



Spatial and temporal assessment of Snow drought characteristic for 1981 to 2020 on Urmia lake catchment scale

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Snow plays a significant role in surface runoff, groundwater resources, and as an important temporary reservoir for winter precipitation. On the other hand, extreme floods can arise when high melt rates in catchments zone combine with torrential rain at the same time, therefore snowmelt quantities are important for the management of lakes.

This study aims at investigating snow drought characteristics in the catchment area of Lake Urmia, which has recently been faced with the issue of drought and declining water levels. To provide an overview of drought intensity for the last 40 years 1981-2020, the Standardized Snow Melt and Rain Index (SMRI), which accounts for rain and snowmelt deficits, was applied and spatial variations of snow drought were assessed. The index was used in drought analysis based on the ERA5 dataset for the whole study area under three-time scales including the 3-, 6- and 12-month. After determining the dry and wet periods, historical characteristics of droughts were identified, and spatial distribution maps of droughts were plotted.

Results show that during the last years, snow drought events were more frequent, severe, and affected a larger area which shows a spatial spread of drought events. According to the snow index results, most extreme events have happened in the Zarine Rud and Simine Rud sub-catchments which play a key role in increasing the groundwater resources of the Basin. With proper management, these resources can be properly used for lake revitalization.

Keywords: Snow droughts, SMRI, Drought characteristics, Urmia lake, Climate extreme