MODERNIZATION OF THE CUBAN WEATHER RADAR NETWORK LOOKING FOR A REGIONAL INTEGRATION

Orlando L. Rodríguez[1], Wilfredo J. Pozas[1], Leonardo L. Fernández[1], Roberto A. Naranjo[1], Arturo A. Peña[1], Albio Barreiras[1], Jorge L. Pérez[1], Vladimir Rodríguez[2], Anyer E. Castillo[1]
[1] Centro de Radares, Instituto de Meteorología de Cuba
[2] Universidad de Camagüey, Cuba

ABSTRACT

1. INTRODUCTION

Cuban Institute of Meteorology operates threeRC-32B Japanese radars since 1973, plus fourMRL-5 Russian radars, since the 80's, plus a modern Meteor 1500 S in temporary use since 2005.
All together give a very good coverage to Cuba and surrounding waters.

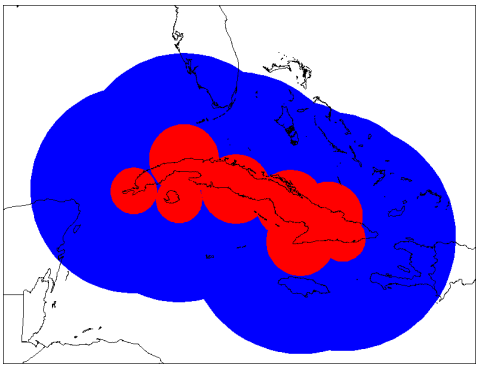

Fig. 1 Surveillance (blue), and Quantitative (red), coverage of Cuban Radar Network.

2. MODERNIZATION

Between 2000 and 2006 we revamped all the seven old radars, to get full unmanned control, automatic data dissemination, and mainly to make them less dependent from the original vendors' parts, which in the 90's were not available.
The heart of the modernization is an in-house developed hardware and software solution equal for all types of radars.
Operating console and all old man-radar interfaces were substituted by a computer friendly interface which shows all radar parameters and allows complete manual or automatic (scheduled) operation.

An industrial PC with I/O cards performs: radar control, timing, signal processing and data acquisition. I/O cards are wired directly to transmitter, receiver, and antenna, checking status and sending commands and timing signals to them. Manufacturer's name and models are irrelevant because functions provided by these components are widely available in the market. This way, the original architecture was dramatically simplified, allowing an unprecedented performance and higher reliability.

3. MOSAICKING RADAR DATA

Compositing data from different radars allows users (non-experienced in radar information and usually very busy) to be concerned only with the meteorological information integrated on those images *over his/her province*.
There issome additional advantages of having some radars (more than one) looking to the same area: redundancy covers the eventual absence for maintenance or failure, of some of the radars, and cone of silence of one radar is covered with data from another radar. Of course, traditional radar-centered images are also available.
Information coming from different radars is easily corrected in Reflectivity, by means of software utilities, in such a way to keep them calibrated relatively between themselves. Archive, data processing and data dissemination is provided on the Radar Center in Camagüey. Radar information is also

integrated with satellite and surface information and is made available in a WEB page for internal use of Cuban Institute of Meteorology.

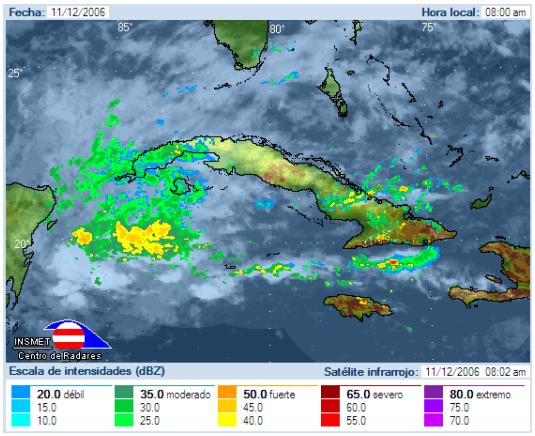

Fig. 2 Mosaic or radar + satellite

4. WEB ORIENTED OUTPUT DATA

Rather than using specialized radar displays, we put a great effort into viewing radar products over the WEB. For this purpose, it was made a WEB application which shows radar products (from individual radars, or from a composite of several radars) as a layerover a standard GIS map, provided by MapServer.

5. UPGRADING TO DOPPLER

Doppler radars have proven to be very useful in short term forecasting, so Cuban Instituto de Meteorología embarked in a project to upgrade the old seven conventional radars to Doppler.

The prototype of Doppler radar for the Cuban service is just finished. This is an old MRL-5 Russian radar, with both X and S bands Doppler, using modern Digital Receiver technology, developed by our engineers.

6. INTRODUCING ORPG

Taking into account that ORPG from NEXRAD was put free and open to the community, and taking into account also that developing such a software package could take a lot of time and effort, we decided to introduce ORPG to obtain products from our radars (Doppler and also non-Doppler).

Now, information from Casablanca radar (conventional MRL-5 in Havana), and information from the newly modernized to Doppler radar from Camaguey, is processed with ORPG algorithms. This year, all radars will be upgraded to use NEXRAD ORPG adapted to work with our radars data.

7. CONCLUSIONS

All these technology improvements will, undoubtedly, contribute to a better short term forecast in Cuba, but there is also a very important issue: now we are able to share radar information in the same format used in USA and Canada.