

Impact of atmospheric oscillations and climate change on snow-cover variability over Germany during the past century

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Flood events which affect each macro-scale river catchment of Germany simultaneously are of high relevance for insurances and flood protection planning. The analysis of river levels of the Rhine, Main, Danube, Elbe, Saale, and Weser River since 1920 revealed, that such Germany-wide floods occurred only during winter with a remarkable clustering of events in the 1940s. In the winter season, rainfall which accompanies the melt of accumulated snow in large areas is a key process in the generation of such floods. Understanding the processes which trigger large-scale snow cover helps to estimate the risk of Germany-wide winter flood events. Therefore, we investigate the temporal variability of snow cover during the past century with station data of the German weather service DWD. Only a few measurement sites have a good data coverage for the past 110 years. Thus, we also use dynamically downscaled ERA20C reanalysis data. The downscaling was performed with the regional climate model COSMO-CLM. We analyze possible correlations of the snow cover in Germany with internal climate variabilities, like the Arctic Oscillation or North Atlantic oscillation. An additional focus lies on the climate change with increasing wintertime temperatures during the last decades and its influence on Germany-wide snow cover.