Geophysical Research Abstracts
Vol. 12, EGU2010-13546, 2010
EGU General Assembly 2010

Glacier dynamics after the disintegration of Wordie Ice Shelf, Antarctic Peninsula

Anja Wendt (1), Francisca Bown (1,2), Andrés Rivera (1,2,3), Jens Wendt (1), Rodrigo Zamora (1), Claudio Bravo (1), Pablo Zenteno (1), Gino Casassa (1), Jorge Carrasco (4), and Juan Quintana (4)

(1) Centro de Estudios Científicos, Valdivia, Chile (awendt@cecs.cl), (2) Centro de Ingeniería de la Innovación del CECS, Valdivia, Chile, (3) Universidad de Chile, Santiago, Chile, (4) Dirección Meteorológica de Chile, Santiago, Chile

The retreat of Wordie Ice Shelf in the 1980s was the first recent episode in a series of ice-shelf collapse events which culminated in a substantial break-up of Wilkins Ice Shelf in April 2009. This widespread behaviour of ice shelves in the Antarctic Peninsula has been attributed to atmospheric and oceanic warming. While atmospheric warming leads to a prolonged melt season and increased melt ponding, oceanic warming increases bottom melting eroding ice shelves from below. Glaciers feeding into these ice shelves are known to accelerate because of the loss of the buttressing force the ice shelf exerted. Although the loss of the ice shelf itself does not contribute to sea level rise, the increased glacier outflow results in a surface lowering of the grounded glaciers associated with a mass loss and a positive contribution to sea level.

Based on remote sensing, airborne and in-situ data collected during 3 recent field campaigns, we study the behaviour of glaciers flowing into Wordie Bay and its relationship to ice-shelf history and local meteorological conditions. Satellite images from different optical and radar sensors (ASTER, Landsat, ERS, and Envisat) were used to map the ice-shelf extent throughout recent years and show an almost complete disappearance of Wordie Ice Shelf. The comparison of surface elevations acquired by airborne laser scanning on Fleming Glacier in 2004 and 2008 reveals a surface elevation decrease of up to 4 m/yr at the grounding line. GPS measurements at sites first surveyed in the 1970s show that the glacier maintains higher ice flow velocities than before the retreat of Wordie Ice Shelf. A continuous GPS station deployed at the upper reaches of Fleming Glacier for one year allows studying changes in ice flow velocity throughout the year.

In summary, high ice flow velocities together with the marked surface elevation at the grounding line indicate that the glaciers in Wordie Bay are still losing mass and have not attained a new equilibrium stage after ice shelf removal.