Application and verification of ECMWF products 2018

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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 high deterministic forecast grib data products like input in LAM (WRF-NMM), 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 for coding synop report in BUFR code and every mount for coding climat report in BUFR code.

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.

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

Describe the different ways in which you post-process ECMWF forecasts, in the following categories:

2.1.1 Statistical adaptation

From grib data who come through the dissemination exchange, we draw some meteo variable (z(500mb,850mb ... , t(500mb,850mb....) , precipitation, ..) for subjective control of the model , and to compare (still not objective compared, we work on some tools (some python scripts) to work operational, to be objective) with products with WRF NMM models and with other global models, like ICON, GFS from NCEP/USA

2.1.2 Physical adaptation

WRF-NMM (the latest version, today is v3.9.1), 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.

Products from LAM (WRF-NMM-E) with input data from ECMWF operational use like input in several hydro models (Wflow, PANTHA-RAI).

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

2.1.3 Derived fields

Include post-processing of ENS output e.g. clustering, probabilities

2.2 ECMWF products

2.2.1 Use of Products

We regularly use EFI prognosis products or announcement of extreme meteorological events such as heavy rainfall, strong winds, extreme temperatures, probability of storm clouds EFI for CAPE.
The cycling path and the type of rainfall are products that help us to prepare forecasts and make final decisions, especially in extreme situations.

2.2.2 Product requests

Include here any particular requests you may have for new or modified ECMWF products

3. Verification of products

Include medium-range HRES and ENS, monthly, seasonal forecasts. ECMWF does extensive verification of its products in the free atmosphere. However, verification of surface parameters is in general limited to using synoptic observations. More detailed verification of weather parameters by national Services is particularly valuable.

At this point in time (2018) ECMWF would particularly welcome:

- Evaluation of systematic errors in near-surface parameters
- Evaluations related to visibility, humidity and clouds
- Conditional verification results (e.g. 2m temperature bias stratified by cloud cover)
- Comparisons between ECMWF ENS and external LAM-EPS systems (for probabilistic forecasts)

3.1 Objective verification

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

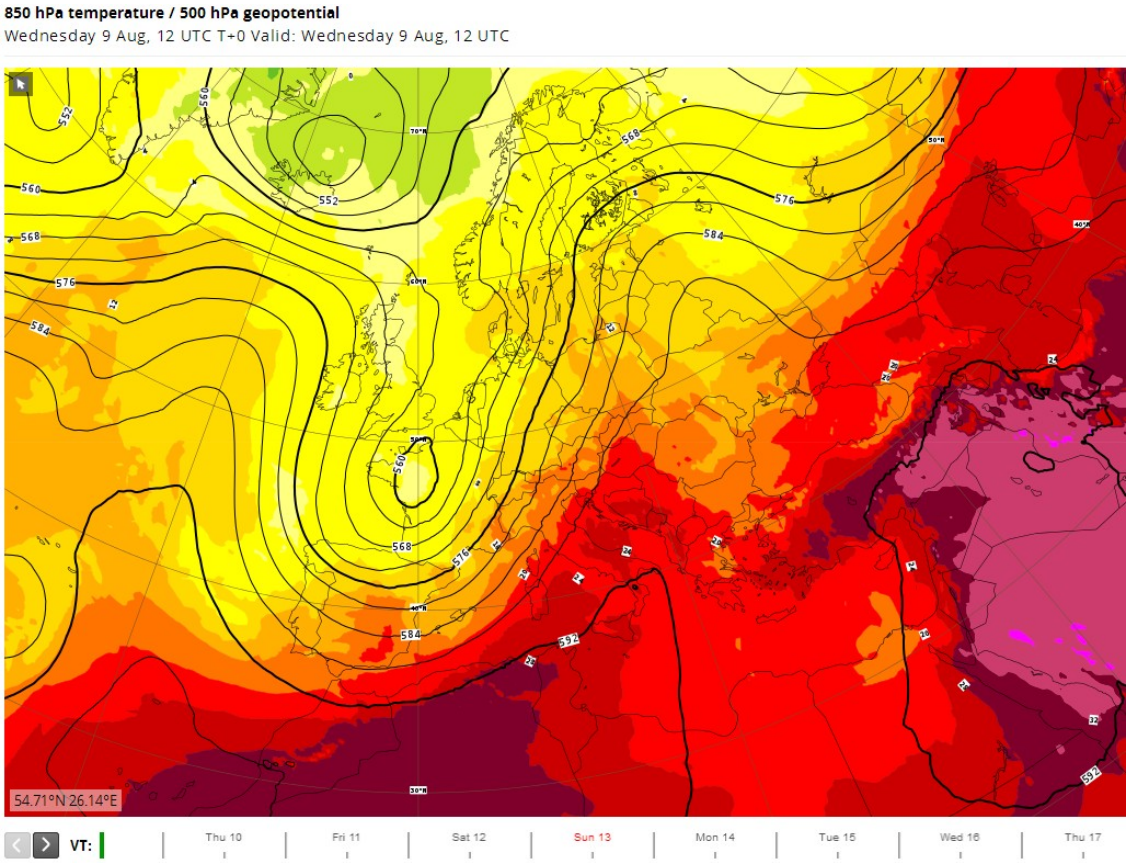
3.2 Subjective verification

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

3.2.2 Case studies

Case study example:

- On 10 August 2017 when we in Montenegro had the tenth day in a row with a maximum daily temperature of over 40 degrees. On 10 August temperature (Tmax) was 42.5 degrees and it was a record temperature during 2017. We had a warning at extreme temperatures. Prognostic material has helped us greatly in making our decisions. On the basis of our decisions on extreme temperatures, open-air breaks were introduced and grape harvesting was carried out during the night and there were some breaks. We had a great number of wild fire and rescue teams intervention.



MONTENEGRO

SYNOP 16th december 2017 06UTC 13460 Meteorological station Cetinje 61803 , 180mm for 18h period

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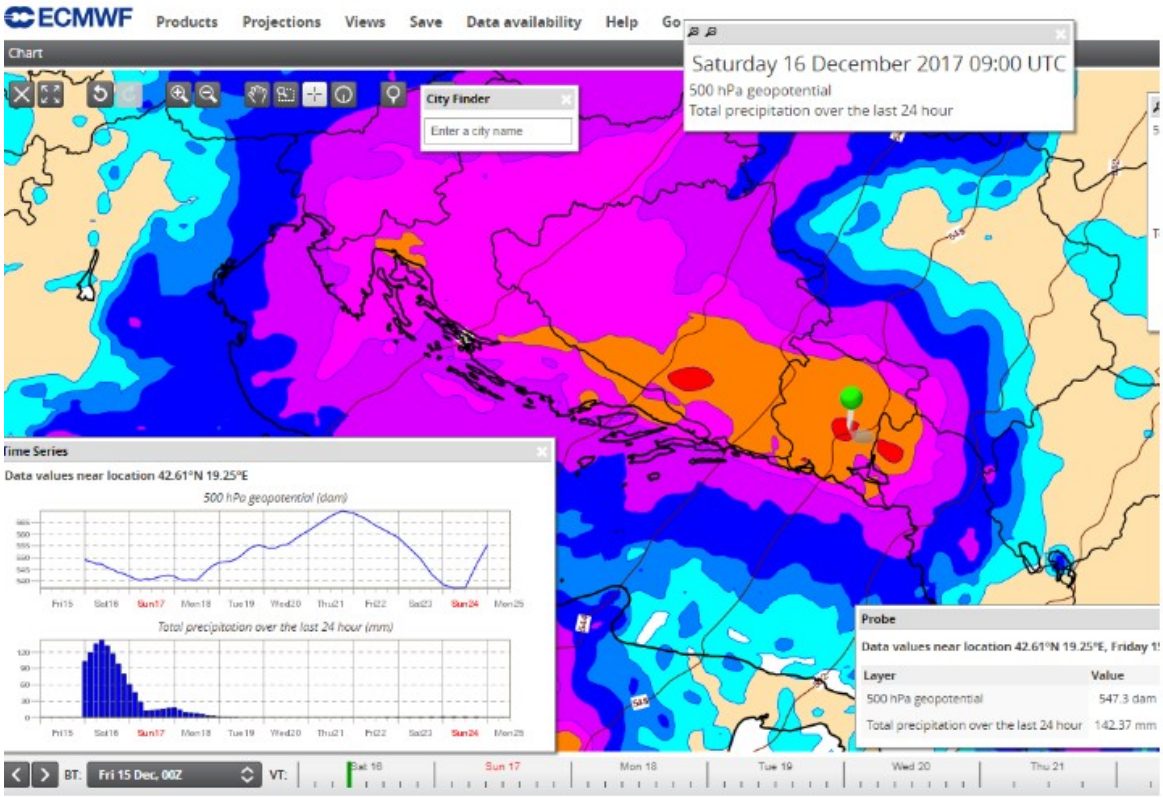

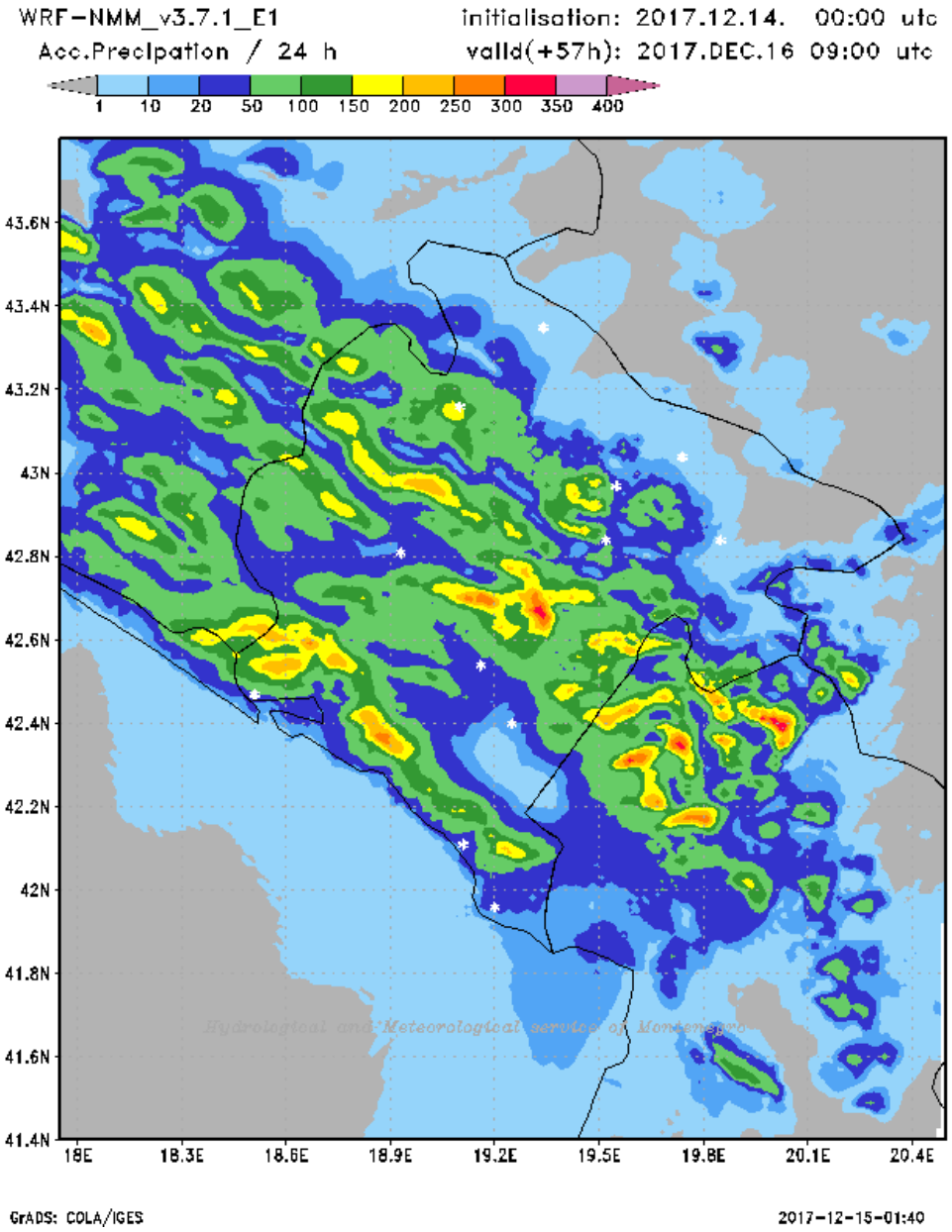
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19.5E
19.8E
20.1E
20.4E
Hydrological and Meteorological service of Montenegro
GrADS: COLA/IGES
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4. Feedback on ECMWF “forecast user” initiatives

. In the coming period we will give our suggestions.

5. References to relevant publications

Our institute has conducted expert analyzes and reports for extreme weather situations. Some have been submitted to our Government. Part of this material is used here.