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Ice core moraine collapse at Forni Glacier (Italian Alps): a case of tourist risk

M. Belò (1), C. D'Agata (1,2), C. Smiraglia (1,2) and M. Pelfini (1,2)

(1) "Ardito Desio" Earth Sciences Department - University of Milan, (2) Italian Glaciological Committee

High mountain environment is nowadays subjected to strong modifications as direct consequences of the dramatic ongoing global Climate Change. In addition in this environment the human activities are reaching the highest elevations: trekking, climbing activities, skiing, and man-made infrastructures are developing over the mountain chains all over the world. On the Italian Alps an interesting case of increasing tourist risk following the glacier shrinkage is offered by Forni Glacier, the largest Italian valley glacier (13 Kmˆ2). One of the most evident events affecting the Forni Glacier proglacial area is the degradation of the LIA moraine ridges. In particular this is occurring on the hydrographical right side where the LIA moraine is collapsing because of the melting of its ice core. The ice core melting activates debris and mud-flows resulting in a wide landslide. The LIA moraine ridge in the right hydrological side of Forni Glacier is crossed by a popular glaciological trail named Sentiero Glaciologico del Centenario realized in 1995. The path is ring-shaped and in its earlier version it started downvalley, it run on the right hydrological side of the Forni valley, it crossed the glacier tongue and it run down along the left hydrological side of the valley. In summer 2005 the Sentiero Glaciologico del Centenario had to be closed, in fact the deep changes affecting the glacier tongue (now highly crevassed and characterized by a steep ice-cliff and an increasing ice-contact lake) and the LIA right lateral moraine discouraged its use by tourists. To monitor the collapse of the ice-core moraine several surveying campaigns by means of optical total station started since the summer season 2003 up to now. A small local network of control points was realized on the LIA moraine ridge area and some benchmarks were also located outside the proglacial area, as reference points for stationing the optical total station used in surveys. Some big boulders were also marked in order to check the land slide velocity. Then the data

obtained were used for calculating Digital Terrain Models of the study area. From comparisons and cross sections analysis of the surface models obtained, it was possible to establish the volume changes occurred in the study periods (summer 2003 and 2005).

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