

Exploring the climate and hydrology of the Upper Indus Basin using the High Asia Refined Analysis

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Understanding the sensitivity of hydrology to climatic variability and change in the Upper Indus Basin (UIB) is critical for local, national and regional water resources management in western South Asia. Significant progress towards this goal has been made in recent years, but large uncertainties remain regarding spatial and temporal patterns of climatic variation and their controls. This issue presents a substantial challenge for assessments of cryospheric and hydrological sensitivities in the basin. The problem is explored here by analysing the High Asia Refined Analysis (HAR), a relatively high resolution dynamical downscaling of coarser global analysis using the Weather Research and Forecasting (WRF) model. Comparison with climatic and hydrological observations and remote sensing data indicates that the HAR captures a number of key features of the basin hydroclimatology. Some biases and errors are inevitably present, but the analysis so far suggests that the HAR may provide physically plausible insights regarding distributions of key climatic variables at the sub-basin scale. Preliminary hydrological modelling results show that the HAR has the potential to be useful in model-based studies of water resources and climatic sensitivities in the UIB.