

*Initial steps toward areal transformations of point observations for precipitation and temperature in subcatchments of the Upper Indus Basin*

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Water from the Indus and its tributaries is the dominant supply source for Pakistan's irrigation, domestic consumption and hydropower demands. Solid precipitation and subsequent melt in the high mountains of the Karakoram and the contiguous Hindu Kush and Western Himalayas generates much of the runoff in the Indus Basin. Accurate and reliable forecasting of the Upper Indus Basin (UIB) river flows will be essential in developing effective strategies to minimise harmful impacts of hydrologic variability and optimise physical and economic returns from available water resources, particularly under changed climate conditions. In order to develop this forecasting capability, new research seeks to establish links between large-scale atmospheric circulation patterns, local climate and hydrology in the Karakoram.

An important network of climate stations located in major UIB tributary valleys has been recording temperature and precipitation for several decades. In the mid 1990's an additional network of automatic weather stations (AWS) was installed to observe conditions at higher elevations within the catchment. Building upon previous studies utilising this data, the new work has begun to investigate the spatial implications of seasonal variations and recent anomalies in temperature and precipitation. Annual cycles in temperature variation along with trends suggested by recent anomalies have significant implications for available energy inputs to the snowmelt processes to be forecast. Spatial patterns in precipitation specific to subregions of the UIB and correlations between observed precipitation by valley and high altitude (AWS) stations could yield readily derivable water-equivalent estimates for areal accumulation of precipitation. These areal transformations of point observations are essential to developing user-appropriate empirical forecasting tools for local decision makers. The results of initial steps in developing these areal transformations are presented here.