

JOINT WMO TECHNICAL PROGRESS REPORT ON THE GLOBAL DATA PROCESSING AND FORECASTING SYSTEM AND NUMERICAL WEATHER PREDICTION RESEARCH ACTIVITIES FOR 2007

ISRAEL

1. Summary of highlights

- IRIS system for weather radar applications, developed by SIGMET, Inc., was installed using PCs running RedHat Linux operating system. It was tested in 2007 and will become fully operational during 2008.
- A new version of the High Resolution model for short range forecasting was implemented at the beginning of 2007.
- A new IMS Web site (www.ims.gov.il) was launched.

2. Equipment in use

2.1. Operational equipment

The IMS computing backbone is provided by SGI Origin 350 Unix server having 2 CPUs (used for database management), SGI Origin 200 Unix server having 2 CPUs (used for communication tasks) and SGI Origin 300 Unix server having 8 CPUs (used for NWP – operational and research activities)

All servers are operated by IRIX operating system, version 6.5.
4 SGI Indy and O2 workstations are used for software development.
A TP9100 storage array provides disc storage of 1 TB.

Peripheral equipment includes 2 IBM Infoprint 1357 laser A3 color printers used mainly for charts printing and 1 DataProducts CI-500e line dot matrix printer for long reports printing.

2.2. Software in use at IMS

The main databases, a real-time database and an archive database are managed by INFORMIX DBMS, version 7.31.

The operational software is written mostly in Fortran 77 and Fortran 90, Java, Javascripts, Perl and Unix shell language.
The Intranet site provides a working environment for the local and remote users.

2.3. Communication

No major changes.

3. Data and Products from GTS and other sources in use

3.1. Data

SYNOP, SYNOP SHIP, BUOY, AMDAR, TEMP, TEMP SHIP, PILOT, SATEM, OPMET data mostly from the northern hemisphere are transmitted to IMS by RTH Offenbach.
Some bulletins in BUFR code are received and decoded.

ECMWF decoding/encoding software has been integrated into IMS message switching system to process BUFR coded data.

3.2. Products

3.2.1. Products received from GTS

A number of products received in a 24-hour period:

GRIB EGRR	1018 bulletins
GRIB EDZW	1330 bulletins
GRIB ECMWF	424 bulletins
CDF in T.4 format	158 charts

3.2.2. Products received from other sources

Gridded products in GRIB code from:

- DWD global model (GME)
- UKMO global model
- NCEP MRF model
- MM5 model from Tel-Aviv University
- NOGAPS model

4. Forecasting system

4.1. System run schedule and forecast ranges

<u>Time (UTC)</u>	<u>System running</u>
01:40	00 UTC preliminary analysis
02:50	00 UTC IMS HRM forecast (00h-78h)
03:40	00 UTC main analysis
05:30	00 UTC WAM forecast (00h-72h)
10:40	00 UTC final analysis
13:40	12 UTC preliminary analysis
14:50	12 UTC IMS HRM forecast (00h-78h)
15:40	12 UTC main analysis
17:30	12 UTC WAM forecast (00h-72h)
22:40	12 UTC final analysis

MSL pressure analysis is carried out every 3 hours with a cut-off of 0:40 and 2:40 hrs.

4.2. Medium range forecasting system (4-10 days)

IMS does not run a medium range forecast model.

4.3. Short-range forecasting system (0-72 hrs)

4.3.1. Data assimilation, objective analysis and initialization

4.3.1.1 In operation

Initial and lateral boundary data are received from DWD after data assimilation at DWD.

4.3.1.2 Research performed in this field
None

4.3.2. Model

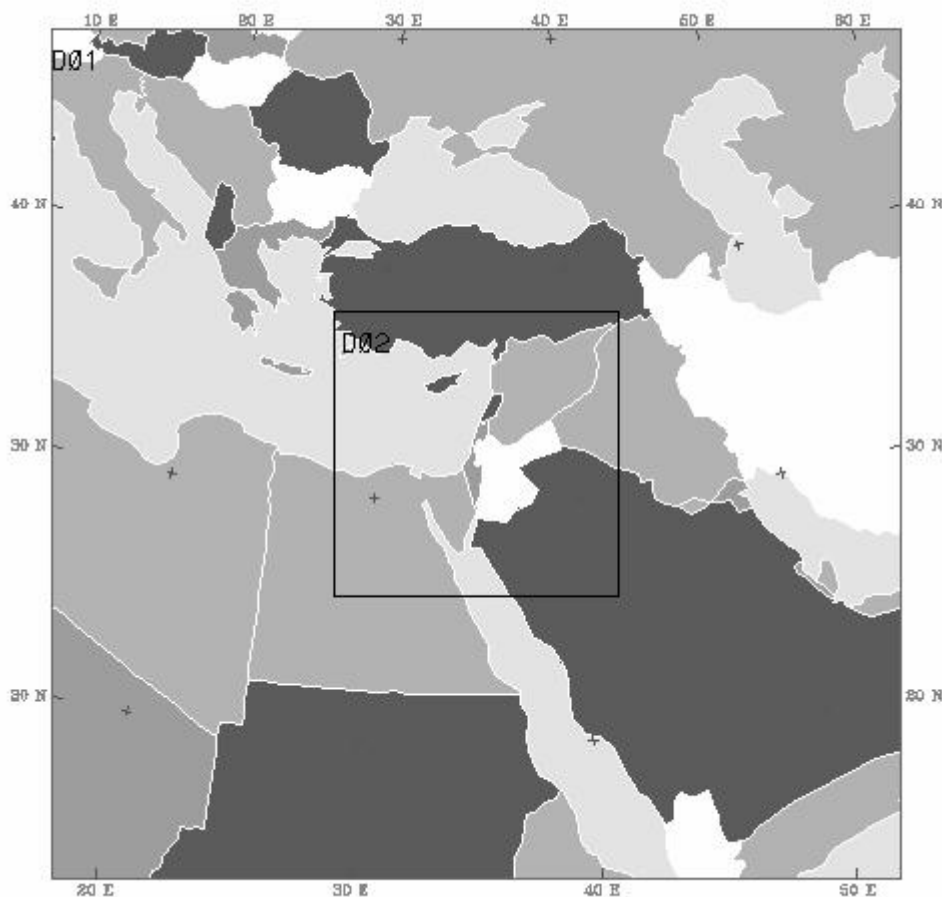
4.3.2.1 In operation

New version of the High Resolution Model with seven-layer soil model was put into operation in the beginning of 2007. Real improvement was noticed.

4.3.2.2 Research performed in this field

The non-hydrostatic Pennsylvania State University (PSU)/ NCAR mesoscale model (MM5, version 3.6) is tested using UKMO model results for the initial state and boundary conditions. Two domains are used for the model run: the coarse one, covering the area of 4000 x 4000km approximately with a spatial resolution of 36km, and the fine (nested), centered over Israel with grid distance of 12km. The model has 28 vertical layers in terrain following Sigma coordinate. It runs twice a day, at 00 and 12 UTC to +72 hours.

The domains for the model run:



4.3.3. Operationally available NWP products

No change

4.3.4. Operational techniques for application of NWP products

4.3.4.1 In operation

None

4.3.4.2 Research performed in this field
None

4.3.5. Ensemble Prediction System

None

4.4. Nowcasting and Very Short-range Forecasting Systems (0-6 hrs)

None

4.5. Specialized numerical predictions

4.5.1. Assimilation of specific data, analysis and initialization (where applicable)

4.5.1.1 In operation
None

4.5.1.2 Research performed in this field
None

4.5.2. Specific models

4.5.2.1 In operation

The Wave analysis model (WAM) is run in an operational mode twice a day at 00 and 12 UTC. Results are not entirely satisfactory and verification of model results continues, using measurements made near Haifa, Hadera and Ashdod. A statistical evaluation is carried out for both daily forecasts.

The cause for the inaccuracy of model results is being investigated.

As the physical and numerical configuration of the model seems to be well suited for IMS needs, the inaccuracy may be caused by the wind data used as input in the model, which may not be accurate enough.

In order to investigate this further, the possibility of replacing the current model wind data used as input so far, with higher resolution local model (HRM) wind data, is being considered.

5. Verification of prognostic products

HRM main verification against analyses for the region (27°E-37°E, 28°N-40°N)

<u>RMS error of mean sea level pressure (hPa)</u>												
	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
24h	1.1	1.2	1.3	1.4	1.3	1.1	1.0	1.1	1.1	1.1	1.2	1.4
48h	1.5	1.4	1.8	1.6	1.7	1.3	1.4	1.5	1.5	1.3	1.5	1.6
72h	2.0	1.8	2.2	1.7	1.9	1.4	1.5	1.7	1.7	1.3	1.7	1.9

RMS error of geopotential height at 500 hPa (m)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
24h	9	10	12	13	12	10	11	8	7	9	10	11
48h	17	11	16	17	16	13	12	9	10	10	13	14
72h	23	21	23	24	20	19	17	15	12	13	17	22

RMS error of temperature at 850 hPa (C°)

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
24h	1.3	1.1	1.2	1.4	1.5	1.3	1.4	1.3	1.3	1.2	1.0	0.9
48h	1.2	1.2	1.6	1.9	2.0	1.7	1.9	1.7	1.7	1.3	1.3	1.2
72h	1.6	1.4	2.0	2.4	2.5	2.1	2.3	2.1	1.9	1.6	1.7	1.5

6. Plans for the future (next 4 years)

6.1. Development of the GDPFS

6.1.1.

- Further improvement of the regional model in collaboration with DWD
- An ongoing improvement of the users' tools
- Connection to GTS through RMDCN
- Cooperation agreement with the ECMWF.

6.1.2.

- Checking the possibility of replacing/upgrading of the IMS message switching system
- Further implementation of BUFR decoding

6.2. Planned research Activities in NWP, Nowcasting and Long-range Forecasting

6.2.1. Planned Research Activities in NWP

Running the regional model for the short-range forecasting with UKMO and ECMWF global models as host models in order to form an ensemble of limited area models over the Mediterranean

Exploring the possibility of using the WRF model initiated by the UKMO global model

6.2.2. Planned Research Activities in Nowcasting

Plans are being made to initiate testing on calibration of weather radar using precipitation data from the automatic rain gauge network that would facilitate the development of nowcasting forecast system.

6.2.3. Planned Research Activities in Long-range Forecasting

Running and analyzing the results of a regional climate modeling system developed at the Hadley Centre at the UK Met Office and adapted for the Eastern Mediterranean.

The boundary data will be provided by one of the five 30-year integrations of HadAMP3 global atmosphere model.

The model runs will be made for both, the future climate of 2070-2100, and for the past, 1960-1990 climate, using the IPCC Special Report on Emission Scenarios (SRES).

7. References