Geophysical Research Abstracts
Vol. 19, EGU2017-2932, 2017
EGU General Assembly 2017

Recent elevation changes in the upper reaches of Fedchenko Glacier, Pamir

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The Fedchenko Glacier in the central Pamir is one of the largest mountain glaciers worldwide. It shows only a small area change during the last nine decades, which is mainly due to its supraglacial debris cover on the lower part of the glacier tongue. However, a considerable elevation decrease of more than 70 m at the terminus could be derived from the comparison of the first available map from 1928 and more recent elevation models. A negative elevation trend for the long term evolution is also observed in the upper part of the glacier, but here the situation is more complex. In the accumulation area a slight elevation increase has been observed during the first decade of the new millennium. A series of kinematic GNSS surveys were carried out on the glacier since 2009. The results show that the elevation increase in the upper part is almost compensated by a lowering during recent years. In addition to the GNSS measurements, a time series of InSAR elevation models has been derived from the satellite radar mission TanDEM-X. Based on these data we are able to determine the seasonal differences in penetration depth for the X-band radar for different altitudes in the accumulation area. This allows us to derive the spatial and temporal variation of the glacier elevation changes above 4300 m.