HISTORY AND PROSPECTS OF DEVELOPMENT OF NUMERICAL WEATHER PREDICTION METHODS IN KAZAKHSTAN.

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Attempts to introduce numerical hydrodynamic methods of weather forecast for the territory of Kazakhstan have been made more than 30 years ago, but due to a number of objective and subjective reasons, the work had not been brought to the stage of introduction into operational practice. In February 2010, the RSOE Kazhidromet made real strides and taken to develop a regional numerical weather prediction methods. A group, and work began on the adaptation and implementation of operational practices mesoscale model WRF (Weather Research Forecast).

WRF model created a team of scientists of the National Center for Atmospheric Research USA. It takes into account the shortcomings of previous models reduced the number of different modules, as well as simplified hardware configuration. Model WRF - a flexible and modern system modeling of the atmosphere. It takes into account the configuration of many computer systems and is therefore effective for high-performance computing cluster systems. Scope of WRF is vast - it is the weather forecast, modeling current and future climate change, pollution, simulation of real and idealized processes at scales from hundreds of meters to thousands of kilometers.

The current status: During 2010-2011. been improved forecasting process, carried out the selection of optimal parameters describing the subgrid-scale processes for the different seasons of the year, the number of output parameters and meteorological technology has improved the process of data visualization. Calculation of the weather forecast is made in three domains - the regions with the prediction resolution from 18 to 6 kilometers from the forecast up to 72 hours (Fig. 1).

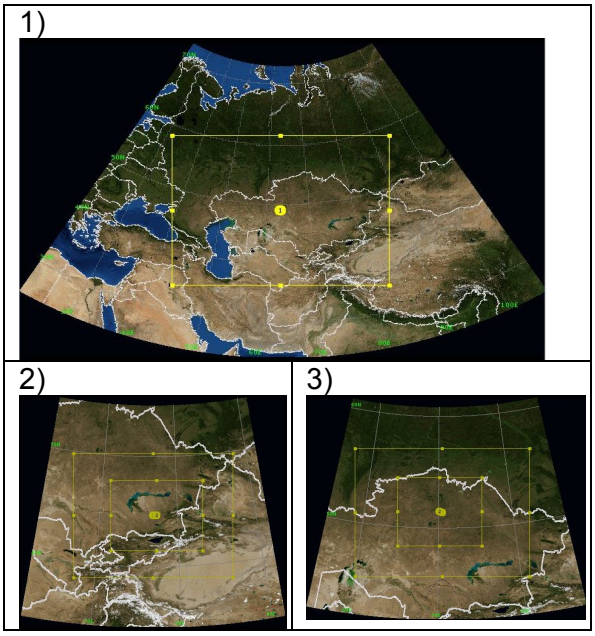

Figure 1: Regions predicting 1) Kazakhstan - the resolution of 18 km 2) south-east of the republic - the resolution of 6 km, 3) North of the republic - the resolution of 6 km. (grid spacing)

Currently, the field is calculated daily air temperature at ground level and at an altitude of AT 850GPa, the fields of accumulated precipitation and total precipitation in convective clouds scheme (for the warm half-year), the field of surface pressure, surface wind field, and his outbursts, the forecast horizontal

visibility at ground level , the field of surface and cloud AT500GPa, the first frost in the air and soil (autumn), dangerous heat (summer) and the danger of frost (winter), weather jet streams on the surface of AT500GPa. Also, wind speed is calculated to 4 regions: Astana, Almaty, Kokshetau Taldykorgan (Fig. 2).

During the Winter Asian Games 2011, to more accurate forecasts in mountainous areas, was carried out modeling of atmospheric processes over a territory covering the vicinity of Almaty, with a spatial step of 2 km.

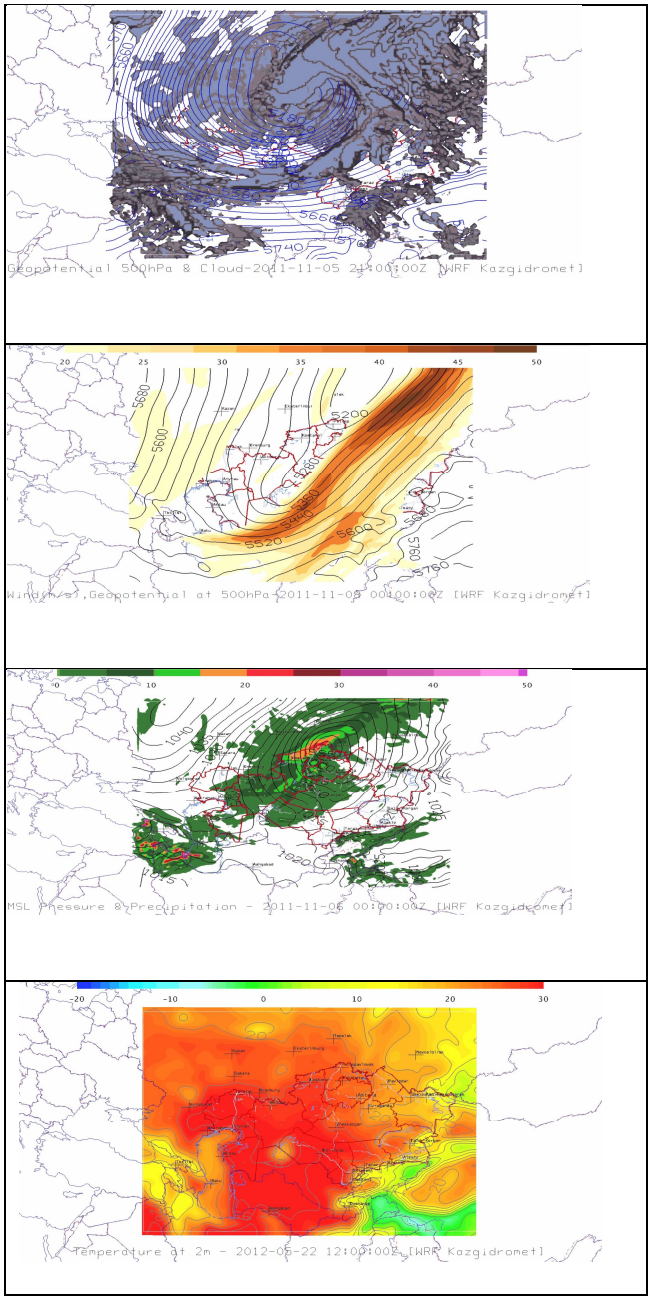

Figure 2: Examples of visualization of the calculated predicted fields of meteorological parameters.

NWP is used in all weather offices in the Republic of Kazakhstan. NWP is an additional resource for the compilation and refinement of the weather forecasts. Daily information is reported to the NWP, analyzed and taken note of the weather forecaster for the forecast.

The average accuracy of forecasts for the city of Astana, Kokshetau and g.Taldy-Korgan is 92-94%. The average percentage of forecasts for the city of Almaty is 88%, because the city is located in difficult topographical conditions of the foothill area and requires further investigation.

Plans for the future: In the near future we plan to carry out calculations of the main meteorological parameters for all areas and regional centers of Kazakhstan in advance 72 hours or more. Expected to improve the quality of the forecast due to expansion of the design scheme WRF model, updated with 2 dimensional and 3-dimensional interpolation of surface weather observations, upper air data and satellite data. With proper equipping and access to international databases of meteorological data is possible to calculate the medium-and long-term weather forecasts for the territory of Kazakhstan.