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Computer simulations of the atmospheric composition climate of Bulgaria

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Some extensive numerical simulations of the atmospheric composition fields in Bulgaria have been recently performed. The US EPA Model-3 system was chosen as a modelling tool. As the NCEP Global Analysis Data with 1 degree resolution was used as meteorological background, the MM5 and CMAQ nesting capabilities were applied for downscaling the simulations to a 3 km resolution over Bulgaria.
The TNO emission inventory was used as emission input. Special pre-processing procedures are created for introducing temporal profiles and speciation of the emissions. The biogenic emissions of VOC are estimated by the model SMOKE.
The numerical experiments have been carried out for different emission scenarios, which makes it possible the contribution of emissions from different source categories to be evaluated. The Models-3 “Integrated Process Rate Analysis” option is applied to discriminate the role of different dynamic and chemical processes for the air pollution formation.
The obtained ensemble of numerical simulation results is extensive enough to allow statistical treatment – calculating not only the mean concentrations and different source categories contribution mean fields, but also standard deviations, skewness, etc. with their dominant temporal modes (seasonal and/or diurnal variations). Thus some basic facts about the atmospheric composition climate of Bulgaria can be retrieved from the simulation ensemble.