High-resolution global climate modeling for the Himalayan region

With a consistent warming trend in surface temperature, changes in precipitation pattern and increase in weather extremes, the Hindu Kush-Himalaya Mountain Ranges perceive climate change signals profoundly from the second half of the twentieth century. This talk will be giving a brief overview of the status of climate change over the high mountainous ranges and examine the state of the art climate models providing consensus views in the observed and projected future changes in a warming world. We are exploring the information from CMIP5, dynamically downscaled CORDEX-SA (50km), statistically downscaled NEX-GDDP (25km), variable resolution simulation from LMDZ (35 km over SA) and High-Resolution IITM-GFS (27km) in this study, to understand the sizeable spatial heterogeneity in precipitation and temperature-related indices over this complex mountainous belt. High-resolution climate models show specific value addition compared to the coarse resolution CMIP5 models and are more skilful in simulating observed patterns and changes in the present day climate. The simulations hint a possible anthropogenic induced warming over the Hindu Kush Himalaya which is likely to be at least 2.5 to 4.5 °C warmer than present, by the end of the 21st century. The extreme precipitation due to the increased WD activity may positively contribute to glacier mass gain over the western Himalaya compared to the other Himalayan sectors. Even though there is considerable inter-model spread, the consensus among different projection strategies gives confidence in the projected increasing signal in mean (30-50%) and extremes (15-30%) in precipitation by the end of the 21st century, which will have severe cryospheric and hydrological implications in socio-economic conditions of billions of life in South Asia.