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The ongoing shrinkage phase of lombardy glaciers. Some results from the new glacier inventory

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During the present phase of climate change Alpine glaciers are modifying strongly their surface with heavy consequences on the mountain landscape and they are also reducing themselves as water resources. So are becoming more and more important studies and researches devoted to quantify the glacier reduction and the actual distribution and dimension of Alpine glaciers. This contribution focuses on the quantification and evaluation of the Lombardy glacier resource. By the analysis of aerial photographs taken in 1999 (Italia Flight Data, 2000) it has been possible to calculate the geometric and topographic parameters used for evaluating the surface and volume glacier reduction. By the aerial photograph analysis (through GIS software) 340 glaciers have been found on the Lombardy Alps. For 34 glaciers bodies (equal to 10% of the total amount) it was not possible to define the main geometric features because of the hard snow cover conditions characterizing the photographs and covering the glacier boundaries; 24 glaciers (equal to 6% of the total) have been classified as “no detectable” because their surface area was minor than 10,000 m2; 20 glaciers (equal to 9% of the total) have been defined as “extinct glaciers” according to the findings of the previous Lombardy inventory (SGL, 1992). In this study we identified also 6 newly formed glaciers following the fragmentations of larger older ones. The new glaciers so found have been identified by an alpha-numeric code (according to the WGMS suggestions for WGI) and if their surface areas were larger than 10,000 m2 they has been classified as new glaciers. So considering only the glaciers characterized by an area larger than 10,000 m2, not to be classified before as extinct and those ones detectable by aerial photographs (no heavy snow cover), we had a glacier sample representing the Lombardy cryosphere equal to 256 glaciers (that is to say the 75%

of the total amount) covering a surface area of 104 km2. On the previous inventory (SGL, 1992) the glaciers analyzed were 334 covering a surface area of 119 km2; if we consider only the 256 glaciers detected also in the new glacier inventory they in the past inventory covered a surface of 117 km2. The evaluated surface variation for the period 1992-1999 for the studied 256 glaciers is equal to 13 +/- 2.7 km2 (that means between -9% and -14% of the previous value). The thicknesses and the volumes of Lombardy glaciers have been estimated by analytical methods (Haberli & Holtzle , 1995). The data obtained allowed to calculate the volume and thickness variations between 1992-1999 and to estimate the corresponding water equivalent value. From the data obtained by aerial photographs analysis, the total glacier volume is 4.7 km3+ 0.026 km3 of ice (equal to 4.3 km3 + 0.024 water equivalent). The volume variation between 1992-1999 is comprised between - 0.57 km3 and - 0.62 km3 of ice (equal to -11% and -12% of the previous value). According to these results the survival time of the Lombardy glaciers could be reduced to less than one century, this is obviously a raw broadcast considering stable in the future the present Climate and constant the calculated glacier reduction rate.