

Application and verification of ECMWF products 2009

Environmental Agency of Slovenia, Meteorological office

1. Summary of major highlights

The ECMWF products are used extensively as the primary source of NWP data in the forecasting process at Slovene Meteorological Office. The ECMWF deterministic forecasts is served as the first guess and the guidance in the semi-automatic system for the forecasts generation. The EPS products and the monthly forecasts are used as the basis for longer range forecasts for general public and for more demanding customers. The experimental seasonal forecasts are being issued regularly and distributed to media based on the ECMWF seasonal forecast data.

2. Use and application of products

The ECMWF deterministic and EPS products are used as basis and support for subjective and automatic production of forecasts at short and medium range. The ECMWF model is used extensively as a source of data for automatic product generation for Internet. The monthly and seasonal forecasts are gaining focus and experimental forecasts are being prepared.

2.1 Post-processing of model output

2.1.1 Statistical adaptation

Kalman filtering is used for improving the T2m forecasts. MOS is performed operationally, giving the information about temperature forecast as well as the information about the level of confidence of the forecast.

2.1.2 Physical adaptation

The ECMWF deterministic output has been used as coupling data for operational runs of WRF/NMM model for the region of Alps and North Adriatic.

The ECMWF data is used as the input for monitoring of the droughts in the central and Eastern Europe in the framework of Draught Monitoring Centre for South-Eastern Europe (DMCSEE)

Historical DMCSEE model climatology was computed by NMM model. To get DMCSEE model climatology, the 7305 daily simulations from 1 January 1989 until 31 December 2008 were driven by ECMWF ERA-Interim. Using simulated daily aggregates for some chosen variables (soil moisture, water balance etc.), supposing to describe water availability, some statistics have been computed (mean, standard, deviation, percentile classes etc.) for the entire data time period (1989 – 2008).

ECMWF operational deterministic forecast, truncated to the ERA-Interim horizontal resolution (T511) is used to simulate ongoing weather patterns, which are compared on a decadal basis to the historical statistics to analyze water availability and get signal on potential ongoing drought severity.

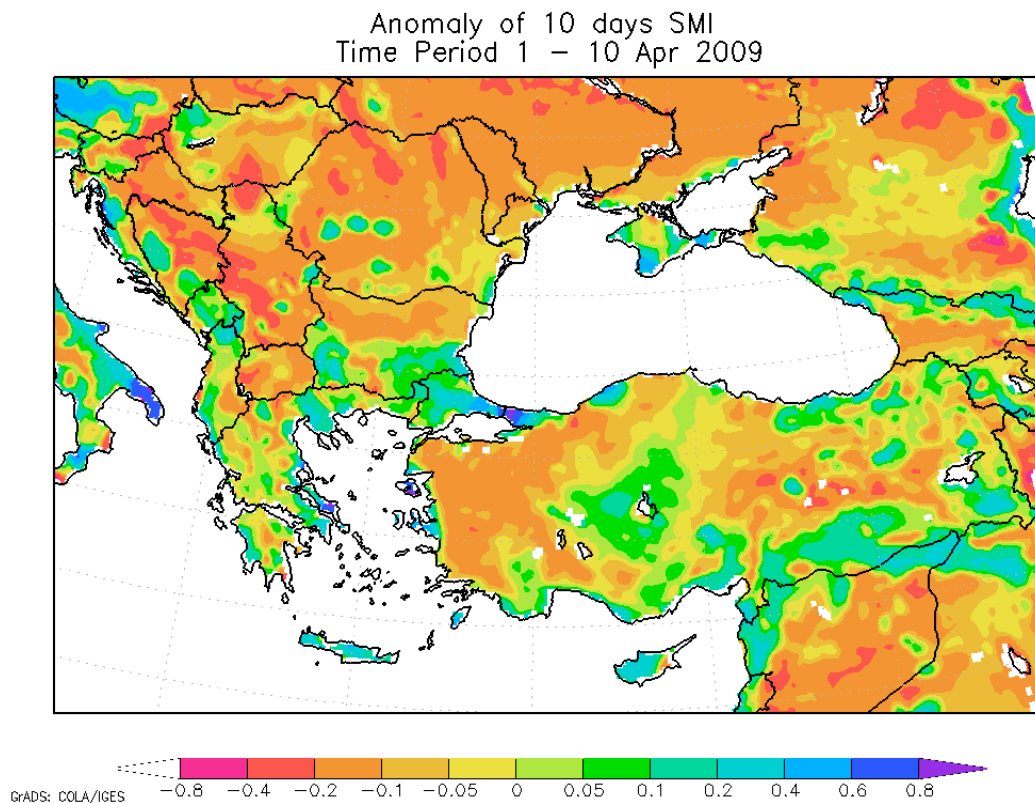


Fig.1 10 days averaged Soil moisture index (NMM model) anomaly for the first decade of April 2009 from model simulated 20 years average.

2.1.3 Derived fields

The EPS clusters and probabilities are computed and visualized locally. The ECMWF wind fields are used for the calculation of forward and backward trajectories for the use of Civil protection authorities.

2.2 Use of products

The new product has been developed and published on the Internet recently based on the EPS precipitation forecasts. The products is being prepared for 5 different Slovenian regions.

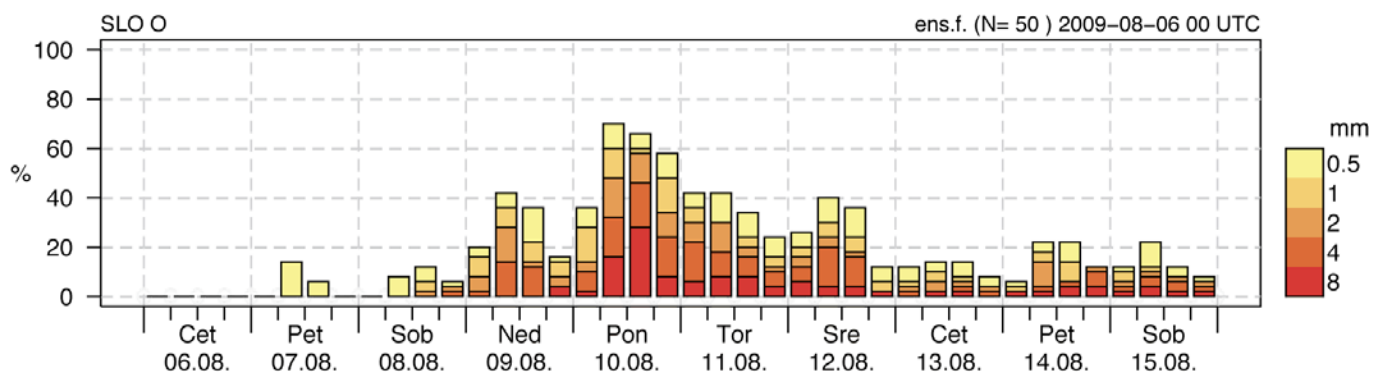


Fig. 2 Example of a 10 days precipitation probabilities for one central Slovenia based on ECMWF EPS forecasts.

3. Verification of products

The ECMWF deterministic point forecasts for surface and upper air are stored into so called verification database in the scope of ALADIN verification project for more than 200 SYNOP and TEMP stations in Europe and N Africa on daily basis. Internal and external users can interactively access and create their own traditional score reports for number of selected locations, areas and forecast ranges. They can compare the skill of different models including deterministic forecast of ECMWF against observations and other models.

3.1 Objective verification

3.1.1 Direct ECMWF model output (both deterministic and EPS)

The ECMWF deterministic forecast together with Kalman correction and MOS is verified against SYNOP data for Slovene SYNOP stations.

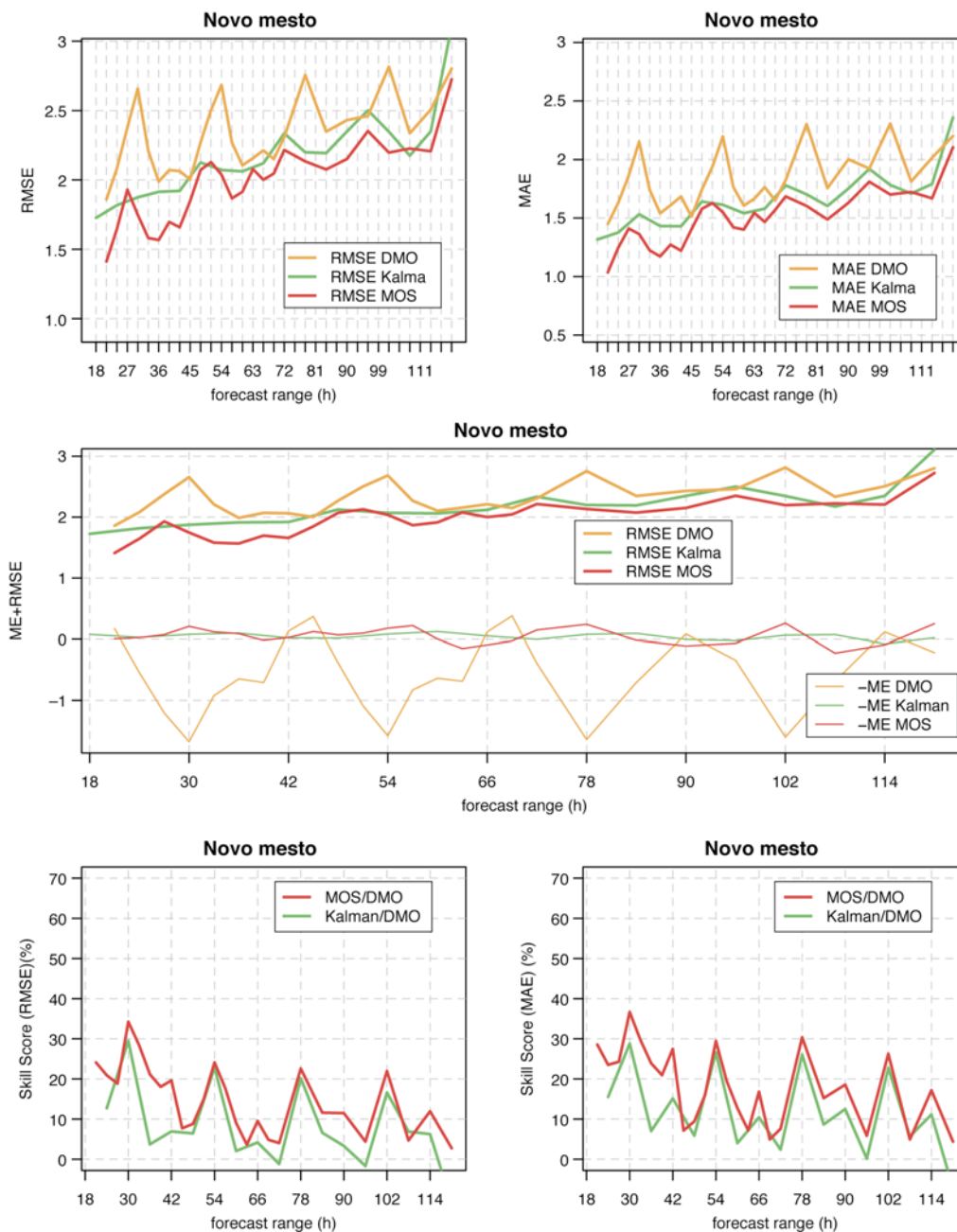


Fig. 3 Comparison of RMSE, MAE and ME for T2m forecast based on ECMWF deterministic forecast, 12 UTC: Direct Model Output (DMO), DMO with Kalman correction (DMO Kalman) and Model Output Statistics (MOS) and Skill Score (RMSE - RMSEref)/(RMSEperf-RMSEref)*100%) of MOS T2m forecast and Kalman corrected T2m in reference to DMO, based on ECMWF deterministic forecast, 12 UTC. Verification period is 1.1.2008 till 31.12.2008. Location: Novo Mesto.

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