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Assessing the impacts of climate change on the snowpack and surface runoff by incorporating radiation parameter

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Climate change is one of the biggest environmental challenges that the world faces today and snow is one of the most important forms of precipitation in the hydrological cycle of mountainous regions of Iran. Regarding the effect of climate change on rainfall types and volume of snow packs in heights of the basin and their impact on the occurrence of long-term droughts, it is crucial to come up with solutions for optimal management of current and future water resources. In this research, possible future climate change, is investigated using the new climate scenarios (RCPs) and general circulation models (GCMs). Also changes in snow melting and runoff during the melting season, Changes in the volume of snow packs and snow cover in the future in the HezarMasjed watershed were investigated using Snow Melt Runoff Model (SRM). We also intend to improve the accuracy of the SRM model with a more accurate and more physically based estimate of the degree-day parameter by incorporating the radiation parameter of Daily net and other measurable parameters in the degree-day factor equation. In this study, the fifth assessment report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) and the Coupled Model Inter-comparison project (CMIP5) set together with new Representative concentration pathway (RCPs) scenarios within regional downscaling in the CORDEX framework are used. In the next step, the data from these models in two scenarios, RCP4.5 and RCP8.5, will be used as optimistic and pessimistic average scenarios respectively, which will be downscale in the CORDEX framework for climate change analysis. Furthermore, the climatic data will be used as input in the hydrological model of snow melt runoff (SRM) and the effect of climate change on snow covered area, snow melt and its runoff during the future years will be evaluated by considering a more precise degree-day factor. SRM uses two well established accuracy criteria; namely, the coefficient of determination and the volume difference for a more objective assessment of how well the simulation has been carried out. Utilizing the outputs of the model, the radiation parameter is added in the calculation of the degree-day factor without changing the conventional structure of the SRM model.