Submitted Abstract

ID IMC22-FSAbstr- 195

First Author First Name Last Name	 Ruth Stephan
Submitting Author First Name Last Name	 Ruth Stephan
Correspondence	ruth.stephan@hydrology.uni-freiburg.de
Co-Authors **>> E-Mails will be not listed**	Stahl, Kerstin
Organisations	Environmental Hydrological Systems, University of Freiburg, Germany

Country	Germany
Region	Western Europe
Title	Modelling Drought Impacts Based On The Alpine Drought Impact Report Inventory (Edii $_{a}$lps).
Keywords	Drought, Impacts, Model Predictions, Alpine Monitoring
Type	List Of Focus Session
Focus Session ID	48

Abstract

Across Europe's generally water-rich Alpine region the number of reports on negative drought impacts increased. They call for a more targeted transnational drought monitoring that goes beyond conventional climate and water monitoring. Therefore, the Alpine Space project "Alpine Drought Observatory (ADO)" develops an online monitoring platform across the European Alps to improve current drought monitoring, preparedness and adaptation. The ADO provides homogenized hydrological, meteorological, and remote-sensing data and calculates several drought indices identifying abnormally dry conditions. These conditions can trigger a range of harmful drought impacts that are typically hard to quantify in monetary terms. To gain a better understanding of past drought impacts across the Alpine region, the Alpine Drought Impact report Inventory (EDIIALPS) was established providing information of more than 3,200 reported impacts classified in various categories. Impacts are diverse, but agriculture and public water supply are most frequent affected sectors. This study uses the categorized impact information as a training dataset for statistical drought impact model development based on predictors from the ADO monitoring indices, incl. the Standardized Indices of precipitation (SPI), atmospheric water deficit (SPEI) or the Vegetation Health Index (VHI). The main aim is to evaluate the capabilities of different model types to predict drought impact occurrence at regions outside the training area and for forecasting in time. Due to seasonal differences of the occurrence of particular impact types, we grouped impacts into soil-moisture drought impacts and hydrological drought impacts. For these impact groups we applied regression models and random forest models predicting from the Northern region to Southern region and from the pre-Alpine region to the high-altitude region and vice versa. In addition, we applied the models to predict from the past to the future. The results suggest considerable potential for spatial prediction, but appear to be weaker for temporal forecasting specifically due to consistent underestimation of upcoming drought events with too few predictions of impact occurrences. This assessment of predictive model performance integrates hydrometeorological, remote-sensing data and reported impact data in various ways and thus, allows to gain a better understanding of the limitations and uncertainty of these coupled natural-human systems. The here developed impact-specific drought models could serve as a risk assessment at pan-Alpine scale, allowing to extrapolate to regions where impact information is scarce and may serve cross-regional learning.