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The response of outlet glaciers to the disintegration of Larsen Ice Shelf, Antarctic Peninsula, observed by ERS SAR and Envisat ASAR

C. Riedl (1), H. Rott (1), W. Rack (2)

(1) Institute of Meteorology and Geophysics, University of Innsbruck, Austria

(2) Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

The Larsen Ice Shelf on the east coast of the Antarctic Peninsula has undergone rapid retreat during the last decades as an effect of significant warming in the region, culminating in two spectacular disintegration events in 1995 and 2002. The grounded ice above the Larsen Ice Shelf is split in many individual glaciers with typical size of several hundred to a few thousand kilometre square in area. The upper parts of the glaciers cover high plateaus, separated by comparatively steep sections from glacier trenches through which the ice is transported to the sea or to ice shelves. The outlet glaciers of the peninsula retreated and accelerated soon after the collapse of Larsen A in 1995. Recent observations show a deceleration of these glaciers, slowly approaching their new equilibrium. Similar rapid response to the disapperance of buttressing ice shelves was also observed at the glaciers above former Larsen B. A detailed analysis of the areal changes and acceleration of the large tributary glaciers of Larsen B was investigated. In January 2005 a tabular iceberg covering 1400 km^2 broke away from the adjoining ice shelf section Larsen C. Larsen C so far has been rather stable, though major changes can be expected if the climate signal spreads further south. Observations and detailed analysis of the flow field are investigated to obtain a baseline for possible future changes. The main data source for our studies are radar images of the years 1992 to 2005 from the satellites ERS-1, ERS-2 and Envisat, complemented by optical images. The grounding zones and velocities of the main outlet glaciers were retrieved by means of SAR interferometry and amplitude correlation. Envisat ASAR data are also used to study the surface melt on the ice shelf and the sea ice extent in front.