Geophysical Research Abstracts
Vol. 20, EGU2018-18430, 2018
EGU General Assembly 2018

Atmospheric River (AR) induced floods in western Norway under current and future climate

Trine Jahr Hegdahl (1,2), Kolbjørn Engeland (1,2), Malte Müller (3), and Jana Sillmann (4)

(1) Norwegian Water Resources and Energy Directorate, Oslo, Norway (tjh@nve.no), (2) University of Oslo, Norway, (3) Norwegian Meteorological Institute, Oslo, Norway, (4) Center for International Climate Research, Oslo, Norway

Climate projections for Norway indicate warmer, wetter and wilder climate, raising new challenges for decision makers securing values and life from the impacts of extreme weather and floods. The majority of climate projection studies use ensemble simulations based on several global and regional climate models to obtain a range of probabilities for future floods. Translating Weather Extremes into the Future (TWEX) is a research project providing complementary event-based information to probabilistic future climate knowledge. The approach is to set the meteorological signature from an observed flood in the context of a warmer world. We use an Atmospheric River (AR) event in Western Norway 2014 as our reference. Western Norway is heavily exposed to intense precipitation due to orographic lifting when ARs reach the Norwegian coast. Such events cause some of the most devastating and costly floods in this region. The aim of this study is to investigate an AR-driven high intensity precipitation event, and compare the flood impact in a warmer future climate to current climate. We will further investigate flood sensitivity to initial soil saturation; caused by very wet, normal and very dry initial conditions.
To answer this, we use data from 10 ensemble members of an Earth System model (EC-Earth) under current and future climate, selecting high intensity precipitation events over western Norway. For selected events, the EC-Earth simulations are downscaled with a weather prediction system (AROME-MetCooP) to 2.5×2.5 km2 resolution, and fed into the operational Norwegian flood-forecasting model for selected catchments in western Norway. Hydrological initial conditions vary from dry to wet, using representative historical data to spin up the hydrological model. The flood levels will be compared, and the sensitivity to initial conditions will be evaluated. The results add information to stakeholders about the potential characteristics of future AR-induced flood-events. In addition, the sensitivity to initial soil saturation highlights how future climate (dryer or wetter) will influence soil conditions and further how this will affect the intensity of floods.