Application and verification of ECMWF products 2009

Estonian Meteorological Hydrological Institute – Aarne Männik

1. Summary of major highlights

During years 2007 and 2008 Estonian Meteorological Hydrological Institute (EMHI) has built the core system of using ECMWF data streams. ECMWF products are now intensively used at EMHI. The main idea behind current application system is the locally tailored visualisation of the basic meteorological products through EMHI's internal web portal. The year 2008 has been a landmark of increased usage of probabilistic forecast at EMHI. A system for verification of the ECMWF products has not been implemented and is not planned yet. However, an attempt to verify duty forecasters predictions of nightly minimum and daily maximum temperatures in specific points is being developed and the system compares with the ECMWF model predictions as well.

2. Use and application of products

2.1 Post-processing of model output

2.1.1 Statistical adaptation

2.1.2 Physical adaptation

ECMWF model fields from boundary conditions project are used as boundary fields for limited area numerical weather prediction model HIRLAM.

2.1.3 Derived fields

2.2 Use of products

The ECMWF deterministic model output is the backbone of EMHI's operational 5-day and longer forecasts. Model fields in GRIB format are received and visualised on SmartMet meteo-workstation.. Alternatively the fields are visualised with GrADS software package and internal web-portal is used to supply the images to forecasters. The web-portal images have better local focus and higher temporal resolution than ECMWF web products. Some of the images are prepared on ecgate at ECMWF. Following maps are provided to forecasters:

1. 12-186 h forecasts with 6 h interval, Northern Europe area
    1. mean sea level pressure together with 6h precipitation fields. Rain, sleet and snow phases are separated with colouring.
    2. 10 m wind and 2 m temperature
    3. 850 mb temperature, geopotential and wind
    4. 300 mb geopotential and wind
    5. 500 mb geopotential and 1000-500 mb thickness
    6. 500 mb potential vorticity
    7. 700 mb relative moisture and vertical velocity
    8. false colour cloud map similar to ECMWF web product
2. 12-186 h forecasts with 6 h interval, Estonian area
    1. 2 m temperature
    2. 6h precipitation
3. 12-186 h forecasts with 6 h interval, the Baltic Sea area
    1. mean sea level pressure together with 10 m wind. Wind field is shaded with different colours when certain level of warning is exceeded
4. analysis, Northern Europe area
    1. mean sea level pressure together with Meteosat image
    2. mean sea level pressure
    3. 10 m wind and 2 m temperature
    4. 850 mb temperature and 500 mb geopotential
    5. 700 mb relative moisture

5. probabilistic products
    1. 24-196 h probability of precipitation exceeding 1, 5, 10 and 20 mm per 24 hours
    2. 24-196 h probability of wind gusts exceeding 15, 20 and 25 m/s
    3. 24-168 h probability of temperature dropping below 0 C
    4. 24-144 h probability of wave height exceeding 2, 4, 6 and 8 m in Baltic Sea
6. additional maps
    1. sea level temperature analysis, European area
    2. sea-ice cover analysis, Northern Europe

Longer than 7 days forecasts are given only on request and data from ECMWF website is used then. Ensemble forecasts are used from ECMWF website only in the case of specific events or request. EPSgrams at the ECMWF website are used often by forecasters but not routinely.

ECMWF model output is used to pre-fill tables of weather of towns in global, European and local scale. Very simple diagnostics is applied to determine weather category icon. The tables are later checked by the forecaster and supplied to a newspaper or TV-station.

A 72 h 10-m wind forecast at two points are provided in table form operationally to energy company “Eesti Energia” for wind-generator production estimation calculations.

For severe weather predictions a very important product for EMHI is the probability of wind gusts exceeding certain level.

3. Verification of products

3.1 Objective verification

3.1.1 Direct ECMWF model output (both deterministic and EPS)

3.1.2 ECMWF model output compared to other NWP models

3.1.3 Post-processed products

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 Synoptic studies

4. References to relevant publications