



## From Mediterranean storms to Karakoram waters

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Mediterranean storms may have effects that go far beyond the Mediterranean basin. In the Karakoram mountain range and the upper Indus basin in Pakistan, precipitation takes place mainly in winter and it is associated with the arrival of “western weather patterns” originating from the Mediterranean and the Middle East. Owing to this circulation, Karakoram glaciers receive their water input in winter and melt in summer, similarly to what happens in the Alps and quite differently from the monsoon-controlled dynamics in the eastern stretches of the Himalayas.

In the Karakoram, glaciers and snow melt contribute a large fraction of Indus waters. To assess the availability of water resources in this area, it is thus necessary to monitor and understand the relationships between precipitation, snowmelt, glacier response and runoff. This is especially important in view of the ongoing climate and land use changes and of the possible variations in the interaction between monsoons and western weather patterns. Modifications in the hydrological regimes in this region, both in terms of floods and droughts, can be rather dangerous owing to the presence of an extended artificial irrigation systems which depends on Indus water.

The French-Italian project PAPRIKA is devoted to addressing some of these topics, with a specific focus on the effects of atmospheric aerosols (black carbon in particular), on cryospheric responses and on water availability in the upper Indus basin. In this talk, some of the results obtained so far on atmospheric aerosols and on precipitation properties in the Karakoram area are reviewed, considering satellite data, meteorological reanalyses and in-situ measurements provided by two Automatic Weather Stations placed at high elevation near the Baltoro glacier. The discussion will then widen to include some general issues related to the hydrological cycle in the Hindu Kush – Karakoram – Himalaya range, its monitoring and numerical modelling.