

## Glacial induced uplift variations in Svalbard – is it a challenge for the reference frame?

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**Abstract.** The geodetic observatory in Ny-Ålesund is a key station in the global geodetic network. It is the northernmost fundamental station, containing all the main geodetic techniques important for the realization of the ITRF. However, its stability has been questioned. The observatory experiences variations in the uplift on seasonal, inter-annual, decadal, and longer time-scales. The uplift for a moving window of 5-years periods has increased from below 6 mm/yr in the 1990 to more than 12 mm/yr today. This has challenged the realization and stability of global and regional reference frames. Svalbard, as other Arctic areas, is heavily affected by climate change. The temperature is increasing, the permafrost is melting, the sea ice is disappearing and the glaciers are retreating. The elastic response of the changes in the glacier affects the earth crust. We have constrained the recent glacier retreat on Svalbard using a series of digital elevation models and computed the induced elastic response. Data from the geodetic observatory in Ny-Ålesund and the GNSS network in Svalbard are analyzed with the software Gamit, GipsyX and Gins. The time series are compared with the elastic response of the glacier changes. We found that the variations in the uplift can be explained by the glacier changes and that the uplift after removing the elastic signal is almost constant for the different time-intervals.