



Thorsten Seehaus, Philipp Malz, Christian Sommer, Lukas Sochor, Matthias Braun

Friedrich-Alexander Universität Erlangen-Nürnberg

Determination of mass changes of Arctic and Antarctic glaciers

The glaciers and icecaps (outside the large ice sheets) of the polar regions have the potential to contribute significantly to global sea-level rise. Due to the large spatial extent and remote location, there exists only few measurements of the ongoing changes, and monitoring via satellite is highly appropriate. Imagery of the synthetic aperture radar satellite mission TanDEM-X provide valuable insights into glacier changes in those regions as the X-band radar is independent from clouds and illumination and can resolve elevation changes of large glacierized areas as well as individual glaciers. We generated and coregistered digital elevation models (DEM) from repeated TanDEM-X data takes to derive glacier elevation changes between 2010 and 2020.

For the Arctic regions, we obtained elevation changes for the Russian Arctic archipelagos from TanDEM-X acquisitions (2010-2017). Currently, we are preparing similar TanDEM-X DEM differences for Arctic glaciers outside the Greenland ice sheet (Svalbard, Iceland, Alaska, Canadian Arctic, Scandinavia and North Asia). In contrast to the wide and smooth areas of the East and West Antarctic ice sheets, the steep topography of the Antarctic Peninsula strongly limits the application of altimeter data for accurately quantifying glacier mass changes. Therefore, we computed glacier mass changes along the Antarctic Peninsula by means of TanDEM-X data.

Additionally, measurements of the IceSAT2 laser altimeter will be integrated to carry out complementary analysis and to improve the estimation of radar signal penetration into snow and firn and thereby reduce the elevation change and mass balance uncertainties.