Influence of climate change predictions on snow in Sierra Nevada Mountains (Spain)

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Snow is a basic component in Earth's surface energy balance. Its importance is greater in mountainous areas and therefore, its study is crucial to obtain conclusion about water resources over these areas. Moreover these regions are more vulnerable to climate variations. Sierra Nevada National Park (Southern Spain), with altitudes range from 2000 to 3500 m.a.s.l., is part of the global climate change observatories network and a clear example of snow regions in a semiarid environment. This work estimates the impact of climate change on snow dynamics and its influence on mountain hydrology in this area. Precipitation and temperature datasets from three different scenarios (A1B, A2, B1) proposed by the Fifth Assessment Report of IPCC (Intergovernmental Panel on Climate Change) were used as forcing meteorological sequences to simulate selected snow variables (snow water equivalent, daily snow cover area, annual number of days with snow and annual snowmelt and evaporation volumes). The associated results were compared for each scenario, and the snow behavior and evolution over the 2046-2100 periods were assessed. The results point to a higher decrease on snow cover extension, than those estimated for other snow variables. As expected, this variation is greater from the worst of the scenarios analyzed (A2). Furthermore, the comparison of the driving meteorological datasets throughout the reference period (1960-2000) with the real observations has allowed the introduction of another term of uncertainty in the estimations, not considered in a simple scenario analysis.