Geophysical Research Abstracts, Vol. 9, 04565, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04565

Study of Ice Mass Balance of Horseshoe Valley, Patriot Hills, Antarctica

A. Wendt (1), G. Casassa (1), A. Rivera (1,2), L. Araya (3,1) and J. Wendt (1)

(1) Centro de Estudios Cientificos, Valdivia, Chile, (2) Departamento de Geografia, Universidad de Chile, Santiago, Chile, (3) Centro de Estudios e Investigaciones Militares, Ejercito de Chile, Santiago, Chile

Horseshoe Valley (80°18'S, 81°22'W) is a semi-enclosed glaciated valley surrounded by the southernmost hills of the Ellsworth Mountains. Despite of its rather small extent the valley is a good indicator of climate-related mass balance changes because of its vicinity ($\sim$ 50 km) to the grounding line at the Ronne Ice Shelf, and the close presence of rock outcrops adequate for deploying a base GPS station for detailed repeat measurements of ice elevations and ice velocities. Since 1995 various field campaigns have been carried out to study the ice mass balance within the valley. The first survey of a stake network was realised by optical measurements in 1995. In 1996 the grid was extended to cover the entire width (30 km) of the valley with a separation of 1 km between the sites and all stakes being surveyed by GPS. The re-survey of the network in 1997 revealed ice flow velocities in the order of 20 m/a and indicated no significant ice elevation change considering a height error of few decimetres. In 2006, a kinematic GPS survey was conducted to reconstruct the snow surface elevation around the sites of the already disappeared stakes. For this purpose a regular net of a radius of 80 m was driven by a snowmobile equipped with dual-frequency GPS allowing for a high number of crossovers while still keeping a low survey time for each point. This approach enables to parameterise the surface and to interpolate an elevation value at the location of the disappeared stakes. Due to the longer time span (2006-1997 vs. 1997-1996), derived elevation change rates are more reliable, but still show no significant change considering the relatively large errors of $\sim$ 0.5 m in elevation in the survey of 1997. For the International Polar Year season 2007/2008 we propose to continue this study by re-surveying the glacier using the same kinematic GPS procedure to ensure consistent data sets for the derivation of ice elevation changes in Horseshoe Valley.