

“Data Flow in Forecasting and Preventing Hurricanes Damages in Cuba”



INSMET, CUBA

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Scientific Data and Knowledge within the Information Society
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October 2006

Tropical Cyclones (Hurricanes) Forecast and Warning Processes

Is a process of:

- ✓ Gather and Transmit Meteorological Data (Input)
- ✓ Process Data and Forecast
- ✓ Issue processed Data (Output) as Forecasts and Warnings

Main features of this process:

- ✓ Met data is needed in wide regions
- ✓ Transmission needs to be very fast
(Meteorological Data are rapidly perishable)

WMO WORLD WEATHER WATCH (WWW)

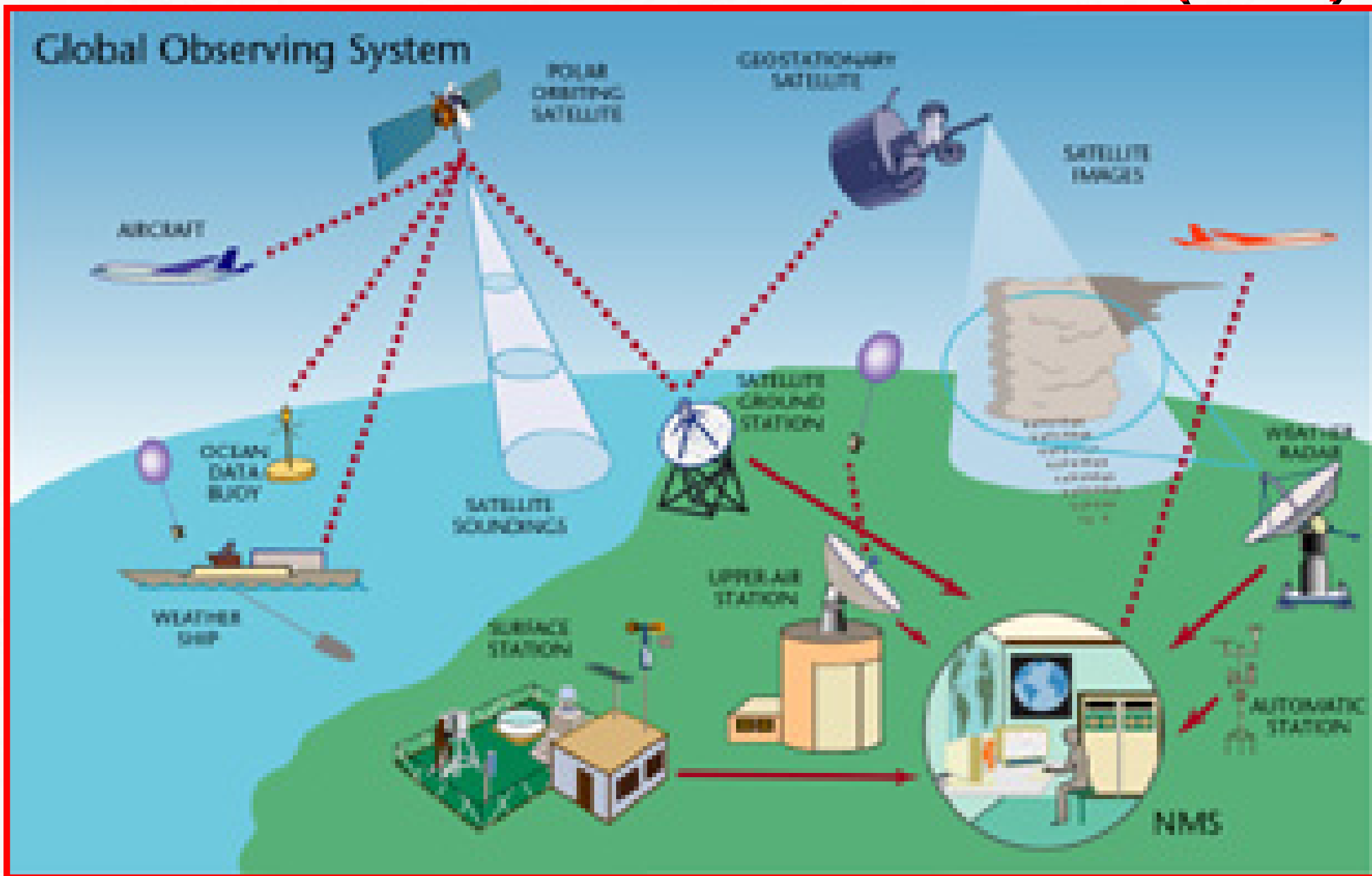
GLOBAL OBSERVING SYSTEM

GLOBAL TELECOMMUNICATION SYSTEM

DATA PROCESSING AND FORECASTING

TROPICAL CYCLONES PROGRAM

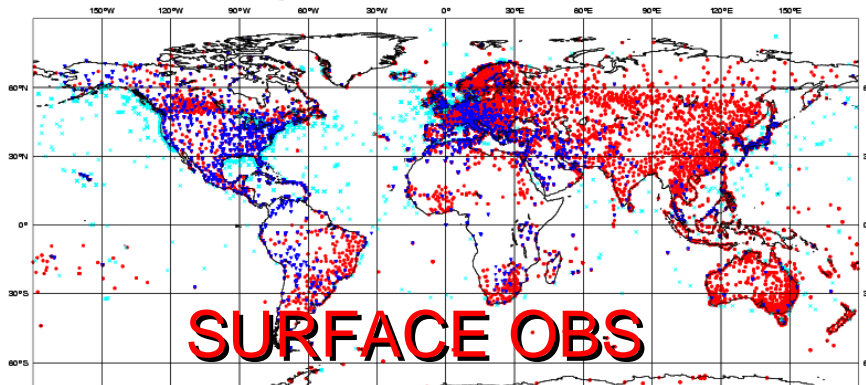
WMO GLOBAL OBSERVING SYSTEM (GOS)



WORLD DATA COVERAGE

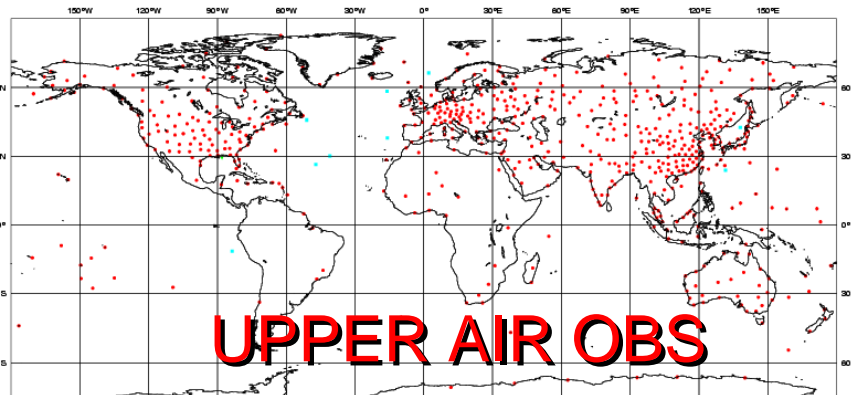
15701 SYNOP 2159 SHIP

ECMWF Data Coverage (All obs) - SYNOP/SHIP
14/OCT/2006; 00 UTC
Total number of obs = 27407



Obs Type
7650 AIREP 20571 AMDAR 30748 ACARS

ECMWF Data Coverage (All obs) - TEMP
14/OCT/2006; 00 UTC
Total number of obs = 619



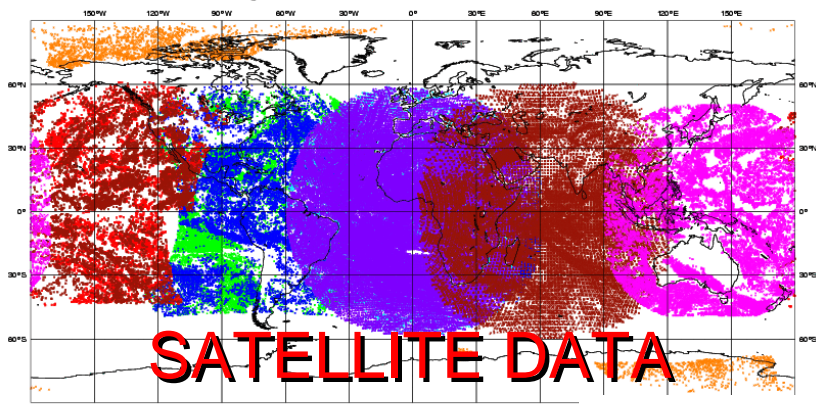
Obs Type
25979 GOES12_IR 17294 GOES12_WV 7378 GOES11_IR 6501 GOES11_WV 45109 MET9_IR
108361 MET9_WV 455 MET9_VIS 38480 METS 18469 MTSAT 3518 MODIS

ECMWF Data Coverage (All obs) - AIRCRAFT
14/OCT/2006; 00 UTC
Total number of obs = 58969

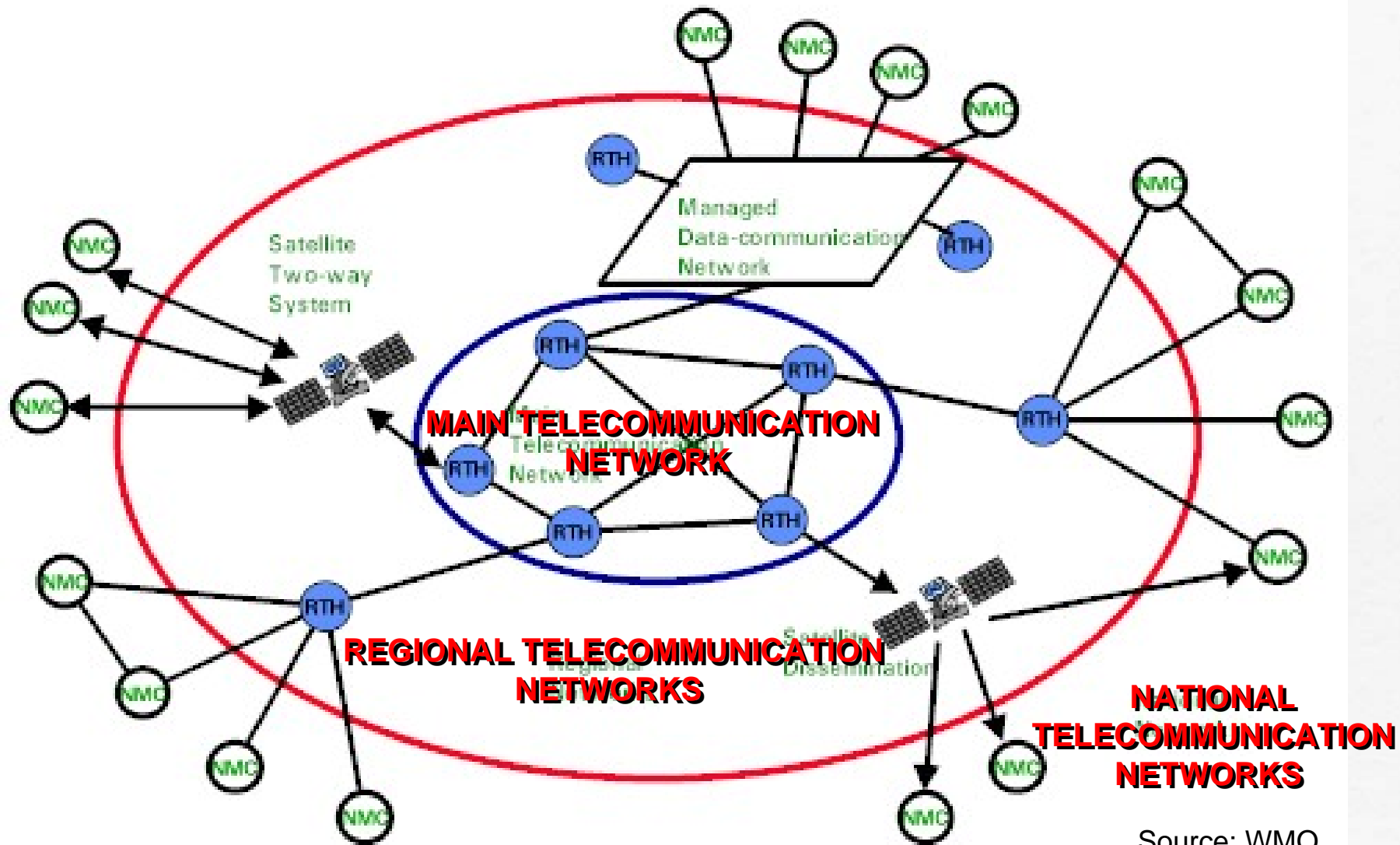


ECMWF

ECMWF Data Coverage (All obs) - AMV
14/OCT/2006; 00 UTC
Total number of obs = 271845



Source: ECMWF



Source: WMO

WMO GLOBAL TELECOMMUNICATION NETWORK (GTS)

WORLD METEOROLOGICAL CENTRES (WMCs)
MELBOURNE, MOSCOW, WASHINGTON

**REGIONAL SPECIALISED METEOROLOGICAL
CENTRES (RSMCs) WITH GEOGRAPHICAL
SPECIALIZATION**

**ALGIERS, BEIJING, BRACKNELL, BRASILIA, BUENOS
AIRES, CAIRO, DAKAR, DARWIN, JEDDAH,
KHABAROVSK, MELBOURNE, MIAMI, MONTREAL,
MOSCOW, NAIROBI, NEW DELHI, NOVOSIBIRSK,
OFFENBACH, PRETORIA, ROME, TASHKENT, TOKYO,
TUNIS/CASABLANCA, WASHINGTON, WELLINGTON**

WORLD TROPICAL CYCLONE SYSTEM

WMO WORLD WEATHER WATCH

Global Observations --- Global Telecommunications

WORLD METEOROLOGICAL SPECIALIZED CENTERS
Global Numerical Models

WMO REGIONAL & TC SPECIALIZED CENTERS
Regional Models and TC Models

NATIONAL METEOROLOGICAL CENTERS
National Weather Watch, Forecasts & Warnings for the Country

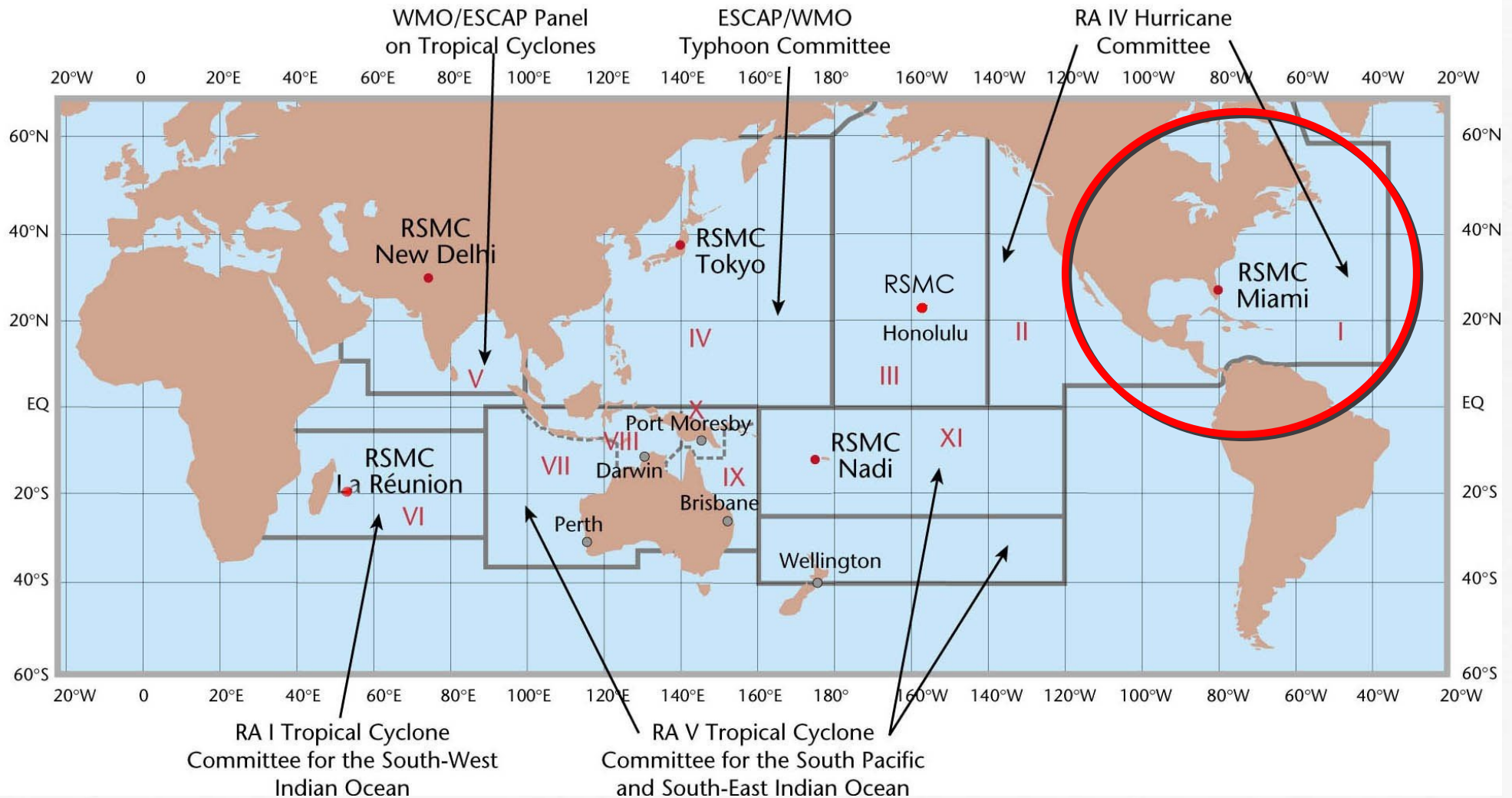
PUBLIC

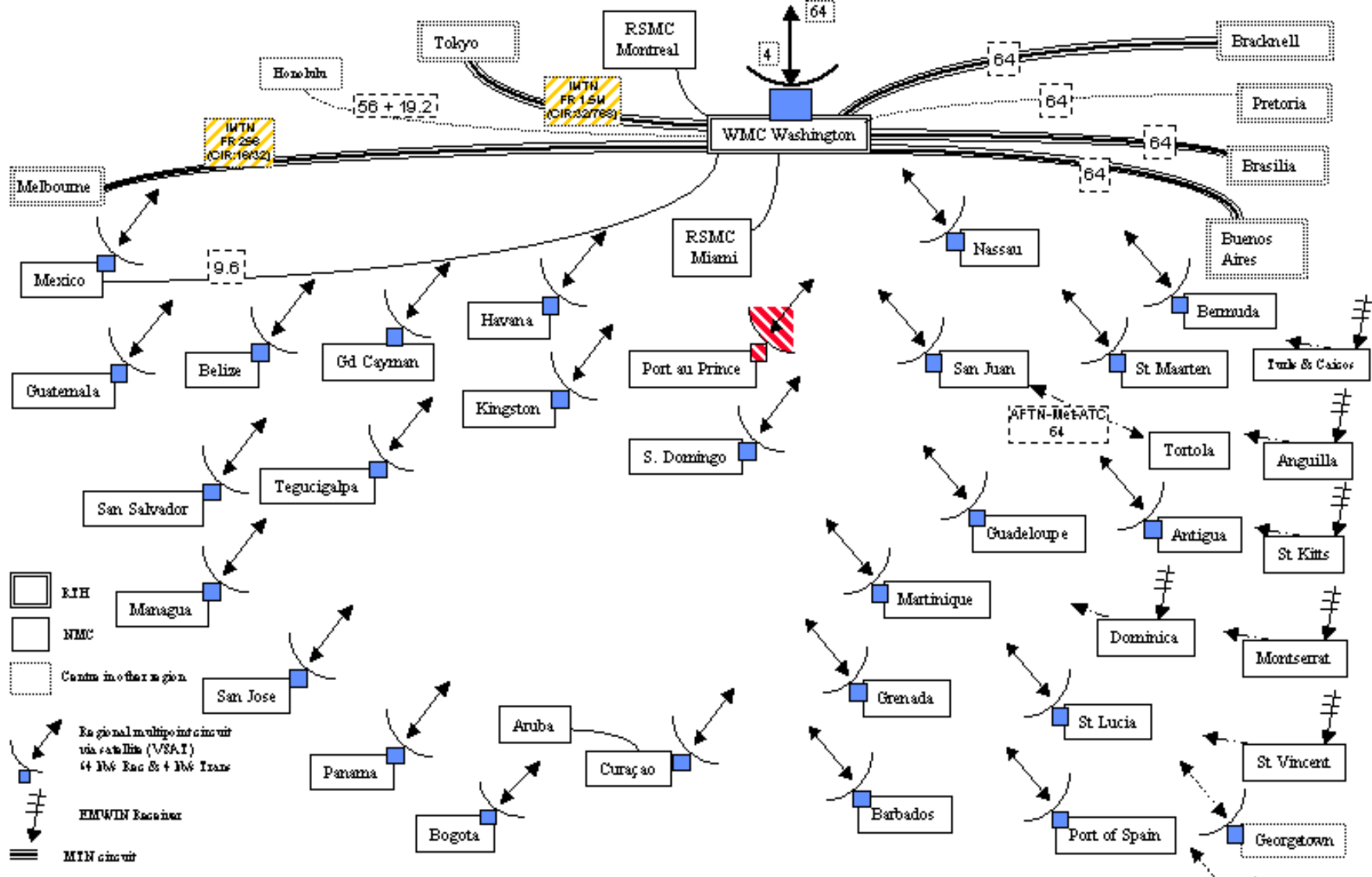
GOVERNMENT

CIVIL DEFENSE

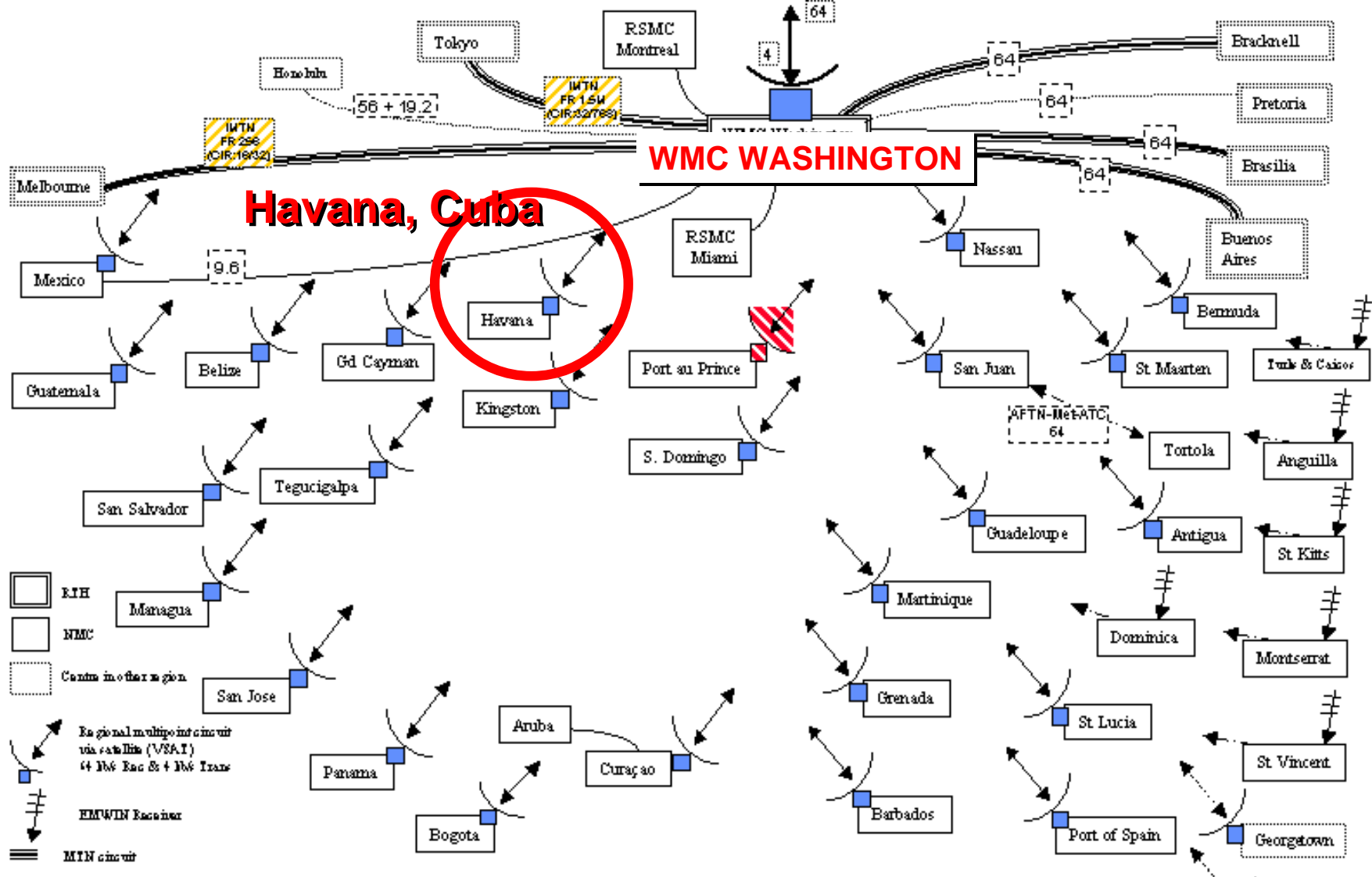
MEDIA

WMO TROPICAL CYCLONE RSMC REGIONS



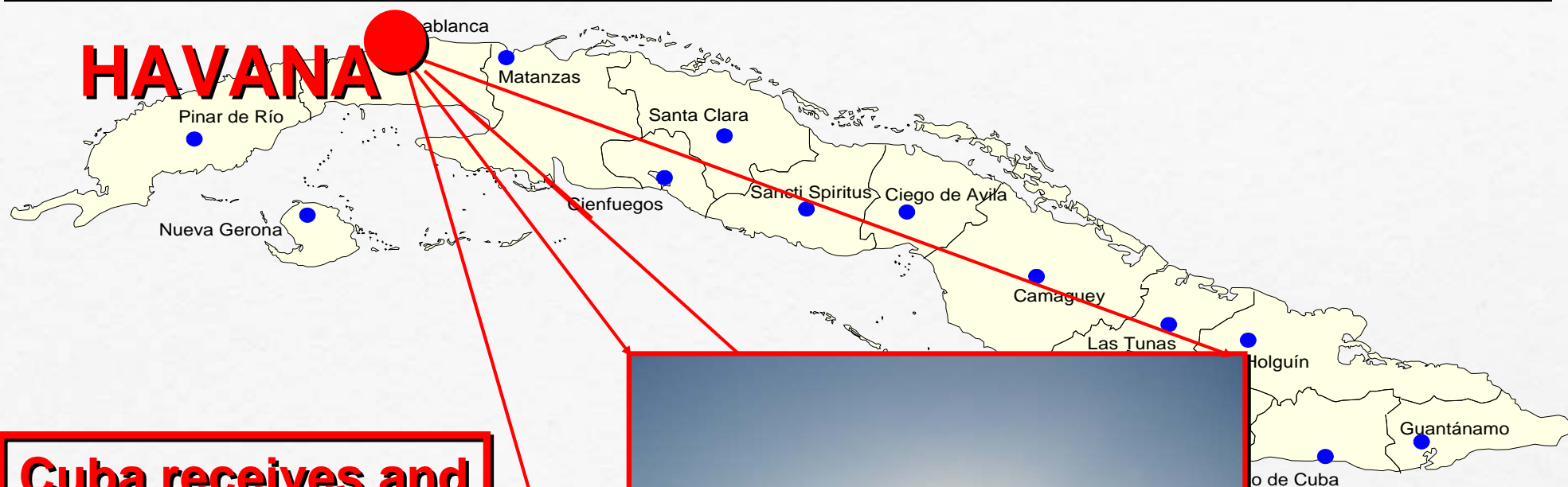


Regional Telecommunication Network for WMO Region IV (North and Central America), point to point and multipoint

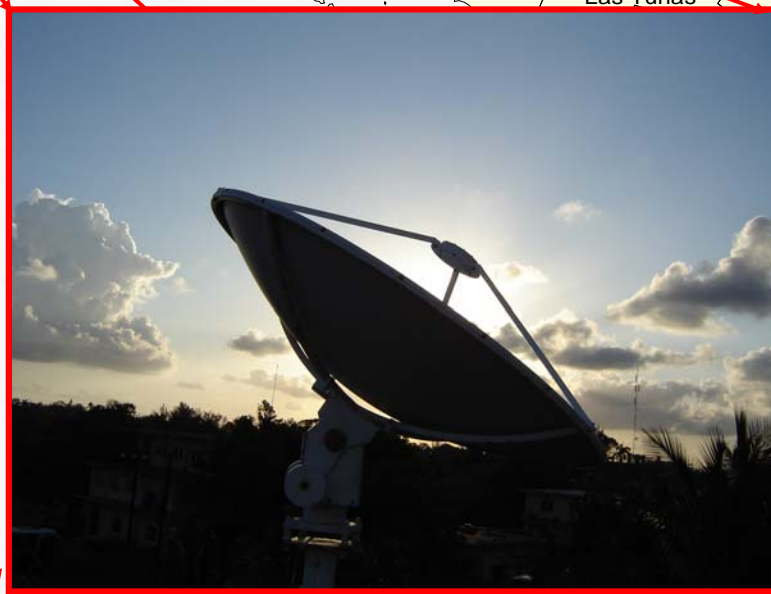


Regional Telecommunication Network for WMO Region IV (North and Central America), point to point and multipoint

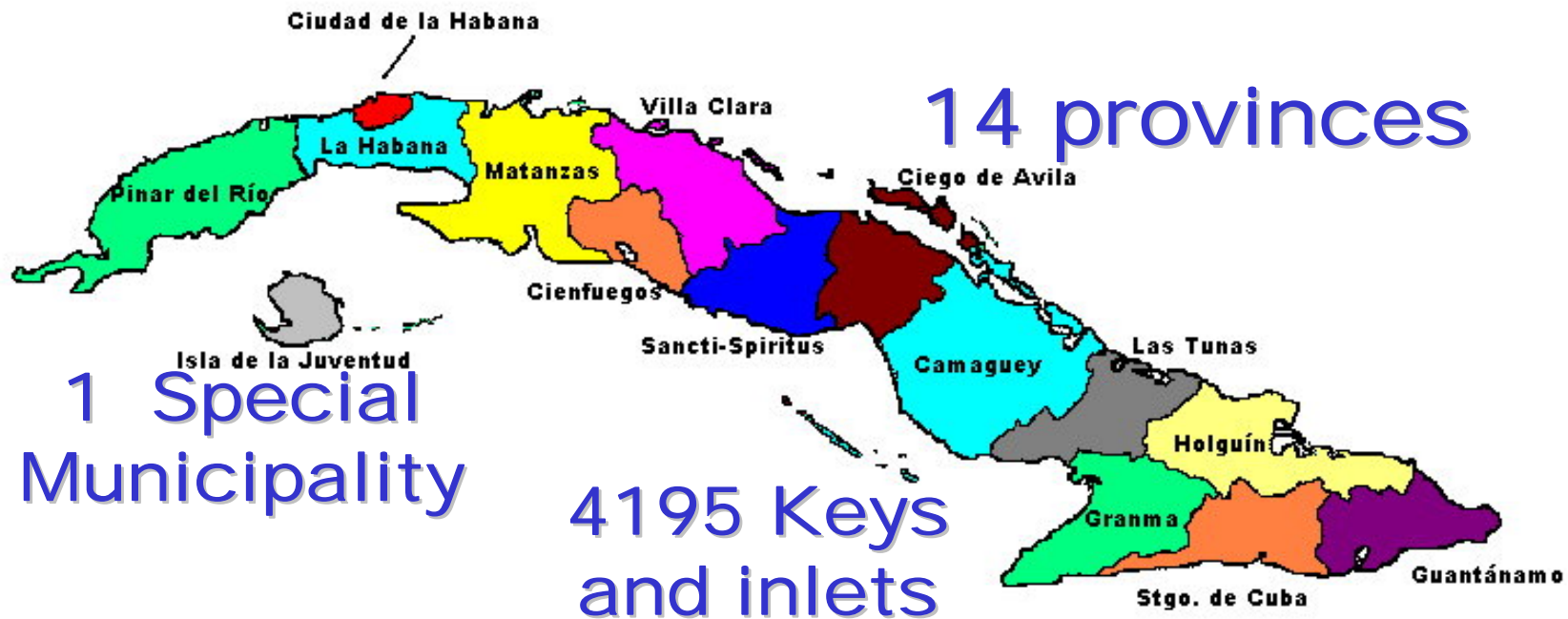
WMO GTS VSAT Station at the Cuban National Meteorological Center in Havana



Cuba receives and transmit Meteorological Information to the GTS in several WMO formats



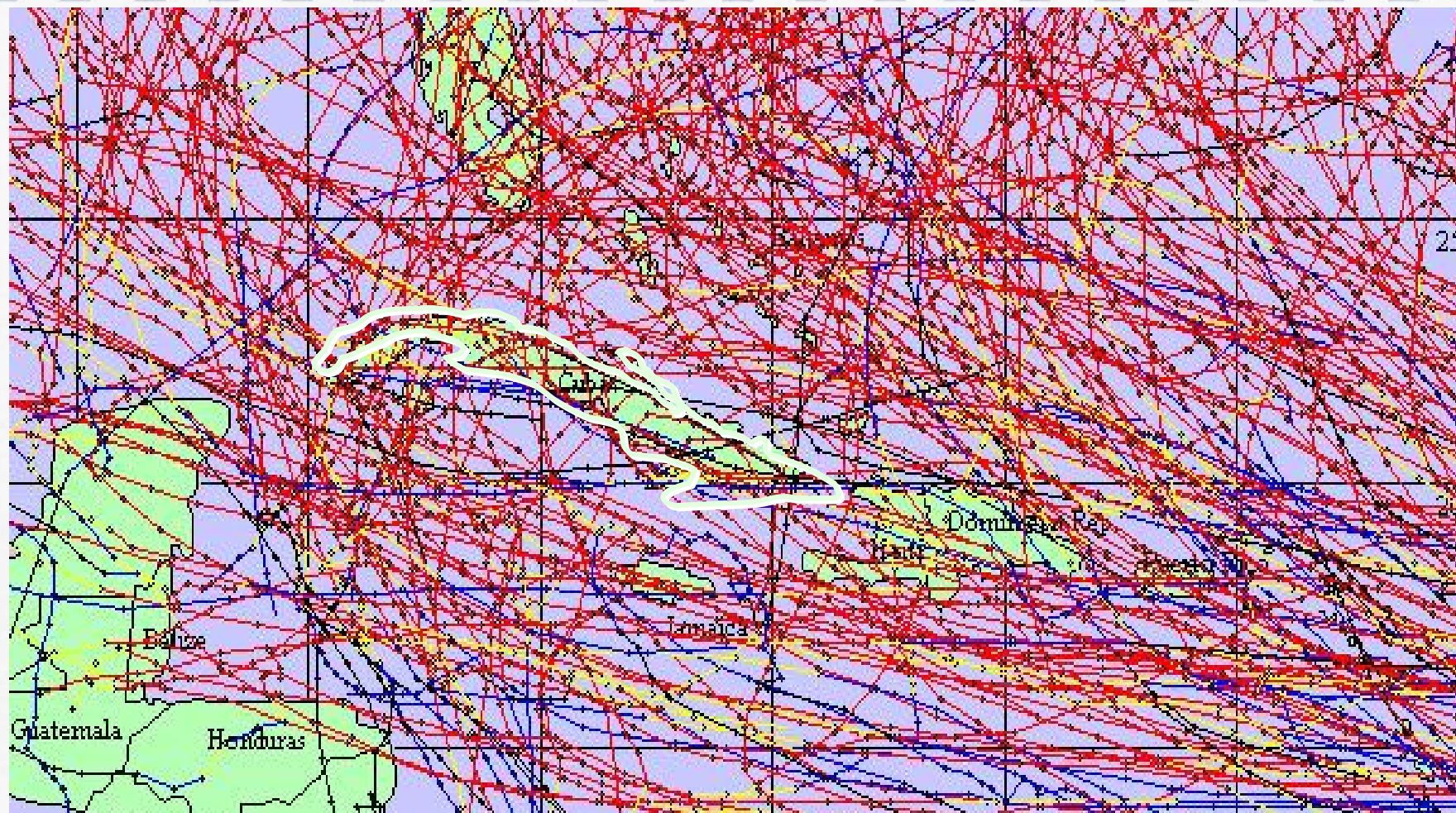
Overview on Cuba



Area : 110 922 km²

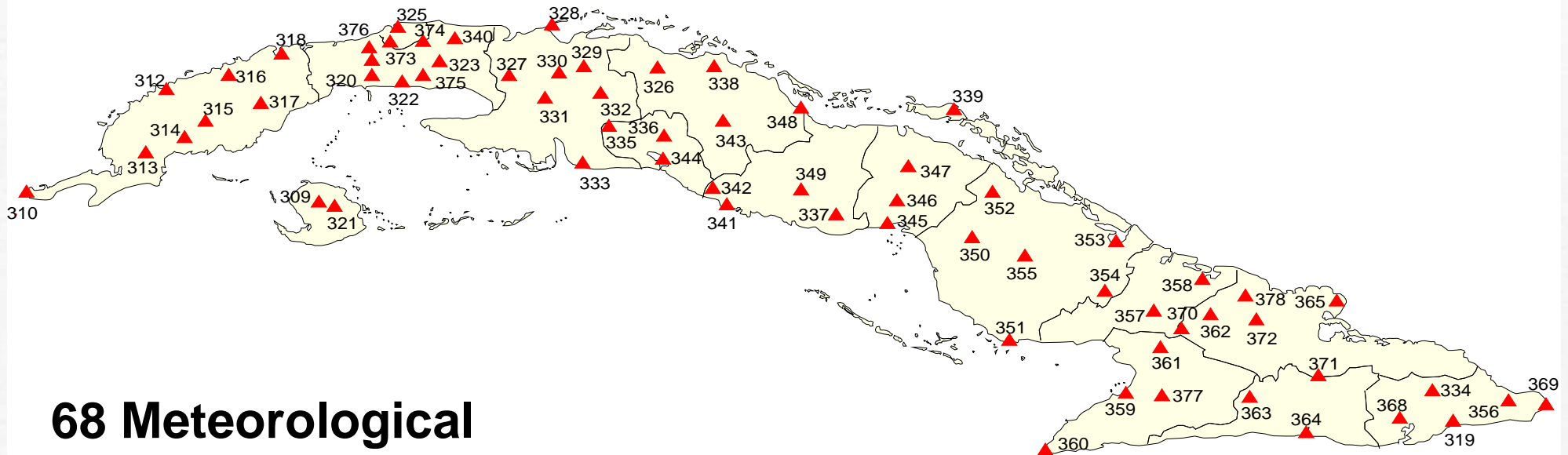
Coastline: 5 746 km

Population: 11 millon



Cuba's greatest meteorological hazard are Hurricanes

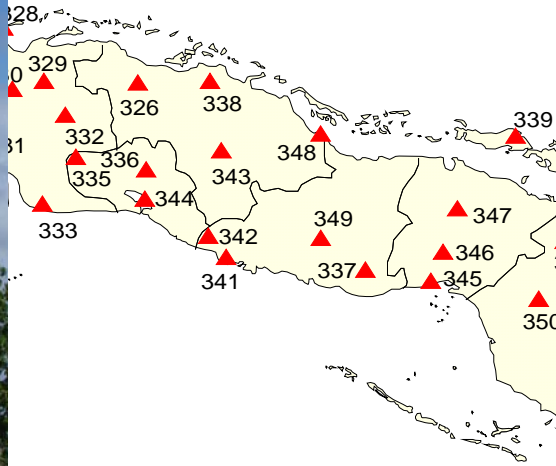
NATIONAL METEOROLOGICAL OBSERVING SYSTEM IN CUBA



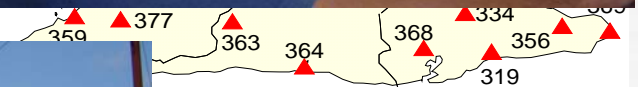
**68 Meteorological
Stations**
**1 Upper Air Sounding
Station**
**1 High Resolution
Satellite Earth Station**



NATIONAL METEOROLOGICAL OBSERVING SYSTEM IN CUBA



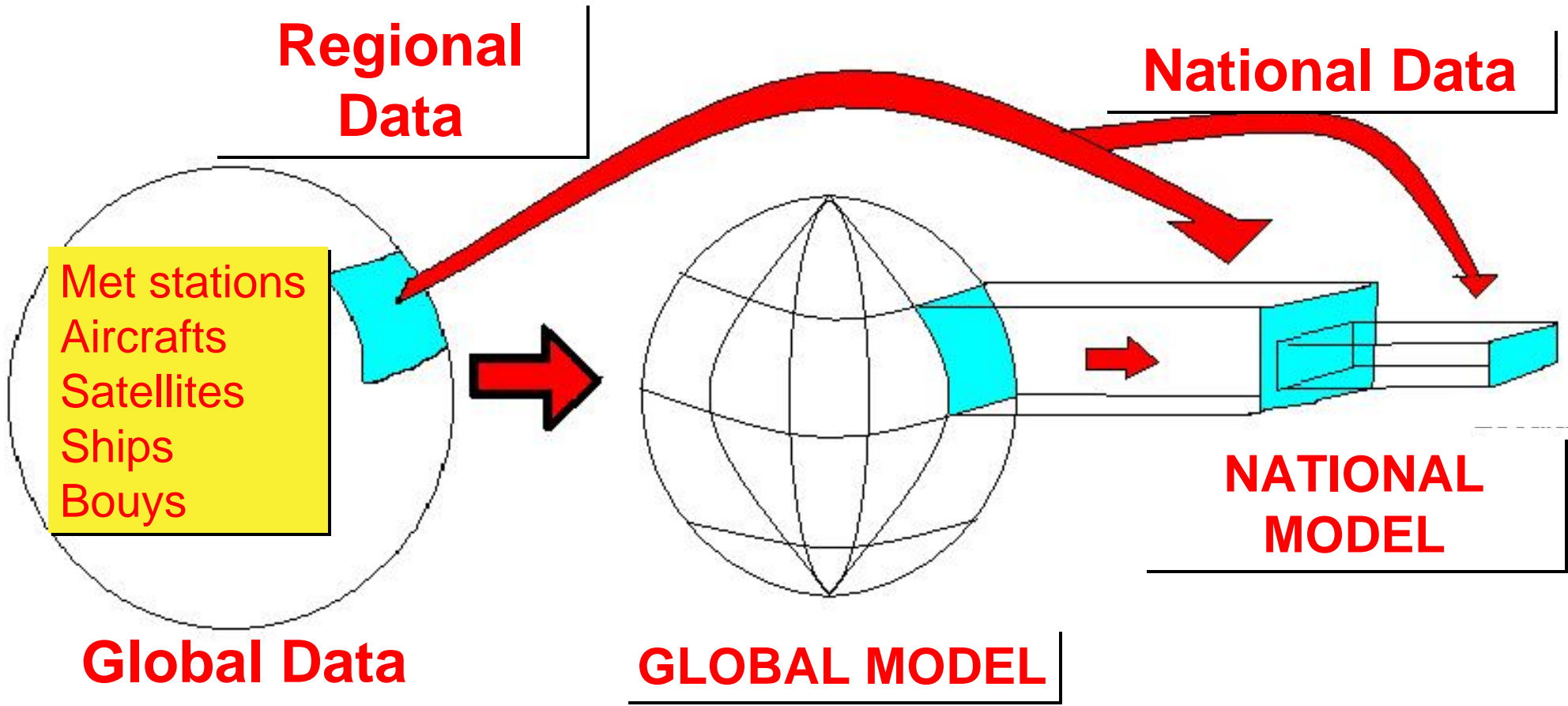
**68 Meteorological
Stations**
**1 Upper Air Sounding
Station**
**1 High Resolution
Satellite Earth Station**



DATA PROCESSING AND FORECASTING



DATA FLOW, PROCESSING AND FORECASTING



40.00

35.00

30.00

25.00

20.00

15.00

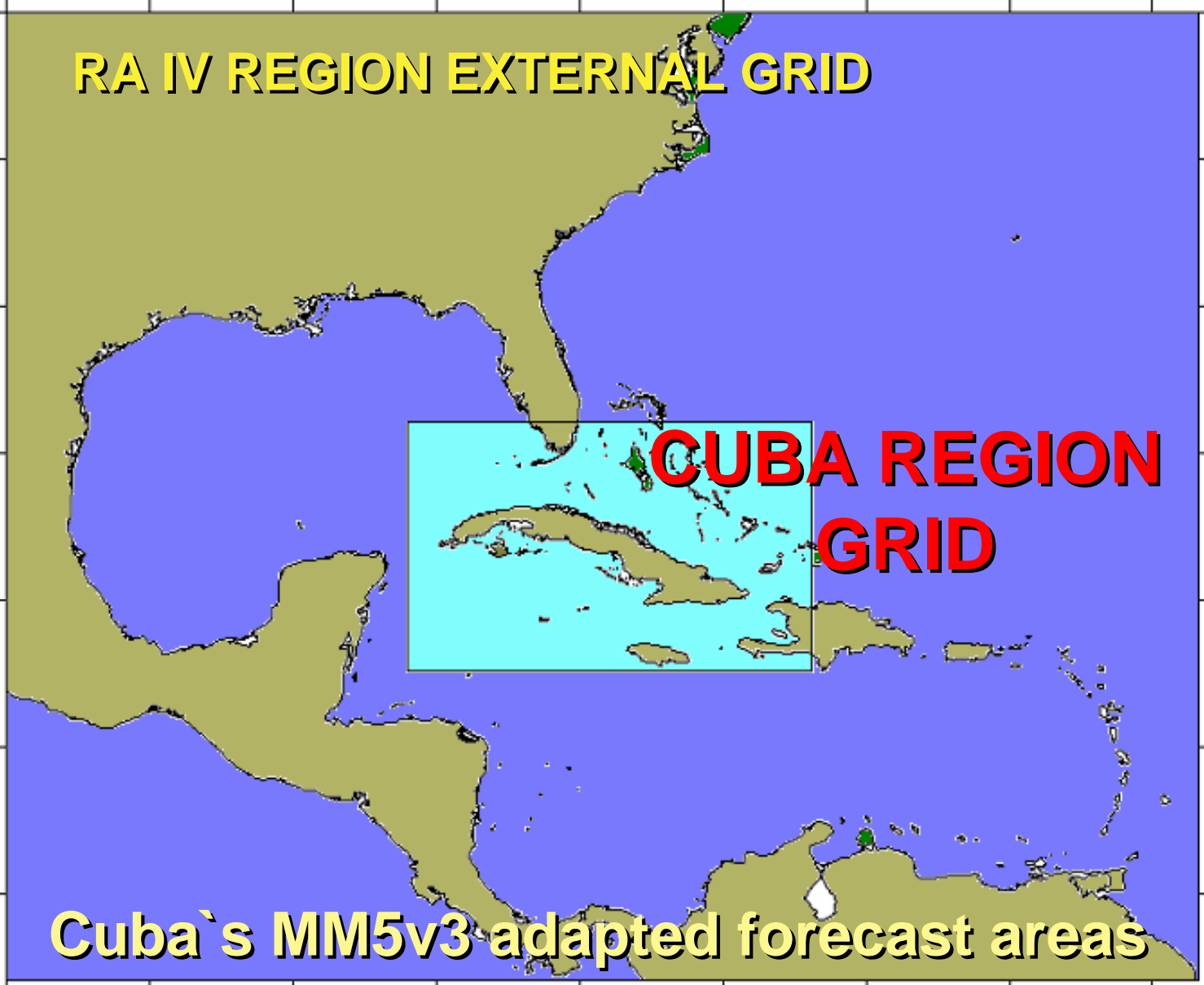
10.00

RA IV REGION EXTERNAL GRID

**CUBA REGION
GRID**

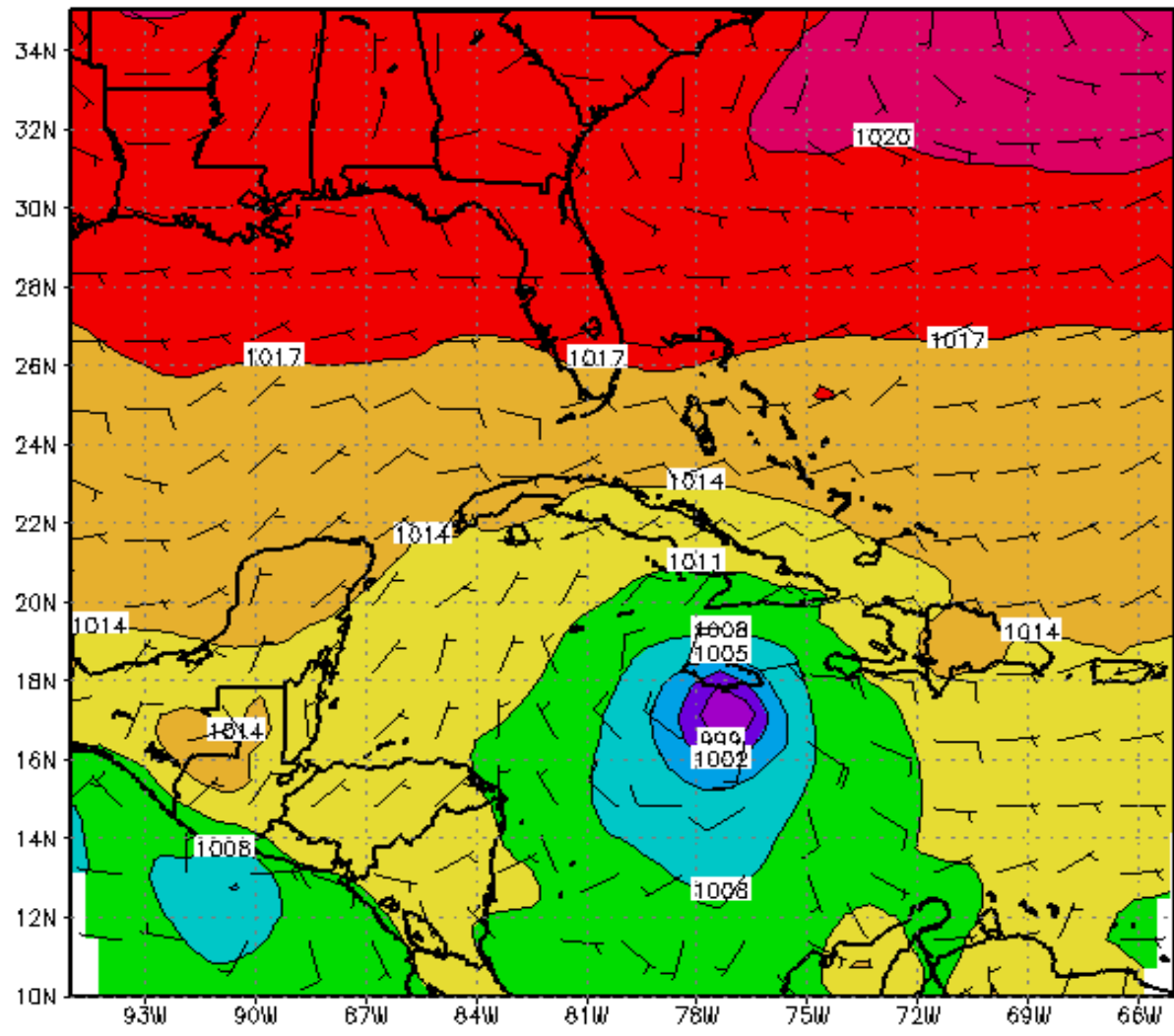
Cuba`s MM5v3 adapted forecast areas

-100.00 -95.00 -90.00 -85.00 -80.00 -75.00 -70.00 -65.00 -60.00



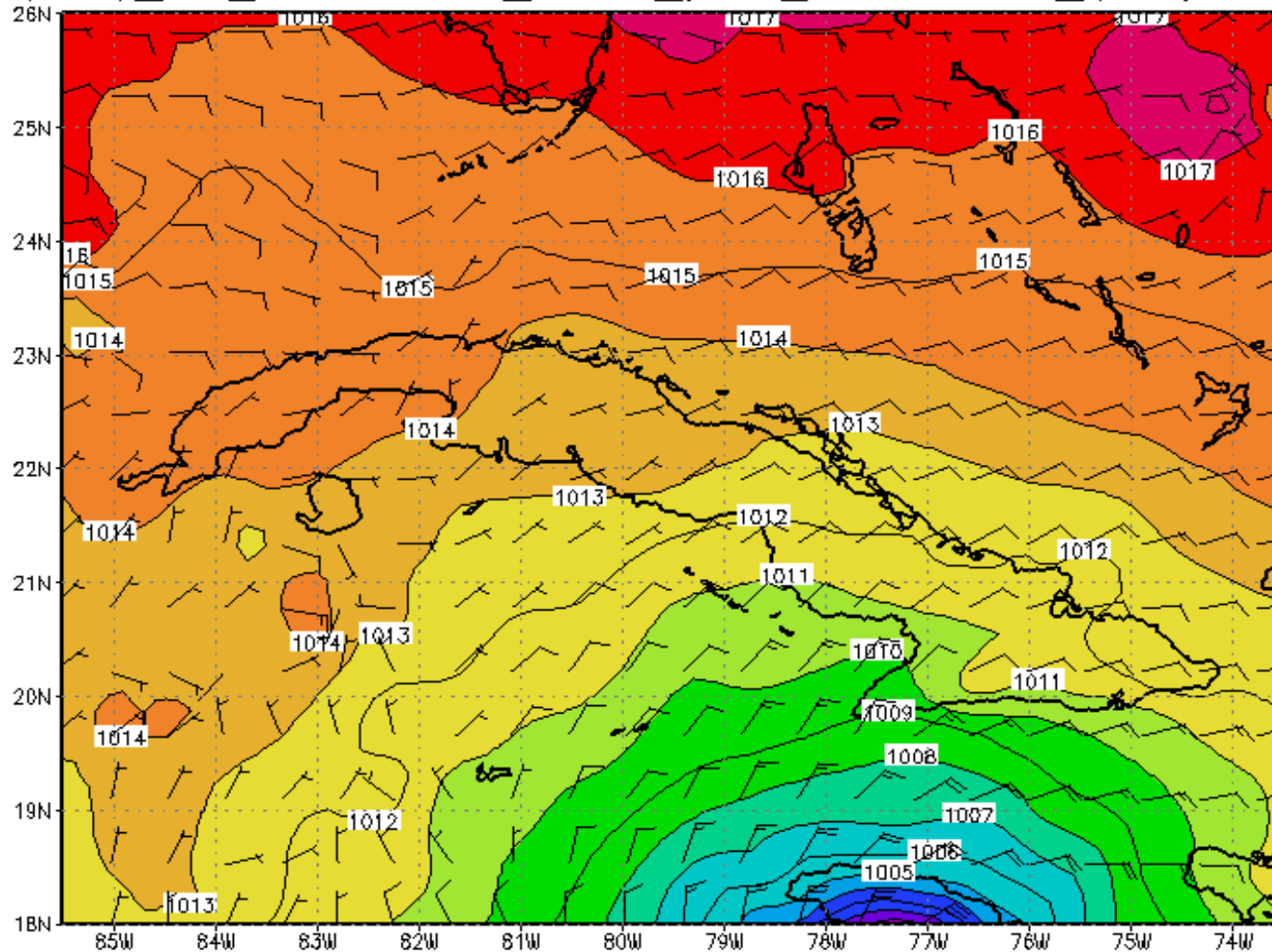
MM5v3 External Grid 72 hr Forecast – Hurricane “Charley”

Ps(hPa)_08080400z_valido_para_11080400z_(CFA/INSMET)

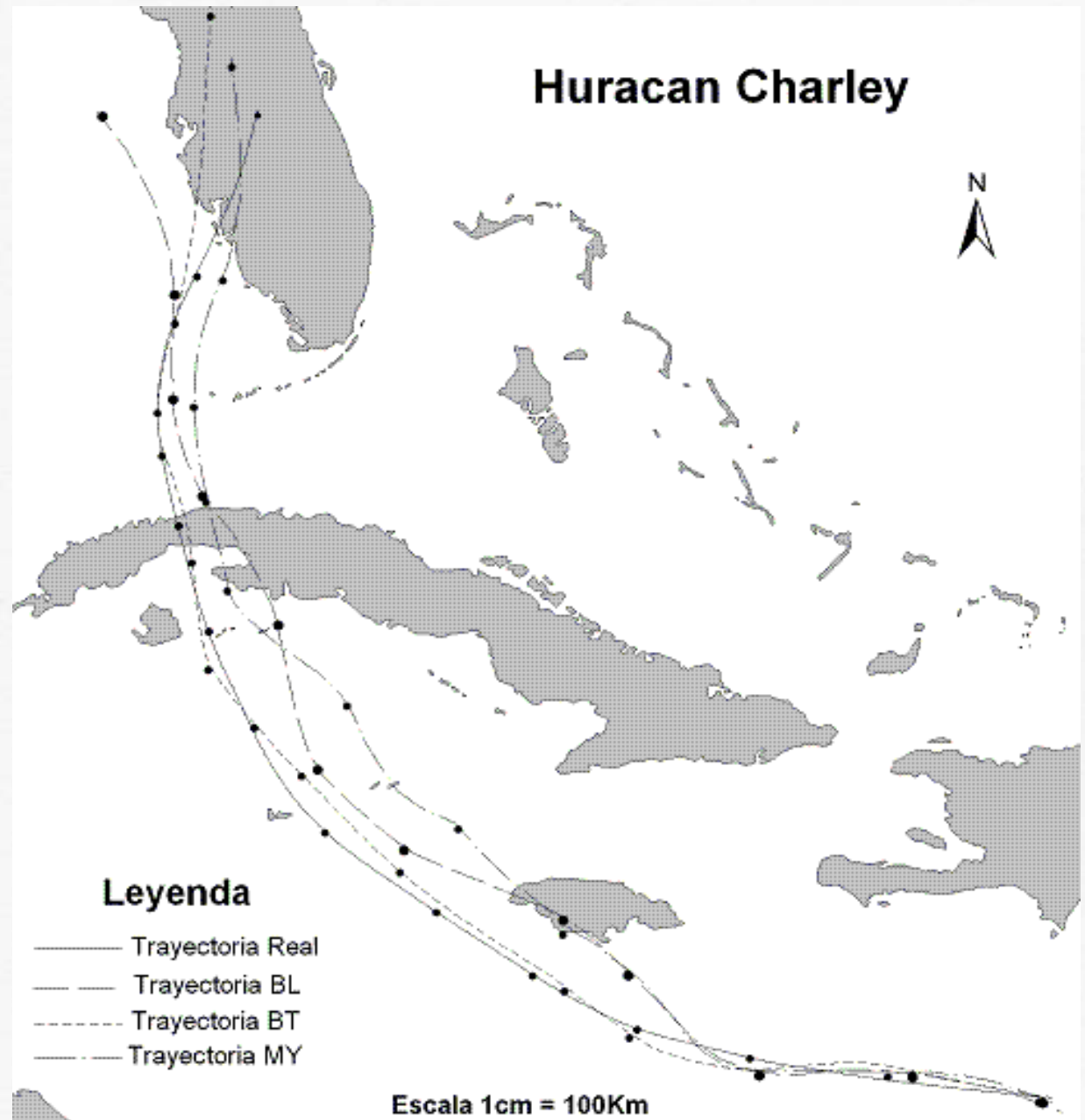


MM5v3 Inner Grid 72 hr Forecast – Hurricane “Charley”

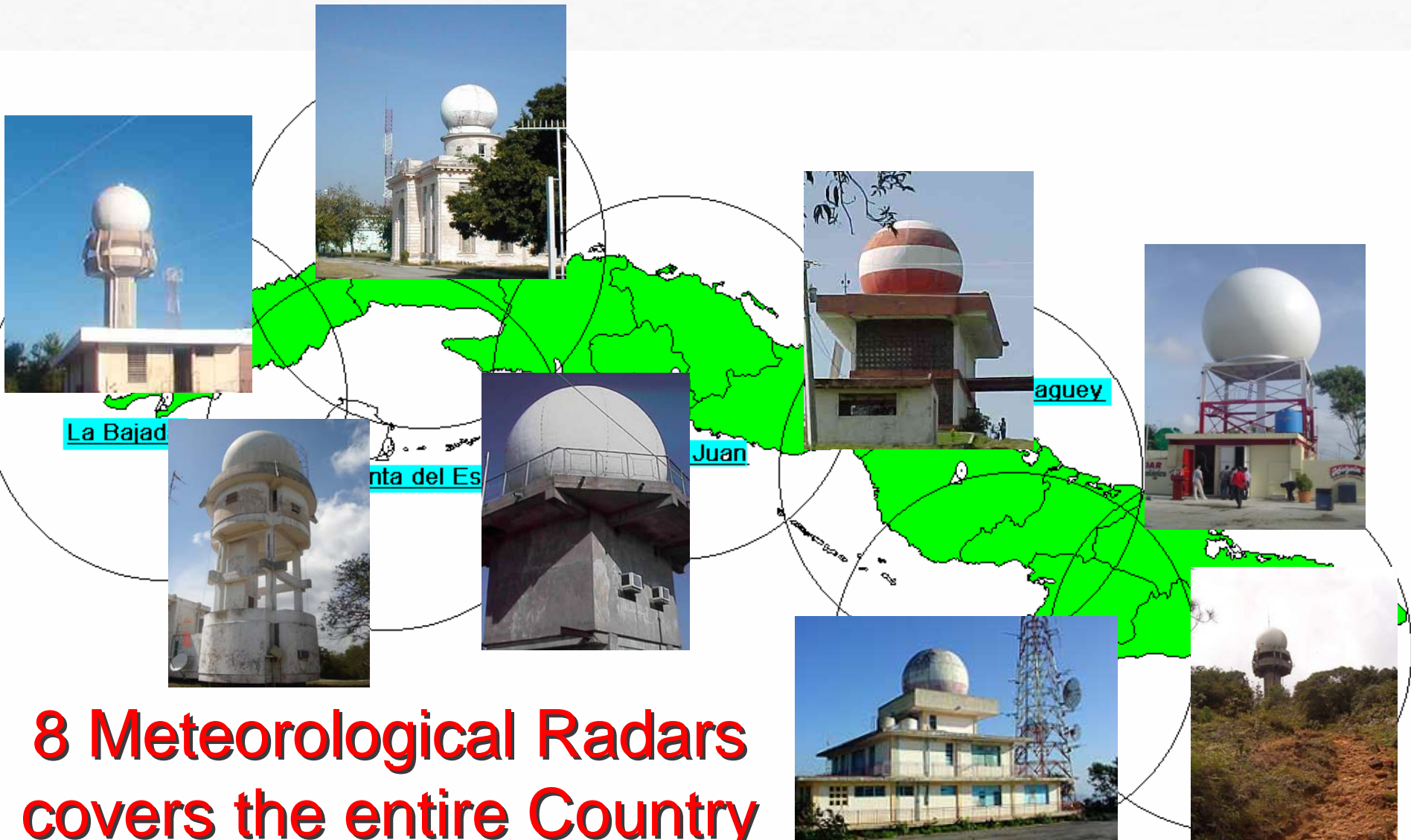
Ps(hPa)_sfc_08080400z_valido_para_11090400z_(CFA/INSMET)



Different Runs of Track Forecast in Hurricane “Charley”



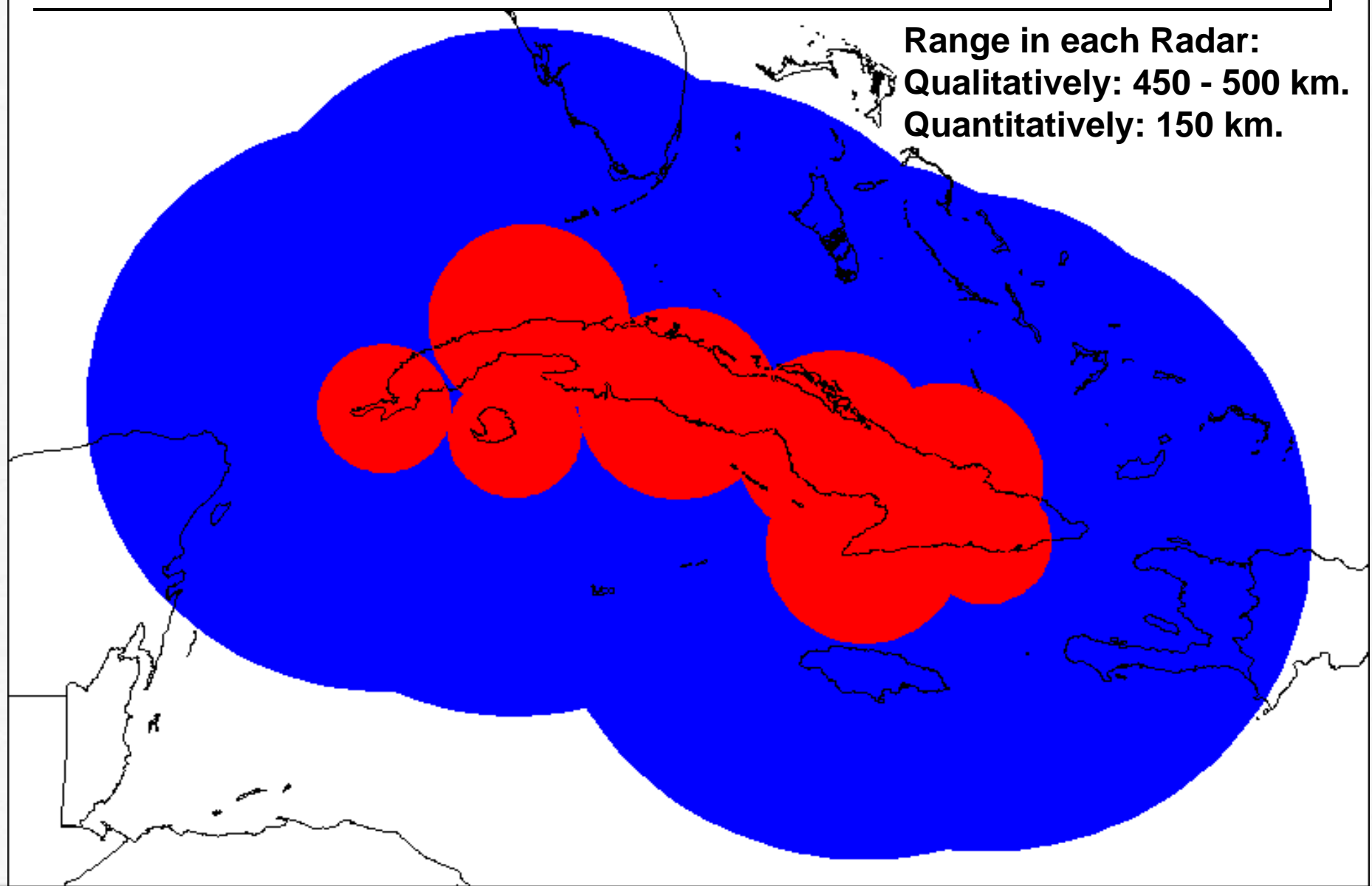
RADAR NETWORK COVERAGE IN CUBA



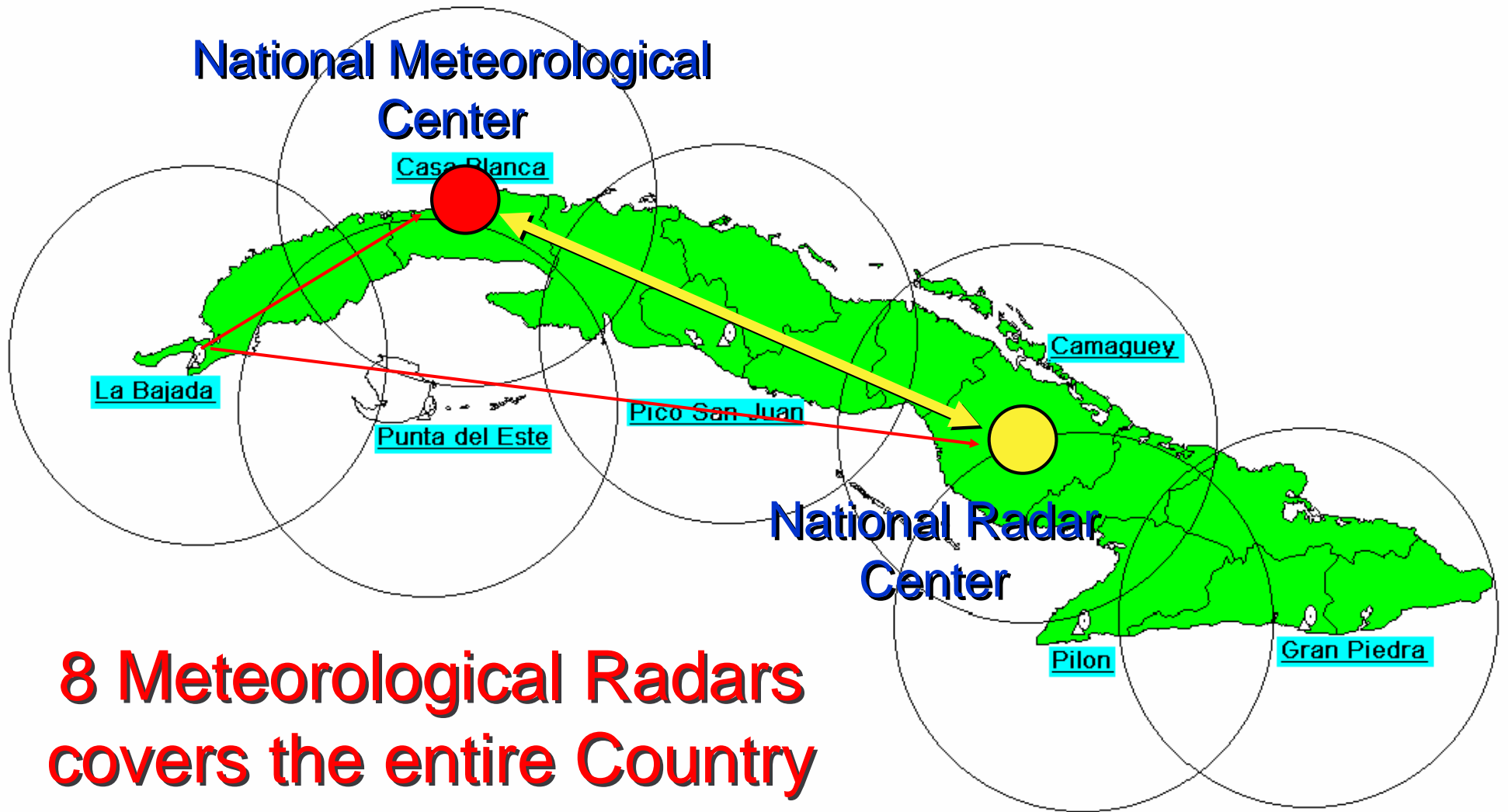
**8 Meteorological Radars
covers the entire Country**

RADAR NETWORK COVERAGE IN CUBA

**Range in each Radar:
Qualitatively: 450 - 500 km.
Quantitatively: 150 km.**



RADAR DATA NETWORK IN CUBA



National Meteorological Center

STRONG

PARTNERSHIP

**The
Media**

TO FACE THE HURRICANE
HAZARD, A STRONG
PARTNERSHIP HAVE BEEN
BUILT AMONG THE NMC, THE
CIVIL DEFENSE AND THE MEDIA

**Civil
Defense**

NATIONAL METEOROLOGICAL CENTER (NMC)

- Cuban NMS uses an user-oriented philosophy, as emphasized by WMO PWS Program.
- Cuban NMS has a reputation of accuracy, reliability and timeliness.
- Early Warnings and Warnings are issued with a clear, concise wording, with a wide use of graphics and the introduction of probabilities to address incertitude.

CIVIL DEFENSE & GOVERNMENT

They receive a clear message so that they can advice to take protective measures such as evacuation, well ahead of the impact.

MEDIA

The Media is an effective link between the NMS, and the community, having a strong influence in how a warning is received

OUTPUT OF WATCHES AND WARNINGS

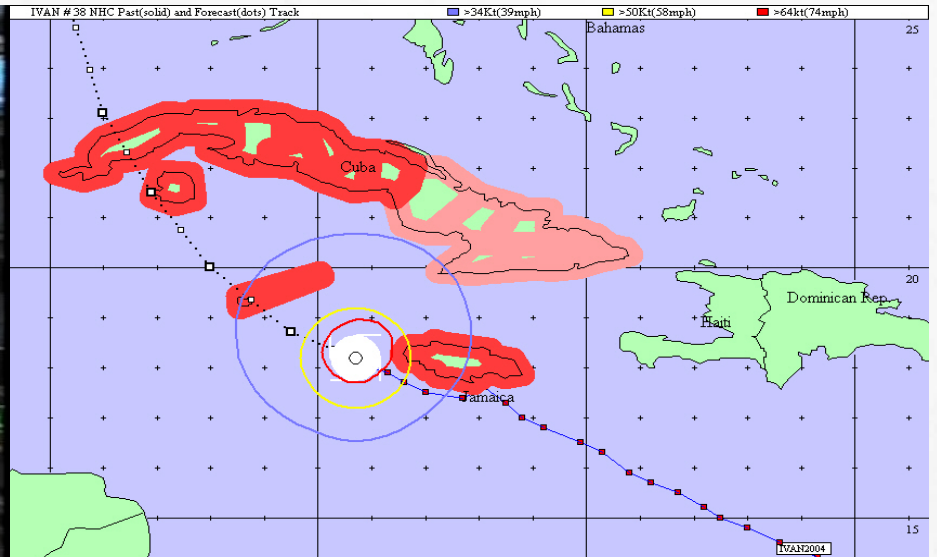
NATIONAL METEOROLOGICAL CENTER

Civil Defense &
Government

Through CD and
Government
Network to all CD
and Government
authorities in all
provinces and
municipalities

Media

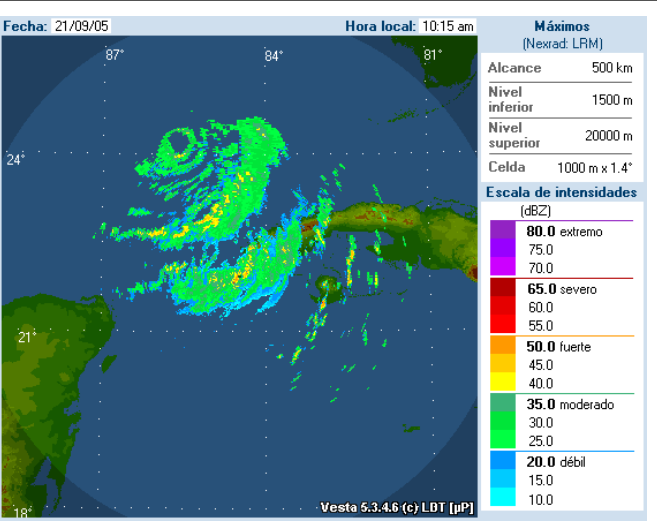
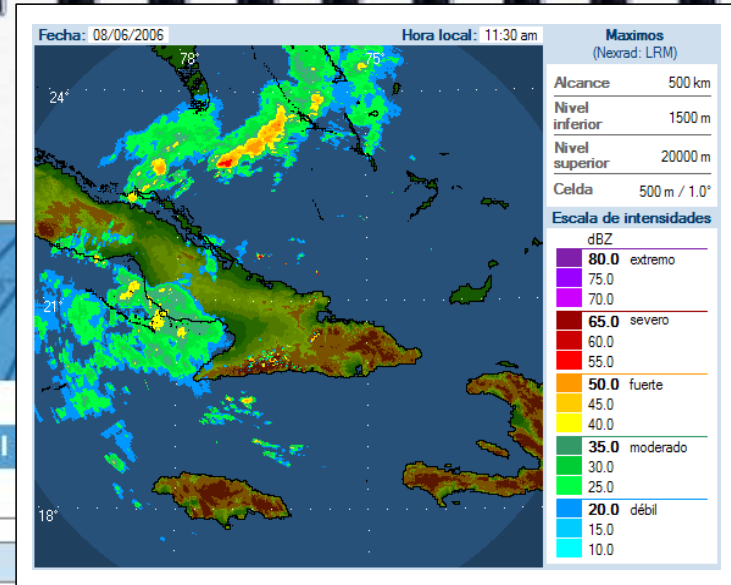
To the General Public through
Radio & TV, broadcasting
“live” from the National
Meteorological Center



INFORMATION BY METEOROLOGISTS ON TELEVISION



INSMET SITE ON THE WEB

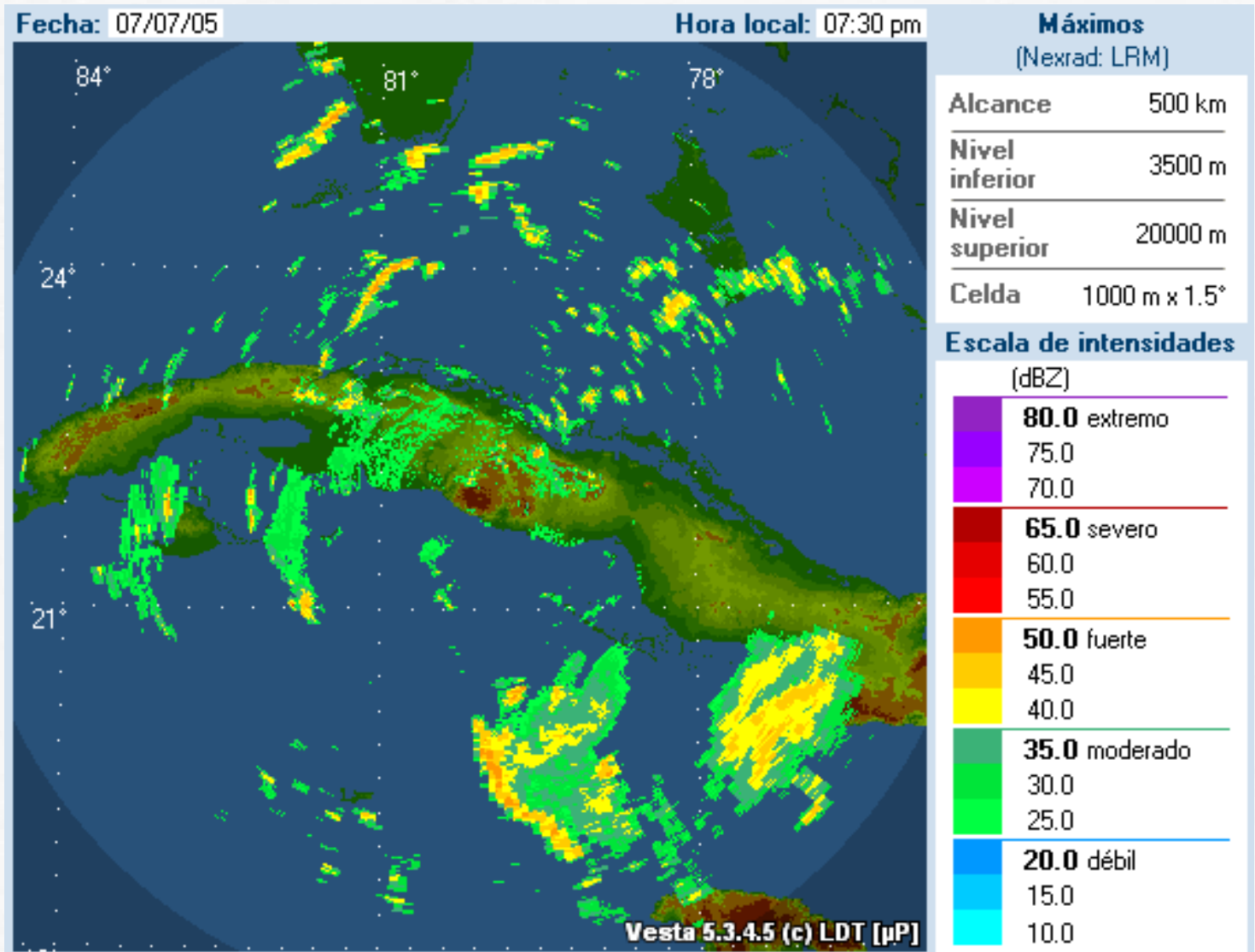


- Resumen Mensual
- Ciclones Tropicales
- Clima
- Agrometeorología
- Calidad del Aire



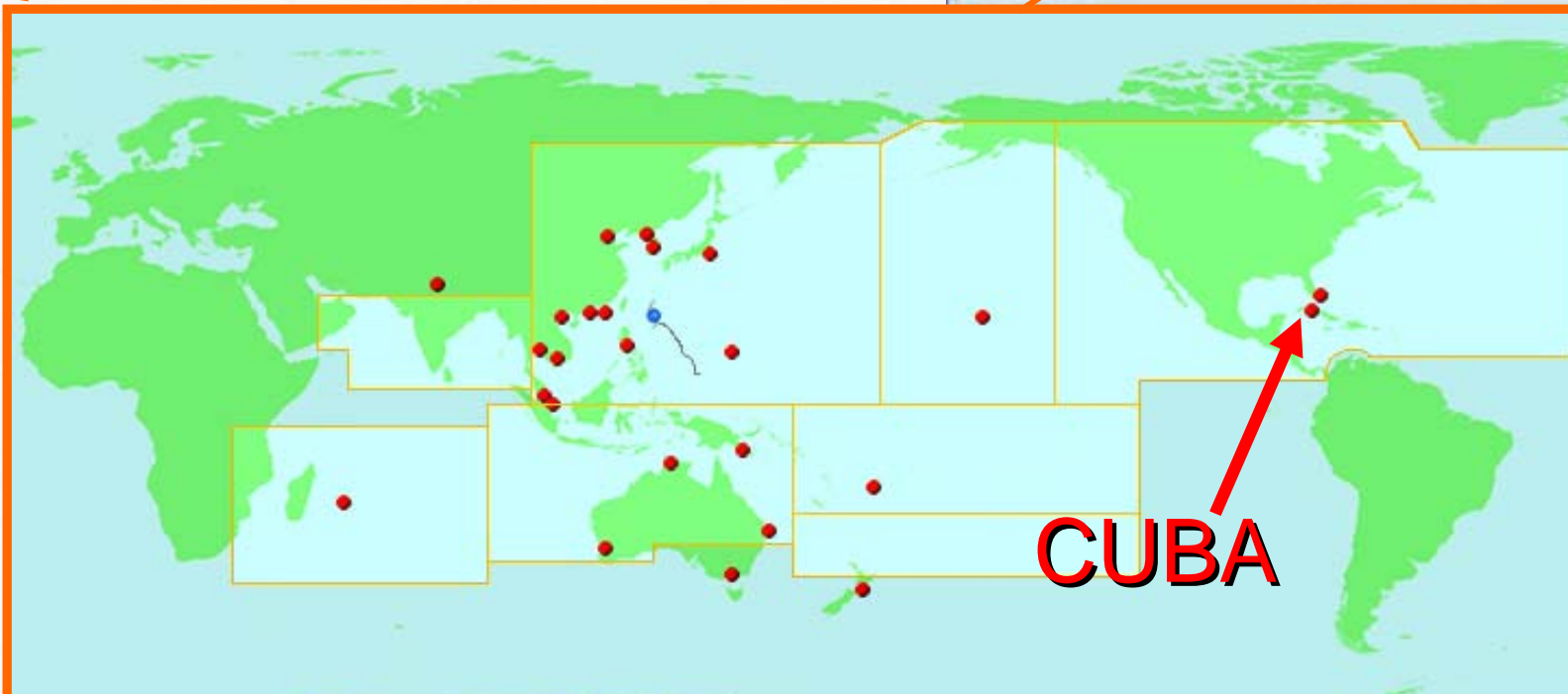
<http://www.insmet.cu>

**Mosaic
Radar
Animation
of
Hurricane
“Dennis”
shown on
TV and
through
the Web
on
July 2005**





<http://severe.worldweather.wmo.int/>

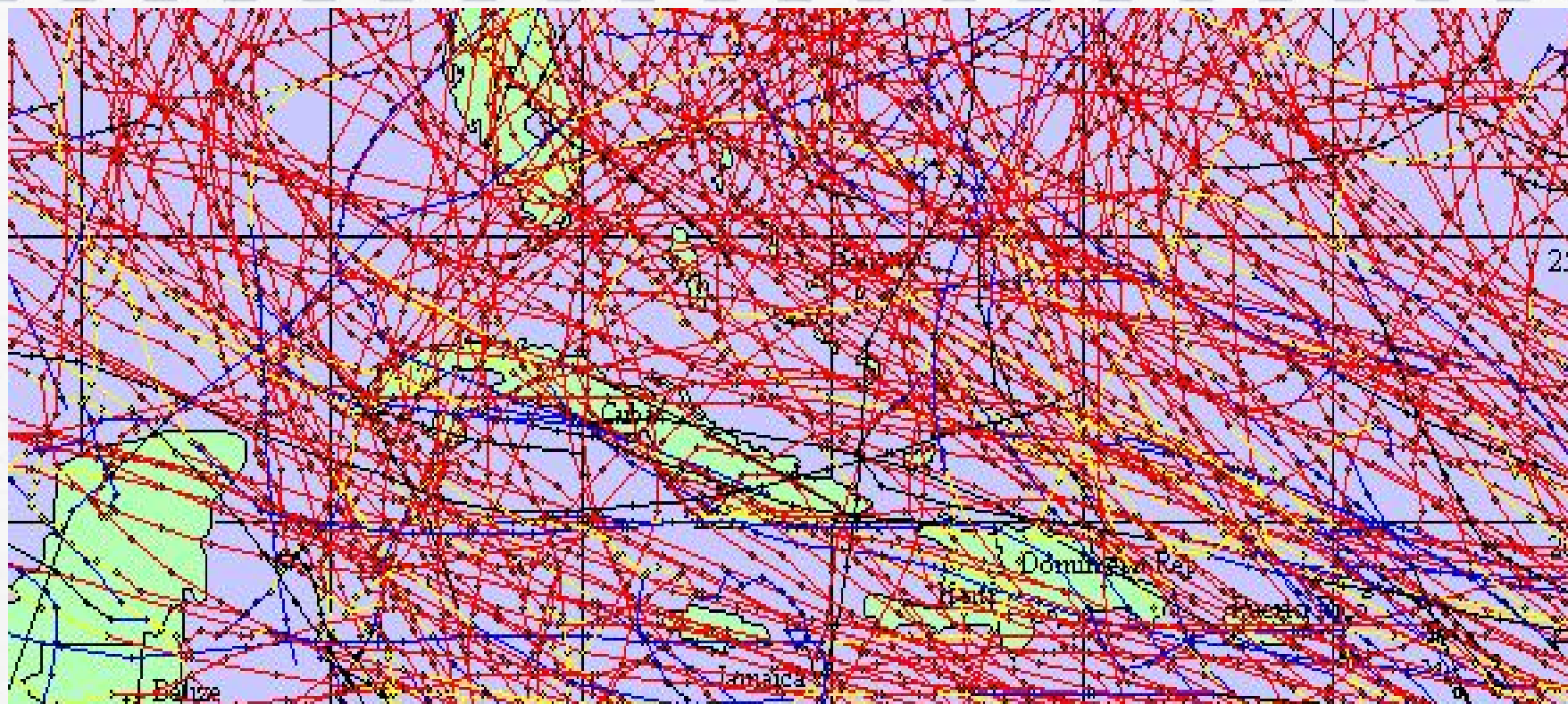


CUBA

TROPICAL CYCLONE FORECAST CENTERS

POSITIVE EXPERIENCES

Name	Year	Category	Casualties
Lili	1996	H2	0
Georges	1998	H1	6
Irene	1999	TT	2
Michelle	2001	H4	5
Isidore	2002	H1	0
Lili	2002	H2	1
Charley	2004	H3	4
Ivan	2004	H5	0
Dennis	2005	H4	16
AVERAGE	10 years	9 Trp. Cycl.	3.77



Cuban experience shows that, in spite of the hurricane hazard, a fast flow of crucial information, a good forecast system and the full coordination with the Civil Defense and the Media, plus the fast distribution of relevant information to all interests, as well as Political Will, have led to great saving of Human lives in the last 10 years

Thank you !

¡ Gracias !

谢谢 !



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