Home
Online Library HESS
- Recent Final Revised Papers
- Volumes and Issues
- Special Issues
- Library Search
- Title and Author Search

Online Library HESSD
Alerts & RSS Feeds
General Information
Submission
Review
Production
Subscription
Comment on a Paper

Volumes and Issues | Contents of Issue 3 | Special Issue

Hydrol. Earth Syst. Sci., 11, 1145-1159, 2007
www.hydrol-earth-syst-sci.net/11/1145/2007/
doi:10.5194/hess-11-1145-2007

Estimates of future discharges of the river Rhine using two scenario methodologies: direct versus delta approach

G. Lenderink, A. Buishand, and W. van Deursen

Abstract. Simulations with a hydrological model for the river Rhine for the present (1960–1989) and a projected future (2070–2099) climate are discussed. The hydrological model (RhineFlow) is driven by meteorological data from a 90-years (ensemble of three 30-years) simulation with the HadRM3H regional climate model for both present-day and future climate (A2 emission scenario). Simulation of present-day discharges is realistic provided that (1) the HadRM3H temperature and precipitation are corrected for biases, and (2) the potential evapotranspiration is derived from temperature only. Different methods are used to simulate discharges for the future climate: one is based on the direct model output of the future climate run (direct approach), while the other is based on perturbation of the present-day HadRM3H time series (delta approach). Both methods predict a similar response in the mean annual discharge, an increase of 30% in winter and a decrease of 40% in summer. However, predictions of extreme flows differ significantly, with increases of 10% in flows with a return period of 100 years in the direct approach and approximately 30% in the delta approach. A bootstrap method is used to estimate the uncertainties related to the sample size (number of years simulated) in predicting changes in extreme flows.

Final Revised Paper (PDF, 823 KB)

Citation: Lenderink, G., Buishand, A., and van Deursen, W.: Estimates of future discharges of the river Rhine using two scenario methodologies: direct versus delta approach, Hydrol. Earth Syst. Sci., 11, 1145-1159, doi:10.5194/hess-11-1145-2007, 2007. Bibtex | EndNote | Reference Manager | XML

News
- Proposal for a Special Issue: Towards Theories that Link Catchment Structures and Model Structures

Recent Papers
01 | HESS, 26 Jul 2010: Measurements and modelling of snowmelt and turbulent heat fluxes over shrub tundra

02 | HESS, 26 Jul 2010: Tidal propagation in an oceanic island with sloping beaches

03 | HESSD, 23 Jul 2010: Reference crop evapotranspiration derived from geo-stationary satellite imagery – a case study for the Fogera flood plain, NW-Ethiopia and the Jordan Valley, Jordan