**Abstract**

Winter-to- early spring precipitation in the western Himalayas (WH) primarily
comes from eastward propagating weather systems from the Mediterranean region
commonly known as western disturbances (WDs). Observations indicate that the frequency
of precipitation extremes in the WH has been on a rise during the recent decades. Further, itis also reported that non-monsoonal winter precipitation is crucial for protecting the
Karakoram-centered WH from significant snowmelt under warming climate. Yet, the large-
scale dynamical controls on the non-monsoonal wintertime precipitation response to
climate change are largely unclear. This issue is examined in this study using long-term high-resolution climate change simulations with and without anthropogenic forcing elements
(i.e., GHG, aerosols, land-use / land-cover change). The present results indicate that the
rising trends in surface temperature over the Himalayan region during the 20th century are
largely attributable to anthropogenic effects. It is also seen that the rising trend of simulated
precipitation extremes over the WH region concur with enhanced amplitude variations in
the WD activity in response to changes in the background upper-level subtropical winds and
mid-tropospheric temperature gradients over the Tibetan highlands. It is interesting to note
that the high-resolution simulation which includes anthropogenic forcing shows
enhancement of WD activity and associated snowfall amounts in the high elevations of the
Hindu Kush and Karakoram ranges in the WH, although a declining tendency of snowfall is
noted in the central and eastern Himalayas associated with increased surface warming.