Regional climate studies using downscaling approach

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1. Contemporary General Circulation Models have a rather coarse spatial resolution and special downscaling approaches are needed for regions with complicated orography and nonhomogeneous surface. There are a number of such methods: empirical, statistical, dynamical, dynamical- statistical.

    In this report the results of developing and applying some of such approaches for the region of the South-Eastern Europe and the Black Sea are giren.

2. Canonical correlation analysis is applied to determine a optimal predictor of precipitation for the Black Sea region. The method proved to be efficient as the linear statistical approach adjusting multiple regression between free atmospheric variables and local precipitation.

3. Artificial neural net was developed for the nonlinear statistical downscaling approach. Results of modeling of dayly precipitation by such net show the better agreement with measurements of precipitation in comparison with data of linear regression and reanalysis of NCEP/ NCAR.

4. Model of space- time structure of near surface wind over the Black Sea was determined as one of the element of "weather generator". This method can be used as synthesis of wind time structure for giving income information in climatic wind-wave models.

5. Regional numerical atmospheric model MM-5 was adapted for the S-E Europe and Black Sea. This model give possibility to reveal and study small scale features of atmospheric fields. In particularly, the orography effects (Crimea and Caucasus) and effects of termical sea-land contrast were studied in details what was important for the explanation of variability of wind circulation in the Black Sea.