

Application and verification of ECMWF products 2016

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1. Summary of major highlights

ECMWF forecast products became the backbone in operational work during last several years. Starting from ten days deterministic forecast, amount of products in use is growing constantly including EPS, EFI, seasonal forecast etc. Available ECMWF software like MetView, bufrdc_*** and GRIB_API are installed and every day in use.

2. Use and application of products

ECMWF products are used for short-range forecast for providing meteorological background for hail suppression activities.

Medium-range forecast is mainly based on ECMWF products from deterministic model as well as EPS products available on ECMWF web site.

IHMS of Montenegro has continued to use ECMWF's monthly forecasts as well as seasonal forecasts of prediction System 3.

Some of ECMWF forecast products, like CAPE and EFI are widely used in every day work. Wind gusts, 2m minimum and maximum daily temperature forecast as well as daily amount of precipitation are used as a background in the severe weather warnings.

2.1 Post-processing of ECMWF model output

Workstation_all, Eta Slop model, has been running operationally since 2002. Model uses ECMWF boundary conditions data from HRES deterministic global model for 96 hours ahead.

NMM-E, first version of non-hydrostatic limited-area model, has been running operationally since 2004. Model uses ECMWF grib1 data from HRES deterministic global model for 96 hours ahead.

WRF-NMM (the latest version, today is v3.7.1), a non-hydrostatic limited-area model, has been running operationally since 2008. Model uses ECMWF grib1 data from HRES deterministic global model for 144 hours ahead, with 2 downscaling we have products with very high horizontal resolution, about 1km, from this model.

Also we use products from HRES ECMWF global model for some historical runs and case study.

2.2 Use of ECMWF products

Twice per day grib1 data standard products from HRES ECMWF model is visualized for Europe and Balkan area.

Relevant IHMS staff who works in weather forecast activities has access to www.ecmwf.int all products.

3. Verification of products

3.1 Objective verification

Objective verification of the products still not part of our activities.

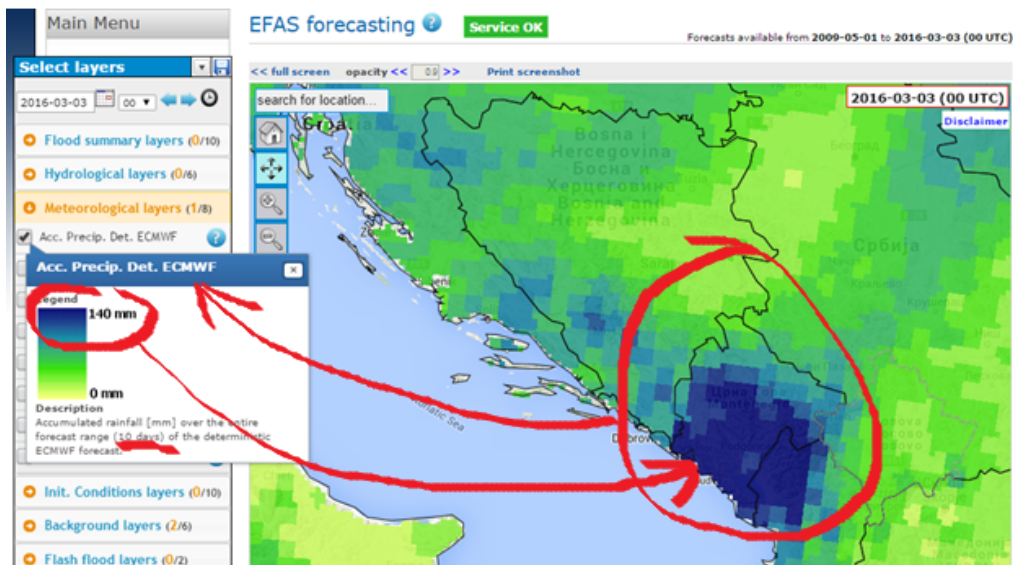
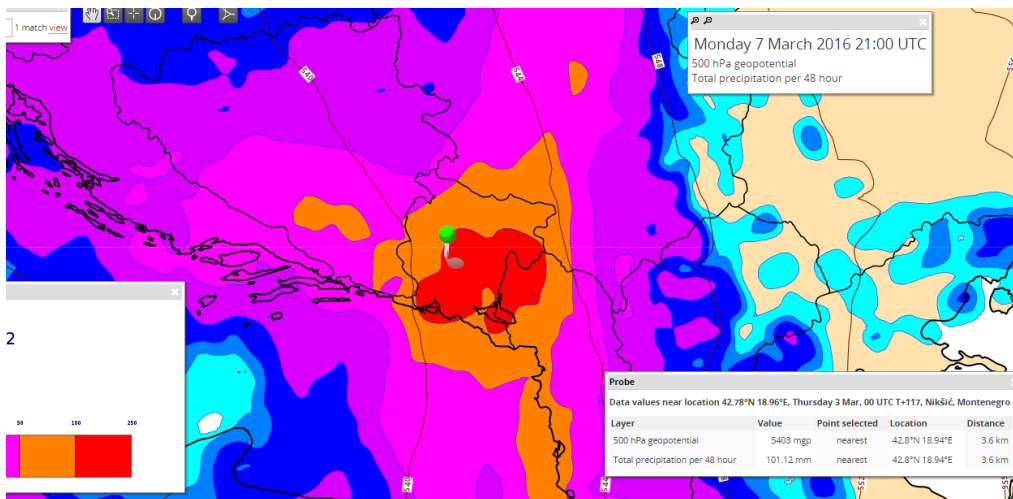
3.2 Subjective verification

3.2.2 Case studies

1st Case study- 03/05/2016. Heavy rain

In the period from 5th to 8th of March is forecasted heavy rainfall. Prognostic models used by HMS on the national level are very well predicted rainfall. EC is also predicted very well the amount of rainfall. Our institution is a written warning The national service for the protection and rescue of the expected bad weather and the risk of large water-flooding. Similarly, EFI index for rainfall was very good 0.8 to 1.0. Realized rainfall 07/03/2016 in 6UTC on some meteorological stations was:

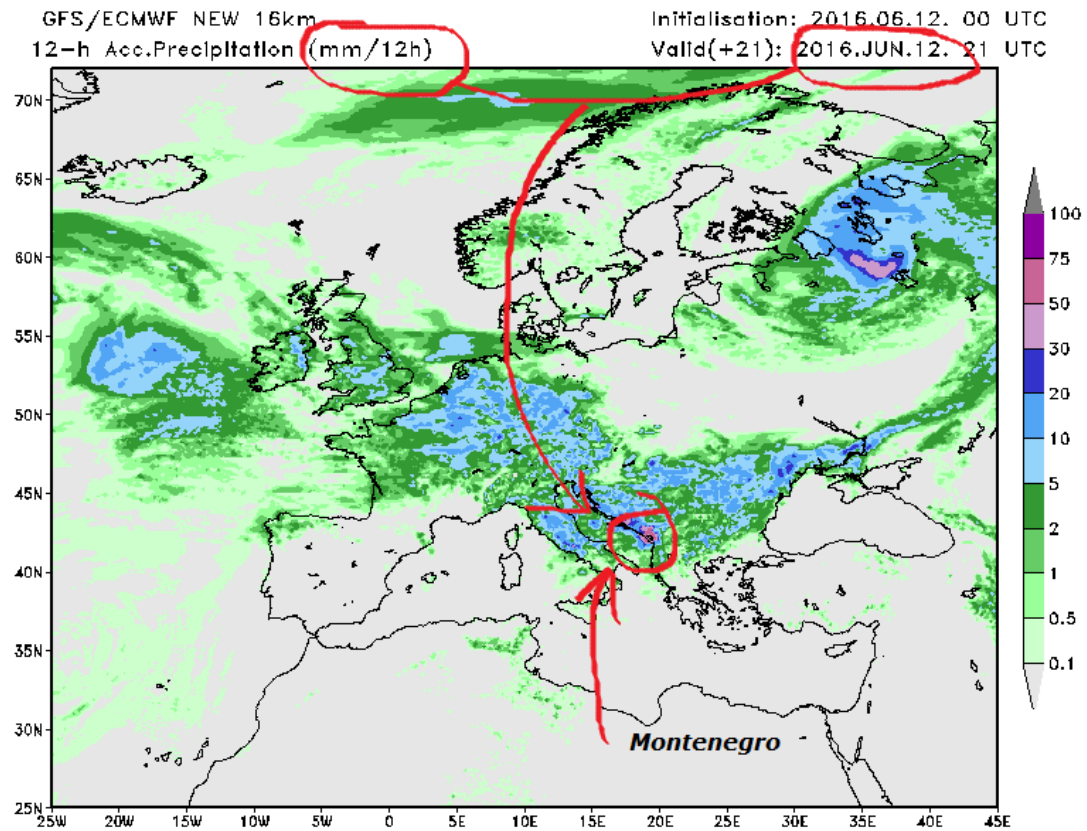
- Cetinje 183mm / 24h
- Podgorica 134mm / 24h
- Herceg Novi 101mm / 24h
- Niksic 89mm / 24h (109mm / 48h) etc.



2nd Case study-Extreme rainfall

12/06/2016. heavy rainfall with very strong blows south wind. Accumulated rainfall for 24 hours was:
Cetinje 242 (record of 1949)
Ulcinj 163mm (record of 1949)
Podgorica 116 (record of 1949)

Forecasts ECMWF were very good and accurate.
ECMWF forecast for 12h Acc.rainfall



3. Case study-16.02.2016. Extremely warm

02/16/2016. It was very warm for this time of year. The measured a record high temperature for February of 1949.

Tmax:

Bar 27.6 C

Podgorica 27.3 C

Ulcinj 24.9 C

These are record temperatures in February of 1949.

