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Preliminary results of hydrological impact studies for catchments of central and lower Danube basin – project CLAVIER

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Preliminary hydrological impact related results of the Project CLAVIER - CLimate ChAnge and Variability: Impact on Central and Eastern EuRope concerning mostly Hungary, Romania, and Bulgaria.The CLAVIER project is supported by the European Commission's 6th Framework Programme (contract number 037013) as a three-year Specific Targeted Research Project from 09/2006 to 08/2009 under the Thematic Sub-Priority "Global Change and Ecosystems".

The hydrological impact task of the project is aimed at the production of future hydrological scenarios based on the output of regional climate models. Analysis of the simulation results received by hydrological models serves as direct or indirect input for water management DSSs:

VITUKI-NHFS and VIDRA conceptual hydrological models were used to produce long term hydrological series. Mostly Tisza River Basin (the largest - by drainage basin size - tributary of the Danube) and its sub-catchments have been studied with special emphasis on Upper Tisza and Mures/Maros rivers. Separately the Arges basin drained by the lower Danube was also covered. The catchments comprising river systems are situated in various climatological and geo-morphological settings across the region.
The hydrological models used in CLAVIER project require 0.1 degree grid resolution meteorologial input data. Since the REMO 5.9 dataset was only available in 0.25 degree resolution, a downscaling procedure based on elevation distribution functions was performed by VITUKI in order to get a dataset in the needed resolution.
REMO5.9-ERA40 (1961 – 2000) and REMO5.9-A1B (1951 – 2050) produced by the Max Planck Institute for Meteorology, Hamburg was further processed. The original error corrected dataset was provided by WegCenter, Graz and INHGA, Bucharest.

Transient simulations were carried out covering the period 1951 – 2050. Validation was related to the period 1984 – 2000. The use of physically based models is supplemented with the application of a continuous stochastic simulation model (a hybrid Markov-chain type model – Szilágyi et al 2005) to produce climate effect reports for a the selected basins with different types of hydrological regimes and flood problems including the interaction of basins of different runoff production significance and the coincidence and superposition of flood waves.
Statistical characteristics of periods 1961-1990 and 2021-2050 were compared. Preliminary results indicate in most cases slight decrease of annual mean flow throughout the region, with significant spatial variability. Some new features in winter and spring flood behaviour are also detected.