JOINT WMO TECHNICAL PROGRESS REPORT ON THE GLOBAL DATA PROCESSING AND FORECASTING SYSTEM AND NUMERICAL WEATHER PREDICTION RESEARCH ACTIVITIES FOR 2013

Republic of Uzbekistan

1. Summary of highlights

Information database is created to study time series by 13 stations located by the administrative centres of the regions of the Republic of Uzbekistan for the meteorological parameters: deviation from the norms of the average monthly temperatures, the average monthly temperatures, deviation from the norms of the average monthly precipitation and the average monthly precipitation for 1992-2013.

Methodology of average monthly air temperature forecasts and assessment of forecasts success over the territory of Uzbekistan has been developed.

2. Equipment in use
"[information on the major data processing units]"

3. Data and Products from GTE in use
- SYNOP
- TEMP
- ECMWF - Reding
- KWBC Washington

4. Forecasting system

4.1 System run schedule and forecast ranges
Weather forecasts are made in Uzhydromet on the basis of the analysis of the actual surface maps and maps of the baric topography taking into account NWP production which Uzhydromet gets via GTS and CMACast system of data receipt and processing. Meteorological forecasts using NWP production are made every day with 1-6 days in advance. The forecasts are made for the regions of Uzbekistan.
Decadal forecasts are also made on the basis of NWP products given on the web-site of ECMWF (deterministic forecast of the geopotentiai on AT-500 MB and temperature on AT-850 MB).

4.2 Medium range forecasting system (4-10 days)
For making 4-10 days forecasts, we use ECMWF products available via GTS with 120-168 hours in advance, NWP products given on the web-site of ECMWF (deterministic forecast of the geopotentiai on AT-500 MB and temperature on AT-850 MB) with 196-240 hours in advance and CMA products received via CMACast system.

4.2.1 Data assimilation, objective analysis and initialization
4.2.1.1   In operation
"[information on Data assimilation, objective analysis and initialization]"

4.2.1.2   Research performed in this field
"[Summary of research and development efforts in the area]"

4.2.2 Model
4.2.2.1   In operation
4.2.2.2   Research performed in this field

"[Summary of research and development efforts in the area]"

4.2.3 Operationally available Numerical Weather Prediction Products
- products from the European Centre of the Medium-Range Forecasts are available via GTS in GRIB code twice a day at 00 GMT and 12 GMT. Production contains analysis and forecast of the surface pressure, wind and humidity on AT-850 MB, wind and humidity on AT-700 MB, wind and geopotential on AT-500 MB, wind on AT-200 MB. Forecasts are made 120-168 hours in advance with step of 24 hours.
- CMA (China Meteorological Administration) products as maps are available via **CMACast** system of data receipt and processing.

4.2.4 Operational techniques for application of NWP products *(MOS, PPM, KF, Expert Systems, etc..)*
4.2.4.1 In operation
"[brief description of automated (formalized) procedures in use for interpretation of NWP ouput]"

4.2.4.2 Research performed in this field
"[Summary of research and development efforts in the area][11]

4.2.5 Ensemble Prediction System (EPS)
4.2.5.1 In operation
In the operational regime Uzhydromet uses SAP products given on the web-site of the European Centre of the Medium-Range Forecasts (ECMWF).

4.2.5.2 Research performed in this field
"[Summary of research and development efforts in the area]"

4.2.5.3 Operationally available EPS Products

Information included to the weather run charts (meteograms) - number of clouds, availability and number of precipitation, wing velocity, temperature (information is given on ECMWF site). In ECMWF the weather run charts (meteograms) are made by 7 regional centres of Uzbekistan

- The map of distribution of precipitation probability is more than 20 mm per day (on ECMWF site).

4.3 Short-range forecasting system (0-72 hrs)
For making forecasts, ECMWF products with the lead time of 00-96 hours available via GTS, WMC Washington products with the lead time of 00-48 hours available via GTS, CMA products available via **CMACast** system are used.

4.3.1 Data assimilation, objective analysis and initialization
4.3.1.1 In operation
"[information on Data assimilation *(if any)*, objective analysis and initialization,]" *(Indicate boundary conditions used)*

4.3.1.2 Research performed in this field
"[Summary of research and development efforts in the area]"

4.3.2 Model
4.3.2.1 In operation
"[Model in operational use, (domain, resolution, number levels, range, hydrostatic?, physics used)]"

4.3.2.2   Research performed in this field
"[Summary of research and development efforts in the area]"

4.3.3 Operationally available NWP products

- products from the European Centre of the Medium-Range Forecasts are available via GTS in GRIB code twice a day at 00 GMT and 12 GMT. Production contains analysis and forecast of the surface pressure, wind and humidity on AT-850 MB, wind and humidity on AT-700 MB, wind and geopotential on AT-500 MB, wind on AT-200 MB. Forecasts are made 120-168 hours in advance with step of 24 hours.
- products from the World Meteorological Centre Washington are available via GTS in GRIB code twice a day at 00 GMT and 12 GMT. Production contains analysis and forecast of the surface pressure and geopotential on AT-500 MB. Forecasts are made 00-48 hours in advance with step of 24 hours.
- CMA (China Meteorological Administration) products as maps are available via **CMACast** system of data receipt and processing.

4.3.4 Operational techniques for application of NWP products

4.3.4.1   In operation
"[brief description of automated (formalized) procedures in use for interpretation of NWP ouput]" *(MOS, PPM, KF, Expert Systems, etc..)*

4.3.4.2   Research performed in this field
"[Summary of research and development efforts in the area]"

4.3.5 Ensemble Prediction System

4.3.5.1   In operation
"[Number of runs, initial state perturbation method, perturbation of physics?]" *(Describe also: time range, number of members and number of models used: their domain, resolution, number of levels, main physics used, for post-processing: calculation of indices, clustering)*

4.3.5.2   Research performed in this field
"[Summary of research and development efforts in the area]"

4.3.5.3   Operationally available EPS Products

Information included to the weather run charts (meteograms) - number of clouds, availability and number of precipitation, wing velocity, temperature (information is given on ECMWF site). In ECMWF the weather run charts (meteograms) are made by 7 regional centres of Uzbekistan

- The map of distribution of precipitation probability is more than 20 mm per day (on ECMWF site).

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

4.4.1   Nowcasting system
4.4.1.1   In operation
"[information on processes in operational use, as appropriate related to 4.4]"

4.4.1.2 Research performed in this field
"[Summary of research and development efforts in the area]"

4.4.2 Models for Very Short-range Forecasting Systems
4.4.2.1   In operation
"[information on models in operational use, as appropriate related to 4.4]"

4.4.2.2   Research performed in this field
"[Summary of research and development efforts in the area]"

4.5 Specialized numerical predictions

[Specialized NP on sea waves, storm surge, sea ice, marine pollution transport and weathering, tropical cyclones, air pollution transport and dispersion, solar ultraviolet (UV) radiation, air quality forecasting, smoke, sand and dust, etc.]

4.5.1 Assimilation of specific data, analysis and initialization (where applicable)
4.5.1.1   In operation
As the initial information coming via AWP «Synoptic», NWP system by the air routes of Tashkent aeronautical meteorological station (TAMS) uses information in GRID code available from Washington by the initial terms 00 and 12 UTC from 12 to 48 hours in advance.

4.5.1.2   Research performed in this field
"[Summary of research and development efforts in the area]"

4.5.2 Specific Models (as appropriate related to 4.5)
4.5.2.1   In operation
NWP system by the air routes of Tashkent aeronautical meteorological station (TAMS) works in the operational regime. Twice a day four portions of forecasts (two for every initial term) are made in order to provide 6-hours overlapping of time of forecast force. From the Regional Specialized Meteorological Centre Tashkent to TAMS and the main airports of Uzbekistan (Samarkand, Bukhara, Urgench, Namangan, Termez, Nukus, AMSC Tashkent Vostochny) the telegrams with the forecasting data of meteorological parameters on the certain areas of air planes flight by internal and external airlines are delivered by the telecommunication channels. Wind and temperature forecasts are made by the heights from 1000 to 100 hPa as well as the parameters of tropopause and maximum wind. Servicing area covers different geographical directions of movement. In total 169 pieces of air routes are operational.

4.5.2.2   Research performed in this field
"[Summary of research and development efforts in the area]"

4.5.3 Specific products operationally available
"[brief description of variables which are outputs from the model integration]"

4.5.4 Operational techniques for application of specialized numerical prediction products *(MOS, PPM, KF, Expert Systems, etc..)* (as appropriate related to 4.5)
4.5.4.1   In operation
"[brief description of automated (formalized) procedures in use for interpretation of specialized NP output]"

4.5.4.2   Research performed in this field
        "[Summary of research and development efforts
        in the area]"
4.5.5 Probabilistic predictions (where applicable)

4.5.5.1   In operation
"[Number of runs, initial state perturbation method etc.]" *(Describe also: time range, number of members and number of models used: their resolution, main physics used etc.)*

4.5.5.2   Research performed in this field
"[Summary of research and development efforts in the area]"

4.5.5.3   Operationally available probabilistic prediction products

"[brief description of variables which are outputs from probabilistic prediction techniques]"

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

4.6.1 Models
4.6.1.1   In operation

Weather and statistic method of Multanovsky is used for making monthly forecast. The forecast includes average monthly temperature, anomaly of temperature and precipitation, diagram of the average monthly temperature and weather phenomena. The forecast of monthly temperature and precipitation anomalies with the lead time of zero is available via HMC of Roshydromet.

4.6.1.2   Research performed in this field
"[Summary of research and development efforts in the area]"

4.6.2 Operationally available NWP model and EPS ERF **products**
"[brief description of variables which are outputs from the model integration]"

4.7   Long range forecasts (LRF) *(30 days up to two years)*
4.7.1 In operation
"[Describe: Models, Coupled? (1 tier, 2 tiers), Ensemble Systems, Methodology and Products]"

4.7.2 Research performed in this field
Information database is created to study time series by 13 stations located by the administrative centres of the regions of the Republic of Uzbekistan for the meteorological parameters: declination from the norms of the average monthly temperatures, the average monthly temperatures, declination from the norms of the average monthly precipitation and the average monthly precipitation for 1992-2013.
Algorithm and package of programs for computers realizing the procedures of the wavelet transform were developed. Control testing and preliminary outputs of software operation are made.

Methodology of average monthly air temperature forecasts and assessment of forecasts success over the territory of Uzbekistan has been developed.

4.7.2 Operationally available EPS **LRF** products

"[brief description of variables which are outputs from the model integration]"

5.   Verification of prognostic products
5.1   "[annual verification summary to be inserted here]"

5.2   Research performed in this field
"[Summary of research and development efforts in the area]"

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, Long-range Forecasting and Specialized Numerical Predictions

"[Summary of planned research and development efforts in NWP, Nowcasting, LRF and Specialized Numerical Predictions for the next 4 years]"

6.2.1 Planned Research Activities in NWP

6.2.2 Planned Research Activities in Nowcasting

6.2.3 Planned Research Activities in Long-range Forecasting
It is planned to develop research methods of the dynamics of the average monthly temperature and monthly precipitation total on the territory of Uzbekistan on the basis of the spectral analysis for temperature and precipitation forecasts in different spatial and temporal scales.

6.2.4 Planned Research Activities in Specialized Numerical Predictions

7.   References
www.meteo.uz

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]"

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

"[Summary of planned research and development efforts in NWP, Nowcasting, LRF and Specialized Numerical Predictions for the next 4 years]"

6.2.1 Planned Research Activities in NWP

6.2.2 Planned Research Activities in Nowcasting

6.2.3 Planned Research Activities in Long-range Forecasting
It is planned to develop research methods of the dynamics of the average monthly temperature and monthly precipitation total on the territory of Uzbekistan on the basis of the spectral analysis for temperature and precipitation forecasts in different spatial and temporal scales.

6.2.4 Planned Research Activities in Specialized Numerical Predictions

7.   References
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