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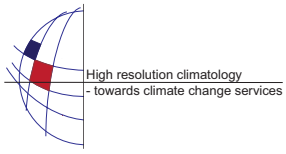

Numerical Weather Prediction Over Caucasus Region With Nested Grid Models

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Global atmosphere models, which describe the weather processes, give the general character of the weather but can't catch the smaller scale processes, especially local weather for the territories with compound topography. Small-scale processes such as convection often dominate the local weather, which cannot be explicitly represented in models with grid size more then 10 km. A much finer grid is required to properly simulate frontal structures and represent cumulus convection.
Georgia lies to the south of the Major Caucasian Ridge and the Lesser Caucasus mountains occupy the southern part of Georgia. About 85 percent of the total land area occupies complex mountain ranges.Therefore for the territory of Georgia it is necessary to use atmosphere models with a very high resolution nested grid system taking into account main orographic features of the area.
We have elaborated and configured Whether Research Forecast - Advanced Researcher Weather (WRF-ARW) model for Caucasus region considering geographical-landscape character, topography height, land use, soil type and temperature in deep layers, vegetation monthly distribution, albedo and others. Porting of WRF-ARW application to the grid was a good opportunity for running model on larger number of CPUs and storing large amount of data on the grid storage elements. On the grid WRF was compiled for both Open MP and MPI (Shared + Distributed memory) environment and WPS was compiled for serial environment using PGI (v7.1.6, MPI-version 1.2.7) on the platform Linux-x86. In searching of optimal execution time for time saving different model directory structures and storage schema was used. Simulations were performed using a set of 2 domains with horizontal grid-point resolutions of 15 and 5 km, both defined as those currently being used for operational forecasts The coarser domain is a grid of 94x102 points which covers the South Caucasus region, while the nested inner domain has a grid size of 70x70 points mainly territory of Georgia. Both use the default 31 vertical levels. We have studied the effect of thermal and advective-dynamic factors of atmosphere on the changes of the West Georgian climate. We have shown that non-proportional warming of the Black Sea and Colkhi lowland provokes the intensive strengthening of circulation. Some results of calculations of the interaction of airflow with complex orography of Caucasus with horizontal grid-point resolutions of 15 and 5 km are presented.
Also with the purpose of study behavior of nested grid method above complex terrain we have elaborated in sigma coordinate system short term prediction regional numerical model for Caucasus region. The results of computation carried out with one directional, two directional and new combined methods are given.