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A CLIMATOLOGICAL DATA BASE FOR THE AMAZON REGION

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First of all, it is important to state that selected data sets should be prepared for the Amazon region to support regional applied studies, and also to support regional and global climate research. Therefore, all data available for the region will be useful for helping large field experiments in Amazonia in the scientific areas of Atmospheric Chemistry, Ecology and Hydro-meteorology. Considering this scenario, the summary will focus some aspects of a major effort to build up a Climatological Data Base for the Amazonia using meteorological data collected at the Brazilian Air Force Network. This meteorological network is composed by 17 (seventeen) surface stations and 3 (three) upper air stations across the Amazon region and neighborhood. In addition, the majority of the surface stations has at least twenty-year series of hourly observations. Therefore, these data have to be considered under historical and present perspectives. The network has been operated by the "Departamento de Eletrônica e Proteção ao Vôo (DEPV)". In order to make this reasonable amount of information available to the scientific community a broad job has been performed to control all aspects of climate data management. This work includes procedures to archive, microfilme, digitize, quality control, analyze and publish climate data. It is important to remind, the main problem concerned to meteorological data and climate data from past years in Amazonia is that most of the information still remains in original paper forms. For this reason, the observations have to be digitized and recorded in magnetic media. However, significant progress toward better data availability has been made over the last years. During the same time, there have been new ideas about what methods of data management help scientists accomplish their goals.

INTRODUCTION

The study of clouds and radiation over the tropical region is very important because clouds control radiation budget at the surface and at the top of the atmosphere, therefore the knowledge about clouds hardly contributes to the improvement of climatic models. Also in Hydrologic studies clouds are responsible for a large amount of water storage. The understanding of the time/space scales that clouds are organized and the convection life cycles allow to better describe the water cycle.

Clouds are organized in a large range of spatial scales (from few meters to thousand kilometers), with different cloud types. To estimate the cloud radiative effect at the top of the atmosphere and the water storage by clouds is necessary to know the internal structure of the clouds or cloud clusters, as well as, the structural characteristics of the cloud fields in the space and time domain.

Figure 1 shows the large range that clouds are organized when observed by geostationary satellites. The figure shows a climatological result where no preferential cloud scale is observed. Despite there is no-preferential cloud scale, the large amount of precipitation falls from mesoscale convective systems in tropical regions. These systems have size in the mature stage of about 300 km and life cycle about 18 hours, these characteristics need to be taken in account in the radiative and hydrologic studies.

Another important aspect, is the relationship between the atmospheric dynamics/thermodynamics, surface fluxes and the cloud field characteristics, in the way to associate large/meso scale to the cloud coverage patterns.

PRELIMINARY STUDIES

To define the sites locations, measures frequency, the observations network, periods of intensive measures, is necessary a climatological description of the region. The knowledge of the diurnal cycle, interdiurnal oscillations and the seasonal cycle, over the region is an important information to plan the experiment. Another important information is the determination of the regional time/space scales of the convective systems and their main trajectories.

NECESSARY MEASUREMENTS

1) Satellite observations:

Cloud type, extent and height can be retrieved by infrared and visible satellite images using special algorithms. In addition, the radiation budget at the top of the atmosphere can be obtained by geostationary and polar orbiting satellites. Also the characterization of the convective stages can be set by analysing spectral and textural features. An important aspect to consider is the possibility to combine information coming from different spatial satellite resolution.

Atmospheric temperature and moisture profiles are important to determine atmospheric state. Due to the intense cloud cover in the region it is necessary to use microwave sensors (SSM/T, SSM/I). The measurements must be validated by atmospheric sounders.

Another thing to take in account, is the possibility to compute atmospheric radiative fluxes and heating profiles. This can be obtained combining measurements from satellites, aircrafts and surface observations. These measurements can be incorporated into analysis algorithms to calculate the radiative heating profiles.

2) Surface and airborne radiometers:

Infrared and visible radiometers looking upward and downward installed in an aircraft can measure the surface albedo and the surface temperature. Equipment at the surface can measure the total downwelling infrared and visible fluxes.

3) Radar:

It is very important to consider information obtained by radar to give a three-dimensional description of the cloud systems and to validate the satellite observations.

REFERENCES

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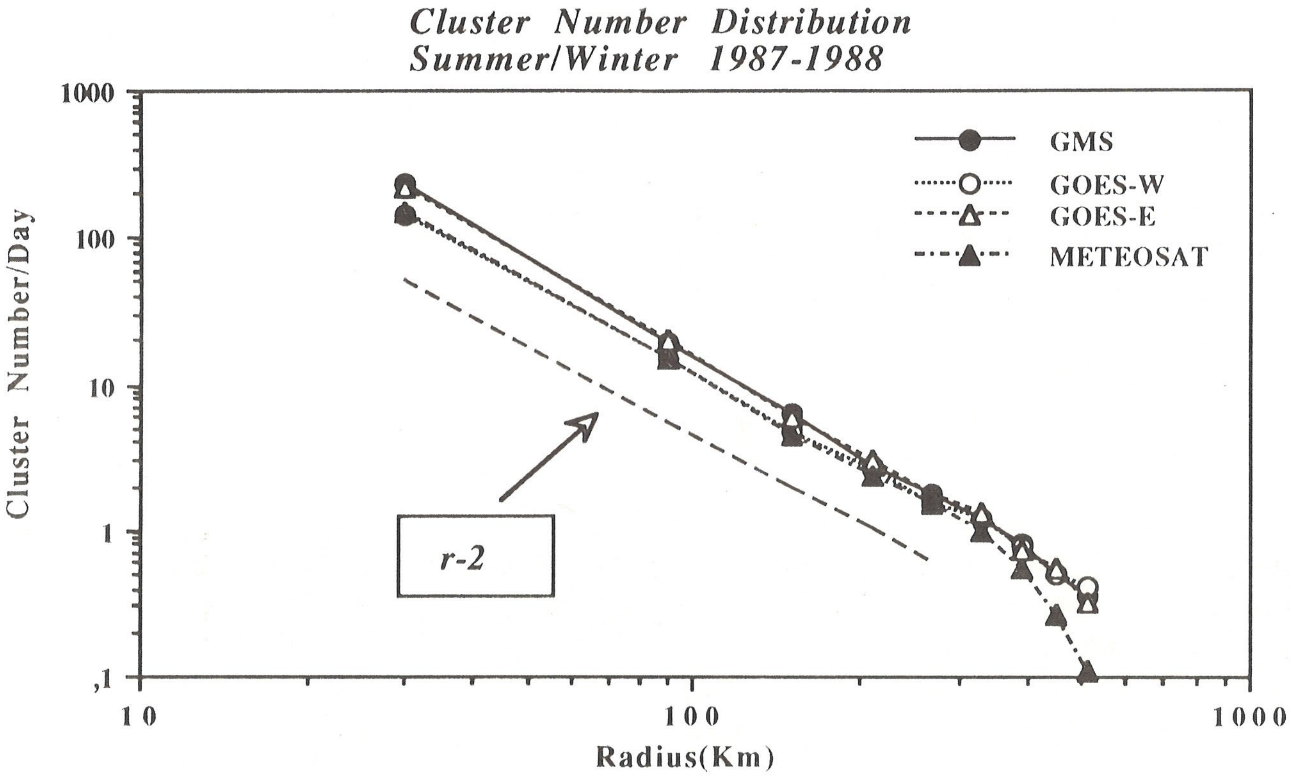

Figure 1. The number of clusters observed per day over the tropics as a function of the cluster size during the summer and winter of 1987-88 (Machado and Rossow 1993). Scale of the disturbances are determined by the radius of cloudy regions with IR effective temperatures < 208 K. Distributions are shown for the western Pacific (GMS and GOES-W), the eastern Pacific (GOES-E), and the Atlantic (METEOSAT). The distributions tend to follow an inverse square law (solid line) with the radius of the disturbance indicating that the total area of deep cloud cover is approximately the same over the tropical oceans, irrespective of the scale of the components.

O número de aglomerados observados por dia nos trópicos em função de seu tamanho durante o verão e inverno de 1987-88 (Machado and Rossow, 1993). A escala dos distúrbios é determinada pelo raio das regiões nebulosas para temperatura efetiva do Infra-Vermelho < 208 K.