Egypt
The Egyptian Meteorological Authority
Cairo

WWW Technical Progress Report for 2003

1. *Summary of highlights* :-

- **January 2003** : Automated Analysis of all weather charts on plotter as a routine work
- *October 2003* : Replacing our ground cables between EMA and our international and National airports with a VSAT system.

2. *Computing facilities*: -

A.

H/W Equipment

- ***The IBM Mainframe*: -**

Fully operation in May 1999: -.
⇒ S/390 integrated Server.
⇒ Processor/Memory Card 256 MB.
⇒ SSA DASD 72 GB.
⇒ 4-MM DDS-3 Dat Tape Drive.
⇒ CD ROM.
⇒ 3.5" FDD.
⇒ Fixed disks 93 45/B/2 (Disk capacity 8MB).
⇒ Cartridge magnetic tape unit 3490E/C22.
⇒ Magnetic tape unit 2240/A01.
⇒ Line printer 6262.
⇒ 4 HP 750 C^{++} Graphic colour plotter.
⇒ 2 HP 800 PS.
⇒ Telecommunication controller model 3745/170.
⇒ Terminal cluster controller 3174-01L.
⇒ 15 Terminals graphic display.

- **The Climeteological Data Base:-**

⇒ 1 SUN server enterprise 450:CLISYS
⇒ 4 SUN Blade workstations: NCDB1 NCDB2 NCDB3 NCDB4 –Solaris 2.8.
⇒ PC Windows 98.

- **Windows NT LAN: -**

⇒ NT Server IBM 300GL, Pentium III, processor 500MHz.
⇒ 12 IBM PC 300GL, Pentium III, processor 500MHz..
⇒ HP laser printer 2500C.
⇒ HP laser jet printer 4050.
⇒ One laser printer 4029 PS 39.
⇒ Tape cartridge 4/10 - 4mm.
⇒ 4 External Rewritable laser disk.
⇒ One Laser jet colour printer.

- **The Telecommunication system (AMSS) :-**

⇒ AMSS Server (one live & one back-up) model IBM 325.
⇒ Concentrators.
⇒ Automatic change over subsystem (rack - form).
⇒ 3 Supervisory IBM PC 300 GL.

⇒ 3 Graphical PC 300 PL.
⇒ A4 colour Scanner.
⇒ 2 Routers.
⇒ 2 Stackable Hub.
⇒ HP ink jet colour printer.
⇒ HP Laser Jet 6P printer.
⇒ External CD-WRITER.

¦ ¦ S/W Equipment :-

The Telecommunication system (AMSS): -

* Operating system Unix Ver. 5.0.4.
* The system is based on the MESSIR automatic message switching system :-

♣ **MESSIR-COMM**: AMSS system equipment composed of server's supervisory PC's communication equipment ,etc,...

♣ **MESSIR-VISION**: The display in alphanumeric from of all observation and forecast reports and bulletins in WMO format.
MESSIR-VISION provides the graphical display of :-

-	WMO observation data	SYNOP, TEMP, METAR,AIREP.... reports.
-	WMO processed data	NWP product word &regional Meteorological Centres & T4 code charts.
-	Meteorological image data	Satellite images data.

♣ **MESSIR-AERO**:-There are 6 workstations totally integrated and interfaced with MESSIR-COMM AMSS which provide the functions MESSIR Vision plus services for civil aviation proposed.

The Climeteological Data Base:-

♣ **Oracle:** -
* Version 8.1.7.
* Enterprise edition on the CLISYS server (release 8.1.7.2.0).
* Oracle client on each workstation (8.1.7).

♣ **Oracle environment:** -
* Database on the CLISYS server 2 databases are running:-
  – ORACLE_SID = CLIM operational database.
  – ORACLE_SID = DBUSER development database (for users development).
* Each client is configured to access to the DBUSER database (by a TWO-TASK environment variable under Unix clients)
* Under the DBUSER database, 5 Oracle users have been created, with a default table space of 10MB each: train1/train1 train2/train2 .. up to train5/train5.

♣ **Unix environment:** -
* Under each workstation is existing a Unix user: login= ncdb password= $ncdb.

B. Graphics system :-

We have a locally developed S/W for plotting and analysis of upper - air charts.

C. Met. databank :-

Daily, monthly and annual averages of different meteorological elements on computer readable media

D. Quality control system for observation :-

We have a locally developed S/W for quality control on the local observations only.

3. Data and products from GTS in use :-

* The following types of observations, extracted from GTS are presently used at the centre according to the typical 24-hours amount :-

  SYNOP 4000
  TEMP 440
  SHIP 100

* The following types of observations, extracted from GTS are presently used at the centre twice a day.
* TEMP 00 , 1200 GMT .
* GRID, GRIB.
* The AMSS system has a connections with SADIS, MDD and RETIM systems. It retransmit the output of these products to MESSIR - Vision and MESSIR-AERO at the forecasting centre and Airports.

4. Data input system :-

* Fully automated system for incoming bulletins and reports from the remote sites .
* Some human intervention available to correct bulletin . reports and to put our local observation .

5. Quality control system :-

1. Quality control of incoming data : the format of all coded reports are checked and if necessary corrected if possible .
2. All received messages are checked for internal consistency before storing and exchange .
3. Space consistency check .
4. Time series consistency check .

6. Monitoring of the observing system :-

* Surface and upper - air observations are monitored on the national level .
* From MESSIR COM we involves the collection of data for annual global for all type and send it to another client PC to make some operations to obtain the results reports to be carried out once a year in October {(1-5) and (1-15)} and send the monitoring results to the WMO FTP server via Internet.
* From MESSIR COM we involves the collection of raw data for all type and send it to another client PC to make A PRE-ANALYSIS by using DP4 software and send the monitoring results to the WMO FTP server via Internet periodically four times per year (February-April - July - October).

7- The forecasting system : -

(a) Mesoscale Model

The prediction model in use is the regional ETA coordinate Model with terrain representation basic equations & primitive equations .

Independent : Longitude, Latitude, Eta, time

Prognostic variables :

Temperature , wind components, Specific humidity, Turbulent kinetic Energy, soil moisture, snow depth, Surface potential temperature .

Diagnostic variable :

Precipitation , vertical velocity, Turbulent exchange Coefficients .

Integration domain :

Eta coordinate with step-like Terrain representation, 32 levels Top at 100 hP a

Grids:

Arakawa E-grid on transformed Latitude / Longitude Coordinate. System centered at 25 E, 31 N. .

Resolution : 35 Km

Time integration :

Split explicit adjustment, Euler Backward advection Adjustment, Time step 120s

Orogaphy: Silhouette mountains

Boundary values :

Time - dependent lateral boundary Conditions from an NMC global forecast, based on 00ut & 12ut and sampled At 6-hourly intervals .

Physical : Mellor - Yamada level 2-5

Parameterization :

Turbulence closure model for Planetary layer, level 12 for surface Layer fourth order non-linear lateral Diffusion. Modified Betts Miller scheme for deep and shallow convection GFDL Radiation Scheme ground surface Processes and Surface hydrology Large-scale Precipitation .

(B) Regional Model (EGYPTETA model) :

The system has the following Properties:

Basic equations : Primitive equations

Independent variables : N,n= A+ B PST

Dependent variables : Temperature, horizontal wind Components , specific Humidity .

Diagnostic variables :

Precipitation, vertical velocity, Turbulent exchange Coefficients .

Integration domain :

40 70
00 to 70 N

Vertical :

ETA coordinate with 32 level, Top at 100 hpa

Arakawa E-grid
35 Km
Split explicit scheme
Semi-lagrange advection scheme
Time-dependent lateral
Boundary Conditions from an
NMC global forecast based on
T-12h and sampled at 60 hourly
Intervals .

Physical :
Parameterization

a) large-scale condensation
b) modified Arakawa-stubborn Convection scheme.
c) Betts-miller shallow Convection scheme.
d) Explicit precipitation scheme including cloud microphysics.
e) Mellor- Yamada level 2.5 turbulence closure model for planetary layer, level 2 for surface layer
f) Radiation scheme
g) Four-Layer soil model

Topographic data set	mean orography, land sea mask.
Operational	forecast initial dates 00,12 UTC
Application	integration up to 120 hours Assimilation cycle: 00m06,12,18 UTC; Integration up to 6 hours .

c) Numerical weather predication products :

The geopotential height at the standard Level and mean sea level pressure .

- Horizontal wind components (U.V).
- Temperature (T).
- Specific Humidity (q).
- Surface pressure(Ps).
- Soil temperature
- Soil moisture content
- Surface temperature
- Connective precipitation
- Layer cloud amount
- Vertical velocity
- Thunderstorm and sandstorm

A new non - hydrostatic forecasting system of at least 36 level sigma Coordinates Forecast for 48 h.

- Basic equations: primitive equations system .
- Independent variables :
- Dependent variables : T,u,V,q,ps
- Integration domain : 25 to 37 22 35
- Horizontal resolution :
- Forecast for 48h
- Vertical resolution ; 36 level .

(D) Mesoscale Model (MM5)- Nonhydrostatic

The prediction model in use is the MMSv3, with ; -

1) additional equations for prognostic 3D vertical velocity and perturbation pressure
2) No equations for prognostic surface pressure diagnostic pressure and diagnostic amega integrations.
3) 24 category for vegetation and physical properties .
4) projections (dx=dy) (Paler-Lambert and Macerator).
5) Data Required to Run :
   * Topography and land use
   * Cribbed analyses (Regional) , wind Heights temp. Snow cover, SST, and RH for 18 levels with top at 100 hpa.
6) Nesting (one and two ways) .
7) Vertical interpolation from pressure levels to sigma coordinate system .
8) Resolution three nested 99,33,11 km.

E) System under tes (RegCM/ICTP) .

8. Plans for the future :-

- The AMSS systems will be upgrade.
- On the AMSS systems: upgrading the circuits (Cairo-Moscow and Cairo-New Delhi) to be TCP/IP (FTP or Socket) instead of X-25 and telegraphic protocols with a suitable speed.
- Replacing the IBM mainframe S/390 by a new system.
- EMA will be establishing an intranet.
- EMA will be upgrade internet speed using SDSL (1Mbps).