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## Short Term Elevation Changes From TanDEM-X for the Mass Balance of the Patagonian Glaciers

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Dramatic losses in the ice volume of temperate glaciers are observed worldwide during the routine quality control of TanDEM-X digital elevation models at DLR/IMF. The present satellite based investigations allow a global view of the development of glaciers during the last 4 years and thus complement conventional glaciological work which focuses mainly on studies of individual glaciers. Since the operational start of the TanDEM-X mission multitemporal datasets have been acquired in regions including, among others, rapidly changing features like ice fields, icecaps and outlet glaciers. This allows the accurate quantification of short time changes in ice elevation, and consequently in volume and mass from December 2010 up to the present.

We generate DEMs from acquired raw data or from intermediate CoSSC products with the Integrated TanDEM-X Processor (ITP). Dual baseline processing is applied when appropriate data are available thus reducing phase unwrapping errors in region of complex topography. Surface elevation changes are computed from differencing the TanDEM-X DEMs. This approach has the advantage of using data acquired by the same InSAR sensor in a time span of 1 to 4 years. The biases due to different spatial resolution or different radar frequencies are thus excluded. A very accurate vertical and horizontal coregistration of the DEMs can be achieved by measuring the mean vertical offset between the pairs of TanDEM-X DEMs and the recently released SRTM v3 DEM on flat ice-free and

unvegetated calibration areas. The ice elevation changes integrated over the glacier surface deliver the volume change in the time interval between the DEM data acquisitions. This value can in turn be converted into mass changes through the density of the lost or gained volume. In most of the cases the density of ice is taken all over the glacier.

This study focuses at short term elevation changes of major outlet glaciers of the Patagonia Icefields. Our previous investigations based on TerraSAR-X, TanDEM-X and SRTM data revealed thinning, front retreat and acceleration of most of the outlet glaciers in the region due mainly to atmospheric warming. The TanDEM-X DEM differencing gives additional details on the evolution of these glaciers during the last 3-4 years.