

EGU2020-3132

<https://doi.org/10.5194/egusphere-egu2020-3132>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



## Geodetic SAR for Height System Unification and Sea Level Research in the Baltics

**Thomas Gruber**<sup>1</sup>, Jonas Ågren<sup>2</sup>, Detlef Angermann<sup>3</sup>, Artu Ellmann<sup>4</sup>, Christoph Gisinger<sup>5</sup>, Jolanta Nastula<sup>6</sup>, Xanthi Oikonomidou<sup>1</sup>, and Markku Poutanen<sup>7</sup>

<sup>1</sup>Technical University of Munich, Institute of Astronomical and Physical Geodesy, Munich, Germany

<sup>2</sup>Lantmäteriet, Swedish Mapping, Cadastral and Land Registration Authority, Gävle, Sweden

<sup>3</sup>Technical University of Munich, German Geodetic Research Institute, Munich, Germany

<sup>4</sup>Tallinn University of Technology, School of Engineering, Tallinn, Estonia

<sup>5</sup>German Aerospace Center, Remote Sensing Technology Institute, Weßling, Germany

<sup>6</sup>Space Research Centre, Polish Academy of Sciences, Warsaw, Poland

<sup>7</sup>Finnish Geospatial Research Institute, Helsinki, Finland

Traditionally, sea level is observed at tide gauge stations, which usually also serve as height reference stations for national levelling networks and therefore define a height system of a country. Thus, sea level research across countries is closely linked to height system unification and needs to be regarded jointly. The project aims to make use of a new observation technique, namely SAR positioning, which can help to connect the GNSS basic network of a country to tide gauge stations and as such to link the sea level records of tide gauge stations to the geometric network. By knowing the geoid heights at the tide gauge stations in a global height reference frame with high precision, one can finally obtain absolute sea level heights of the tide gauge stations in a common reference system and can link them together. By this method, on the one hand national height systems can be connected and on the other hand the absolute sea level at the tide gauge stations can be determined. By analyzing time series of absolute sea level heights their changes can be determined in an absolute sense in a global reference frame and the impact of climate change on sea level can be quantified (e.g. by ice sheet and glacier melting, water inflow, global warming). The paper presents the main scientific questions to be addressed by the project, introduces the idea of using SAR transponders for this application and describes the observation network implemented for this feasibility study.