INSTRUCTIVO DE PREDICCIÓN NUMÉRICA

COMPARACIÓN DE SISTEMAS DE MODELACIÓN

6

INSTRUCTIVO DE PREDICCIÓN NUMÉRICA
COMPARACIÓN DE SISTEMAS DE MODELACIÓN

FOR**SAT**

Fortalecimiento del Sistema
de Alerta Temprana
Hidrometeorológico

INRH

INSMET

unicef

ONU HABITAT
POR UN MEJOR FUTURO URBANO

DEFENSA CIVIL CUBA

AMA

M E

Cruz Roja

ICRT

F R C

INSTRUCTIVE LEAFLET OF NUMERIC FORECAST

COMPARISON OF MODELING SYSTEMS

Authors
Group of authors from the Center of Atmospheric Physics.
Institute of Meteorology

UNDP Coordinating Team
Eng. Liliana Pino Carballido
Arch. Rosendo Mesías González
B. Elvilayne Vidal Medina
Eng. Dayana Kindelán Peñalver

Edition
B. Alaine Beltrán Blanco

Design
Yamil A. Díaz Pérez

WEATHER NUMERICAL FORECAST SYSTEM FOR PREDICTION OF EXTREME METEOROLOGICAL EVENTS AT VERY SHORT TERM, USING THE COUPLING OF WEATHER NUMERICAL PREDICTION MODELS AND DATA ASSIMILATION.

The system in its first version is based on the models:
Global Forecast System (GFS): provider of initialization data.

Weather Research & Forecast (WRF): mesoscale model for weather numerical forecast.

Advanced Regional Prediction System (ARPS): mesoscale and small model scale for the numerical weather forecast.

The system updates 4 times a day, at 0000, 0600, 1200 and 1800 UTC times.

The modeling domains are shown below:

Simulation Domains

The functioning of the entire forecasting system is given by the following steps:

1- Download the GFS data in the synoptic schedules: 0000, 0600, 1200 and 1800 UTC (via Internet).

2- Download data from surface stations, surveys, buoy data, data of ships and airplanes (via Internet).

3- Acquisition of data from national stations on the surface and data from the LRIT satellite station.

4- Construction of the initial mesh, that is, initialization of the WRF model. The initialization is done from the data acquired in steps 1-3, through the process known as data assimilation.

5- Run of the WRF models for the domains with resolution 27, 9 and 3 km that cover the geographical area shown in Figure 1.

6- Post-processing of the WRF model outputs. At this point the maps needed for forecasters are created.

7- Transmission of data via FTP, Web, Platform.

8- Construction of the initial mesh, in this case for the ARPS model. At this point the initial data is the output of 3km resolution of the WRF and the data acquired in steps 2-3, through the process known as data assimilation.

9- Run of the ARPS model for the 1km resolution domains.

10- Post-processing of the outputs of the ARPS model.

11- Transmission of data via FTP, Web, Platform.

12- Generation of the reports from the detection, evaluation and automatic report Tool (MDRE). This tool allows automatic detection of hurricanes, cold fronts and areas of intense rainfall. It facilitates the interpretation of the models outputs.

13- Evaluation of the previous forecast using the data from the weather stations and satellite images from the LRIT station.

An outline of the entire procedure is shown in the following figure.
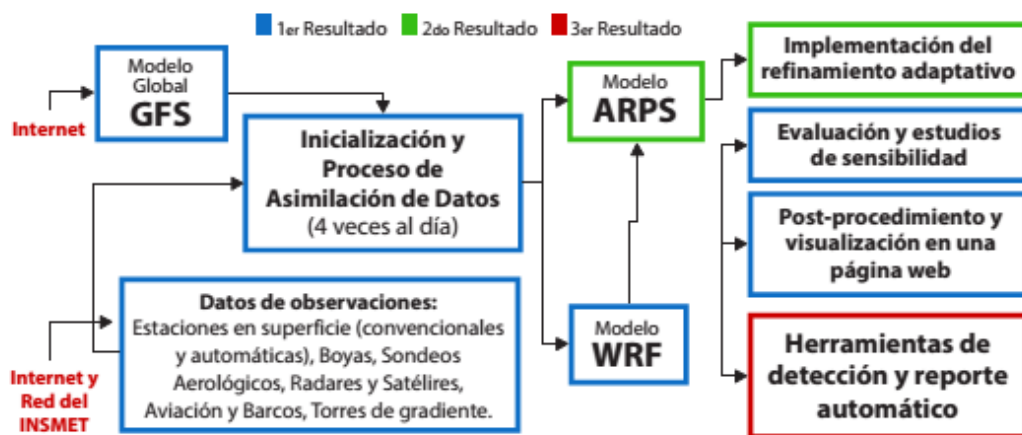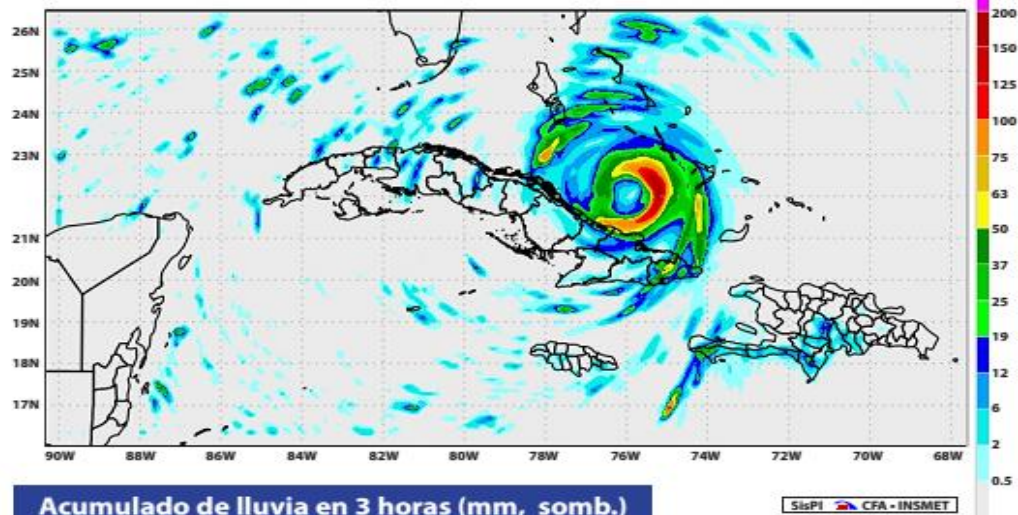

Scheme of system operation

The following system products are shown as examples:

    a. Maps of the different meteorological variables (example for the case of Hurricane Matthew).
    b. Meteograms
    c. Surveys
    d. Hurricane trajectory
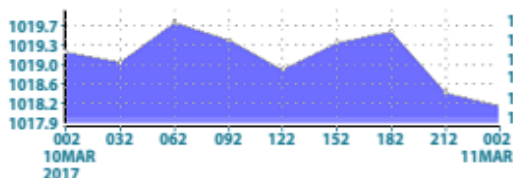   e. Detection of cold fronts

Rain accumulated in 3 hours
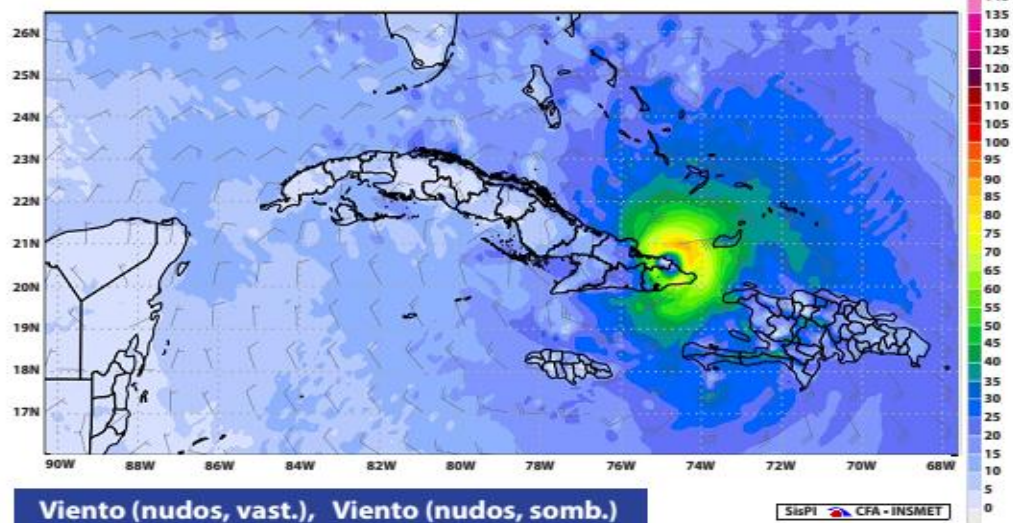
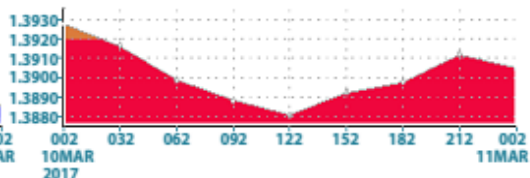Winds (knots, vast.) Wind (knots, somb.)

METEOGRAMA
Coordenadas: 23.07 / - 82.32

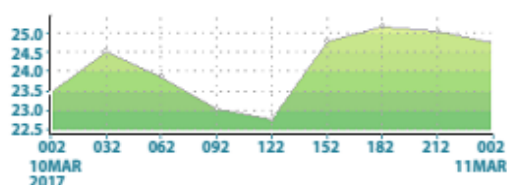Pronóstico válido por 24 horas a partir de las 00 UTC del día 10 / Mar / 2017
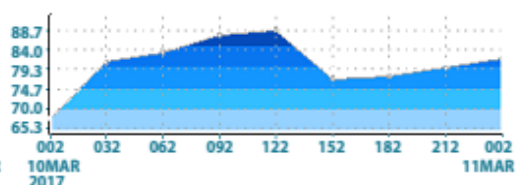
Presión Atmosférica al Nivel del Mar (hPo)

1019.7	
1019.3	
1019.0	
1018.6	
1018.2	
1017.9	

002 032 062 092 122 152 182 212 002
10MAR 2017 — 11MAR

Espesor de la capa entre 1000 mb y 850 mb (km)

1.3930	
1.3920	
1.3910	
1.3900	
1.3890	
1.3880	

002 032 062 092 122 152 182 212 002
10MAR 2017 — 11MAR

Temp. Ambiente y Temp. Pto. Rociб (C)

25.0	
24.5	
24.0	
23.5	
23.0	
22.5	

002 032 062 092 122 152 182 212 002
10MAR 2017 — 11MAR

Humedad Relativa a 2m (%)

88.7	
84.0	
79.3	
74.7	
70.0	
65.3	

002 032 062 092 122 152 182 212 002
10MAR 2017 — 11MAR

Lluvia Total (azul) y Lluvia Con. (naranja) (mm/h)

0.03	
0.03	
0.02	
0.02	
0.01	
0.01	
0.00	

002 032 062 092 122 152 182 212 002
10MAR 2017 — 11MAR
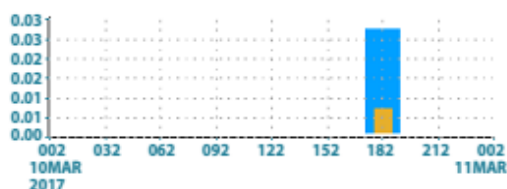
Altura del LCL y Nubosidad (% ciclo cubierto)

8.2 7.8 14.2 19.4 17.4 28.1 14.4 9.8 31.0

936.0	
884.0	
832.0	
760.0	
728.0	

002 032 062 092 122 152 182 212 002
10MAR 2017 — 11MAR
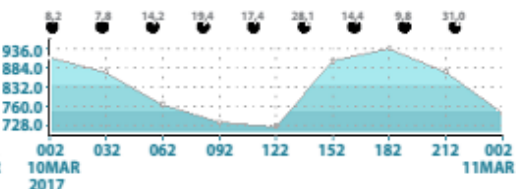
Dirección y Velocidad del Viento a 10 m (nudos)
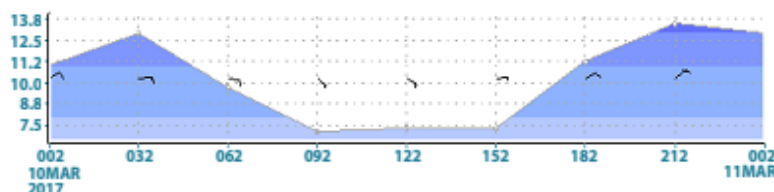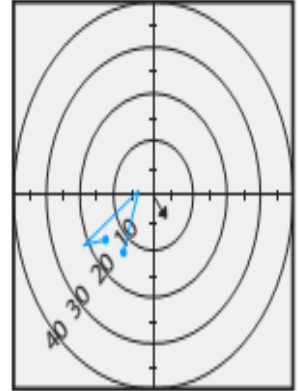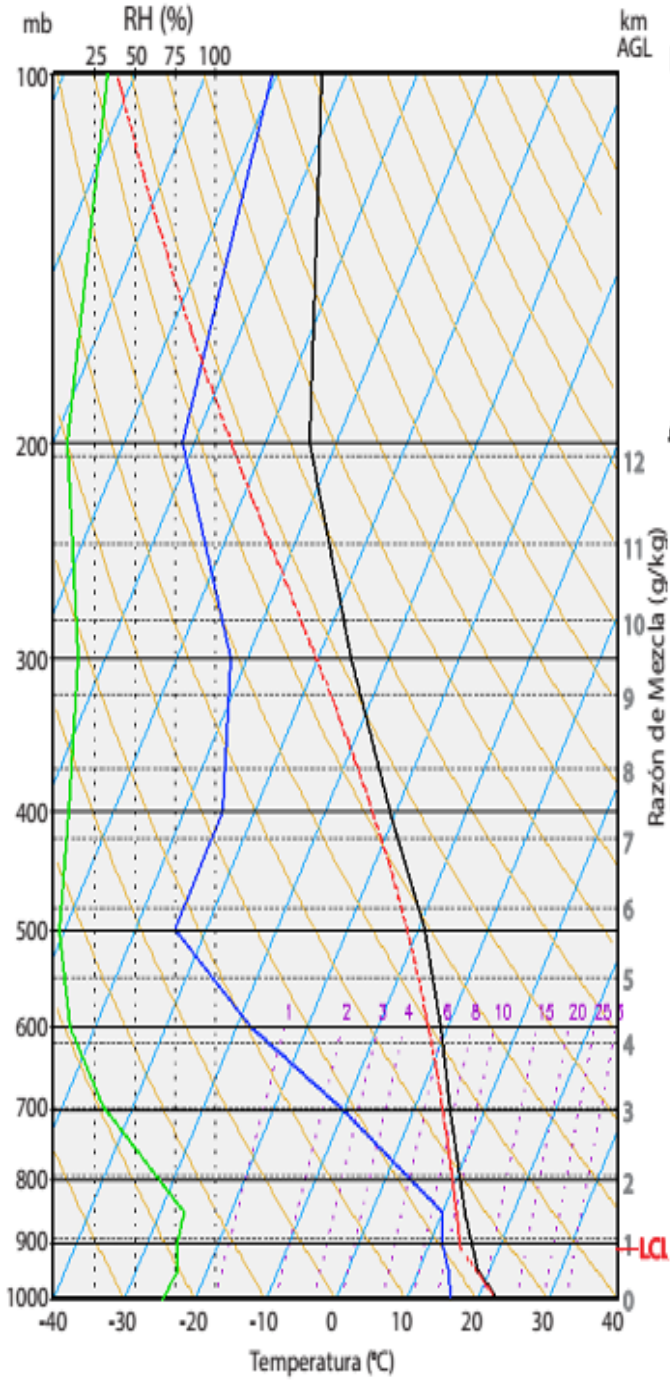
13.8	
12.5	
11.2	
10.0	
8.8	
7.5	

002 032 062 092 122 152 182 212 002
10MAR 2017 — 11MAR

RAP - WRF   SIBTT   CFA - INSMET

Meteogram

Skew-T log-P diagram

RH (%) scale: 25, 50, 75, 100

mb (pressure, left axis): 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000

km AGL (right axis): 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0

LCL

Razón de Mezcla (g/kg): 1, 2, 3, 4, 6, 8, 10, 15, 20, 25

Temperatura (°C): -40, -30, -20, -10, 0, 10, 20, 30, 40

		Surface	
K	16	Temp (°C)	22.6
TT	41	Dewp (°C)	16.2
PW (cm)	2.21	θ_k (K)	332
Hodograph		LI	3
EH	4	CAPE (J)	0
SREH	15	CIN (J)	0
StmDir	334°	Most Unstable	
StmSpd (kt)	5	Press (mb)	1000
GD		θ_k (K)	332
STP		LI	3
SPC		CAPE (J)	0
SWEAT		CIN (J)	0

Sondeo

10-Mar-2017 000 UTC / 7:00 pm

Lon: -82.375   Lat: 23.162

RAP · WRF   SiBTT   CFA · INSMET

Trayectoria de huracanes (Ejemplo para el huracán Wilma)
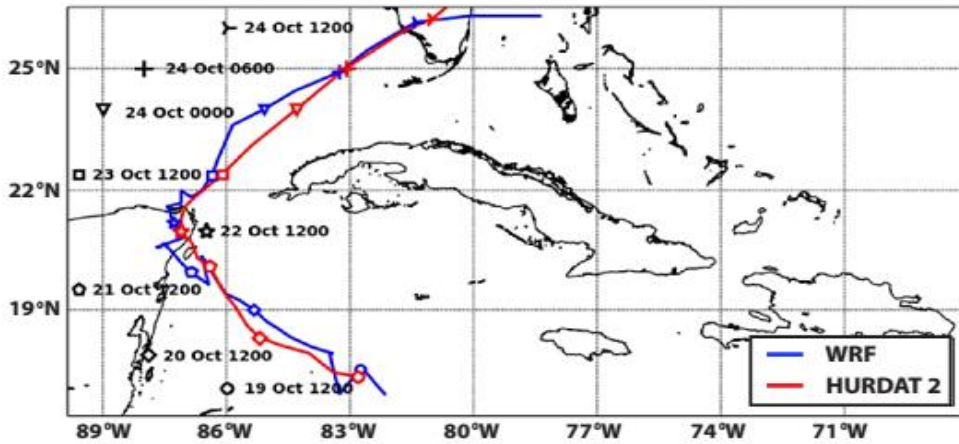
Hurricane trajectory (Example for Wilma hurricane)

Detección de Frentes Fríos

Cold front detection