ANALYSIS AND SIMULATION OF THE FLOW PROCESS OF THE ELBE RIVER

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Various aspects along the Elbe river depend on its streamflow process, especially during flood events. The description and the understanding of this process by statistical analyses and stochastic simulations are therefore required for further research activities, e.g., in the scope of the BMBF-research program 'Elbe-Ecology', as well as for a decision support concerning the river system, e.g., regarding actually discussed dike-shifting measures. One major task is the statistical analysis of the flood situation. Frequencies of extreme events are analysed at single gauges, spatially adjusted and regionalized as longitudinal sections aiming at a plausible overall picture. The analyses reveal that the flood situation changed significantly during the 20th century. It may be assumed that important factors are a climatological long-term variability and a human impact. The latter implies the installation of large reservoirs, especially during the 1950s/60s in the czech basin part, and diking measures during the second half of the 20th century along the german part of the river. Consequently the results strongly depend on the analyzed series lengths and are subject of an actual discussion. The evaluation of this problem and the contribution to an understanding of respon-sible hydrological processes is one of the goals of simulations of daily flow series by tools which are appropriate at the given scale and with the available information. The stochastic model of Treiber B. (1975) enables simulations of flow series of the Elbe river which are statistically equivalent to historical flow situations. A detailed diagnosis of simulated series versus measured series comparing also series of different time spaces is carried out with the aim of the identification and precise characterization of significant changes in the flow process. This may contribute to a proper determination of series representing the hydrological status quo to be statistically analyzed. Furthermore series of any desired length may be generated using the Treiber model. This enables a long-term evaluation of the status quo under various aspects, inspite of the lack of corresponding measured series lengths. The restriction of simulations on conditions of historical flow situations may be overcome by a better physical funding of the simulation technique. A simulation technique oriented to special hydrological process characteristics in the Elbe basin is developed. It implies non-linear precipitation-runoff dynamics as well as routing and retention processes along the watercourse. It shall contribute to an evaluation of the impact of climate-change scenarios and human activities.