**Modeling of extreme wind velocities in the Western sector of the Russian Arctic.**

Extreme winds in coastal areas has fine structure and are strongly depend on shoreline configuration and local land surface properties, especially in the Arctic. Therefore, correct simulation of these wind patterns is possible using high-resolution modeling only. It allows detailed reproduction of low-troposphere atmospheric flows and taking into account many boundary layer properties.

In this study, the climate version of COSMO model (COSMO-CLM) was used. It is well-known non-hydrostatic regional atmospheric model developed by German Weather Service (DWD) and CLM-Community. The COSMO-CLM model was applied for many case-studies simulation of the most extreme winds observed over the Russian Arctic basin during the last 15 years. These extreme cases were sorted out previously from observations samples, based on the 0.99 quantiles of Weibull and Pareto distributions, i.e. the wind speed exceeded 20 – 25 m/s. Three cases were presented for further modeling: 29 – 30.10.2000, 26.01.2002 and 12.12.2013.

Model runs were performed for the unified ‘large’ domain with spatial resolution of 0.120, covered the Barents Sea, part of Kara Sea, northern European territory of Russia and the surrounding water areas. Driving conditions came from ERA-Interim reanalysis (~0.750 resolution). After that, the downscaling technology was performed for the different ‘small’ domains (resolution of ~2.8 km), inside the ‘large’ domain. Standard configuration of COSMO-CLM model (version 5.0) was applied: Runge-Kutta integration scheme with 5th advection order; 50 vertical levels for more detailed reproduction of boundary layer; prognostic TKE-based scheme for turbulence; standard Tiedtke convection scheme, etc. Runs continued for a week for the most cases including extreme situations observed near the middle of the period.

Analyze has shown that model reproduces the synoptic-scale dynamics and general wind velocity patterns well as both with the 0.120 km, and 2 – 3 km resolutions. However, model with 0.120 resolution has captured the fine structure of wind velocity pattern poorly, while model with 2.8 km succeed to reproduce detailed spotty wind pattern, caused by local orography or/and dynamic factors. On the one hand, the model underestimates observed mean values and wind gusts over seashores up to 4 – 5 m/s systematically. On the other hand, it could be interpreted as follow: such extreme speeds of air particles (15 – 20 m/s and more) does not make much physical sense for wind velocity at a certain point. Therefore, we can consider wind velocity values for a some area, according to the distance, corresponding to wind velocities.

Taking into account these reasons, we can ascertain, that COSMO-CLM model reproduces wind velocity pattern quite adequately, but using the resolution 5 km and less, only.