



A water balance model for Saxonian catchments - present state and projections up to 2100

Peter Winkler, Corina Hauffe, Agnes Baldy, and Robert Schwarze
Institut für Hydrologie und Meteorologie, TU Dresden

The impact of climate change on the regional water balance regime may have severe consequences for agriculture, forestry and water resources management. In this respect the following questions arise: Will extensive irrigation be necessary on Saxonian crop land in future? Which are the necessary adaptations in water resources management? Are new agricultural and forestry concepts necessary?

Therefore, the project KliWES aims at modelling the present water balance regime for whole Saxonia (with the exception of the mining regions and the Elbe-corridor which is largely governed by flood events). Moreover, the effects of climate projections from the WetReg model (CEC) on the water balance regime have been investigated. The calibration strategy relies on splitting up the measured discharges into the major water balance components (evaporation, surface flow, subsurface flow and percolation) by a geometrical analysis of the hydrograph (DIFGA, Schwarze et al.). Thereafter, the water balance software ArcEGMO (Pfützner et al.) has been calibrated on these water balance components. Calibration parameters include correction factors for soil macroporosity, evapo-transpiration and the distribution factor between fast and slow groundwater components. Geological and Soil data have been drawn from official databases (LfULG). Subareas where no continuous gauge data are available have been parametrised by a regionalisation procedure relying on correlations between parameters and physical properties of the subareas considered. Possibilities and limitations of such a regionalisation procedure have been pointed out.

Focal point of the present study is an investigation of water balance components in different spatial and temporal resolutions. The Results of the model for the climate projections show drastic increase of evaporation and decrease of groundwater recharge especially in the north-eastern parts of Saxonia (Lausitz). Here, this problem is worsened by the predominantly sandy soils in this region. Therefore, the necessity of adapted agricultural strategies is evident. In the south-western parts of the country (Erzgebirge) the same trend is present, but in a more moderate way. The model results show that up to 2050 the changes are expected to be rather moderate, whereas from 2050 on the trend to water scarcity will dramatically increase.

References

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