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Snow ablation and runoff in the southern High Atlas Mountains of Morocco

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As snow melt from mountains in semi-arid regions is suggested to be a major water source for river runoff and water delivery to the even drier forelands, the analysis of snow ablation processes and runoff data in the area under investigation advises a differentiated view. Results from field research as well as from physical and conceptual modelling indicate that in zones of lower altitude climatic conditions cause snow melt throughout the winter, while in the upper zones between 3000 and 4000 m the snow cover underlies alternating melt and remarkable sublimation processes. Hydrograph analysis at the border of the mountain area shows a minor influence of springtime snow melt on river runoff. Continuous base flow indicates slow water movement during the year. Increased runoff occurs only immediately after heavy rain and snow falls. Water of little rain or snow fall events evaporates directly and therefore does not produce runoff. Considering the constellation of snow ablation processes in the southern High Atlas Mountains, the consequences of climate change for water availability are divers and quantification is in the early stages. Raising temperatures and snow lines are going to decrease the portion of snow while evaporation is enhanced and the potential area of sublimation is reduced. Higher intensity of rain fall produces more direct runoff that leaves the mountains and is stored in reservoirs where evaporation takes place. The consequences of this shift between the storage as snow in the mountains and as water in the foreland's reservoirs are crucial for the population in a region that is already under water stress.