.1	22.0	24.9
TEMPERATURE MOYENNE	C	(4)	15.3	16.1	17.0	18.5	20.6	21.8	21.9	22.5	22.4	21.0	18.7	17.2	19.4
TEMPERATURE DIURNE	C	(7)	17.0	17.9	19.0	20.6	22.8	24.0	23.6	24.6	24.4	23.1	20.7	19.0	21.4
TEMPERATURE NOCTURNE	C	(7)	13.8	14.4	15.0	16.2	18.1	19.2	19.9	20.2	20.4	18.9	16.9	15.7	17.4

STATION (SITE) : SITAMPIKY                                      LATITUDE : 16 DEG 39 MIN SOUTH                      PERIODE D'OBSERVATION : 1936-60  
 No. IRMA : 27    LONGITUDE : 046 DEG 04 MIN EAST                      Nb D'ANNEES D'OBS. : 25  
 No. CUIRRI : 1665046063                              ALTITUDE : 200 METERS                                      SOURCES : 3,7  
 No. SERVICE MET: XXXXX

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(3)	2	5	9	33	123	238	472	390	266	44	4	1	1587
JOURS DE PLUIES =>1 mm		(3)	0.4	0.8	0.9	3	7	13	19	15	13	3	0.5	0.3	76

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : TSARATANANA	LATITUDE : 16 DEG 47 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 28	LONGITUDE : 047 DEG 39 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1678047653	ALTITUDE : 380 METERS	SOURCES : 3,4,7
No. SERVICE MET: 67047		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(3)	1	3	3	45	147	350	544	395	318	57	9	2	1874
JOURS DE PLUIES =>1 mm		(3)	0.3	0.5	0.3	3	9	16	21	17	16	4	0.9	0.4	88
TEMPERATURE MINIMUM	C	(4)	16.5	17.0	17.5	18.9	20.4	20.9	21.1	21.1	21.1	20.5	18.3	16.8	19.2
TEMPERATURE MAXIMUM	C	(4)	28.1	29.2	31.0	33.0	33.1	32.4	30.4	30.8	31.2	31.9	30.4	29.2	30.9
TEMPERATURE MOYENNE	C	(4)	22.3	23.1	24.3	26.0	26.8	26.7	25.8	26.0	26.2	26.2	24.4	23.0	25.1
TEMPERATURE DIURNE	C	(7)	24.4	25.3	26.7	28.5	29.0	28.7	27.4	27.7	28.0	28.3	26.6	25.3	27.2
TEMPERATURE NOCTURNE	C	(7)	20.4	21.0	21.9	23.3	24.2	24.3	23.9	24.1	24.3	24.2	22.4	21.1	22.9

STATION (SITE) : SOANIERANA-IVONGO	LATITUDE : 16 DEG 55 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 29	LONGITUDE : 049 DEG 35 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1691049583	ALTITUDE : 10 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(3)	317	260	170	117	151	266	421	395	505	403	341	331	3677
JOURS DE PLUIES =>1 mm		(3)	23	22	18	14	13	16	19	18	20	20	20	21	224
TEMPERATURE MINIMUM	C	(4)	17.9	17.8	18.1	19.1	20.6	21.8	22.6	22.6	22.5	21.7	20.0	18.5	20.3
TEMPERATURE MAXIMUM	C	(4)	24.2	24.1	25.1	26.5	27.9	29.1	29.7	29.6	29.0	28.2	26.5	24.9	27.1
TEMPERATURE MOYENNE	C	(4)	21.1	21.0	21.6	22.8	24.3	25.5	26.2	26.1	25.8	25.0	23.3	21.7	23.7
TEMPERATURE DIURNE	C	(7)	22.3	22.1	22.9	24.1	25.6	26.8	27.4	27.3	27.0	26.2	24.5	22.9	24.9
TEMPERATURE NOCTURNE	C	(7)	20.1	19.9	20.3	21.4	22.8	24.0	24.7	24.7	24.6	23.9	22.2	20.7	22.4

STATION (SITE) : ANANIMENABAKA	LATITUDE : 16 DEG 56 MIN SOUTH	PERIODE D'OBSERVATION : 1956-70
No. IRMA : 30	LONGITUDE : 048 DEG 30 MIN EAST	Nb D'ANNEES D'OBS. : 15
No. CUIRRI : 1693048503	ALTITUDE : 1000 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(8)	32	23	3	27	119	228	248	189	216	38	21	20	1164
JOURS DE PLUIES =>1 mm		(8)	7	7	2	2	7	13	12	10	10	3	3	4	80

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : BEKODOKA	LATITUDE : 16 DEG 58 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 31	LONGITUDE : 045 DEG 06 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1696045103	ALTITUDE : 300 METERS	SOURCES : 1,3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(3)	6	9	22	42	137	232	389	314	244	87	11	3	1496
JOURS DE PLUIES =>1 mm		(3)	0.7	1	2	4	8	10	18	15	13	5	1	0.4	78
TEMPERATURE MINIMUM	C	(1)	14.8	16.2	18.0	19.6	20.8	21.3	21.5	21.3	21.4	20.4	17.4	15.3	19.0
TEMPERATURE MAXIMUM	C	(1)	30.3	31.3	32.7	33.5	33.7	32.1	30.5	31.0	31.9	32.6	31.8	30.3	31.8
TEMPERATURE MOYENNE	C	(1)	22.6	23.8	25.4	26.6	27.3	26.7	26.0	26.2	26.7	26.5	24.6	22.8	25.4
TEMPERATURE DIURNE	C	(7)	25.4	26.5	28.0	29.1	29.6	28.6	27.6	27.9	28.6	28.7	27.2	25.5	27.7
TEMPERATURE NOCTURNE	C	(7)	20.1	21.3	22.8	23.9	24.7	24.4	24.1	24.3	24.7	24.4	22.3	20.4	23.1

STATION (SITE) : ANDILAMENA	LATITUDE : 17 DEG 01 MIN SOUTH	PERIODE D'OBSERVATION : 1936-70
No. IRMA : 32	LONGITUDE : 048 DEG 34 MIN EAST	Nb D'ANNEES D'OBS. : 35
No. CUIRRI : 1701048563	ALTITUDE : 935 METERS	SOURCES : 7,8
No. SERVICE MET: 67068		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(8)	12	13	6	17	100	177	235	198	147	33	14	11	963
JOURS DE PLUIES =>1 mm		(8)	5	5	4	4	7	12	13	13	12	5	3	5	88

STATION (SITE) : MAHABE	LATITUDE : 17 DEG 20 MIN SOUTH	PERIODE D'OBSERVATION : 1950-70
No. IRMA : 33	LONGITUDE : 045 DEG 30 MIN EAST	Nb D'ANNEES D'OBS. : 21
No. CUIRRI : 1733045503	ALTITUDE : 500 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(8)	6	11	20	49	137	227	374	269	230	85	10	2	1420
JOURS DE PLUIES =>1 mm		(8)	2	1	2	4	9	14	17	14	13	6	2	0.5	85

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : FENOARIVO (FENERIVE EST)      LATITUDE : 17 DEG 23 MIN SOUTH      PERIODE D'OBSERVATION : 1931-60  
 No. IRMA : 34      LONGITUDE : 049 DEG 25 MIN EAST      Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 1738049413      ALTITUDE : 5 METERS      SOURCES : 1,3,7  
 No. SERVICE MET: 67069

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(3)	153	146	118	111	156	281	340	419	407	276	182	169	2758
JOURS DE PLUIES =>1 mm		(3)	17	17	14	12	13	15	17	16	17	16	14	15	183
TEMPERATURE MINIMUM	C	(1)	17.1	16.9	17.1	18.2	20.2	20.8	22.4	22.2	21.8	20.7	19.1	17.9	19.5
TEMPERATURE MAXIMUM	C	(1)	24.9	25.0	25.9	27.4	28.8	30.0	30.7	30.9	30.5	29.3	27.8	25.9	28.1
TEMPERATURE MOYENNE	C	(1)	21.0	21.0	21.5	22.8	24.5	25.4	26.6	26.6	26.2	25.0	23.5	21.9	23.8
TEMPERATURE DIURNE	C	(7)	22.4	22.5	23.1	24.4	26.0	27.0	28.0	28.1	27.8	26.6	25.1	23.4	25.4
TEMPERATURE NOCTURNE	C	(7)	19.8	19.6	19.9	21.0	22.7	23.5	24.9	24.9	24.6	23.5	22.1	20.7	22.3

STATION (SITE) : ANDRIAMENA      LATITUDE : 17 DEG 26 MIN SOUTH      PERIODE D'OBSERVATION : 1936-60  
 No. IRMA : 35      LONGITUDE : 047 DEG 27 MIN EAST      Nb D'ANNEES D'OBS. : 25  
 No. CUIRRI : 1743047453      ALTITUDE : 750 METERS      SOURCES : 3,7  
 No. SERVICE MET: XXXXX

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(3)	2	3	3	45	132	284	384	300	256	30	9	3	1451
JOURS DE PLUIES =>1 mm		(3)	0.4	0.7	0.4	3	8	15	19	15	15	3	1	0.7	81

STATION (SITE) : KANDREHO      LATITUDE : 17 DEG 28 MIN SOUTH      PERIODE D'OBSERVATION : 1936-60  
 No. IRMA : 36      LONGITUDE : 046 DEG 05 MIN EAST      Nb D'ANNEES D'OBS. : 25  
 No. CUIRRI : 1746046083      ALTITUDE : 285 METERS      SOURCES : 1,3,7  
 No. SERVICE MET: 67057

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.2	11.6	12.0	12.5	12.9	13.1	13.0	12.7	12.2	11.8	11.3	11.1	
PRECIPITATIONS TOTALES	mm	(3)	4	9	13	49	127	278	509	329	310	65	6	3	1702
JOURS DE PLUIES =>1 mm		(3)	0.6	1	2	5	8	15	21	17	16	5	1	0.5	92
TEMPERATURE MINIMUM	C	(1)	16.6	17.6	19.1	20.7	21.8	22.0	21.8	21.7	21.7	21.1	18.8	17.1	20.0
TEMPERATURE MAXIMUM	C	(1)	31.1	32.3	33.6	35.0	35.3	34.3	32.6	33.2	32.9	33.7	32.7	31.4	33.2
TEMPERATURE MOYENNE	C	(1)	23.9	25.0	26.4	27.9	28.6	28.2	27.2	27.5	27.4	27.5	25.8	24.3	26.6
TEMPERATURE DIURNE	C	(7)	26.5	27.7	29.0	30.4	31.0	30.3	29.1	29.5	29.4	29.8	28.3	26.9	29.0
TEMPERATURE NOCTURNE	C	(7)	21.6	22.5	23.8	25.1	25.8	25.6	25.0	25.2	25.3	25.3	23.5	22.1	24.2

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : TAMBOHORANO	LATITUDE : 17 DEG 31 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 37	LONGITUDE : 043 DEG 58 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1751043963	ALTITUDE : 20 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(3)	3	6	9	17	45	181	368	285	173	23	11	3	1124
JOURS DE PLUIES =>1 mm		(3)	0.4	0.8	0.8	2	3	9	14	11	9	2	1	0.5	54
TEMPERATURE MINIMUM	C	(4)	17.0	17.9	19.6	21.2	22.7	23.4	23.9	23.7	23.5	22.8	19.1	17.6	21.0
TEMPERATURE MAXIMUM	C	(4)	29.4	29.4	30.2	31.3	31.9	32.5	31.6	31.7	32.1	32.0	30.3	29.4	31.0
TEMPERATURE MOYENNE	C	(4)	23.2	23.7	24.9	26.3	27.3	28.0	27.8	27.7	27.8	27.4	24.7	23.5	26.0
TEMPERATURE DIURNE	C	(7)	25.5	25.8	26.8	28.1	28.9	29.6	29.1	29.1	29.3	29.1	26.7	25.7	27.8
TEMPERATURE NOCTURNE	C	(7)	21.2	21.8	23.0	24.3	25.4	26.1	26.2	26.1	26.2	25.8	22.9	21.7	24.2

STATION (SITE) : ANDRIBA	LATITUDE : 17 DEG 36 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 38	LONGITUDE : 046 DEG 55 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1760046913	ALTITUDE : 625 METERS	SOURCES : 3,7
No. SERVICE MET: 67059		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(3)	2	5	12	47	145	329	532	414	337	55	14	2	1894
JOURS DE PLUIES =>1 mm		(3)	0.3	0.9	1	4	10	17	20	16	17	4	1	0.5	92

STATION (SITE) : ANTOKAZO	LATITUDE : 17 DEG 36 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 39	LONGITUDE : 048 DEG 33 MIN EAST	Nb D'ANNEES D'OBS. : +-14
No. CUIRRI : 1760048553	ALTITUDE : 1050 METERS	SOURCES : 1,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(1)	19	20	8	34	104	171	229	258	187	31	10	20	1091
TEMPERATURE MINIMUM	C	(1)	10.6	10.9	11.1	12.0	14.4	16.2	17.2	17.2	16.9	14.9	12.8	10.9	13.8
TEMPERATURE MAXIMUM	C	(1)	21.2	22.7	24.3	26.9	29.1	28.3	27.2	27.4	26.7	25.7	23.7	21.3	25.4
TEMPERATURE MOYENNE	C	(1)	15.9	16.8	17.7	19.5	21.8	22.3	22.2	22.3	21.8	20.3	18.3	16.1	19.6
TEMPERATURE DIURNE	C	(7)	17.8	18.9	20.1	22.1	24.4	24.4	23.9	24.1	23.6	22.3	20.3	18.0	21.7
TEMPERATURE NOCTURNE	C	(7)	14.2	14.8	15.3	16.6	18.8	19.7	20.1	20.3	20.0	18.4	16.5	14.5	17.4

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMBATOMAINTY	LATITUDE : 17 DEG 41 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 40	LONGITUDE : 045 DEG 40 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1768045663	ALTITUDE : 350 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(3)	11	8	22	78	149	269	421	359	254	63	9	4	1647
JOURS DE PLUIES =>1 mm		(3)	1	0.8	2	6	9	14	17	16	13	6	1	0.7	87
TEMPERATURE MINIMUM	C	(4)	14.0	15.7	17.8	20.0	21.4	21.7	21.9	22.0	21.7	20.5	16.9	14.8	19.0
TEMPERATURE MAXIMUM	C	(4)	30.8	31.8	33.3	34.3	34.6	32.6	31.6	31.8	32.0	32.9	32.3	30.9	32.4
TEMPERATURE MOYENNE	C	(4)	22.4	23.8	25.6	27.2	28.0	27.2	26.8	26.9	26.9	26.7	24.6	22.9	25.8
TEMPERATURE DIURNE	C	(7)	25.5	26.7	28.4	29.7	30.3	29.1	28.5	28.6	28.7	28.9	27.4	25.8	28.1
TEMPERATURE NOCTURNE	C	(7)	19.7	21.1	22.8	24.4	25.3	24.9	24.8	25.0	25.0	24.5	22.1	20.4	23.3

STATION (SITE) : MANAKAMBAHINY-EST	LATITUDE : 17 DEG 46 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 41	LONGITUDE : 048 DEG 39 MIN EAST	Nb D'ANNEES D'OBS. : +-10
No. CUIRRI : 1776048653	ALTITUDE : 990 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
TEMPERATURE MINIMUM	C	(4)	11.1	11.1	11.5	12.8	14.8	16.0	17.2	16.8	16.9	15.7	13.2	11.6	14.1
TEMPERATURE MAXIMUM	C	(4)	19.9	21.0	22.0	25.3	27.4	28.0	27.3	27.2	26.7	25.7	23.4	21.3	24.6
TEMPERATURE MOYENNE	C	(4)	15.5	16.1	16.8	19.1	21.1	22.0	22.3	22.0	21.8	20.7	18.3	16.5	19.4
TEMPERATURE DIURNE	C	(7)	17.1	17.9	18.7	21.3	23.3	24.1	24.1	23.8	23.6	22.5	20.2	18.3	21.2
TEMPERATURE NOCTURNE	C	(7)	14.1	14.4	14.9	16.7	18.5	19.5	20.2	19.9	20.0	19.0	16.6	15.0	17.4

STATION (SITE) : AMBATONDRAZAKA	LATITUDE : 17 DEG 48 MIN SOUTH	PERIODE D'OBSERVATION : 1941-69
No. IRMA : 42	LONGITUDE : 048 DEG 26 MIN EAST	Nb D'ANNEES D'OBS. : 29
No. CUIRRI : 1780048433	ALTITUDE : 767 METERS	SOURCES : 7,8
No. SERVICE MET: 67065		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(8)	6	6	2	19	119	206	241	178	162	30	9	7	985
JOURS DE PLUIES =>1 mm		(8)	4	4	2	3	9	13	15	12	13	4	2	3	84
TEMPERATURE MINIMUM	C	(8)	11.0	11.0	11.6	13.2	16.1	17.6	18.4	18.5	18.2	16.5	13.7	11.7	14.8
TEMPERATURE MAXIMUM	C	(8)	23.8	24.3	26.3	28.4	29.8	29.7	29.1	29.0	28.7	28.9	26.4	24.7	27.4
TEMPERATURE MOYENNE	C	(7)	17.4	17.7	19.0	20.8	23.0	23.7	23.8	23.8	23.5	22.7	20.1	18.2	21.1
TEMPERATURE DIURNE	C	(7)	19.7	20.1	21.6	23.5	25.3	25.8	25.6	25.6	25.3	24.9	22.4	20.6	23.4
TEMPERATURE NOCTURNE	C	(7)	15.4	15.4	16.3	17.8	20.1	21.1	21.5	21.7	21.5	20.6	18.0	16.2	18.8

XXXX-XX - means unknown data



## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MOROFENOBE			LATITUDE : 17 DEG 49 MIN SOUTH			PERIODE D'OBSERVATION : 1936-60									
No. IRMA : 43			LONGITUDE : 044 DEG 56 MIN EAST			Nb D'ANNEES D'OBS. : 25									
No. CUIRRI : 1781044933			ALTITUDE : 147 METERS			SOURCES : 3,4,7									
No. SERVICE MET: XXXXX															
M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(3)	6	10	21	61	162	288	494	348	320	69	7	3	1789
JOURS DE PLUIES =>1 mm		(3)	0.6	1	2	5	10	16	19	16	16	5	1	0.5	92
TEMPERATURE MINIMUM	C	(4)	16.1	17.3	18.9	20.7	21.7	22.1	22.2	22.3	22.1	21.4	18.6	16.3	20.0
TEMPERATURE MAXIMUM	C	(4)	30.6	31.6	33.4	34.3	34.1	33.0	31.8	32.1	32.3	33.1	31.8	30.6	32.4
TEMPERATURE MOYENNE	C	(4)	23.4	24.5	26.2	27.1	27.9	27.6	27.0	27.2	27.2	27.3	25.2	23.5	26.2
TEMPERATURE DIURNE	C	(7)	26.0	27.1	28.8	29.5	30.1	29.5	28.7	28.9	29.0	29.4	27.6	26.1	28.4
TEMPERATURE NOCTURNE	C	(7)	21.1	22.1	23.6	24.5	25.3	25.3	25.0	25.3	25.3	25.3	23.1	21.3	23.9
STATION (SITE) : VOHIDIALA			LATITUDE : 17 DEG 51 MIN SOUTH			PERIODE D'OBSERVATION : XXXX-XX									
No. IRMA : 44			LONGITUDE : 048 DEG 15 MIN EAST			Nb D'ANNEES D'OBS. : 13									
No. CUIRRI : 1785048253			ALTITUDE : 773 METERS			SOURCES : 1,7									
No. SERVICE MET: XXXXX															
M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(1)	7	7	5	30	146	193	264	239	223	46	12	7	1179
TEMPERATURE MINIMUM	C	(1)	10.9	10.8	11.5	12.7	16.0	18.3	18.0	17.6	17.5	16.3	12.9	11.7	14.5
TEMPERATURE MAXIMUM	C	(1)	24.0	25.8	27.6	30.9	31.1	30.3	30.3	28.9	29.1	27.3	25.5	24.4	27.9
TEMPERATURE MOYENNE	C	(1)	17.5	18.3	19.6	21.8	23.6	24.3	24.2	23.3	23.3	21.8	19.2	18.1	21.3
TEMPERATURE DIURNE	C	(7)	19.9	21.0	22.5	25.0	26.2	26.4	26.3	25.3	25.4	23.8	21.5	20.4	23.6
TEMPERATURE NOCTURNE	C	(7)	15.4	15.8	16.7	18.3	20.5	21.8	21.6	21.1	21.1	19.9	17.2	16.1	18.8
STATION (SITE) : RENDIRENDRY			LATITUDE : 17 DEG 57 MIN SOUTH			PERIODE D'OBSERVATION : XXXX-XX									
No. IRMA : 45			LONGITUDE : 049 DEG 13 MIN EAST			Nb D'ANNEES D'OBS. : +-10									
No. CUIRRI : 1795049213			ALTITUDE : 550 METERS			SOURCES : 4,7									
No. SERVICE MET: XXXXX															
M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
TEMPERATURE MINIMUM	C	(4)	16.0	15.7	15.6	16.8	19.0	20.4	21.6	21.8	21.3	20.2	18.2	16.6	18.6
TEMPERATURE MAXIMUM	C	(4)	22.2	22.4	23.8	25.5	27.5	28.6	29.3	30.2	28.3	27.2	25.2	23.0	26.1
TEMPERATURE MOYENNE	C	(4)	19.1	19.1	19.7	21.2	23.3	24.5	25.5	26.0	24.8	23.7	21.7	19.8	22.4
TEMPERATURE DIURNE	C	(7)	20.2	20.3	21.2	22.7	24.8	25.9	26.8	27.5	26.1	25.0	23.0	21.0	23.7
TEMPERATURE NOCTURNE	C	(7)	18.1	18.0	18.2	19.5	21.5	22.8	23.9	24.3	23.5	22.5	20.6	18.8	21.0

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : KIANGARA	LATITUDE : 17 DEG 58 MIN SOUTH	PERIODE D'OBSERVATION : 1936-70
No. IRMA : 46	LONGITUDE : 047 DEG 02 MIN EAST	Nb D'ANNEES D'OBS. : 35
No. CUIRRI : 1796047033	ALTITUDE : 900 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(8)	8	5	13	59	216	352	382	329	264	59	10	5	1702
JOURS DE PLUIES =>1 mm		(8)	1	1	2	5	13	18	18	17	15	5	2	1	98

STATION (SITE) : IVOLOINA	LATITUDE : 18 DEG 03 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 47	LONGITUDE : 049 DEG 19 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1805049313	ALTITUDE : 20 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(3)	195	196	127	79	160	217	377	417	464	335	246	241	3054
JOURS DE PLUIES =>1 mm		(3)	19	18	15	10	11	14	17	16	18	17	15	18	188
TEMPERATURE MINIMUM	C	(4)	17.0	16.9	17.0	18.3	20.1	21.3	22.4	22.3	22.1	21.0	19.2	17.6	19.6
TEMPERATURE MAXIMUM	C	(4)	24.8	24.9	26.0	27.5	28.9	30.1	30.7	30.7	30.3	29.3	27.6	25.7	28.0
TEMPERATURE MOYENNE	C	(4)	20.9	20.9	21.5	22.9	24.5	25.7	26.6	26.5	26.2	25.2	23.4	21.7	23.8
TEMPERATURE DIURNE	C	(7)	22.3	22.4	23.1	24.5	26.0	27.2	28.0	28.0	27.7	26.7	24.9	23.2	25.3
TEMPERATURE NOCTURNE	C	(7)	19.7	19.6	19.9	21.1	22.7	23.8	24.9	24.8	24.7	23.8	22.0	20.4	22.3

STATION (SITE) : KINANOMENA	LATITUDE : 18 DEG 16 MIN SOUTH	PERIODE D'OBSERVATION : 1938-70
No. IRMA : 48	LONGITUDE : 046 DEG 03 MIN EAST	Nb D'ANNEES D'OBS. : 33
No. CUIRRI : 1826046053	ALTITUDE : 800 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(8)	7	10	17	54	162	325	381	329	325	79	14	7	1710
JOURS DE PLUIES =>1 mm		(8)	1	2	3	7	13	18	20	18	18	7	1	1	109

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : ANKAZOBE	LATITUDE : 18 DEG 19 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 49	LONGITUDE : 047 DEG 07 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1831047113	ALTITUDE : 1225 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67081		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(3)	5	8	12	41	165	297	361	275	228	51	11	4	1458
JOURS DE PLUIES =>1 mm		(3)	0.7	1	1	4	12	17	18	14	14	4	2	0.7	88
TEMPERATURE MINIMUM	C	(1)	9.3	10.0	11.3	13.5	15.2	16.1	16.4	16.4	16.3	14.7	12.0	10.2	13.5
TEMPERATURE MAXIMUM	C	(1)	22.4	23.3	25.6	28.1	28.2	27.6	26.4	26.6	26.7	26.6	24.9	23.2	25.8
TEMPERATURE MOYENNE	C	(1)	15.8	16.6	18.4	20.8	21.7	21.8	21.4	21.5	21.5	20.6	18.4	16.7	19.6
TEMPERATURE DIURNE	C	(7)	18.2	19.0	21.0	23.4	24.0	23.8	23.1	23.3	23.4	22.8	20.8	19.1	21.8
TEMPERATURE NOCTURNE	C	(7)	13.7	14.4	15.8	18.0	19.0	19.4	19.3	19.5	19.6	18.5	16.3	14.7	17.4

STATION (SITE) : ANJOZOROBE	LATITUDE : 18 DEG 23 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 50	LONGITUDE : 047 DEG 53 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1838047883	ALTITUDE : 1550 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(3)	17	12	12	33	107	222	312	242	209	38	14	18	1236
JOURS DE PLUIES =>1 mm		(3)	5	3	3	4	9	14	17	14	14	5	3	5	96

STATION (SITE) : FENOARIVO OUEST	LATITUDE : 18 DEG 28 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 51	LONGITUDE : 046 DEG 32 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1846046533	ALTITUDE : 1100 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
PRECIPITATIONS TOTALES	mm	(3)	6	8	15	71	162	320	374	310	327	74	20	4	1691
JOURS DE PLUIES =>1 mm		(3)	1	1	2	6	12	18	19	18	18	6	2	0.6	104

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMPANGABE	LATITUDE : 18 DEG 28 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 52	LONGITUDE : 048 DEG 17 MIN EAST	Nb D'ANNEES D'OBS. : +10
No. CUIRRI : 1846048283	ALTITUDE : 905 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.7	12.3	11.7	11.3	11.0	
TEMPERATURE MINIMUM	C	(4)	10.6	10.5	10.9	12.6	15.5	16.5	17.6	17.3	17.0	15.6	12.8	11.6	14.0
TEMPERATURE MAXIMUM	C	(4)	20.7	21.4	23.2	26.3	28.2	28.5	28.2	27.6	26.9	26.4	24.3	22.1	25.3
TEMPERATURE MOYENNE	C	(4)	15.7	16.0	17.1	19.5	21.9	22.5	22.9	22.5	22.0	21.0	18.6	16.9	19.7
TEMPERATURE DIURNE	C	(7)	17.5	18.0	19.3	21.9	24.1	24.6	24.7	24.3	23.8	23.0	20.7	18.8	21.7
TEMPERATURE NOCTURNE	C	(7)	14.1	14.2	14.9	16.8	19.3	19.9	20.7	20.4	20.1	19.1	16.7	15.3	17.6

STATION (SITE) : TSIROANOMANDIDY	LATITUDE : 18 DEG 46 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 53	LONGITUDE : 046 DEG 03 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1876046053	ALTITUDE : 869 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67079		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	6	11	25	69	158	298	385	330	277	80	12	5	1656
JOURS DE PLUIES =>1 mm		(3)	1	1	3	9	12	19	20	18	17	6	1	1	108
TEMPERATURE MINIMUM	C	(1)	11.0	12.9	14.5	16.3	17.6	18.1	18.4	18.1	18.1	16.3	13.7	12.4	15.6
TEMPERATURE MAXIMUM	C	(1)	25.8	27.5	29.1	31.0	30.5	29.9	28.3	28.8	28.6	28.9	27.9	26.6	28.6
TEMPERATURE MOYENNE	C	(1)	18.4	20.2	21.8	23.7	24.1	24.1	23.4	23.5	23.4	22.7	20.8	19.6	22.1
TEMPERATURE DIURNE	C	(7)	21.1	22.9	24.4	26.3	26.4	26.1	25.1	25.4	25.3	25.0	23.4	22.2	24.5
TEMPERATURE NOCTURNE	C	(7)	16.1	17.8	19.2	20.8	21.4	21.6	21.3	21.4	21.4	20.5	18.5	17.4	19.8

STATION (SITE) : AMBODIRANO	LATITUDE : 18 DEG 46 MIN. SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 54	LONGITUDE : 048 DEG 27 MIN EAST	Nb D'ANNEES D'OBS. : +10
No. CUIRRI : 1876048453	ALTITUDE : 923 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
TEMPERATURE MINIMUM	C	(4)	10.8	11.1	12.0	13.6	15.8	17.3	18.1	17.9	17.7	16.2	14.0	11.8	14.7
TEMPERATURE MAXIMUM	C	(4)	20.1	21.3	23.3	26.6	28.3	28.3	28.5	27.7	26.5	26.1	23.7	21.8	25.2
TEMPERATURE MOYENNE	C	(4)	15.5	16.2	17.7	20.1	22.1	22.8	23.3	22.8	22.1	21.2	18.9	16.8	20.0
TEMPERATURE DIURNE	C	(7)	17.2	18.1	19.7	22.4	24.3	24.7	25.1	24.5	23.7	23.0	20.7	18.6	21.8
TEMPERATURE NOCTURNE	C	(7)	14.0	14.5	15.7	17.6	19.5	20.5	21.1	20.8	20.5	19.5	17.3	15.3	18.0

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : ANIVORANO - EST	LATITUDE : 18 DEG 46 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 55	LONGITUDE : 048 DEG 58 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1876048963	ALTITUDE : 15 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	177	164	119	70	120	225	362	391	514	223	145	183	2693
JOURS DE PLUIES =>1 mm		(3)	18	17	13	10	11	14	19	16	19	16	15	17	185

STATION (SITE) : BRICKAVILLE(AMPASIMANOLOT)	LATITUDE : 18 DEG 48 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 56	LONGITUDE : 049 DEG 04 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1880049063	ALTITUDE : 19 METERS	SOURCES : 3,7
No. SERVICE MET: 67091		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	196	170	118	78	147	226	345	397	521	236	199	231	2864
JOURS DE PLUIES =>1 mm		(3)	18	17	14	10	12	15	20	18	19	17	16	17	193

STATION (SITE) : AMBOHIDRATRIMO	LATITUDE : 18 DEG 49 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 57	LONGITUDE : 047 DEG 27 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1881047453	ALTITUDE : 1300 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	6	6	7	39	144	240	310	242	207	39	9	5	1254
JOURS DE PLUIES =>1 mm		(3)	1	1	1	4	10	13	17	13	14	3	2	1	80

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MAROVITSIKA	LATITUDE : 18 DEG 50 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 58	LONGITUDE : 048 DEG 05 MIN EAST	Nb D'ANNEES D'OBS. : +10
No. CUIRRI : 1883048083	ALTITUDE : 923 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
TEMPERATURE MINIMUM	C	(4)	10.7	10.5	11.4	13.4	15.5	16.6	17.5	17.2	17.0	15.6	13.8	11.1	14.2
TEMPERATURE MAXIMUM	C	(4)	20.7	21.5	23.6	26.6	28.3	28.2	28.3	27.9	26.6	26.0	24.0	22.1	25.3
TEMPERATURE MOYENNE	C	(4)	15.7	16.0	17.5	20.0	21.9	22.4	22.9	22.6	21.8	20.8	18.9	16.6	19.8
TEMPERATURE DIURNE	C	(7)	17.5	18.0	19.7	22.3	24.1	24.4	24.8	24.5	23.5	22.7	20.8	18.6	21.7
TEMPERATURE NOCTURNE	C	(7)	14.1	14.2	15.3	17.4	19.2	19.9	20.6	20.5	20.0	19.0	17.3	14.9	17.7

STATION (SITE) : NANISANA	LATITUDE : 18 DEG 53 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 59	LONGITUDE : 047 DEG 33 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1888047553	ALTITUDE : 1259 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	7	7	13	45	153	271	282	239	238	41	12	7	1315
JOURS DE PLUIES =>1 mm		(3)	2	2	2	4	10	15	15	13	13	4	2	1	83
TEMPERATURE MINIMUM	C	(4)	7.8	8.0	9.3	11.2	13.5	15.1	15.9	16.0	15.6	13.7	11.0	8.6	12.1
TEMPERATURE MAXIMUM	C	(4)	20.5	21.3	23.1	26.0	27.0	26.6	26.8	26.4	25.9	25.2	23.3	21.6	24.5
TEMPERATURE MOYENNE	C	(4)	14.2	14.7	16.2	18.6	20.3	20.9	21.4	21.2	20.8	19.5	17.2	15.1	18.3
TEMPERATURE DIURNE	C	(7)	16.5	17.1	18.7	21.2	22.7	22.9	23.3	23.0	22.6	21.6	19.4	17.5	20.5
TEMPERATURE NOCTURNE	C	(7)	12.2	12.5	13.7	15.7	17.5	18.4	19.1	19.1	18.9	17.5	15.2	13.1	16.1

STATION (SITE) : ANJIRO	LATITUDE : 18 DEG 53 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 60	LONGITUDE : 047 DEG 57 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1888047953	ALTITUDE : 960 METERS	SOURCES : 3;7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	41	45	30	54	179	363	421	317	361	105	47	39	2002
JOURS DE PLUIES =>1 mm		(3)	10	9	6	6	12	17	20	17	19	11	8	9	144

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MANJAKANDRIANA	LATITUDE : 18 DEG 54 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 61	LONGITUDE : 047 DEG 44 MIN EAST	Nb D'ANNEES D'OBS. : 13
No. CUIRRI : 1890047733	ALTITUDE : 1383 METERS	SOURCES : 1,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(1)	30	32	20	41	167	196	339	243	205	46	27	27	1373
TEMPERATURE MINIMUM	C	(1)	8.3	8.2	9.4	10.8	11.3	12.6	14.7	14.1	13.9	13.3	11.5	9.5	11.5
TEMPERATURE MAXIMUM	C	(1)	18.7	18.7	21.2	23.6	24.5	25.0	24.8	24.8	24.3	23.8	21.9	20.0	22.6
TEMPERATURE MOYENNE	C	(1)	13.5	13.4	15.3	17.2	18.4	19.3	19.7	19.4	19.1	18.5	16.7	14.7	17.1
TEMPERATURE DIURNE	C	(7)	15.4	15.3	17.4	19.5	20.7	21.5	21.5	21.3	21.0	20.4	18.6	16.6	19.1
TEMPERATURE NOCTURNE	C	(7)	11.9	11.6	13.2	14.7	15.7	16.7	17.6	17.3	17.2	16.7	15.0	13.1	15.1

STATION (SITE) : FANOVANA	LATITUDE : 18 DEG 54 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 62	LONGITUDE : 048 DEG 31 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1890048513	ALTITUDE : 720 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	158	157	114	91	168	352	457	485	494	185	120	155	2936
JOURS DE PLUIES =>1 mm		(3)	17	18	13	11	13	18	21	19	23	17	15	16	201

STATION (SITE) : ANALAMAZAOTRA-PERINET	LATITUDE : 18 DEG 55 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 63	LONGITUDE : 048 DEG 24 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1891048403	ALTITUDE : 928 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	78	65	52	45	120	235	303	309	271	95	61	79	1713
JOURS DE PLUIES =>1 mm		(3)	14	12	10	8	11	16	18	17	17	12	12	13	160
TEMPERATURE MINIMUM	C	(4)	10.5	10.5	11.1	12.7	14.7	16.2	16.9	16.9	16.7	15.6	13.1	11.2	13.8
TEMPERATURE MAXIMUM	C	(4)	20.3	20.8	22.2	24.7	26.7	27.2	27.1	27.6	26.7	25.7	23.4	21.7	24.5
TEMPERATURE MOYENNE	C	(4)	15.4	15.7	16.7	18.7	20.7	21.7	22.0	22.3	21.7	20.7	18.3	16.5	19.2
TEMPERATURE DIURNE	C	(7)	17.2	17.6	18.7	20.8	22.8	23.6	23.8	24.2	23.5	22.5	20.2	18.4	21.1
TEMPERATURE NOCTURNE	C	(7)	13.9	14.0	14.7	16.4	18.2	19.4	19.9	20.2	19.8	19.0	16.6	14.9	17.3

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MORAMANGA	LATITUDE : 18 DEG 57 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 64	LONGITUDE : 048 DEG 13 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1895048213	ALTITUDE : 912 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67089		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	45	35	26	39	136	267	307	259	231	71	42	46	1504
JOURS DE PLUIES =>1 mm		(3)	11	9	7	5	11	15	17	16	16	10	9	10	136
TEMPERATURE MINIMUM	C	(1)	10.6	10.4	11.3	12.8	14.9	16.1	17.6	17.5	17.0	15.5	13.2	11.6	14.0
TEMPERATURE MAXIMUM	C	(1)	20.0	20.7	22.7	25.8	27.7	28.2	27.5	27.7	26.9	25.4	23.4	21.2	24.8
TEMPERATURE MOYENNE	C	(1)	15.3	15.5	17.0	19.3	21.3	22.0	22.5	22.6	21.9	20.4	18.3	16.4	19.4
TEMPERATURE DIURNE	C	(7)	17.0	17.4	19.1	21.6	23.5	24.1	24.2	24.4	23.7	22.2	20.2	18.2	21.3
TEMPERATURE NOCTURNE	C	(7)	13.8	13.8	14.9	16.8	18.6	19.4	20.4	20.6	20.0	18.7	16.7	14.9	17.4

STATION (SITE) : MIARINARIVO	LATITUDE : 18 DEG 58 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 65	LONGITUDE : 046 DEG 53 MIN EAST	Nb D'ANNEES D'OBS. : 19
No. CUIRRI : 1896046883	ALTITUDE : 1330 METERS	SOURCES : 1,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(1)	5	6	10	68	162	297	390	278	257	57	18	6	1554

STATION (SITE) : ANTANAMALAZA	LATITUDE : 18 DEG 59 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 66	LONGITUDE : 047 DEG 51 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1898047853	ALTITUDE : 1515 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	10	12	12	45	129	246	278	224	201	33	15	9	1214
JOURS DE PLUIES =>1 mm		(3)	3	3	2	4	10	15	16	13	13	5	3	2	89

XXXX-XX - means unknown data



## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : BABETVILLE-SAKAY	LATITUDE : 19 DEG 01 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 67	LONGITUDE : 046 DEG 27 MIN EAST	Nb D'ANNEES D'OBS. : +-5
No. CUIRRI : 1901046453	ALTITUDE : 940 METERS	SOURCES : 1,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(1)	6	4	13	48	87	199	231	260	314	74	7	4	1247
TEMPERATURE MINIMUM	C	(1)	10.6	13.4	11.5	12.0	14.8	17.5	17.6	17.5	17.2	15.3	12.6	10.1	14.2
TEMPERATURE MAXIMUM	C	(1)	26.3	29.8	31.7	32.6	30.9	31.5	29.3	29.7	29.7	29.0	28.6	27.0	29.7
TEMPERATURE MOYENNE	C	(1)	18.4	21.6	21.6	22.3	22.8	24.5	23.4	23.6	23.5	22.1	20.6	18.5	21.9
TEMPERATURE DIURNE	C	(7)	21.3	24.6	25.2	26.0	25.6	26.9	25.4	25.8	25.7	24.6	23.5	21.6	24.7
TEMPERATURE NOCTURNE	C	(7)	15.9	18.9	18.0	18.3	19.5	21.5	20.9	21.2	21.2	19.7	18.0	15.9	19.1

STATION (SITE) : MIADANIMERINA	LATITUDE : 19 DEG 01 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 68	LONGITUDE : 047 DEG 27 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1901047453	ALTITUDE : 1325 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	7	8	15	37	140	282	282	228	239	47	13	6	1304
JOURS DE PLUIES =>1 mm		(3)	1	1	2	4	11	17	17	14	14	5	2	1	89

STATION (SITE) : MANTASOA	LATITUDE : 19 DEG 01 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 69	LONGITUDE : 047 DEG 50 MIN EAST	Nb D'ANNEES D'OBS. : 23
No. CUIRRI : 1901047833	ALTITUDE : 1400 METERS	SOURCES : 1,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(1)	38	43	23	53	144	300	290	289	210	63	34	33	1520
TEMPERATURE MINIMUM	C	(1)	8.1	8.4	9.4	10.3	12.9	14.2	15.1	15.1	14.7	13.3	11.1	8.8	11.8
TEMPERATURE MAXIMUM	C	(1)	16.9	17.5	19.3	22.4	24.0	24.1	24.0	24.6	23.8	22.2	20.1	18.2	21.4
TEMPERATURE MOYENNE	C	(1)	12.5	12.9	14.3	16.3	18.4	19.1	19.5	19.8	19.2	17.7	15.6	13.5	16.6
TEMPERATURE DIURNE	C	(7)	14.1	14.6	16.1	18.4	20.3	20.8	21.0	21.5	20.8	19.3	17.2	15.2	18.3
TEMPERATURE NOCTURNE	C	(7)	11.1	11.4	12.5	13.9	16.1	17.0	17.6	17.9	17.5	16.2	14.2	12.1	14.8

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MERIKANJAKA	LATITUDE : 19 DEG 02 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 70	LONGITUDE : 047 DEG 45 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1903047753	ALTITUDE : 1450 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	34	34	27	55	140	265	257	248	246	53	33	29	1421
JOURS DE PLUIES =>1 mm		(3)	9	8	6	6	11	19	18	16	18	9	7	8	135

STATION (SITE) : MASOARIVO	LATITUDE : 19 DEG 03 MIN SOUTH	PERIODE D'OBSERVATION : 1950-70
No. IRMA : 71	LONGITUDE : 044 DEG 20 MIN EAST	Nb D'ANNEES D'OBS. : 21
No. CUIRRI : 1905044333	ALTITUDE : 40 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(8)	3	7	6	17	66	197	300	246	123	28	7	1	1001
JOURS DE PLUIES =>1 mm		(8)	0.6	0.9	1	2	6	11	13	11	8	2	2	0.4	58

STATION (SITE) : FIHASINANA	LATITUDE : 19 DEG 04 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 72	LONGITUDE : 047 DEG 42 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1906047703	ALTITUDE : 1600 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	18	17	19	49	160	269	311	231	232	40	16	19	1381
JOURS DE PLUIES =>1 mm		(3)	6	5	4	5	11	17	18	16	16	6	4	5	113

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMBALAVAO-CENTRE	LATITUDE : 19 DEG 05 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 73	LONGITUDE : 047 DEG 32 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1908047533	ALTITUDE : 1367 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.0	13.2	13.1	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	10	12	14	52	166	281	278	245	237	50	15	9	1369
JOURS DE PLUIES =>1 mm		(3)	2	2	2	4	11	16	17	15	14	5	2	2	92

STATION (SITE) : SOAVINANDRIANA	LATITUDE : 19 DEG 10 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 74	LONGITUDE : 046 DEG 45 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1916046753	ALTITUDE : 1575 METERS	SOURCES : 3,4,7
No. SERVICE MET: 67103		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.1	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	11.0	
PRECIPITATIONS TOTALES	mm	(3)	15	10	26	75	191	408	450	379	270	88	26	12	1950
JOURS DE PLUIES =>1 mm		(3)	2	2	3	8	14	21	22	20	19	9	3	2	125
TEMPERATURE MINIMUM	C	(4)	7.4	8.0	9.5	11.3	13.0	14.1	14.5	14.3	14.0	12.5	10.2	8.5	11.4
TEMPERATURE MAXIMUM	C	(4)	21.0	22.3	23.9	25.3	25.2	24.4	24.3	24.0	24.1	24.2	22.3	21.3	23.5
TEMPERATURE MOYENNE	C	(4)	14.2	15.2	16.7	18.3	19.1	19.3	19.4	19.2	19.1	18.4	16.3	14.9	17.5
TEMPERATURE DIURNE	C	(7)	16.7	17.8	19.3	20.8	21.2	21.1	21.1	20.9	20.9	20.5	18.5	17.2	19.7
TEMPERATURE NOCTURNE	C	(7)	12.1	12.8	14.1	15.6	16.6	17.1	17.3	17.3	17.2	16.4	14.4	12.9	15.3

STATION (SITE) : BEHENJY	LATITUDE : 19 DEG 12 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 75	LONGITUDE : 047 DEG 30 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1920047503	ALTITUDE : 1427 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	11	9	16	59	168	269	276	233	236	47	17	7	1348
JOURS DE PLUIES =>1 mm		(3)	2	2	2	4	11	16	16	14	14	5	2	2	90

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : ANDRAMASINA	LATITUDE : 19 DEG 12 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 76	LONGITUDE : 047 DEG 36 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1920047603	ALTITUDE : 1350 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	10	8	13	44	169	270	267	212	247	42	9	7	1298
JOURS DE PLUIES =>1 mm		(3)	3	2	2	4	11	16	15	14	13	5	2	2	89

STATION (SITE) : AMBOHIMIADANA	LATITUDE : 19 DEG 14 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 77	LONGITUDE : 047 DEG 45 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1923047753	ALTITUDE : 1525 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	19	17	13	49	128	253	292	222	228	48	22	16	1307
JOURS DE PLUIES =>1 mm		(3)	6	5	3	5	10	16	17	15	16	7	5	5	110

STATION (SITE) : AMBATOLAMPY	LATITUDE : 19 DEG 22 MIN SOUTH	PERIODE D'OBSERVATION : 1936-70
No. IRMA : 78 (a,b)	LONGITUDE : 047 DEG 26 MIN EAST (047 DEG 18 MIN EAST)	Nb D'ANNEES D'OBS. : 35
No. CUIRRI : 1936047433	ALTITUDE : 1555 METERS (1625 METERS)	SOURCES : 1,3,7
No. SERVICE MET: 67111		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	22	22	23	60	178	279	331	292	279	82	42	16	1626
JOURS DE PLUIES =>1 mm		(3)	5	4	4	6	13	19	18	16	17	8	5	4	119
TEMPERATURE MINIMUM	C	(1)	5.2	5.4	6.4	8.6	11.0	12.3	13.3	12.3	12.9	11.1	7.7	6.6	9.4
TEMPERATURE MAXIMUM	C	(1)	18.4	18.7	20.5	23.6	24.0	23.9	24.0	23.6	23.5	23.0	20.7	18.8	21.9
TEMPERATURE MOYENNE	C	(1)	11.8	12.0	13.4	16.1	17.5	18.1	18.6	17.9	18.2	17.0	14.2	12.7	15.6
TEMPERATURE DIURNE	C	(7)	14.2	14.4	15.9	18.8	19.8	20.1	20.5	19.9	20.1	19.2	16.6	14.9	17.9
TEMPERATURE NOCTURNE	C	(7)	9.7	9.8	10.9	13.2	14.8	15.6	16.3	15.6	16.2	14.9	12.1	10.8	13.3

N.B. Donnees temperatures du station Ambatolampy-Manjakatempa (alt. 1625m).

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : FARATSIHO	LATITUDE : 19 DEG 24 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 79	LONGITUDE : 046 DEG 57 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1940046953	ALTITUDE : 1750 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67106		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	19	14	28	102	195	352	399	337	313	109	32	13	1913
JOURS DE PLUIES =>1 mm		(3)	2	2	3	8	15	21	22	18	19	9	4	2	125
TEMPERATURE MINIMUM	C	(1)	6.4	7.1	8.3	10.6	12.1	12.9	13.7	12.2	11.9	10.3	8.4	7.3	10.1
TEMPERATURE MAXIMUM	C	(1)	20.0	21.5	23.4	24.6	24.4	23.9	23.7	23.3	23.6	23.6	21.8	20.7	22.9
TEMPERATURE MOYENNE	C	(1)	13.2	14.3	15.9	17.6	18.3	18.4	18.7	17.8	17.8	17.0	15.1	14.0	16.5
TEMPERATURE DIURNE	C	(7)	15.7	16.9	18.6	20.1	20.4	20.3	20.4	19.8	19.9	19.4	17.5	16.5	18.8
TEMPERATURE NOCTURNE	C	(7)	11.1	11.9	13.2	14.9	15.7	16.0	16.6	15.6	15.6	14.7	13.0	11.9	14.2

STATION (SITE) : ANOSIBE	LATITUDE : 19 DEG 26 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 80	LONGITUDE : 048 DEG 12 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1943048203	ALTITUDE : 750 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	98	74	69	46	156	339	398	369	336	155	82	104	2226
JOURS DE PLUIES =>1 mm		(3)	13	11	9	6	12	17	18	17	18	14	12	15	162
TEMPERATURE MINIMUM	C	(4)	12.2	12.1	12.7	13.8	15.9	17.6	19.0	19.1	18.6	17.4	14.9	12.8	15.5
TEMPERATURE MAXIMUM	C	(4)	22.8	22.2	23.7	26.7	28.7	29.1	28.3	29.0	28.1	27.2	24.7	23.6	26.2
TEMPERATURE MOYENNE	C	(4)	17.5	17.2	18.2	18.8	22.3	23.4	23.7	24.1	23.4	22.3	19.8	18.2	20.7
TEMPERATURE DIURNE	C	(7)	19.4	19.0	20.2	21.1	24.5	25.4	25.3	25.8	25.1	24.1	21.6	20.2	22.6
TEMPERATURE NOCTURNE	C	(7)	15.8	15.5	16.2	16.3	19.6	20.9	21.7	22.1	21.6	20.6	18.2	16.5	18.8

STATION (SITE) : NANOKELY	LATITUDE : 19 DEG 31 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 81	LONGITUDE : 047 DEG 02 MIN EAST	Nb D'ANNEES D'OBS. : +-10
No. CUIRRI : 1951047033	ALTITUDE : 2020 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
TEMPERATURE MINIMUM	C	(4)	3.8	3.8	5.1	7.3	9.5	10.7	11.4	11.4	11.0	9.1	6.4	4.4	7.8
TEMPERATURE MAXIMUM	C	(4)	16.7	18.2	20.7	22.4	22.3	21.5	20.8	20.8	20.9	20.3	18.4	17.4	20.0
TEMPERATURE MOYENNE	C	(4)	10.3	11.0	12.9	14.9	15.9	16.1	16.1	16.1	16.0	14.7	12.4	10.9	13.9
TEMPERATURE DIURNE	C	(7)	12.7	13.6	15.7	17.6	18.1	18.0	17.7	17.8	17.8	16.7	14.6	13.3	16.1
TEMPERATURE NOCTURNE	C	(7)	8.3	8.6	10.1	11.9	13.2	13.8	14.1	14.2	14.1	12.8	10.5	8.9	11.7

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MIANDRIVAZO	LATITUDE : 19 DEG 32 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 82	LONGITUDE : 045 DEG 28 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1953045463	ALTITUDE : 71 METERS	SOURCES : 1,3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	2	8	15	52	134	237	325	256	218	48	8	6	1309
JOURS DE PLUIES =>1 mm		(3)	0.3	1	2	5	10	15	18	15	13	4	1	0.7	85
TEMPERATURE MINIMUM	C	(1)	14.4	17.1	19.7	22.0	23.1	23.1	23.2	23.1	22.5	21.6	18.5	16.5	20.4
TEMPERATURE MAXIMUM	C	(1)	31.9	33.5	34.9	37.1	36.1	34.7	33.0	33.8	33.7	34.5	34.0	32.0	34.1
TEMPERATURE MOYENNE	C	(1)	23.2	25.3	27.3	29.6	29.6	28.9	28.2	28.5	28.2	28.1	26.3	24.3	27.3
TEMPERATURE DIURNE	C	(7)	26.4	28.3	30.0	32.3	31.9	30.9	29.9	30.4	30.2	30.4	29.1	27.1	29.7
TEMPERATURE NOCTURNE	C	(7)	20.5	22.6	24.6	26.6	26.9	26.4	26.1	26.4	26.1	25.9	23.8	21.9	24.8

STATION (SITE) : MANDOTO	LATITUDE : 19 DEG 34 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 83	LONGITUDE : 046 DEG 17 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1956046283	ALTITUDE : 915 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	8	7	11	72	156	290	360	289	256	68	16	6	1539
JOURS DE PLUIES =>1 mm		(3)	1	1	2	6	12	18	21	17	17	6	2	1	104

STATION (SITE) : AMBOHIBARY	LATITUDE : 19 DEG 37 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 84	LONGITUDE : 047 DEG 07 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1961047113	ALTITUDE : 1640 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67108		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	28	17	31	74	174	287	288	266	226	92	38	24	1545
JOURS DE PLUIES =>1 mm		(3)	5	3	4	7	15	21	21	17	18	11	6	5	133
TEMPERATURE MINIMUM	C	(1)	5.1	5.2	6.0	8.8	11.0	12.8	13.8	13.6	13.4	11.2	8.3	5.3	9.5
TEMPERATURE MAXIMUM	C	(1)	19.2	20.6	22.7	24.9	25.0	24.8	24.8	24.7	24.2	23.6	21.8	20.1	23.0
TEMPERATURE MOYENNE	C	(1)	12.2	12.9	14.4	16.9	18.0	18.8	19.3	19.2	18.8	17.4	15.2	12.7	16.3
TEMPERATURE DIURNE	C	(7)	14.8	15.7	17.4	19.8	20.4	20.9	21.2	21.2	20.7	19.6	17.7	15.4	18.7
TEMPERATURE NOCTURNE	C	(7)	10.0	10.3	11.4	13.8	15.1	16.2	17.0	17.0	16.8	15.3	13.0	10.4	13.9

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : TSINJOARIVO	LATITUDE : 19 DEG 37 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 85	LONGITUDE : 047 DEG 42 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1961047703	ALTITUDE : 1640 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	24	25	25	39	157	277	259	223	193	59	31	33	1345
JOURS DE PLUIES =>1 mm		(3)	7	5	5	5	12	17	17	15	16	8	7	8	122
TEMPERATURE MINIMUM	C	(4)	7.1	7.3	8.1	10.1	12.1	13.3	13.8	14.2	13.8	12.2	10.1	7.7	10.8
TEMPERATURE MAXIMUM	C	(4)	16.7	17.7	20.2	22.6	24.4	23.9	23.6	23.4	23.0	22.0	20.0	18.4	21.3
TEMPERATURE MOYENNE	C	(4)	11.9	12.5	14.2	16.4	18.3	18.6	18.7	18.8	18.4	17.1	15.1	13.1	16.1
TEMPERATURE DIURNE	C	(7)	13.7	14.4	16.4	18.6	20.4	20.4	20.4	20.4	20.0	18.9	16.9	15.1	18.0
TEMPERATURE NOCTURNE	C	(7)	10.4	10.8	12.0	14.0	15.7	16.3	16.6	17.0	16.7	15.4	13.5	11.5	14.2

STATION (SITE) : ISALO	LATITUDE : 19 DEG 43 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 86	LONGITUDE : 045 DEG 27 MIN EAST	Nb D'ANNEES D'OBS. : +-10
No. CUIRRI : 1971045453	ALTITUDE : 40 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
TEMPERATURE MINIMUM	C	(4)	13.7	15.8	18.0	20.7	22.1	22.6	23.1	23.2	22.9	21.4	17.6	14.7	19.7
TEMPERATURE MAXIMUM	C	(4)	31.8	33.3	35.4	36.8	36.9	35.0	34.5	33.9	33.8	34.6	33.3	31.8	34.3
TEMPERATURE MOYENNE	C	(4)	22.8	24.6	26.7	28.8	29.5	28.8	28.8	28.6	28.4	28.0	25.5	23.3	27.0
TEMPERATURE DIURNE	C	(7)	26.1	27.8	29.8	31.7	32.1	30.9	30.8	30.5	30.3	30.4	28.4	26.4	29.6
TEMPERATURE NOCTURNE	C	(7)	20.0	21.7	23.6	25.6	26.4	26.1	26.4	26.4	26.4	25.7	23.0	20.7	24.3

STATION (SITE) : ANTSIRABE	LATITUDE : 19 DEG 52 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 87	LONGITUDE : 047 DEG 01 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 1986047013	ALTITUDE : 1506 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67107		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	17	15	24	77	158	268	293	241	218	77	31	13	1432
JOURS DE PLUIES =>1 mm		(3)	2	2	3	7	13	19	20	16	16	7	3	2	110
TEMPERATURE MINIMUM	C	(1)	5.7	5.9	7.7	9.7	11.9	13.9	14.6	14.1	14.0	11.7	8.5	6.6	10.4
TEMPERATURE MAXIMUM	C	(1)	19.3	20.6	23.0	25.5	25.7	25.2	24.8	25.1	24.4	24.0	21.9	19.7	23.3
TEMPERATURE MOYENNE	C	(1)	12.6	13.3	15.4	17.6	18.9	19.6	19.8	19.6	19.2	17.8	15.2	13.2	16.9
TEMPERATURE DIURNE	C	(7)	15.1	16.0	18.2	20.4	21.3	21.6	21.6	21.5	21.1	20.0	17.6	15.6	19.2
TEMPERATURE NOCTURNE	C	(7)	10.5	10.8	12.6	14.5	16.0	17.2	17.6	17.4	17.2	15.7	13.1	11.2	14.5

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : BEREVO	LATITUDE : 19 DEG 55 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 88	LONGITUDE : 044 DEG 59 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 1991044983	ALTITUDE : 23 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	2	4	10	35	72	210	302	236	194	24	6	3	1098
JOURS DE PLUIES =>1 mm		(3)	0.3	0.6	1	3	6	12	15	13	10	2	1	0.4	64

STATION (SITE) : AMBATOLAMY	LATITUDE : 20 DEG 01 MIN SOUTH	PERIODE D'OBSERVATION : 1941-70
No. IRMA : 89	LONGITUDE : 045 DEG 32 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2001045533	ALTITUDE : 75 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(8)	3	3	5	29	96	193	303	221	171	19	10	3	1056
JOURS DE PLUIES =>1 mm		(8)	0.6	0.6	1	3	6	12	16	12	11	2	0.9	0.8	66

STATION (SITE) : MAROLAMBO	LATITUDE : 20 DEG 03 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 90	LONGITUDE : 048 DEG 08 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2005048133	ALTITUDE : 400 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	93	73	61	40	128	266	343	365	356	130	88	90	2033
JOURS DE PLUIES =>1 mm		(3)	15	12	10	8	13	17	20	18	22	15	14	14	178
TEMPERATURE MINIMUM	C	(4)	14.0	14.0	15.0	16.5	18.2	19.5	20.4	20.2	20.0	18.9	16.7	14.8	17.4
TEMPERATURE MAXIMUM	C	(4)	23.3	23.9	25.4	28.2	29.9	30.5	30.3	30.1	29.1	28.2	25.9	24.5	27.4
TEMPERATURE MOYENNE	C	(4)	18.7	19.0	20.2	22.4	24.1	25.0	25.4	25.2	24.6	23.6	21.3	19.7	22.4
TEMPERATURE DIURNE	C	(7)	20.4	20.8	22.1	24.5	26.1	26.9	27.1	26.9	26.2	25.3	23.0	21.5	24.2
TEMPERATURE NOCTURNE	C	(7)	17.3	17.3	18.3	20.1	21.6	22.6	23.3	23.2	22.9	22.0	19.8	18.2	20.6

XXXXX - means unknown data



## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : MALAIMBANDY	LATITUDE : 20 DEG 21 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 91	LONGITUDE : 045 DEG 36 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2035045603	ALTITUDE : 162 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67119		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	2	2	10	46	97	243	364	295	257	31	6	4	1357
JOURS DE PLUIES =>1 mm		(3)	0.5	0.4	1	4	8	15	19	15	14	3	1	0.7	82
TEMPERATURE MINIMUM	C	(1)	14.0	18.8	17.6	20.1	21.5	22.0	22.3	22.2	21.6	19.7	16.3	14.5	19.2
TEMPERATURE MAXIMUM	C	(1)	31.2	32.7	34.4	36.7	36.3	35.0	33.0	34.0	33.5	34.7	33.4	31.5	33.9
TEMPERATURE MOYENNE	C	(1)	22.7	23.8	26.0	28.4	29.0	28.6	27.7	28.1	27.6	27.2	24.9	23.0	26.4
TEMPERATURE DIURNE	C	(7)	25.8	26.3	29.0	31.3	31.6	30.8	29.6	30.2	29.7	29.9	28.0	26.1	29.0
TEMPERATURE NOCTURNE	C	(7)	20.0	21.5	23.0	25.1	25.9	25.8	25.4	25.7	25.4	24.6	22.2	20.4	23.8

STATION (SITE) : MAHABO	LATITUDE : 20 DEG 22 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 92	LONGITUDE : 044 DEG 39 MIN EAST	Nb D'ANNEES D'OBS. : 12
No. CUIRRI : 2036044653	ALTITUDE : 75 METERS	SOURCES : 1,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(1)	2	0	6	24	42	127	269	193	162	10	4	0.4	839
TEMPERATURE MINIMUM	C	(1)	12.3	13.3	16.5	19.8	21.0	22.3	23.1	23.0	21.4	21.1	15.4	14.1	18.6
TEMPERATURE MAXIMUM	C	(1)	30.9	31.9	33.8	36.0	35.2	35.2	33.0	33.6	32.7	32.7	33.8	32.5	33.4
TEMPERATURE MOYENNE	C	(1)	21.6	22.6	25.2	27.9	28.1	28.8	28.1	28.3	27.1	26.9	24.1	23.8	26.0
TEMPERATURE DIURNE	C	(7)	25.0	26.0	28.3	30.8	30.6	31.0	29.8	30.2	29.1	29.0	27.5	27.2	28.7
TEMPERATURE NOCTURNE	C	(7)	18.7	19.5	22.1	24.7	25.1	26.0	26.0	26.2	25.0	24.9	21.2	21.0	23.4

STATION (SITE) : ANKILIZATO	LATITUDE : 20 DEG 25 MIN SOUTH	PERIODE D'OBSERVATION : 1949-70
No. IRMA : 93	LONGITUDE : 045 DEG 02 MIN EAST	Nb D'ANNEES D'OBS. : 22
No. CUIRRI : 2041045033	ALTITUDE : 200 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(8)	4	3	6	29	75	218	259	243	129	29	7	1	1003
JOURS DE PLUIES =>1 mm		(8)	0.4	0.6	0.9	2	5	11	13	13	9	2	0.9	0.4	58

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMPASINAMBO	LATITUDE : 20 DEG 31 MIN SOUTH	PERIODE D'OBSERVATION : 1936-70
No. IRMA : 94	LONGITUDE : 048 DEG 00 MIN EAST	Nb D'ANNEES D'OBS. : 35
No. CUIRRI : 2051048003	ALTITUDE : 480 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(8)	123	111	76	64	183	364	416	293	415	181	110	126	2462
JOURS DE PLUIES =>1 mm		(8)	17	15	10	10	14	20	21	19	24	17	15	15	197

STATION (SITE) : NOSY-VARIKA	LATITUDE : 20 DEG 34 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 95	LONGITUDE : 048 DEG 32 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2056048533	ALTITUDE : 16 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67127		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	151	143	109	77	151	226	366	394	463	249	214	235	2778
JOURS DE PLUIES =>1 mm		(3)	15	13	11	8	10	13	17	18	20	16	14	16	171
TEMPERATURE MINIMUM	C	(1)	16.7	16.5	17.3	18.9	20.8	22.4	22.8	22.4	22.2	20.9	18.9	17.4	19.8
TEMPERATURE MAXIMUM	C	(1)	24.2	24.5	25.3	26.5	27.7	28.5	29.5	29.4	28.9	28.3	26.6	24.8	27.0
TEMPERATURE MOYENNE	C	(1)	20.5	20.5	21.3	22.7	24.3	25.3	26.2	25.9	25.6	24.6	22.8	21.1	23.4
TEMPERATURE DIURNE	C	(7)	21.9	22.0	22.7	24.0	25.5	26.4	27.4	27.1	26.8	25.9	24.2	22.5	24.7
TEMPERATURE NOCTURNE	C	(7)	19.3	19.2	19.9	21.2	22.8	24.0	24.8	24.5	24.3	23.3	21.6	20.0	22.1

STATION (SITE) : MANDROSONORO	LATITUDE : 20 DEG 35 MIN SOUTH	PERIODE D'OBSERVATION : 1950-70
No. IRMA : 96	LONGITUDE : 046 DEG 00 MIN EAST	Nb D'ANNEES D'OBS. : 21
No. CUIRRI : 2058046003	ALTITUDE : 1050 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.3	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(8)	6	5	12	42	109	278	302	219	166	23	9	6	1177
JOURS DE PLUIES =>1 mm		(8)	1	0.9	2	5	8	17	17	14	11	3	1	1	81

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : TSIMAZAVA	LATITUDE : 20 DEG 41 MIN SOUTH	PERIODE D'OBSERVATION : 1949-70
No. IRMA : 97	LONGITUDE : 045 DEG 42 MIN EAST	Nb D'ANNEES D'OBS. : 22
No. CUIRRI : 2068045703	ALTITUDE : 350 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.4	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(8)	11	10	15	43	108	374	423	358	229	50	15	6	1642
JOURS DE PLUIES =>1 mm		(8)	2	1	2	4	7	16	18	13	11	4	1	0.9	80

STATION (SITE) : AMBOROMPOTSY	LATITUDE : 20 DEG 41 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 98	LONGITUDE : 046 DEG 11 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2068046183	ALTITUDE : 1386 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	11.0	11.5	12.0	12.6	13.1	13.4	13.2	12.8	12.3	11.7	11.2	10.9	
PRECIPITATIONS TOTALES	mm	(3)	5	10	15	55	132	306	317	251	214	36	9	7	1357
JOURS DE PLUIES =>1 mm		(3)	1	1	1	5	8	16	16	13	12	3	1	1	78

STATION (SITE) : AMBOHIMANGA DU SUD	LATITUDE : 20 DEG 52 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 99	LONGITUDE : 047 DEG 35 MIN EAST	Nb D'ANNEES D'OBS. : 7
No. CUIRRI : 2086047583	ALTITUDE : 610 METERS	SOURCES : 1,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.5	12.0	12.6	13.1	13.4	13.3	12.8	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(1)	78	86	66	31	198	284	533	323	425	139	83	114	2360

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## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : IALATSARA	LATITUDE : 21 DEG 02 MIN SOUTH	PERIODE D'OBSERVATION : 1944-70
No. IRMA : 100	LONGITUDE : 047 DEG 11 MIN EAST	Nb D'ANNEES D'OBS. : 27
No. CUIRRI : 2103047183	ALTITUDE : 1400 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.5	12.0	12.6	13.1	13.4	13.3	12.8	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(8)	55	48	29	36	132	228	250	226	199	51	46	49	1349
JOURS DE PLUIES =>1 mm		(8)	12	10	6	7	14	18	18	16	19	11	9	10	150

STATION (SITE) : AMBOHIMAHASOA	LATITUDE : 21 DEG 06 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 101	LONGITUDE : 047 DEG 11 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2110047183	ALTITUDE : 1200 METERS	SOURCES : 3,7
No. SERVICE MET: 67139		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.5	12.0	12.6	13.1	13.4	13.3	12.8	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	33	27	27	33	124	223	263	189	211	51	32	30	1243
JOURS DE PLUIES =>1 mm		(3)	8	7	5	5	12	17	18	16	17	9	7	8	129

STATION (SITE) : TSITONDROINA	LATITUDE : 21 DEG 18 MIN SOUTH	PERIODE D'OBSERVATION : 1932-70
No. IRMA : 102	LONGITUDE : 046 DEG 01 MIN EAST	Nb D'ANNEES D'OBS. : 39
No. CUIRRI : 2130046013	ALTITUDE : 1100 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.4	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(8)	3	3	7	35	81	228	292	181	152	25	13	8	1028
JOURS DE PLUIES =>1 mm		(8)	1	0.6	0.9	3	7	13	15	10	8	2	2	0.9	63

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : IFANADIANA	LATITUDE : 21 DEG 18 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 103	LONGITUDE : 047 DEG 37 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2130047613	ALTITUDE : 450 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67140		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.4	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	97	82	77	55	168	324	422	445	424	167	102	112	2475
JOURS DE PLUIES =>1 mm		(3)	12	11	9	7	13	18	20	19	21	14	11	13	168
TEMPERATURE MINIMUM	C	(1)	11.9	12.4	13.4	15.4	17.6	18.5	19.2	19.0	18.8	17.5	14.6	12.6	15.9
TEMPERATURE MAXIMUM	C	(1)	22.8	23.4	24.8	27.4	28.6	29.6	29.4	29.0	28.2	27.4	25.2	23.5	26.6
TEMPERATURE MOYENNE	C	(1)	17.3	17.9	19.1	21.4	23.1	24.0	24.3	24.0	23.5	22.4	19.9	18.0	21.2
TEMPERATURE DIURNE	C	(7)	19.3	19.9	21.2	23.5	25.0	25.9	26.1	25.8	25.2	24.2	21.8	20.0	23.2
TEMPERATURE NOCTURNE	C	(7)	15.6	16.1	17.0	19.0	20.8	21.6	22.1	22.0	21.7	20.7	18.2	16.4	19.3

STATION (SITE) : KIANJAVATO	LATITUDE : 21 DEG 22 MIN SOUTH	PERIODE D'OBSERVATION : 1955-70
No. IRMA : 104	LONGITUDE : 047 DEG 53 MIN EAST	Nb D'ANNEES D'OBS. : 16
No. CUIRRI : 2136047883	ALTITUDE : 0 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.4	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(8)	89	103	72	78	184	182	366	387	382	119	61	60	2083
JOURS DE PLUIES =>1 mm		(8)	11	10	8	7	13	16	15	15	18	11	11	10	145

STATION (SITE) : MANJA	LATITUDE : 21 DEG 26 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 105	LONGITUDE : 044 DEG 20 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2143044333	ALTITUDE : 267 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.4	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	1	2	9	18	60	186	266	181	150	16	6	3	898
JOURS DE PLUIES =>1 mm		(3)	0.3	0.4	1	2	5	10	13	9	8	2	1	0.6	52

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : BEROROHA		LATITUDE : 21 DEG 40 MIN SOUTH		PERIODE D'OBSERVATION : 1936-60												
No. IRMA : 106		LONGITUDE : 045 DEG 10 MIN EAST		Nb D'ANNEES D'OBS. : 25												
No. CUIRRI : 2166045163		ALTITUDE : 180 METERS		SOURCES : 1,3,7												
No. SERVICE MET: XXXXX																
M O I S :		UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)		10.9	11.4	12.0	12.6	13.2	13.4	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)		2	3	8	24	63	176	212	152	115	13	6	3	777
JOURS DE PLUIES =>1 mm		(3)		0.5	0.6	0.9	2	5	11	10	8	2	0.9	0.6	0.5	42
TEMPERATURE MINIMUM	C	(1)		12.6	14.0	18.4	20.3	21.8	22.2	22.6	22.6	21.6	19.9	15.8	13.4	18.8
TEMPERATURE MAXIMUM	C	(1)		29.4	31.1	33.5	36.6	36.6	35.3	33.6	34.5	33.0	32.7	31.6	29.7	33.1
TEMPERATURE MOYENNE	C	(1)		21.0	22.6	26.0	28.5	29.2	28.9	28.2	28.6	27.3	26.3	23.7	21.6	26.0
TEMPERATURE DIURNE	C	(7)		24.1	25.7	28.7	31.4	31.8	31.2	30.1	30.7	29.3	28.6	26.6	24.6	28.6
TEMPERATURE NOCTURNE	C	(7)		18.4	19.8	23.3	25.3	26.1	26.0	25.8	26.2	25.2	24.1	21.2	19.2	23.4
STATION (SITE) : FENOARIVO-SUD.		LATITUDE : 21 DEG 43 MIN SOUTH		PERIODE D'OBSERVATION : 1950-70												
No. IRMA : 107		LONGITUDE : 046 DEG 23 MIN EAST		Nb D'ANNEES D'OBS. : 21												
No. CUIRRI : 2171046383		ALTITUDE : 750 METERS		SOURCES : 7,8												
No. SERVICE MET: XXXXX																
M O I S :		UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)		10.9	11.4	12.0	12.6	13.2	13.4	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(8)		3	3	7	29	91	246	267	142	118	24	8	13	951
JOURS DE PLUIES =>1 mm		(8)		0.4	0.6	1	4	8	14	14	10	7	3	1	2	65
STATION (SITE) : BEMARIVO		LATITUDE : 21 DEG 47 MIN SOUTH		PERIODE D'OBSERVATION : 1950-70												
No. IRMA : 108		LONGITUDE : 044 DEG 26 MIN EAST		Nb D'ANNEES D'OBS. : 21												
No. CUIRRI : 2178044433		ALTITUDE : 80 METERS		SOURCES : 7,8												
No. SERVICE MET: XXXXX																
M O I S :		UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)		10.9	11.4	12.0	12.6	13.2	13.4	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(8)		3	5	8	23	65	164	200	153	104	28	5	5	763
JOURS DE PLUIES =>1 mm		(8)		0.7	0.9	1	2	6	10	12	9	7	2	1	1	53

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMBALAVAO-SUD	LATITUDE : 21 DEG 49 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 109	LONGITUDE : 046 DEG 56 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2181046933	ALTITUDE : 1000 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.4	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	9	10	16	34	115	229	239	150	145	25	14	15	1001
JOURS DE PLUIES =>1 mm		(3)	3	2	2	4	10	15	14	12	13	4	3	3	85

STATION (SITE) : SENDRISOA-BEANANA	LATITUDE : 22 DEG 00 MIN SOUTH	PERIODE D'OBSERVATION : 1950-70
No. IRMA : 110	LONGITUDE : 046 DEG 57 MIN EAST	Nb D'ANNEES D'OBS. : 21
No. CUIRRI : 2200046953	ALTITUDE : 1100 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.5	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(8)	26	29	25	30	112	245	279	200	175	32	20	22	1195
JOURS DE PLUIES =>1 mm		(8)	7	5	4	5	12	18	17	13	15	6	4	6	112

STATION (SITE) : BEFANDRIANA SUD	LATITUDE : 22 DEG 06 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 111	LONGITUDE : 043 DEG 52 MIN EAST	Nb D'ANNEES D'OBS. : 20
No. CUIRRI : 2210043863	ALTITUDE : 300 METERS	SOURCES : 1,7
No. SERVICE MET: 67159		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.5	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(1)	3	2	8	36	87	177	220	203	124	27	8	5	900

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## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : ANTANIFOTSY	LATITUDE : 22 DEG 06 MIN SOUTH	PERIODE D'OBSERVATION : 1956-70
No. IRMA : 112	LONGITUDE : 046 DEG 54 MIN EAST	Nb D'ANNEES D'OBS. : 15
No. CUIRRI : 2210046903	ALTITUDE : 1900 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.5	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(8)	21	28	32	45	132	295	273	240	161	46	20	17	1310
JOURS DE PLUIES =>1 mm		(8)	9	6	5	7	14	20	19	16	17	10	5	6	134

STATION (SITE) : MANAKARA	LATITUDE : 22 DEG 08 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 113	LONGITUDE : 048 DEG 02 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2213048033	ALTITUDE : 4 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67159		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.5	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	153	136	100	77	151	215	349	354	439	252	198	210	2634
JOURS DE PLUIES =>1 mm		(3)	13	12	9	7	10	13	16	17	19	14	13	13	156
TEMPERATURE MINIMUM	C	(1)	16.1	16.2	17.1	18.9	20.8	22.0	23.0	22.5	22.3	20.9	18.5	16.8	19.6
TEMPERATURE MAXIMUM	C	(1)	23.5	23.6	24.2	25.2	26.6	27.9	28.3	28.3	28.0	27.2	25.8	24.2	26.1
TEMPERATURE MOYENNE	C	(1)	19.8	19.9	20.7	22.1	23.7	25.0	25.7	25.4	25.2	24.1	22.1	20.5	22.9
TEMPERATURE DIURNE	C	(7)	21.2	21.2	22.0	23.2	24.7	26.0	26.6	26.4	26.2	25.2	23.4	21.9	24.0
TEMPERATURE NOCTURNE	C	(7)	18.7	18.7	19.4	20.9	22.5	23.7	24.6	24.2	24.1	23.0	21.0	19.4	21.7

STATION (SITE) : ANKAZOABO-SUD	LATITUDE : 22 DEG 17 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 114	LONGITUDE : 044 DEG 31 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2228044513	ALTITUDE : 428 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.5	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	2	3	6	25	61	156	201	142	91	20	7	8	722
JOURS DE PLUIES =>1 mm		(3)	0.2	0.6	0.9	2	5	11	12	9	7	2	1	1	52
TEMPERATURE MINIMUM	C	(4)	11.6	12.8	14.7	17.1	19.8	20.6	20.9	20.8	19.8	17.5	14.2	12.2	16.8
TEMPERATURE MAXIMUM	C	(4)	28.5	30.1	32.7	34.4	34.9	33.6	33.3	33.0	32.6	32.9	29.7	27.9	32.0
TEMPERATURE MOYENNE	C	(4)	20.1	21.5	23.7	25.8	27.4	27.1	27.1	26.9	26.2	25.2	22.0	20.1	24.4
TEMPERATURE DIURNE	C	(7)	23.2	24.6	26.9	28.9	30.0	29.3	29.2	29.0	28.5	28.0	24.8	23.0	27.1
TEMPERATURE NOCTURNE	C	(7)	17.5	18.6	20.5	22.4	24.2	24.2	24.4	24.4	23.8	22.6	19.6	17.8	21.7

XXXXX - means unknown data



## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : SAKALALINA	LATITUDE : 22 DEG 21 MIN SOUTH	PERIODE D'OBSERVATION : 1950-70
No. IRMA : 115	LONGITUDE : 046 DEG 29 MIN EAST	Nb D'ANNEES D'OBS. : 21
No. CUIRRI : 2235046483	ALTITUDE : 400 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.5	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(8)	8	7	13	27	82	169	202	104	79	21	12	8	732
JOURS DE PLUIES =>1 mm		(8)	2	1	2	3	8	13	14	8	8	3	2	2	66

STATION (SITE) : IHOSY	LATITUDE : 22 DEG 24 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 116	LONGITUDE : 046 DEG 08 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2240046133	ALTITUDE : 800 METERS	SOURCES : 3,4,7
No. SERVICE MET: 67153		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.5	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	3	6	9	24	99	201	224	133	84	22	9	7	821
JOURS DE PLUIES =>1 mm		(3)	0.6	1	1	3	9	13	13	9	8	3	1	1	63
TEMPERATURE MINIMUM	C	(4)	11.1	12.0	13.3	15.6	17.4	18.6	19.0	18.9	18.3	16.8	13.5	11.4	15.5
TEMPERATURE MAXIMUM	C	(4)	23.7	25.0	27.5	30.4	31.1	30.4	30.0	29.4	28.8	28.5	25.6	24.1	27.9
TEMPERATURE MOYENNE	C	(4)	17.4	18.5	20.4	23.0	24.3	24.5	24.5	24.2	23.6	22.7	19.6	17.8	21.7
TEMPERATURE DIURNE	C	(7)	19.7	20.9	23.0	25.6	26.7	26.5	26.4	26.0	25.5	24.8	21.8	20.1	23.9
TEMPERATURE NOCTURNE	C	(7)	15.5	16.4	17.8	20.1	21.4	21.9	22.1	22.1	21.6	20.7	17.7	15.9	19.4

STATION (SITE) : KARIANGA	LATITUDE : 22 DEG 26 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 117	LONGITUDE : 047 DEG 17 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2243047283	ALTITUDE : 310 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.5	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	93	89	82	70	99	324	382	384	468	148	93	113	2345
JOURS DE PLUIES =>1 mm		(3)	8	8	6	6	11	13	16	15	17	11	8	8	127

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : FOTIVOLO	LATITUDE : 22 DEG 28 MIN SOUTH	PERIODE D'OBSERVATION : 1957-70
No. IRMA : 118	LONGITUDE : 044 DEG 53 MIN EAST	Nb D'ANNEES D'OBS. : 14
No. CUIRRI : 2246044883	ALTITUDE : 850 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.5	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(8)	8	12	8	22	73	184	184	111	90	23	9	10	734
JOURS DE PLUIES =>1 mm		(8)	1	2	2	2	6	12	13	10	7	3	2	2	62

STATION (SITE) : IVOHIBE	LATITUDE : 22 DEG 29 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 119	LONGITUDE : 046 DEG 51 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2248046853	ALTITUDE : 700 METERS	SOURCES : 3,7
No. SERVICE MET: 67154		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.9	11.4	12.0	12.6	13.2	13.5	13.3	12.9	12.3	11.7	11.1	10.8	
PRECIPITATIONS TOTALES	mm	(3)	22	18	15	24	75	142	215	171	156	19	20	25	902
JOURS DE PLUIES =>1 mm		(3)	5	4	4	3	8	13	15	13	13	4	4	5	91

STATION (SITE) : RANOHIRA	LATITUDE : 22 DEG 33 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 120	LONGITUDE : 045 DEG 24 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2255045403	ALTITUDE : 833 METERS	SOURCES : 1,3,7
No. SERVICE MET: 67152		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.5	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)	5	6	14	37	82	199	228	308	139	16	10	11	1055
JOURS DE PLUIES =>1 mm		(3)	0.6	1	2	3	8	15	14	11	9	2	1	1	68
TEMPERATURE MINIMUM	C	(1)	10.8	11.7	13.2	15.3	16.9	18.2	19.0	18.5	17.9	16.0	14.0	11.8	15.3
TEMPERATURE MAXIMUM	C	(1)	24.6	25.8	27.2	30.4	30.4	30.3	29.0	29.3	28.1	28.9	27.2	24.2	28.0
TEMPERATURE MOYENNE	C	(1)	17.7	18.8	20.2	22.9	23.7	24.3	24.0	23.9	23.0	22.5	20.6	18.0	21.6
TEMPERATURE DIURNE	C	(7)	20.2	21.4	22.7	25.6	26.0	26.4	25.7	25.8	24.8	24.8	23.0	20.3	23.9
TEMPERATURE NOCTURNE	C	(7)	15.6	16.5	17.7	19.9	20.8	21.6	21.8	21.7	21.1	20.3	18.5	16.2	19.3

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : VONDROZO	LATITUDE : 22 DEG 48 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 121	LONGITUDE : 047 DEG 18 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2280047303	ALTITUDE : 80 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.5	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)	79	85	60	79	175	330	423	425	481	151	80	99	2467
JOURS DE PLUIES =>1 mm		(3)	9	10	8	7	12	17	20	18	19	13	9	10	152

STATION (SITE) : SAKARAH	LATITUDE : 22 DEG 55 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 122	LONGITUDE : 044 DEG 32 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2291044533	ALTITUDE : 460 METERS	SOURCES : 3,4,7
No. SERVICE MET: 67151		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.5	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)	5	5	7	25	60	149	186	140	120	19	11	8	735
JOURS DE PLUIES =>1 mm		(3)	0.6	0.9	1	3	5	10	12	9	8	3	2	1	56
TEMPERATURE MINIMUM	C	(4)	8.4	9.4	11.9	15.3	18.2	19.7	20.2	20.0	18.8	15.7	11.6	9.2	14.9
TEMPERATURE MAXIMUM	C	(4)	27.5	29.1	31.7	33.5	34.1	33.0	32.8	32.6	32.2	32.3	29.1	27.2	31.3
TEMPERATURE MOYENNE	C	(4)	18.0	19.3	21.8	24.4	26.2	26.4	26.5	26.3	25.5	24.0	20.4	18.2	23.1
TEMPERATURE DIURNE	C	(7)	21.5	22.9	25.4	27.6	29.0	28.7	28.7	28.5	27.9	27.0	23.6	21.5	26.0
TEMPERATURE NOCTURNE	C	(7)	15.1	16.1	18.2	20.8	22.8	23.5	23.8	23.7	23.0	21.2	17.7	15.5	20.1

STATION (SITE) : IAKORA	LATITUDE : 23 DEG 06 MIN SOUTH	PERIODE D'OBSERVATION : 1936-70
No. IRMA : 123	LONGITUDE : 046 DEG 39 MIN EAST	Nb D'ANNEES D'OBS. : 35
No. CUIRRI : 2310046653	ALTITUDE : 950 METERS	SOURCES : 7,8
No. SERVICE MET: 67167		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.5	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(8)	19	19	9	40	129	230	236	216	161	45	19	19	1142
JOURS DE PLUIES =>1 mm		(8)	5	4	2	5	11	13	16	12	12	6	4	5	95

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : BETROKA		LATITUDE : 23 DEG 17 MIN SOUTH		PERIODE D'OBSERVATION : 1931-60											
No. IRMA : 124		LONGITUDE : 046 DEG 05 MIN EAST		Nb D'ANNEES D'OBS. : 30											
No. CUIRRI : 2328046083		ALTITUDE : 795 METERS		SOURCES : 1,3,7											
No. SERVICE MET: XXXXX															
M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.6	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)	7	6	15	33	97	202	208	134	95	27	12	11	847
JOURS DE PLUIES =>1 mm		(3)	1	1	2	3	8	13	12	10	8	2	2	1	63
TEMPERATURE MINIMUM	C	(1)	9.3	10.3	12.6	15.4	17.3	18.2	19.0	18.7	17.6	15.8	12.3	10.1	14.7
TEMPERATURE MAXIMUM	C	(1)	24.4	26.6	28.2	31.7	32.1	30.7	29.9	30.6	29.4	29.4	27.0	24.6	28.7
TEMPERATURE MOYENNE	C	(1)	16.9	18.5	20.4	23.6	24.7	24.5	24.5	24.7	23.6	22.6	19.7	17.4	21.8
TEMPERATURE DIURNE	C	(7)	19.7	21.5	23.2	26.5	27.3	26.6	26.4	26.8	25.7	25.1	22.4	20.1	24.3
TEMPERATURE NOCTURNE	C	(7)	14.6	15.8	17.6	20.4	21.5	21.7	22.1	22.3	21.4	20.3	17.4	15.3	19.2
STATION (SITE) : BETANIMENA		LATITUDE : 23 DEG 19 MIN SOUTH		PERIODE D'OBSERVATION : 1936-60											
No. IRMA : 125		LONGITUDE : 043 DEG 42 MIN EAST		Nb D'ANNEES D'OBS. : 25											
No. CUIRRI : 2331043703		ALTITUDE : 5 METERS		SOURCES : 3,4,7											
No. SERVICE MET: XXXXX															
M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.6	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)	4	2	9	12	26	58	73	76	46	9	19	13	347
JOURS DE PLUIES =>1 mm		(3)	0.8	0.3	1	0.9	2	4	6	5	4	0.9	2	2	29
TEMPERATURE MINIMUM	C	(4)	12.7	13.3	14.7	17.2	19.8	21.7	22.4	22.1	21.2	18.5	15.6	13.6	17.7
TEMPERATURE MAXIMUM	C	(4)	27.3	28.3	29.4	30.2	31.9	32.5	33.3	33.3	32.6	32.0	29.8	27.8	30.7
TEMPERATURE MOYENNE	C	(4)	20.0	20.8	22.1	23.7	25.9	22.6	27.9	27.7	26.9	25.3	22.7	20.7	23.9
TEMPERATURE DIURNE	C	(7)	22.7	23.5	24.7	26.0	28.0	24.4	29.8	29.7	28.9	27.7	25.3	23.3	26.2
TEMPERATURE NOCTURNE	C	(7)	17.8	18.3	19.5	21.1	23.3	20.2	25.5	25.4	24.8	23.0	20.5	18.6	21.5
STATION (SITE) : VAGAINDRANO		LATITUDE : 23 DEG 22 MIN SOUTH		PERIODE D'OBSERVATION : 1936-60											
No. IRMA : 126		LONGITUDE : 047 DEG 35 MIN EAST		Nb D'ANNEES D'OBS. : 25											
No. CUIRRI : 2336047583		ALTITUDE : 25 METERS		SOURCES : 3,7											
No. SERVICE MET: XXXXX															
M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.6	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)	136	127	86	96	166	319	322	383	198	125	165	136	2259
JOURS DE PLUIES =>1 mm		(3)	12	12	9	9	11	16	18	17	20	15	12	13	164

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : BENENITRA	LATITUDE : 23 DEG 26 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 127	LONGITUDE : 045 DEG 05 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2343045083	ALTITUDE : 220 METERS	SOURCES : 1,3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.6	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)	4	15	12	31	59	162	165	115	138	19	15	10	745
JOURS DE PLUIES =>1 mm		(3)	0.8	1	1	3	6	11	12	9	7	2	2	2	57
TEMPERATURE MINIMUM	C	(1)	11.3	11.8	13.7	16.2	18.9	20.0	20.9	20.5	19.9	18.2	14.1	12.5	16.5
TEMPERATURE MAXIMUM	C	(1)	29.6	30.9	33.2	36.5	36.2	36.0	34.1	35.0	33.8	34.0	31.4	28.9	33.3
TEMPERATURE MOYENNE	C	(1)	20.5	21.4	23.5	26.4	27.6	28.1	27.5	27.8	26.9	26.2	22.8	20.8	25.0
TEMPERATURE DIURNE	C	(7)	23.9	24.9	27.0	30.0	30.6	30.8	29.8	30.3	29.4	29.1	26.0	23.8	28.0
TEMPERATURE NOCTURNE	C	(7)	17.8	18.3	20.0	22.4	23.9	24.5	24.6	24.8	24.3	23.5	20.1	18.4	21.9

STATION (SITE) : BEZAHA	LATITUDE : 23 DEG 30 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 128	LONGITUDE : 044 DEG 31 MIN EAST	Nb D'ANNEES D'OBS. : +10
No. CUIRRI : 2350044513	ALTITUDE : 100 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.6	13.4	12.9	12.3	11.6	11.0	10.7	
TEMPERATURE MINIMUM	C	(4)	10.7	11.4	13.7	17.1	19.5	21.2	21.7	21.8	20.9	17.9	13.4	11.3	16.7
TEMPERATURE MAXIMUM	C	(4)	29.1	30.7	33.3	35.5	36.1	35.3	35.2	35.4	34.9	34.3	30.5	28.6	33.2
TEMPERATURE MOYENNE	C	(4)	19.9	21.1	23.5	26.3	27.8	28.3	28.5	28.6	27.7	26.1	22.0	20.0	25.0
TEMPERATURE DIURNE	C	(7)	23.3	24.6	27.0	29.6	30.7	30.7	30.8	31.0	30.2	29.1	25.1	23.2	27.9
TEMPERATURE NOCTURNE	C	(7)	17.1	17.9	20.0	22.7	24.3	25.2	25.6	25.8	25.1	23.3	19.4	17.4	22.0

STATION (SITE) : MIDONGY-DU-SUD	LATITUDE : 23 DEG 35 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 129	LONGITUDE : 047 DEG 02 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2358047033	ALTITUDE : 500 METERS	SOURCES : 3,4,7
No. SERVICE MET: 67170		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.4	12.0	12.7	13.2	13.6	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)	44	60	45	62	146	299	359	330	281	106	51	81	1864
JOURS DE PLUIES =>1 mm		(3)	9	9	7	8	13	18	21	18	18	13	9	11	154
TEMPERATURE MINIMUM	C	(4)	10.6	11.8	12.6	14.8	16.5	17.9	18.6	18.6	18.2	16.4	13.1	10.8	15.0
TEMPERATURE MAXIMUM	C	(4)	22.4	23.2	25.0	27.5	28.8	29.0	28.9	28.5	27.5	26.9	24.6	22.8	26.3
TEMPERATURE MOYENNE	C	(4)	16.5	17.5	18.8	21.2	22.7	23.5	23.8	23.6	22.9	21.7	18.9	16.8	20.7
TEMPERATURE DIURNE	C	(7)	18.7	19.6	21.0	23.4	24.8	25.4	25.6	25.3	24.6	23.6	21.0	19.0	22.7
TEMPERATURE NOCTURNE	C	(7)	14.7	15.6	16.6	18.7	20.1	21.0	21.6	21.6	21.2	19.9	17.1	15.0	18.6

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : BETIOKY SUD.		LATITUDE : 23 DEG 43 MIN SOUTH		PERIODE D'OBSERVATION : 1931-60												
No. IRMA : 130		LONGITUDE : 044 DEG 23 MIN EAST		Nb D'ANNEES D'OBS. : 30												
No. CUIRRI : 2371044383		ALTITUDE : 263 METERS		SOURCES : 1,3,7												
No. SERVICE MET: 67162																
M O I S :		UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)		10.8	11.4	12.0	12.7	13.2	13.6	13.4	12.9	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)		4	5	11	15	66	143	159	111	67	15	11	10	617
JOURS DE PLUIES =>1 mm		(3)		0.7	0.7	1	1	4	9	9	8	5	2	2	1	43
TEMPERATURE MINIMUM	C	(1)		11.9	13.6	15.1	17.5	19.7	21.0	21.4	21.4	20.6	18.3	15.0	12.8	17.4
TEMPERATURE MAXIMUM	C	(1)		27.5	29.5	31.6	34.4	34.7	34.4	34.0	33.8	33.2	32.8	29.4	27.2	31.9
TEMPERATURE MOYENNE	C	(1)		19.7	21.5	23.3	25.9	27.2	27.7	27.7	27.6	26.9	25.5	22.2	20.0	24.6
TEMPERATURE DIURNE	C	(7)		22.6	24.4	26.3	28.9	29.8	30.0	29.9	29.8	29.2	28.1	24.8	22.6	27.2
TEMPERATURE NOCTURNE	C	(7)		17.4	18.9	20.3	22.6	24.0	24.7	24.9	25.1	24.5	23.0	20.0	17.9	21.9
STATION (SITE) : MANAMBONDRO		LATITUDE : 23 DEG 48 MIN SOUTH		PERIODE D'OBSERVATION : 1949-70												
No. IRMA : 131		LONGITUDE : 047 DEG 34 MIN EAST		Nb D'ANNEES D'OBS. : 22												
No. CUIRRI : 2380047563		ALTITUDE : 10 METERS		SOURCES : 7,8												
No. SERVICE MET: XXXXX																
M O I S :		UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)		10.8	11.3	12.0	12.7	13.3	13.6	13.4	13.0	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(8)		181	167	107	137	202	236	348	282	412	273	148	185	2678
JOURS DE PLUIES =>1 mm		(8)		13	13	9	10	14	16	18	15	20	16	13	13	170
STATION (SITE) : BEFOTAKA-SUD		LATITUDE : 23 DEG 50 MIN SOUTH		PERIODE D'OBSERVATION : 1938-70												
No. IRMA : 132		LONGITUDE : 046 DEG 58 MIN EAST		Nb D'ANNEES D'OBS. : 33												
No. CUIRRI : 2383046963		ALTITUDE : 740 METERS		SOURCES : 7,8												
No. SERVICE MET: XXXXX																
M O I S :		UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)		10.8	11.3	12.0	12.7	13.3	13.6	13.4	13.0	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(8)		65	63	39	68	126	231	281	264	224	84	59	53	1557
JOURS DE PLUIES =>1 mm		(8)		10	9	6	8	11	15	15	15	15	10	8	8	130

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : ANTONDABE	LATITUDE : 23 DEG 52 MIN SOUTH	PERIODE D'OBSERVATION : 1950-73
No. IRMA : 133	LONGITUDE : 047 DEG 06 MIN EAST	Nb D'ANNEES D'OBS. : 24
No. CUIRRI : 2386047103	ALTITUDE : 325 METERS	SOURCES : 7,8
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.3	12.0	12.7	13.3	13.6	13.4	13.0	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(8)	2	3	5	18	107	224	485	368	258	57	7	3	1537
JOURS DE PLUIES =>1 mm.		(8)	0.6	0.7	0.6	2	7	13	17	15	13	3	1	0.6	74

STATION (SITE) : AMPARIHY-EST	LATITUDE : 23 DEG 58 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 134	LONGITUDE : 047 DEG 21 MIN EAST	Nb D'ANNEES D'OBS. : +-10
No. CUIRRI : 2396047353	ALTITUDE : 30 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.3	12.0	12.7	13.3	13.6	13.4	13.0	12.3	11.6	11.0	10.7	
TEMPERATURE MINIMUM	C	(4)	13.8	14.3	16.2	18.2	19.5	20.6	21.1	21.0	20.8	19.3	16.3	14.5	18.0
TEMPERATURE MAXIMUM	C	(4)	24.4	25.4	26.7	28.9	30.7	31.1	31.0	30.1	29.3	28.7	26.7	25.3	28.2
TEMPERATURE MOYENNE	C	(4)	19.1	19.9	21.5	23.6	25.1	25.9	26.1	25.6	25.1	24.0	21.5	19.9	23.1
TEMPERATURE DIURNE	C	(7)	21.0	21.9	23.4	25.5	27.0	27.7	27.8	27.2	26.6	25.7	23.4	21.9	24.9
TEMPERATURE NOCTURNE	C	(7)	17.5	18.1	19.6	21.5	22.7	23.5	23.9	23.7	23.5	22.4	19.9	18.3	21.2

STATION (SITE) : TSIVORY	LATITUDE : 24 DEG 04 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 135	LONGITUDE : 046 DEG 05 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2406046083	ALTITUDE : 399 METERS	SOURCES : 1,3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.3	12.0	12.7	13.3	13.6	13.4	13.0	12.3	11.6	11.0	10.7	
PRECIPITATIONS TOTALES	mm	(3)	14	10	18	23	109	226	223	160	124	37	17	19	980
JOURS DE PLUIES =>1 mm		(3)	2	2	2	3	8	12	11	9	8	4	2	2	65
TEMPERATURE MINIMUM	C	(1)	9.7	11.1	12.8	15.3	17.7	17.7	18.4	18.6	18.4	16.8	13.1	12.0	15.1
TEMPERATURE MAXIMUM	C	(1)	28.0	28.3	31.0	31.8	33.3	33.3	32.8	32.9	31.0	31.2	28.7	26.9	30.8
TEMPERATURE MOYENNE	C	(1)	18.9	19.8	21.8	24.6	25.5	25.5	25.6	25.8	24.7	24.0	20.9	19.5	23.1
TEMPERATURE DIURNE	C	(7)	22.3	22.9	25.1	27.5	28.2	28.2	28.1	28.3	27.0	26.6	23.8	22.2	25.9
TEMPERATURE NOCTURNE	C	(7)	16.2	17.0	18.5	21.3	22.2	22.0	22.4	22.9	22.3	21.5	18.5	17.3	20.2

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMPADRANAVA	LATITUDE : 24 DEG 07 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 136	LONGITUDE : 045 DEG 43 MIN EAST	Nb D'ANNEES D'OBS. : +10
No. CUIRRI : 2411045713	ALTITUDE : 700 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.8	11.3	12.0	12.7	13.3	13.6	13.4	13.0	12.3	11.6	11.0	10.7	
TEMPERATURE MINIMUM	C	(4)	14.2	14.7	15.9	17.7	19.1	20.3	21.1	20.9	19.8	18.3	15.5	14.4	17.7
TEMPERATURE MAXIMUM	C	(4)	26.1	27.8	30.6	32.9	32.6	32.9	32.5	31.9	31.2	31.1	27.8	25.8	30.3
TEMPERATURE MOYENNE	C	(4)	20.2	21.3	23.3	25.3	25.9	26.6	26.8	26.4	25.5	24.7	21.7	20.1	24.0
TEMPERATURE DIURNE	C	(7)	22.4	23.7	25.9	28.0	28.2	28.8	28.8	28.3	27.5	27.0	24.0	22.2	26.2
TEMPERATURE NOCTURNE	C	(7)	18.4	19.2	20.7	22.3	23.0	23.8	24.3	24.1	23.4	22.5	19.8	18.4	21.7

STATION (SITE) : BEKILY	LATITUDE : 24 DEG 13 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 137	LONGITUDE : 045 DEG 19 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2421045313	ALTITUDE : 400 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.6	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(3)	8	5	15	27	66	181	169	116	93	23	11	13	727
JOURS DE PLUIES =>1 mm		(3)	1	0.9	1	2	5	10	9	7	6	3	1	2	48
TEMPERATURE MINIMUM	C	(4)	10.0	11.4	13.6	16.4	18.7	20.3	20.8	20.5	19.4	17.2	12.8	10.7	16.0
TEMPERATURE MAXIMUM	C	(4)	27.5	29.4	32.3	34.1	34.8	33.9	33.8	33.7	33.3	32.8	29.4	27.3	31.9
TEMPERATURE MOYENNE	C	(4)	18.8	20.4	23.0	25.3	26.8	27.1	27.3	27.1	26.4	25.0	21.1	19.0	23.9
TEMPERATURE DIURNE	C	(7)	22.0	23.7	26.4	28.4	29.6	29.4	29.5	29.4	28.9	27.8	24.1	22.0	26.8
TEMPERATURE NOCTURNE	C	(7)	16.2	17.5	19.6	21.8	23.4	24.0	24.4	24.4	23.8	22.3	18.6	16.6	21.1

STATION (SITE) : MANANTENINA	LATITUDE : 24 DEG 17 MIN SOUTH	PERIODE D'OBSERVATION : 1943-70
No. IRMA : 138	LONGITUDE : 047 DEG 18 MIN EAST	Nb D'ANNEES D'OBS. : 28
No. CUIRRI : 2428047303	ALTITUDE : 22 METERS	SOURCES : 7,8
No. SERVICE MET: 67189		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.6	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(8)	178	221	115	163	248	385	424	375	453	284	169	203	3218
JOURS DE PLUIES =>1 mm		(8)	12	12	9	10	14	18	17	16	19	13	10	11	161

XXXX-XX - means unknown data



## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : ESIRA	LATITUDE : 24 DEG 18 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 139	LONGITUDE : 046 DEG 43 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2430046713	ALTITUDE : 400 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.6	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(3)	8	8	22	27	83	158	160	128	81	34	12	18	739
JOURS DE PLUIES =>1 mm		(3)	1	1	2	3	7	11	8	7	6	3	2	2	53

STATION (SITE) : AMPANIHY-OUEST	LATITUDE : 24 DEG 41 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 140	LONGITUDE : 044 DEG 45 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2468044753	ALTITUDE : 275 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(3)	7	7	14	16	56	125	134	86	62	28	15	16	566
JOURS DE PLUIES =>1 mm		(3)	2	1	2	2	5	9	9	7	5	2	2	2	48
TEMPERATURE MINIMUM	C	(4)	12.0	13.1	14.8	17.1	19.1	20.8	21.1	20.9	20.1	18.3	14.3	12.6	17.0
TEMPERATURE MAXIMUM	C	(4)	27.6	29.0	31.7	33.6	35.5	35.3	35.6	34.8	34.0	33.2	29.0	28.0	32.3
TEMPERATURE MOYENNE	C	(4)	19.8	21.1	23.3	25.4	27.3	28.1	28.4	27.9	27.1	25.8	21.7	20.3	24.7
TEMPERATURE DIURNE	C	(7)	22.7	24.0	26.3	28.3	30.1	30.6	30.9	30.3	29.6	28.5	24.4	23.1	27.4
TEMPERATURE NOCTURNE	C	(7)	17.5	18.5	20.3	22.1	23.8	24.8	25.2	25.0	24.5	23.3	19.5	18.1	21.9

STATION (SITE) : TRANOROA	LATITUDE : 24 DEG 43 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 141	LONGITUDE : 045 DEG 03 MIN EAST	Nb D'ANNEES D'OBS. : +10
No. CUIRRI : 2471045053	ALTITUDE : 208 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
TEMPERATURE MINIMUM	C	(4)	11.3	12.4	14.2	17.0	19.4	20.7	21.3	21.2	20.3	18.0	14.0	12.0	16.8
TEMPERATURE MAXIMUM	C	(4)	27.4	29.2	31.9	34.0	35.1	34.9	34.4	33.9	33.3	32.5	29.1	26.9	31.9
TEMPERATURE MOYENNE	C	(4)	19.4	20.8	23.1	25.5	27.3	27.8	27.9	27.6	26.8	25.3	21.6	19.5	24.4
TEMPERATURE DIURNE	C	(7)	22.4	23.9	26.3	28.5	30.0	30.2	30.2	29.8	29.1	27.9	24.4	22.2	27.1
TEMPERATURE NOCTURNE	C	(7)	17.0	18.1	19.9	22.1	23.9	24.6	25.0	25.0	24.4	22.8	19.3	17.3	21.6

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## MADAGASCAR

STATION (SITE) : ANTANIMORA	LATITUDE : 24 DEG 50 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 142	LONGITUDE : 045 DEG 40 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2483045663	ALTITUDE : 300 METERS	SOURCES : 3,4,7
No. SERVICE MET: 67181		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(3)	8	6	13	25	55	111	109	85	69	21	15	24	541
JOURS DE PLUIES =>1 mm		(3)	2	2	2	2	5	8	8	6	5	2	2	3	47
TEMPERATURE MINIMUM	C	(4)	12.8	14.0	14.9	17.1	19.2	20.2	21.1	21.0	19.9	18.1	14.8	13.1	17.2
TEMPERATURE MAXIMUM	C	(4)	26.2	27.3	29.9	32.1	33.6	33.2	33.5	32.8	32.3	31.3	27.6	25.8	30.5
TEMPERATURE MOYENNE	C	(4)	19.5	20.7	22.4	24.6	26.4	26.7	27.3	26.9	26.1	24.7	21.2	19.5	23.8
TEMPERATURE DIURNE	C	(7)	22.0	23.1	25.1	27.2	28.9	28.9	29.4	29.0	28.3	27.1	23.5	21.8	26.2
TEMPERATURE NOCTURNE	C	(7)	17.5	18.5	19.7	21.6	23.3	23.8	24.6	24.5	23.8	22.5	19.2	17.7	21.4

STATION (SITE) : IFARANTSA	LATITUDE : 24 DEG 55 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 143	LONGITUDE : 046 DEG 51 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2491046853	ALTITUDE : 10 METERS	SOURCES : 3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(3)	82	85	51	54	99	158	250	213	279	77	97	119	1564
JOURS DE PLUIES =>1 mm		(3)	8	8	5	5	8	11	13	11	13	7	7	9	105

STATION (SITE) : BEHARA	LATITUDE : 24 DEG 57 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 144	LONGITUDE : 046 DEG 23 MIN EAST	Nb D'ANNEES D'OBS. : +-10
No. CUIRRI : 2495046383	ALTITUDE : 55 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
TEMPERATURE MINIMUM	C	(4)	10.7	11.0	13.3	16.0	18.7	21.0	21.4	21.4	20.3	17.5	14.0	12.4	16.5
TEMPERATURE MAXIMUM	C	(4)	27.6	28.7	31.3	33.6	34.8	35.0	35.0	34.8	34.0	32.9	29.3	27.3	32.0
TEMPERATURE MOYENNE	C	(4)	19.2	19.9	22.3	24.8	26.8	28.0	28.2	28.1	27.2	25.2	21.7	19.9	24.3
TEMPERATURE DIURNE	C	(7)	22.3	23.1	25.5	27.9	29.6	30.4	30.5	30.4	29.6	28.0	24.5	22.6	27.0
TEMPERATURE NOCTURNE	C	(7)	16.7	17.0	19.1	21.3	23.3	24.8	25.2	25.3	24.6	22.6	19.4	17.7	21.4

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : NAHAMPOANA	LATITUDE : 24 DEG 57 MIN SOUTH	PERIODE D'OBSERVATION : 1936-60
No. IRMA : 145	LONGITUDE : 046 DEG 57 MIN EAST	Nb D'ANNEES D'OBS. : 25
No. CUIRRI : 2495046953	ALTITUDE : 25 METERS	SOURCES : 3,4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(3)	150	133	101	123	144	178	293	253	309	125	156	162	2127
JOURS DE PLUIES =>1 mm		(3)	11	9	8	8	10	13	15	15	16	10	10	11	136
TEMPERATURE MINIMUM	C	(4)	13.8	14.3	15.4	17.3	19.2	20.7	21.6	21.7	21.0	19.2	16.6	14.9	18.0
TEMPERATURE MAXIMUM	C	(4)	24.6	24.6	26.0	27.4	28.8	29.4	30.2	29.6	28.9	28.1	25.8	24.6	27.3
TEMPERATURE MOYENNE	C	(4)	19.2	19.5	20.7	22.4	24.0	25.1	25.9	25.7	25.0	23.7	21.2	19.8	22.7
TEMPERATURE DIURNE	C	(7)	21.2	21.4	22.6	24.2	25.7	26.6	27.4	27.1	26.4	25.3	22.9	21.6	24.4
TEMPERATURE NOCTURNE	C	(7)	17.6	17.8	18.8	20.4	21.9	23.1	24.0	24.1	23.5	22.2	19.8	18.4	21.0

STATION (SITE) : ANDROKA	LATITUDE : 25 DEG 02 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 146	LONGITUDE : 044 DEG 04 MIN EAST	Nb D'ANNEES D'OBS. : +-10
No. CUIRRI : 2503044063	ALTITUDE : 4 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
TEMPERATURE MINIMUM	C	(4)	14.1	15.0	16.1	18.2	20.6	22.4	23.2	23.4	22.5	20.3	16.9	15.0	19.0
TEMPERATURE MAXIMUM	C	(4)	25.2	25.9	27.0	27.8	29.2	30.7	31.5	31.4	30.6	29.5	27.2	25.4	28.5
TEMPERATURE MOYENNE	C	(4)	19.7	20.5	21.6	23.8	24.9	26.6	27.4	27.4	26.6	24.9	22.1	20.2	23.8
TEMPERATURE DIURNE	C	(7)	21.7	22.5	23.6	25.5	26.4	28.0	28.8	28.8	28.0	26.6	24.0	22.1	25.5
TEMPERATURE NOCTURNE	C	(7)	18.1	18.7	19.6	21.9	23.0	24.7	25.6	25.7	25.1	23.3	20.5	18.7	22.1

STATION (SITE) : AMPATOKA	LATITUDE : 25 DEG 03 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 147	LONGITUDE : 046 DEG 24 MIN EAST	Nb D'ANNEES D'OBS. : +-10
No. CUIRRI : 2505046403	ALTITUDE : 67 METERS	SOURCES : 4,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
TEMPERATURE MINIMUM	C	(4)	11.1	12.1	13.6	16.5	18.9	20.8	21.7	21.6	20.7	18.2	14.6	11.9	16.8
TEMPERATURE MAXIMUM	C	(4)	27.9	29.2	31.3	33.2	34.1	34.5	34.4	34.4	34.3	32.7	29.3	27.2	31.9
TEMPERATURE MOYENNE	C	(4)	19.5	20.7	22.5	24.9	26.5	27.7	28.1	28.0	27.5	25.5	22.0	19.6	24.4
TEMPERATURE DIURNE	C	(7)	22.6	23.8	25.7	27.8	29.1	30.0	30.3	30.2	29.9	28.1	24.7	22.4	27.1
TEMPERATURE NOCTURNE	C	(7)	17.0	17.9	19.3	21.6	23.2	24.6	25.3	25.4	24.9	23.0	19.8	17.4	21.6

XXXX-XX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : AMPASIMPOLAKA      LATITUDE : 25 DEG 09 MIN SOUTH      PERIODE D'OBSERVATION : 1936-60  
 No. IRMA : 148      LONGITUDE : 046 DEG 28 MIN EAST      Nb D'ANNEES D'OBS. : 25  
 No. CUIRRI : 2515046463      ALTITUDE : 67 METERS      SOURCES : 3,4,7  
 No. SERVICE MET: XXXXX

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(3)	29	21	25	18	43	67	76	56	56	20	38	50	499
JOURS DE PLUIES = 1 mm		(3)	4	3	3	2	5	6	6	4	6	3	4	4	50
TEMPERATURE MINIMUM	C	(4)	13.4	13.4	14.8	17.4	19.8	21.5	22.2	22.3	21.8	19.1	15.9	14.0	18.0
TEMPERATURE MAXIMUM	C	(4)	26.7	27.3	29.2	30.8	31.9	33.2	33.3	33.4	32.7	31.2	28.3	26.3	30.4
TEMPERATURE MOYENNE	C	(4)	20.1	20.4	22.0	24.1	25.9	27.4	27.8	27.9	27.3	25.2	22.1	20.2	24.2
TEMPERATURE DIURNE	C	(7)	22.5	22.9	24.6	26.5	28.0	29.4	29.7	29.8	29.2	27.4	24.4	22.5	26.4
TEMPERATURE NOCTURNE	C	(7)	18.1	18.1	19.4	21.4	23.3	24.7	25.3	25.6	25.3	23.1	20.2	18.4	21.9

STATION (SITE) : BELOHA      LATITUDE : 25 DEG 10 MIN SOUTH      PERIODE D'OBSERVATION : 1936-60  
 No. IRMA : 149      LONGITUDE : 045 DEG 03 MIN EAST      Nb D'ANNEES D'OBS. : 25  
 No. CUIRRI : 2516045053      ALTITUDE : 100 METERS      SOURCES : 3,4,7  
 No. SERVICE MET: 67191

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(3)	12	7	15	13	32	101	96	75	49	16	20	22	458
JOURS DE PLUIES =>1 mm		(3)	3	1	2	2	3	7	6	5	4	2	3	3	41
TEMPERATURE MINIMUM	C	(4)	11.7	12.8	14.3	16.7	19.3	20.8	21.4	21.6	20.5	18.5	15.5	12.4	17.1
TEMPERATURE MAXIMUM	C	(4)	26.9	28.1	31.0	32.1	33.2	34.4	34.7	34.5	33.5	32.2	28.4	27.0	31.3
TEMPERATURE MOYENNE	C	(4)	19.3	20.5	22.3	24.4	26.3	27.6	28.1	28.1	27.0	25.4	22.0	19.7	24.2
TEMPERATURE DIURNE	C	(7)	22.1	23.3	25.3	27.1	28.7	29.9	30.4	30.4	29.3	27.9	24.4	22.4	26.8
TEMPERATURE NOCTURNE	C	(7)	17.1	18.0	19.3	21.3	23.3	24.5	25.2	25.4	24.6	23.1	20.0	17.6	21.6

STATION (SITE) : AMBOVOMBE      LATITUDE : 25 DEG 11 MIN SOUTH      PERIODE D'OBSERVATION : 1931-60  
 No. IRMA : 150      LONGITUDE : 046 DEG 06 MIN EAST      Nb D'ANNEES D'OBS. : 30  
 No. CUIRRI : 2518046103      ALTITUDE : 135 METERS      SOURCES : 1,3,7  
 No. SERVICE MET: 67195

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(3)	26	24	21	24	43	88	89	84	59	26	38	53	575
JOURS DE PLUIES =>1 mm		(3)	4	3	3	3	5	8	7	6	6	4	4	5	58
TEMPERATURE MINIMUM	C	(1)	12.2	12.3	13.7	17.0	19.8	20.9	20.8	21.2	20.2	18.4	15.2	13.6	17.1
TEMPERATURE MAXIMUM	C	(1)	25.2	25.9	28.2	30.4	30.5	31.7	32.0	32.1	30.4	30.3	28.2	25.8	29.2
TEMPERATURE MOYENNE	C	(1)	18.7	19.1	21.0	23.7	24.9	26.3	26.4	26.7	25.3	24.4	21.7	19.7	23.2
TEMPERATURE DIURNE	C	(7)	21.1	21.6	23.6	26.1	26.8	28.1	28.3	28.6	27.1	26.6	24.1	21.9	25.3
TEMPERATURE NOCTURNE	C	(7)	16.8	16.9	18.4	21.0	22.6	23.8	23.9	24.4	23.4	22.4	19.7	17.9	20.9

XXXXX - means unknown data

## BANQUE DE DONNEES AGROCLIMATOLOGIQUES

## M A D A G A S C A R

STATION (SITE) : TSIHOMBE	LATITUDE : 25 DEG 18 MIN SOUTH	PERIODE D'OBSERVATION : 1931-60
No. IRMA : 151	LONGITUDE : 045 DEG 30 MIN EAST	Nb D'ANNEES D'OBS. : 30
No. CUIRRI : 2530045503	ALTITUDE : 64 METERS	SOURCES : 1,3,7
No. SERVICE MET: XXXXX		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(3)	14	8	15	15	31	106	78	90	60	19	24	31	491
JOURS DE PLUIES =>1 mm		(3)	3	2	2	2	4	8	7	6	5	3	3	4	49
TEMPERATURE MINIMUM	C	(1)	11.8	12.3	15.2	17.2	19.3	20.7	21.8	22.0	21.1	18.7	15.0	13.1	17.4
TEMPERATURE MAXIMUM	C	(1)	25.3	27.5	28.9	32.6	32.1	32.8	32.2	32.7	30.8	30	28.3	28.1	30.1
TEMPERATURE MOYENNE	C	(1)	18.6	19.9	22.1	24.9	25.7	26.8	27.0	27.4	25.9	24.4	21.7	20.6	23.8
TEMPERATURE DIURNE	C	(7)	21.1	22.7	24.6	27.6	27.9	28.9	28.8	29.3	27.6	26.5	24.1	23.4	26.0
TEMPERATURE NOCTURNE	C	(7)	16.6	17.4	19.6	21.8	22.9	24.1	24.7	25.2	24.1	22.5	19.7	18.4	21.4

STATION (SITE) : BETONTY (FAUX CAP)	LATITUDE : 25 DEG 35 MIN SOUTH	PERIODE D'OBSERVATION : XXXX-XX
No. IRMA : 152	LONGITUDE : 045 DEG 32 MIN EAST	Nb D'ANNEES D'OBS. : 24
No. CUIRRI : 2558045533	ALTITUDE : 22 METERS	SOURCES : 1,7
No. SERVICE MET: 67194		

M O I S :	UNIT	S	JUIL	AOUT	SEPT	OCT.	NOV.	DEC.	JANV	FEVR	MARS	AVRIL	MAI	JUIN	ANNUAL
PERIODE DIURNE (N)	Hr	(7)	10.7	11.3	12.0	12.7	13.3	13.7	13.5	13.0	12.3	11.6	10.9	10.6	
PRECIPITATIONS TOTALES	mm	(1)	18	15	12	15	23	56	45	75	45	17	17	37	375
TEMPERATURE MINIMUM	C	(1)	16.5	16.5	17.4	18.9	20.0	22.3	22.9	23.3	22.8	21.2	18.8	16.6	19.8
TEMPERATURE MAXIMUM	C	(1)	23.6	23.6	25.0	26.2	27.7	29.0	29.4	29.2	28.4	27.4	25.5	23.9	26.6
TEMPERATURE MOYENNE	C	(1)	20.0	20.1	21.2	22.5	23.8	25.6	26.1	26.2	25.6	24.3	22.1	20.2	23.1
TEMPERATURE DIURNE	C	(7)	21.3	21.4	22.6	23.8	25.1	26.7	27.2	27.2	26.6	25.4	23.3	21.5	24.3
TEMPERATURE NOCTURNE	C	(7)	19.0	19.0	19.8	21.0	22.1	24.1	24.7	25.0	24.5	23.2	21.1	19.1	21.9

XXXX-XX - means unknown data

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