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Showers Simulation Study over Caucasus Region by WRF Model Based on Grid Computing

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The main goal of this paper is investigation of some singularities and specific features of atmosphere flows above the complex terrain of the Georgian territory, for prediction a regional scale dangerous events (heavy rains, hails) formation by different cumulus parameterization (CPSs) and micro physics (MP) schemes. To achieve the specified goal, we have used 3-D non-hydrostatic, non-stationary Weather Research Forecast - Advanced Researcher Weather (WRF-ARW) version 3.6 model. We have configured the WRF-ARW nested grid 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. Investigations required High Performance Computer systems. That is way we have ported the WRF-ARW application to the GRID site GE-01-GRENA in Georgia which is located at Georgian Research and Educational Networks Association (GRENA). As GRENA connected in European GRID infrastructure so it was a good opportunity for running model on larger number of CPUs and storing large amount of data on the grid storage elements. The ability of the WRF model in prediction precipitations with different set of these MP and CPSs was examined using two precipitation events occur on the territory of eastern Georgia for warm season of 2015. Two set of domains with horizontal grid-point resolutions of 6.6 and 2.2 km are chosen to represent complex topography in current research WRF v.3.6 model. Accumulated total (24 h) precipitations are evaluated by careful examination of meteorological radar and radio zoned data and simulated fields. Some results of the numerical calculations performed by WRF model are presented.

Short biography note

Prof./Dr. Teimuraz Davitashvili holds a 5-year Diploma in Mathematics (specialization Hydro-air Mechanics) from Tbilisi State University (1972). In 1985 he received the Ph.D and in 1997 the Doctor of Physics and Mathematics upon the doctoral thesis “Numerical Modelling of Some Problems of Atmosphere Physics for Mountain Regions”. Since 1972- researcher, senior researcher, head of department and currently head of laboratory of Mathematical Modelling and Numerical Analyses at Tbilisi State University. From 1994 to 1998 he was an Associate Professor and from 1999 to 2006 Full Professor of Tbilisi State University. He published about 130 research papers in various scientific journals and international conference proceedings. Dr. T.Davitashvili acted as manager or team leader in the following projects: Horizon2020VI-SEEM No. 675121.(2015-2018) GNSF No 09_614_5_210, 2010-2011; EXTEND No 251137 2008-2010; SEE-GRID-SCI, No 211338 , 2008-2010, ESMG No.1.01.81, 2005; WSF (2000-2001), (2002-2003), (2004-2005), (2006-2007). His general research interests are: applied mathematics, computational simulation of non-ordinary events, numerical modeling of environmental pollution, regional climate change, and weather forecast by numerical methods.

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