



Climate drivers of temperature and precipitation extremes across Gansu Province in China considering climate shift

Dong An, Linus Zhang, and Yiheng Du

Division of Water Resources Engineering, Lund University, Lund, Sweden (dong.an@tvrl.lth.se)

Abstract: Temperature and precipitation extremes are the dominant cause of natural disasters. In this study, seven indices of extreme temperature and precipitation events in Gansu Province, China, were analysed for the period 1961-2017. An abrupt climate shift was recorded during 1980-81. Thus, the study period was divided into a preshift (before the climate shift) period 1961-1980 and an aftshift (after the climate shift) period 1981-2017. Comparison of mean extreme indices in the preshift and aftshift periods was adopted for the purpose of exploring possible increasing/decreasing patterns. A generalized extreme value (GEV) distribution was applied spatially to fit the extreme indices with return periods up to 100 years for preshift/aftshift periods. Singular value decomposition (SVD) was performed to investigate possible correlation between the extreme climate events and indices of large-scale atmospheric circulation. The results indicate that change in mean value and return period between the preshift and aftshift period varied significantly in time and space for the different extreme indices. Increase in extreme temperature regarding both magnitude and frequency for the aftshift period as compared to the preshift period suggests a change to a warmer and more extreme climate during recent years. Changes in precipitation extremes were different in the southern and northern parts of Gansu. The precipitation extremes in the north were enhanced that could result in more serious floods and droughts in the future. SVD analyses revealed a complex pattern of correlation between climate extremes and indices of large scale atmospheric circulation. Strengthening of westerlies and weakening of the south summer monsoon contribute to the complex changing patterns of precipitation extremes. Results in this study contribute to disaster prevention and water management in this area.
Keywords: Temperature extremes, precipitation extremes, frequency analysis, teleconnection patterns, Gansu Province.