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Impact of climate change on runoff timing over the Hindukush Karakorum Himalaya (HKH) region using CORDEX-CORE scenario simulations

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Hindukush Karakorum and Himalayan (HKH) is a unique region with a vast number of glaciers and lies in the north of the South Asia landmass, which serves as the main reservoir for the South Asian freshwater resources. By using CORDEX-CORE downscaled simulations with ICTP Regional Climate Model (RegCM4.7) the climate change impact on the water resources of the HKH region is analysed. HKH contains Indus, Ganges and Brahmaputra water basins, which are feed from both snow as well as precipitation. Due to the temperature increase over this region, the snowmelt timing will be affected, and therefore the snowmelt driven runoff (SDR) in the whole HKH basin. This effect will be combined with the projected increase of precipitation and in particular convective precipitation mostly due to extreme precipitation increase. As a result for the whole HKH basin, the water year will be longer with a shift (negative) toward the earlier months of the year of the time when the 25th (~2-3 months), 50th (~1 month), and 75th (~1 month) percentile of the total runoff is observed in a certain point, in the upper part of the basin and a positive shift (~10 days) in the lower part of the basin for the 50th and 75th percentile. The results show that the Indus basin is the one most affected by the snow melt time change followed by the Brahmaputra and Ganges as the last one. This study indicates that changing climate may result in a shift in the discharge timing over the HKH region and this information may be crucial for planning the mitigation and adaptation actions like for example building dams, changing dam regulation options, and changing agriculture strategies.