



Documentation of a significant increase of debris cover on Eastern Alpine glaciers

Andrea Fischer (1), Bernd Seiser (1), and Christian Mitterer (2)

(1) Austrian Academy of Sciences, Institute for Interdisciplinary Mountain Research, Innsbruck, Austria
(andrea.fischer@oeaw.ac.at), (2) Verein Gletscher-Klima, Innsbruck

Changing debris cover changes the sensitivity of glacier mass balance to atmospheric forcing by changing albedo and insulation. It is evident from historical documents, photographs and glacier inventories that the debris cover of Austria's glaciers significantly increased during the last decade. Several glaciers ended up completely covered by debris between the 1980s and today.

For about 100 glaciers, regular photographic documentation of the debris cover of the glacier tongues is available in the archives of the Austrian Alpine Club. These data show an increased debris flow from side moraines towards the glacier tongues, a broadening of the medial moraines, as well as a shift of the medial moraines' onsets to a higher elevation. In extreme cases, as the well documented example of Litzner Glacier in the Silvretta group shows, the debris covered nearly the entire glacier area within few decades, first increasing and later decreasing ice ablation with increasing thickness of the debris cover. The documented reasons for the increased debris cover include increased rock fall and mud flow activity as well as high ELA, with transport of basal and intraglacial debris and sediments up to the surface, and significantly reduced ice flow velocities. The transportation of basal or internal debris to the glacier surface alters the backscattering properties, even in areas where superficial debris is not deposited directly from periglacial areas.

The development of debris cover and dead ice between 1969 and 2006 is also evident from the glacier inventories and will be further analysed to quantify the effects of the increased debris cover and the statistics of glacial recession as an important geomorphological parameter.