Abstract:
Western disturbances (WDs) are synoptic-scale weather systems embedded within the subtropical westerly jet. Manifesting as upper-level troughs often associated with a lower-tropospheric low over western or northern India, they share some dynamical features with extratropical cyclones. WDs are most common during the boreal winter (December to March), during which they bring the majority of precipitation – both rain and snow – to the western Himalaya, as well as to surrounding areas of north India, Pakistan, and the Tibetan Plateau. WDs are also associated with weather hazards such as heavy snowfall, hailstorms, fog, cloudbursts, avalanches, frost, and cold waves.

In this talk, I will review recent developments in understanding WDs and their impacts. This talk is separated into six main sections – structure and thermodynamics, precipitation and impacts, teleconnections, modelling experiments, forecasting at a range of scales, and paleoclimate and climate change. Use of new modelling frameworks and tracking algorithms has significantly improved knowledge of WD structure and variability. I will discuss their interaction with the summer monsoon – particularly pertinent given this year's extreme weather. I will end by summarising unresolved questions and outlining key future WD research topics.