

# Application and verification of ECMWF products 2015

National Meteorological Administration

## 1. Summary of major highlights

1. No major changes in use of ECMWF products.
2. MOS-ARPEGE and MOS\_ECMWF equations were updated using 4 years development data set. A new system MOS using ECMWF model at 0.25 resolution was developed. This system runs on “ecgate” at ECMWF.
3. In the field of verification, a new procedure to daily verification of all models(surface parameters), used at NMA was implemented. This procedure use the t METv5.0 verification tools from NCAR

## 2. Use and application of products

### 2.1 Post-processing of ECMWF model output

#### 2.1.1 Statistical adaptation

The MOS statistical models have been in operational use since 2004. No major changes in basic models since that time. We have to notice that since 2012 the discriminant analysis was replaced with logistic regression, for all MOS systems. The models provide twice on a day, local forecasts up to 10 days, to 163 meteorological stations for the following main parameters: 2m temperatures, extreme temperatures, 10m wind speed and direction, total cloudiness (3 classes) and total precipitation (3 classes). The results are plotted in map forms, text format, and displayed on the web site.

Since 2010 – MOS\_MIXTE model using MOS\_ECMWF RUN 12 UTC and MOS\_ARPEGE RUN 00 provide once a day extremes temperatures for 163 meteorological stations.

In 2014 a MOS version using HRES ECMWF model was developed and implemented on “ecgate”. The statistical models used follows the same architecture.

#### 2.1.2 Physical adaptation

#### 2.1.3 Derived fields

### 2.2 Use of ECMWF products

The ECMWF products available at NMA are used for the short and medium range forecasts. These products are provided to forecasters (public, state authorities, national warning system) or to customers (more mass media) in different type format (graphical or grib data files).

The graphical products are available for the Weather Forecast Department, in real time, and are obtained using graphical packages developed at ECMWF: Metview and Magics.

Some examples of graphical products, which are available on a specific web site, are as follows:

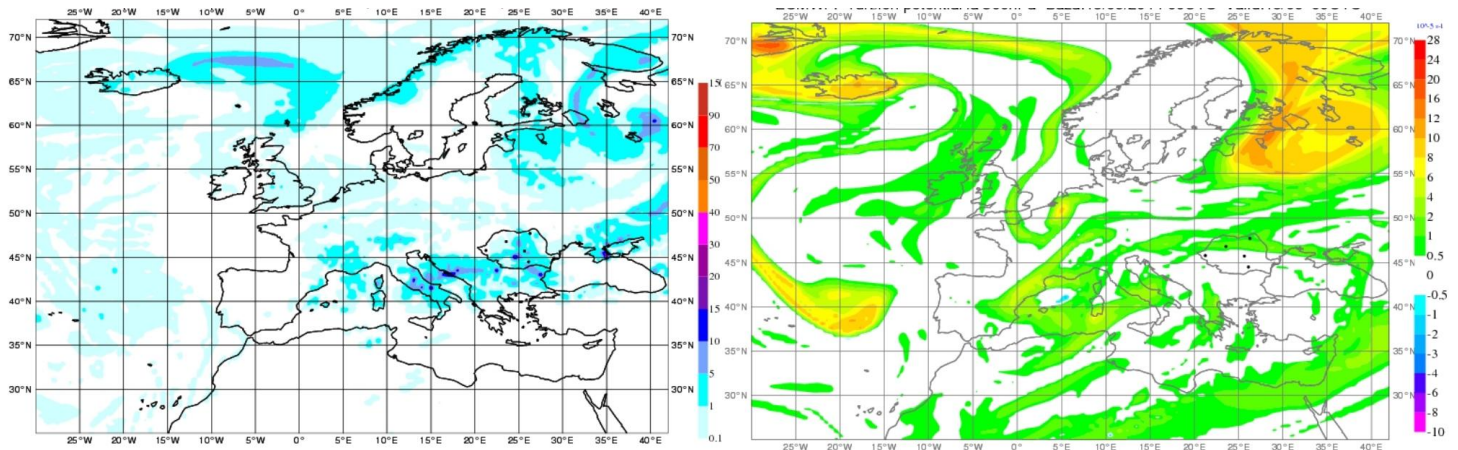


Fig.1: left – cumulated precipitation in 6 hours Base:18.06.2014, 00 UTC, Valid: 18.06 – 18.06, 12 UTC; right – potential vorticity at 300 hPa, Base: 18.06.2014, 00 UTC, Valid: 18.06.2014, 12 UTC

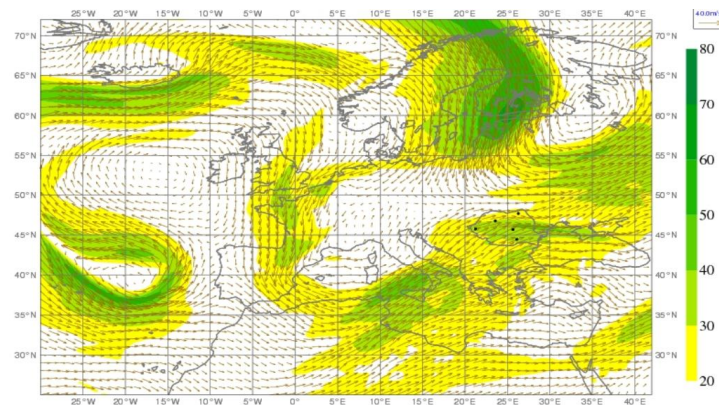


Fig. 2: wind at 300 hPa Base:18.06.2014, 00 UTC, Valid: 18.06.2014, 12 UTC

The EUMETSAT Nowcasting SAF provides operational services to ensure the optimum use of meteorological satellite data in Nowcasting and Very Short Range Forecasting by targeted users. To achieve this goal, the SAFNWC is responsible for the development and maintenance of appropriate SW Packages. NWCSAF MSG and PPS software packages use Numerical Weather Prediction (NWP) data, coded in GRIB1 or GRIB2 format. By default, NWCSAF MSG and PPS are configured to use ECMWF products. The NWCSAF MSG products are further processed and made available for Weather Forecast Department in real time.

Figure 3 represents an example of a NWCSAF MSG Cloud Type product (date 10.08.2015, 11:30 UTC).

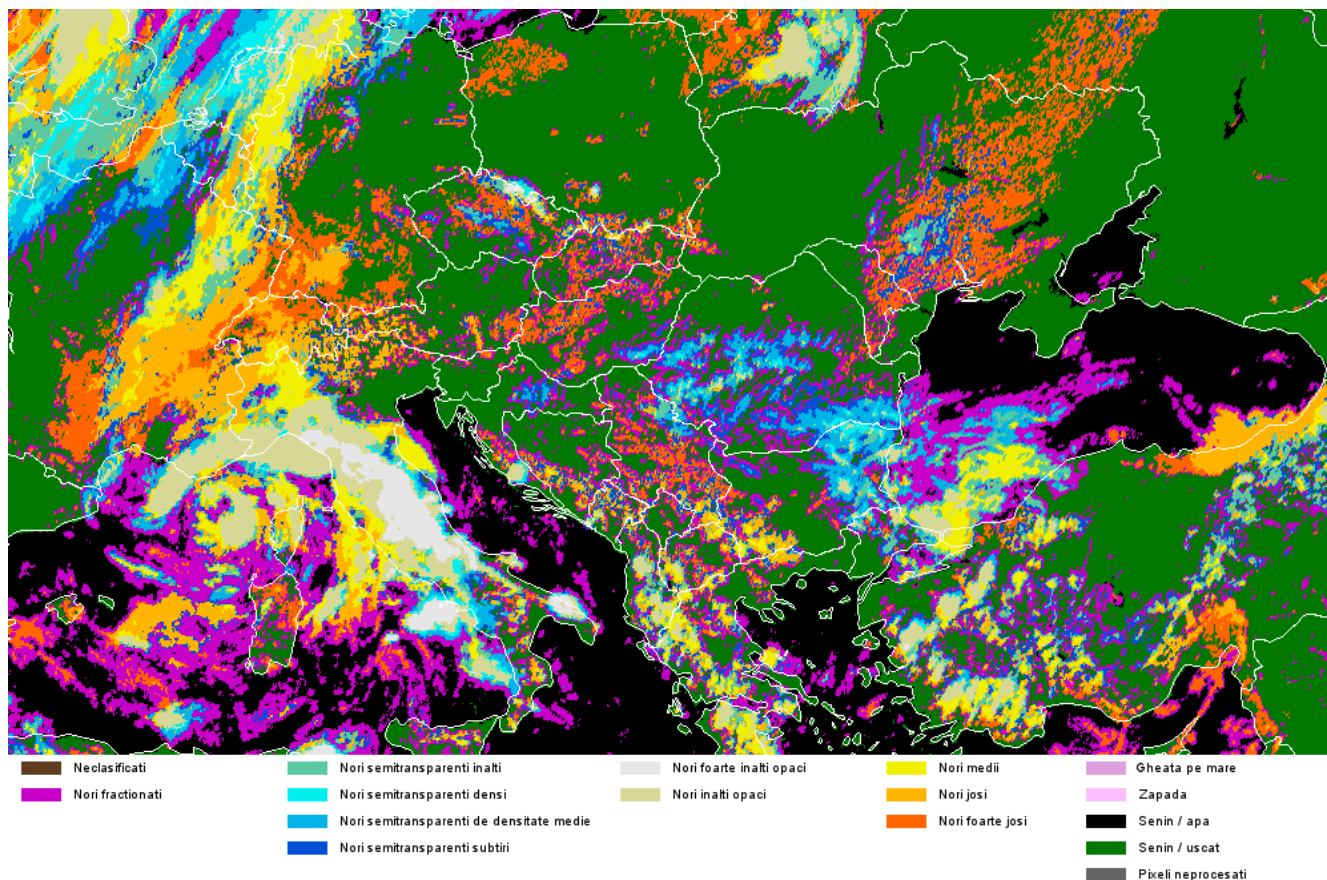


Fig. 3

### 3. Verification of products

#### 3.1 Objective verification

##### 3.1.1 Direct ECMWF model output (both HRES and ENS)

The objective verification has been continued in 2014, using the **VERMOD** - an unitary system for objective verification of all models used operationally by the National Meteorological Administration (NMA): ECMWF, ARPEGE, ALADIN, ALARO COSMO\_RO. A wide range of statistical verification measures are computed daily and monthly. The results are disseminated via dedicated statistical and verification web-site. The results are averaged over different stations selections.

A new procedure to daily verification of all models (surface parameters), used at NMA was implemented.

This procedure use the **METv5.0** verification tools from **NCAR**

[file://localhost/http://www.dtcenter.org/met/users/support/online\\_tutorial/METv5.0/index.php](http://www.dtcenter.org/met/users/support/online_tutorial/METv5.0/index.php)

The results are disseminated, daily, on the dedicated statistical and verification web-site. Examples in the figures 4 and 5 below:

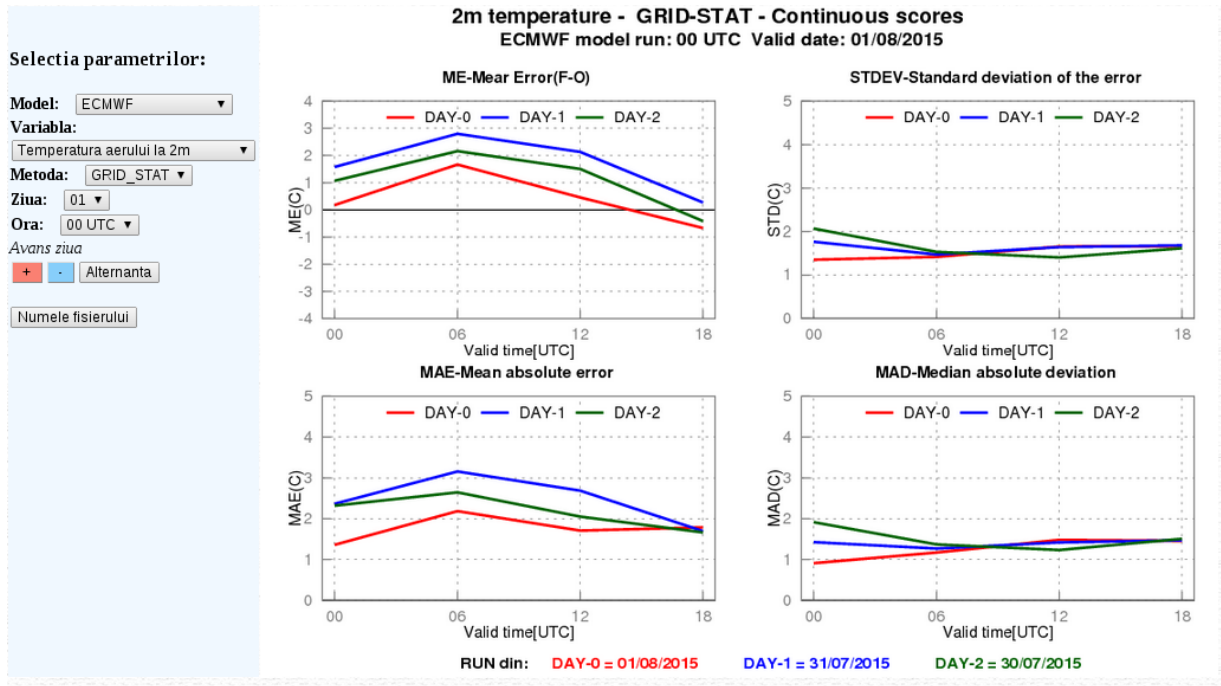


Fig. 4 Example of the the web user interface to acces of the daily models verification scores

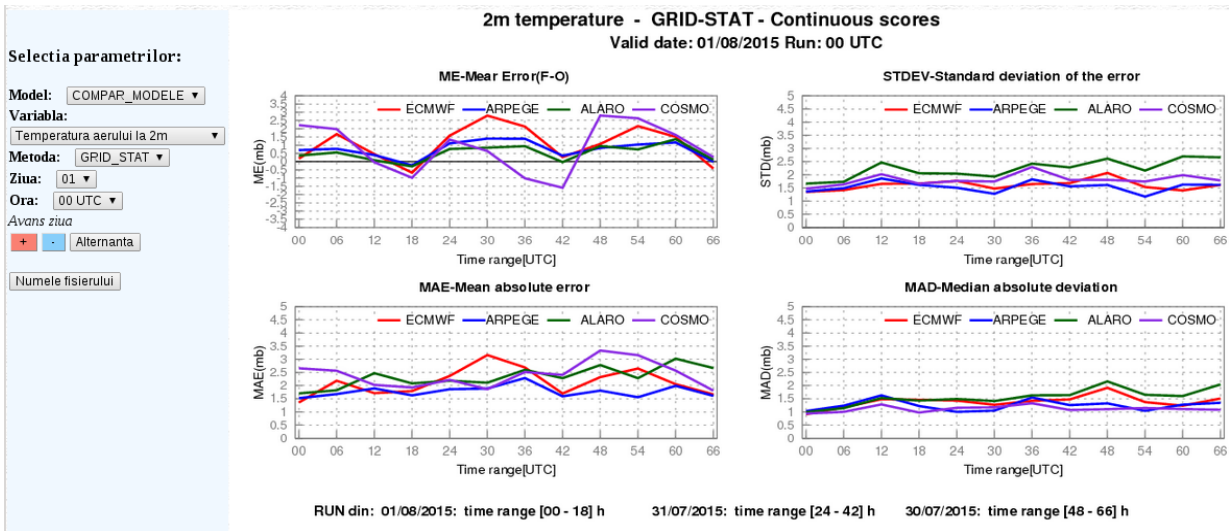


Fig. 5 Example of the the web user interface to acces of the daily models verification scores. All models scores are plotted on the same graphs.

3.1.2 ECMWF model output compared to other NWP models

Comparison of performance of ECMWF model to other NWP models used by NMA is performed daily and monthly, for the most important surface weather parameters: 2m temperature, 10m wind speed, total cloudiness, mslp pressure and 24 h total amount of precipitation. Graphs of the main verification scores are available on the web-site and also an overview of the performances of the models for all year. The monthly scores are presented on the web-site in the graphs form. The monthly comparative BIAS and RMSE distribution for 2014 – 2m temperature- is shown in Fig 6.

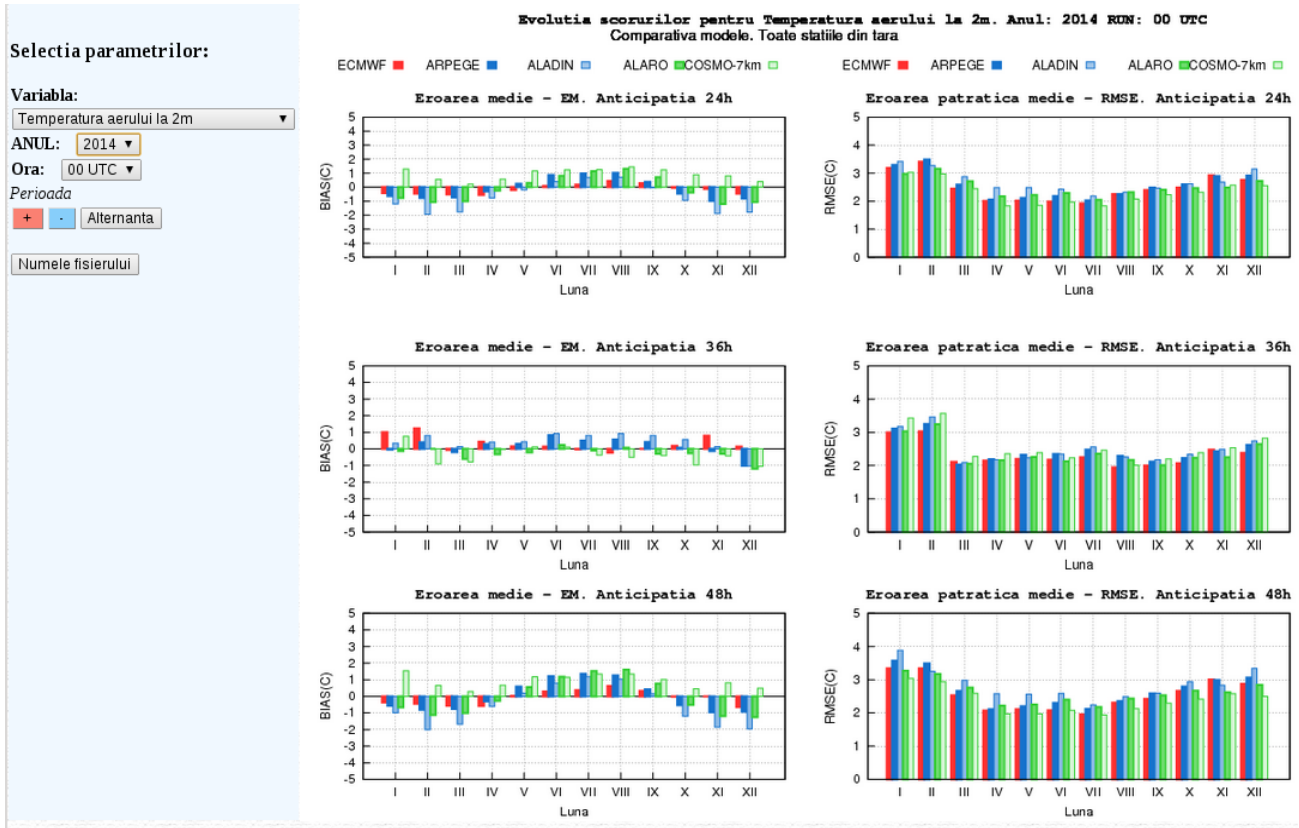


Fig. 6 Web interface to access on the monthly scores. Example: 2m Temperature. Mean monthly BIAS and RMSE scores distribution using all meteorological stations.

Year – 2014

3.1.3 Post-processed products

All MOS forecasts have been verified every month since 2004, and the results have been displayed on the web site. A comparison between MOS and meteorologist forecasts, for extreme temperatures, total cloudiness and precipitation (Yes/No) is performed daily and monthly. There were no major changes during 2014.

3.1.4 End products delivered to users

3.2 Subjective verification

3.2.1 Subjective scores (including evaluation of confidence indices when available)

3.2.2 Case studies

Severe weather events/non-events are of particular interest. Include an evaluation of the behaviour of the model(s).

4. References to relevant publications