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Surface and volume changes of Lys Glacier (Monte Rosa, Italian Alps)

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This contribution deals with the surface, thickness and volume changes occurred during the last thirty years (1975-2005) at Lys, a valley glacier located in Aosta Valley (Mount Rosa, Italian Alps). Lys Glacier, at 9.6 km2 the fourth largest Italian glacier by area, has been studied for terminus fluctuations since the beginning of the past century and several historical maps describing its surface and altimetry were drawn during the last two centuries. Moreover aerial photographs are available to process DEMs and orthophotos useful to calculate glacier's variations. The surface area of the supraglacial debris cover on the Lys tongue is growing, which is causing a deep change of Lys Glacier making the ablation sector an actual debris covered tongue and it increases the interest for studying the recent evolution of this glacier. To evaluate the geometry changes of Lys Glacier different methods and techniques have been used: processing of aerial photographs (to calculate DEMs and orthophotos), analyzing of large scale maps by GIS software and field surveying (by DGPS to collect updated data of glacier surface and altimetry). It resulted that the surface area reduction between 1975 and 2003 was equal to c. -10% of the 1975 value and in the same time frame the supraglacial debris cover was increased of c. 50% respect to the 1975 datum. The volume changes were calculated both respect to the whole glacier surface and to the glacier tongue: it resulted that between 1975 and 1991 considering the whole glacier a light volume increase occurred and it was followed by a decreasing phase which causes a glacier reduction of c. - 2.5 * 10ˆ6 m3 in the period 1991-2003. The glacier tongue instead during the period 1975-2005 lost a volume of c. -13 x 10ˆ6 m3 equal to a thickness reduction of c.- 30 m. the tongue of Lys. Moreover, by the elaboration of the literature data about terminus fluctuations, it resulted that the glacier retreated

of c. 600 m in the period 1915-2004.

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