JOINT WMO TECHNICAL PROGRESS REPORT ON THE GLOBAL DATA PROCESSING AND FORECASTING SYSTEM AND NUMERICAL WEATHER PREDICTION RESEARCH ACTIVITIES FOR "2017"

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1.   Summary of highlights

One of the main focal points in the last years was the procure the better computer according to our abilities and improve the model resolutions and operational forecast, which is necessary according to complexity the topography in our country.

2.   Equipment in use

Computer	RAM	Storage
DELL Rak Server (2 CPUs with 16 cores each)	32 GB	2 TB
Intel i7 with 8 cores	16 GB	1 TB

3.   Data and Products from GTS in use
- SYNOP
- METAR
- TEMP
- TAF
- SW
- TTAA

4.   Forecasting system

4.1   System run schedule and forecast ranges
In FHMI of Bosnia and Herzegovina two deterministic forecast models are in use:
WRF-NMM (4 km resolutions, 1 runs per day) and NMMB (6 km resolutions, 1 runs per day)

WRF-NMM

Suite	Analysis time + forecast range	Product availability
1	00 UTC+96 h	5:00 UTC

NMMB

Suite	Analysis time + forecast range	Product availability
1	00 UTC+96 h	5:40 UTC

4.2 Medium range forecasting system (4-10 days)

GFS (0.25 deg) for the next 10 days and ICON-EU for the next 5 days

4.3 Short-range forecasting system (0-72 hrs)

4.3.1 Data assimilation, objective analysis and initialization

For initialization is used GFS model

4.3.2 Model
4.3.2.1 In operation

The non-hydrostatic WRF-NMM model have been using for the last 10 years in operational purpuses. The microphysics is Ferrier. Longwave and shprwave radiation is GFDL. Noah land-surface model. Mellor-Yamada-Janjic TKE scheme. No cumulus physics.

Horizontal resolutions	4 km
Number of the levels	41
Time step	30 s
Forecast range	96 h
Outputs	Every hour
Physics	

The NMMB model have been using for the last tree years. Microphysics: Ferrier. Convection: Betts-Miller-Janjic. Shortwave and longwave radiation schemes: GFDL. Turbulence: Mellor-Yamada-Janjic. Surface layer schemes: Mellor-Yamada-Janjic. Land surface schemes: Liss.

Horizontal resolutions	6 km
Number of the levels	50
Time step	
Forecast range	96 h
Outputs	Every hour
Physics	

4.3.2.2 Research performed in this field

4.3.3 Operationally available NWP products
Clouds fractions, temperature, dew point, Cape, Snow, total precipitation etc.

4.3.4 Operational techniques for application of NWP products
4.3.4.1 In operation
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4.3.4.2   Research performed in this field

The Standardized Precipitation Index (SPI) is a widely used index to characterize meteorological drought on a range of timescales. The raw precipitation data are typically fitted to a gamma or a Pearson Type III distribution, and then transformed to a normal distribution. The SPI values can be interpreted as the number of standard deviations by which the observed anomaly deviates from the long-term mean. The SPI can be created for differing periods of 1-to-36 months, using monthly input data. For the operational community, the SPI has been recognized as the standard index that should be available worldwide for quantifying and reporting meteorological drought. Key strengths are; uses precipitation only; it can characterize drought or abnormal wetness at different time scales which correspond with the time availability of different water resources. We use output of WRF-NMM model as input for calculations for SPI forecast and monitoring for FBiH. Forecast is for 5 days and monitoring cover 30 days. This product is manly for agriculture community, and it is widely us in practical purposes.

4.3.5   Ensemble Prediction System

4.3.5.1 In operation
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4.3.5.2 Research performed in this field

4.3.5.3 Operationally available EPS Products

4.4   Nowcasting and Very Short-range Forecasting Systems (0-6 hrs)

4.4.1   Nowcasting system
4.4.1.1   In operation

4.4.1.2   Research performed in this field

4.4.2   Models for Very Short-range Forecasting Systems
4.4.2.1   In operation

4.4.2.2   Research performed in this field

4.5   Specialized numerical predictions

4.5.1   Assimilation of specific data, analysis and initialization (where applicable)
4.5.1.1 In operation

4.5.1.2 Research performed in this field

4.5.2   Specific Models
4.5.2.1 In operation

4.5.2.2 Research performed in this field

4.5.3   Specific products operationally available

4.6   Extended range forecasts (ERF) *(10 days to 30 days)*

4.6.1   Models
4.6.1.1 In operation

4.6.1.2 Research performed in this field

4.6.2   Operationally available NWP model and EPS ERF **products**

4.7   Long range forecasts (LRF) *(30 days up to two years)*
4.7.1   In operation

4.   Research performed in this field
5.
4.7.2   Operationally available EPS LRF products

5.   Verification of prognostic products
5.1
5.2   Research performed in this field

6.   Plans for the future *(next 4 years)*

6.1   Development of the GDPFS

6.1.1 [major changes in the Operational DPFS which are expected in the next year]

6.1.2 [major changes in the Operational DPFS which are envisaged within the next 4 years]

6.2   Planned research Activities in NWP, Nowcasting and Long-range Forecasting

6.   Planned Research Activities in NWP
   Better equipment (computers), new staff, doing verifications and starting the models with objective analysis.

6.2.2 Planned Research Activities in Nowcasting

6.2.3 Planned Research Activities in Long-range Forecasting