

## 4.5

## DATA PRODUCTS FROM CPTEC AVAILABLE ON THE IDD-BRASIL

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### 1. INTRODUCTION

Unidata Internet Data Distribution (IDD) system (Domenico, *et. al.*, 1994, Davis and Rew, 1994), is a network of over 160 institutions that cooperate in the sharing of real-time atmospheric science and related data. The Unidata's primary mission is "*Providing data, tools, and community leadership for enhanced Earth-system education and research*".

Since the IDD offered a means by which education and research institutions could receive a reliable stream of real-time meteorological data, and since it also provided a mechanism that allows sharing of locally held datasets with other IDD participants, several Brazilian institutions joined the data relay network.

### 2. THE IDD-BRASIL PROJECT

Cooperation among Brazil's Centro de Previsão de Tempo e Estudos Climáticos (CPTEC, a division of INPE), Brazilian Universities like the Universidade Federal do Rio de Janeiro (UFRJ), and the U.S. Unidata Program Center has resulted in the expansion of the Unidata Internet Data Distribution

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(IDD) system in Brazil. This effort, named **IDD-Brasil**, is now delivering the full set of global observations, global model output transmitted distributed, the US NWS in NOAAPORT, and all GOES-East imager channels in near real-time to top level redistribution nodes established at CPTEC and UFRJ. From there, the data is being relayed to a rapidly increasing community of university users. This project was inaugurated in January, 2004, and the results were presented at the XIII Congresso Brasileiro de Meteorologia (CBMET) held in Fortaleza, Ceará, Brazil (Almeida, 2004; Yoksas, 2004).

After the congress the participation of Brazilian institutions increase sharply, and this has made Brazil the largest user of Unidata IDD and display and analysis tools outside of the US (Almeida, 2005).

### 3. DATA SHARING OF CPTEC'S DATA ON IDD

At CPTEC the data sharing component of the IDD-Brazil is being used to disseminate the output of the CPTEC models, satellite imagery, satellite derived products, and hard-to-obtain mesonet and automated reporting network observations to university participants in both the South American IDD-Brazil and North American IDD.

Dissemination of the observational data is important given the sparse coverage of WMO synoptic reporting stations in Brazil. The numerical outputs from CPTEC's regional models have the highest resolution available for South America, like the operational ETA in 40 Km scale grid, and the pre-operational ETA in 20 Km scale grid. GOES satellite imagery also is operationally collected at CPTEC, and derived products are being implemented to be ingested on IDD, like high-resolution sectors of South America. Soon several others additional CPTEC's products for South America area will be available on the system.

All these data ingesting on IDD system makes high-resolution specific products for South America easily and freely available for universities and meteorological centers. Although these data are freely available on CPTEC's internet page, they still are not available on the WMO's GTS system.

#### **4. SOUTH AMERICA ETA MODEL**

Regional ETA Model is the operational model at CPTEC since 1996, being the first regional model to run in an operational way within a Brazilian meteorological center. It has been used daily by meteorologists from CPTEC and others Brazilian centers, such as the DHN (Brazilian Navy), for weather forecasting. This hydrostatic model covers almost all South America and adjacent oceans. Its horizontal resolution is 40 km (regular grid) and 38 vertical levels. This model is run operationally twice a day, at 00:00 and 12:00 UTC, and the model results are available in GRIB format (using a specific GRIB table from CPTEC). The model results are inserted in IDD-Brazil as soon as they are available.

The CPTEC also is running several other numerical models, like South America ETA with 20

km horizontal resolution, Brazilian RAMs model (called BRAMs), a global COLA/CPTEC, among others. In the future all these models can be ingested on *IDD-Brasil*.

#### **5. AUTOMATED REPORTING NETWORK**

The data of approximately 500 automated stations from several Brazilian institutions are collected by CPTEC's satellite data transmission system and distributed by internet and IDD. These stations are called "PCDs", from "Data Collecting Platform". Most of them are of hydrological type, but more than 50 are of meteorological type and also have measurements of atmospheric pressure, wind direction and velocity. New instruments are being added to existing stations.

#### **6. SATELLITE IMAGERY**

CPTEC has a set of antennas for satellite data reception. From these data several types of derived products are generated, like satellite winds, temperature soundings and precipitation estimations.

The CPTEC's data satellite system is the Terascan of SeaSpace Corporation. For IDD delivery the imagery is being converted to McIDAS AREA format, using FORTRAN routines developed at CPTEC. The first satellite data being ingested in IDD-Brasil are the full-resolution GOES-12 imagery for South America, at every 30 minutes.

#### **7. GEMPAK ADAPTATION**

GEMPAK (General Meteorological Package) is an open-source analysis software distributed by the Unidata Program Center. This software is very popular among the IDD user community. To a new data be easily accessible to the user community,

this data must be compatible with some of the standard visualization tools, like GEMPAK.

The authors of this paper have done adaptations on the GEMPAK's graphical interface to be able to visualize CPTEC's data products easily. The information about the needed modifications are available on the internet, and are being incorporated to the newer Unidata GEMPAK distributions.

## 8. CONCLUSIONS

The US IDD community recognizes the importance of access to environmental data from other countries, particularly those in the southern hemisphere, to enhance education and research capabilities toward studying global problems like climate change, ozone depletion, and ENSO. A critical requirement for such research studies is the acquisition and assimilation of a complete spectrum of global meteorological, oceanographic and hydrological observations. We view the data relay infrastructure that has been installed in Brazil as the beginnings of a continent-wide network that can act as conduit for multi-way sharing of locally held data sets with peers in the IDD North American university community and with a similar network that we are now building in Central America and the Caribbean.

The first university outside of Brazil that connect to the *IDD-Brasil* were the Universidade de Aveiros (UA) in Portugal and the Universidad de Buenos Aires (UBA) in Buenos Aires, Argentina. Their participation has been enabled by recently gained access to Internet2 and improvements in departmental networking infrastructure. As more institutions get better connected to the high-speed Internet, more will be able to participate in data sharing efforts like the *IDD-Brasil*.

In the near future more data will be available to the community, since there are several locally held datasets that investigators may be willing to share with their Brazilian colleagues and South, Central, and North American IDD participants. Datasets being investigated include local radar data from Amazonia and long term rain gauge records. CPTEC is also working to provide access to broader set of meteorological and hydro-meteorological observations that are not currently available on the IDD through the *IDD-Brasil* or in the Global Telecommunications System (GTS).

It is envisioned that data sharing efforts such as these will foster new collaborations among Brazilian meteorological centers and universities and their counterparts throughout South, North, and Central America.

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