



Mass balance of Nef glacier (Patagonia) by means of laser altimetry

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Glaciers of Southern Patagonia Icefield (SPI) and Northern Patagonia Icefield (NPI) have shown an enhanced wasting and an increased melting in recent decades, mainly in reaction to regional warming. In consequence, water resources originating from those glaciers are also affected by their negative mass balance. Mass balance measurements provide information about the mass changes of both the accumulation and the ablation zones. A main limitation in attempting estimations of glacier mass balance of the NPI (4,197 km²) and the SPI (13,000 km²) is the difficulty in performing field observations, particularly within the accumulation areas, largely because of unfavourable meteorological conditions as well as the limitations due to the large size of the icefields. There is thus a need for carrying out detailed analyses of individual representative glaciers in Patagonia, covering both the ablation and accumulation areas.

The Nef Glacier (138 km² in February 2005), is one of the largest and most representative glaciers of the eastern side of the NPI. During the last century it has been retreating and losing mass, and its evolution has been similar to other large glaciers of the NPI. Moreover, the Nef River is one of the most important tributaries of the Baker River, the largest drainage basin in the region and the river with the highest discharge in Chile.

In this paper we present results of mass balance (2008 – 2009) of Nef glacier estimated using the geodetic method, where Digital Elevation Models (DEMs) of the glacier constructed at different dates are compared. The DEMs have been constructed using data from airborne laser altimetry with CECS Airborne Laser Scanner (Wendt et al., 2008), which has the advantage over airborne photogrammetry that it involves less data processing and practically no ground control, yielding excellent sub-meter precision.