

Lakes in permafrost areas - inter- and intra-annual variations

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Climate change is pronounced in the Arctic. Increasing temperatures above the global mean are expected for most of the region. This has an effect on soil temperature and thus the extent of permafrost. Lakes are a characteristic feature of lowland permafrost. Their changes as detected with satellite data are often interpreted as indicator for climate change. They are however in many cases connected to flood plains and thus undergo seasonal changes which are not confined to the period just after snowmelt.

The Yamal peninsula is one of the areas from which changes have been reported (active layer thickness measurements for more than 20 years) and where it is expected that continuous permafrost will not be present anymore towards the end of this century.

It has been already shown in the past that seasonal variations are common in several parts of the peninsula. These need to be considered for longterm studies based on lake monitoring. This requires high temporal resolution which can be only achieved with high resolution radar information (SAR which is cloud independent). The ENVISAT ASAR archive provided data for initial studies covering 2007 and 2008. This time series has been now extended with TerraSAR-X to 2015 for hotspots of variations and changes (shrinking versus emerging vegetation) verified by in-situ observations. The new data also provide better spatial detail (3 m compared to 75m). Inter and intra-annual variations have been quantified in space and time. The temporal pattern has been also analyzed with respect to snowmelt timing (obtained by satellite and ground temperature observations). Results are discussed with respect to previous inundation trend studies based on global coarse resolution (>25 km) datasets which depict significant changes on the peninsula.