Geophysical Research Abstracts
Vol. 13, EGU2011-12038, 2011
EGU General Assembly 2011

Changes in glacier extents on the Antarctic Peninsula, 2000-2010, mapped from a range of multispectral and radar imagery

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The Antarctic Peninsula has been one of the fastest warming places on Earth (∼3 °C in the last 50 years) and is thought to be one of the largest contributors to current sea-level rise. In order to understand the contribution of glaciers in this region to sea-level rise it is essential to understand the processes controlling changes in their extent.

A previous joint project between the US Geological Survey and British Antarctic Survey, 'Coastal-Change and Glaciological Maps of Antarctica' finished with the delivery of a comprehensive GIS database of changes in ice extent around the Antarctic Peninsula since the 1940s, and a paper published in Science summarising the trends (Cook et al., 2005). The positions were digitised from aerial photographs, satellite imagery and maps, with the most recent positions in the GIS dating from 2001. As the first stage of a new project, the Coastal-Change database has now been revised to bring it up to date using a wide range of image data including Landsat ETM+, Envisat ASAR, SPOT and Terra Aster. As more satellite data has become available over the past decade it has been possible to obtain ice front positions at more frequent intervals, allowing for a detailed representation of recent change. The Landsat Image Mosaic of Antarctica (LIMA) has enabled identification of features down to 15m resolution and gives a geospatially accurate base coastline, against which all other coastal positions are measured. Landsat ETM+ images give good spatial coverage around the Antarctic Peninsula and scenes have been selected to give approximately biennial positions. Where there is cloud-cover or no image available, Envisat ASAR images (spatial resolution 30m), SPOT 5 SPIRIT images (5m) or Terra Aster images (15m) are used.

We will report on preliminary results of the recent behaviour of a subset of glaciers from the database. Sample glaciers for initial analysis have been chosen according to glacier behaviour in the previous study. We have selected those that showed particularly interesting changes between the 1940s-2001, such as those with overall advance/retreat of unusual magnitudes, or neighbouring glaciers that showed contrasting scales of change. Other glaciers of interest include those that once flowed into ice shelves that have now collapsed, resulting in rapid retreat of the newly exposed marine glacier fronts. The poster will show the rates of change of these glacier fronts over the past decade and describe the methods used in compiling the database and techniques developed for measuring changes in length of the glaciers.