Monitoring of the Himalayan and Arctic Cryosphere: a multidisciplinary approach through in-situ observations

Various studies on the Himalayan glaciers have been recently initiated as they are of particular interest in terms of future water supply, regional climate change and as well as the catastrophic mountain hazard such as glacial lake outburst floods. In 2002, a long-term monitoring program was initiated on Chhota Shigri glacier in Himachal Pradesh for multidisciplinary studies under the framework of DST, Govt. of India. The glacier is now recognised as one of the best-studied glaciers as a climate change indicator having the longest record of in-situ glacier mass balance dataset in Hindu-Kush-Himalayan region. So far, our results reveal that the Chhota Shigri glacier has lost a mass of ~7 m w.e. (-0.53 m w.e. yr-1) over the last decade. The timing and intensity of snowfall events during the summer monsoon season play a key role on controlling the annual mass balance of the glacier in the western Himalaya. The lower ablation part close to 4425 m a.s.l. (excluding debris-covered area) experienced the highest melting throughout the entire measurement period (since 2002) with cumulative value of ~50 m w.e. at Chhota Shigri glacier

Over the time we have expanded our network to monitor few more glaciers to understand the influence of different climate regime and circulations such as Indian summer monsoon and mid-latitude westerlies. We have initiated the monitoring of long-term mass budget for Patsio glacier (Himachal Pradesh) since 2010, Stok glacier (Ladakh, J&K) since 2015, Lato glacier (Ladakh) since 2018 and one glacier in Eastern Sikkim. Besides the Himalaya, we are a part of national polar glacier research programme under which Vestre Broggerbreen and Feiringbreen glaciers in Svalbard, High Arctic have been taken up for long-term monitoring.