EGU21-12550
https://doi.org/10.5194/egusphere-egu21-12550
EGU General Assembly 2021

Evolution of Dryness/Wetness conditions and their characteristics (duration and severity) across Upper Jhelum Basin, Pakistan

Rubina Ansari and Giovanna Grossi
University of Brescia, DICATAM, Department of Civil, Environmental, Architectural Engineering and Mathematics, Italy (r.ansari@unibs.it)

Global warming and anthropogenic activities have significantly altered the hydrological cycle and amplified the extreme events (floods and droughts) in many regions of the world, with associated environmental, economic, and social losses. For effective hydro extremes hazards management, it is significant to understand how climate change influences the occurrence, duration, and severity of the regional dryness/wetness conditions (droughts/floods). The present study was carried out over Upper Jhelum Basin (UJB) in Pakistan which lies in the western Himalaya, a most effected mountainous range by Climate Change. Firstly, a suitable gridded precipitation dataset was selected/chosen among various datasets (APHRODITE, CHIRPS, ERA5, PGMFD, MSWEP) through spatio-temporal comparison against in situ data at monthly, seasonal, and annual scale. Secondly, selected gridded data was adjusted for biases using linear (Linear scaling-LS, Local intensity scaling-LOCI) and nonlinear (Power transformation-PT and Distribution mapping-DM) statistical methods. Finally, standardized precipitation index (SPI) at multiple time scale was used to analyses dryness/wetness conditions in the Upper Jhelum Basin over a 35-year period (1981–2015). Results show the higher capability of ERA5 data to represent the UJB precipitation patterns with correlation coefficient (r=0.79) and normalized standard deviation (nSD=1.1), despite of overestimation especially during peak months. Regarding precipitation bias adjustment, all methods were able to correct the mean values while LOCI and DM take advantage over other two methods to correct wet-day probability and precipitation intensity. The SPI analysis at different time scales showed that wet periods occurred more in the first half of the study period, but at later years, drying periods ranging from moderate to severe continue to be seen with increasing frequency. A strong change in dry/wet conditions was observed around years 1997/1998. This change may be the result of the strongest El Nino event (1997-98) occurred in the history. However, further studies are still needed to check whether there is only a large multi-decadal variation or dry conditions will prevail in future. Overall, these findings would assist to better understand the changing pattern of extreme events with climate variability and help water resources managers to develop basin wide appropriate mitigation and adaptation measures to combat climate change and its consequences.