



Light-absorption of dust and elemental carbon in snow from Sunderdhunga Valley, Indian Himalaya

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In most conditions the absorption of short-wave radiation is the dominant energy source for melting snow and ice. Light-absorption in snow is largely dependent on the surface albedo, which is mainly regulated by the snow grain size, and the presence of light-absorbing impurities (LAI). The Himalaya is an area experiencing exceptional cryospheric changes, which has detrimental effects for many nations that depend on glacier meltwater as a fresh water source. With a close proximity to different emissions of LAI, glaciers in the Himalaya have been observed to be affected by the deposition of LAI. The extent that LAI is affecting the Himalayan cryosphere remains unresolved due to a scarcity in measurements. Here, snow samples from two glaciers in the Sunderdhunga Valley, Uttarkhand, India, are investigated for their content of main LAI components, mineral dust and elemental carbon, using a filter-based thermal-optical and an additional optical method. The EC concentration in snow samples has a seasonal temporal pattern and are in the same range as previous reported values from the Chinese side of the Himalaya. The light absorption from mineral dust in the snow samples sometimes exceed 50%, highlighting the importance of dust in this region of the Himalaya.