

EGU22-9425, updated on 30 May 2022

<https://doi.org/10.5194/egusphere-egu22-9425>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Geodetic SAR – the use of electronic corner reflectors in Wladyslawowo and Leba, Poland

Tomasz Kur¹, Ryszard Zdunek¹, Jolanta Nastula¹, Christoph Gisinger², and Justyna Śliwińska¹

¹Space Research Centre of the Polish Academy of Sciences (CBK PAN), Department of Planetary Geodesy, Warsaw, Poland

²German Aerospace Center (DLR), Remote Sensing Technology Institute, SAR Signal Processing, Oberpfaffenhofen, Germany

We present results for geodetic SAR which is a technique in the field of geodesy and remote sensing that enables the localization of specifically designed radar targets. It might help to connect the GNSS network to tide gauge stations and then to link the sea level records of tide gauge stations to the geometric network. In further perspective it will also enable the determination of vertical movements of the Earth's crust at these stations, allowing the estimation of the absolute value of sea level changes in various regions of the world, which are important in the study of climate change. In order to investigate the feasibility of using active SAR transponders ESA Project Baltic+ Theme No. 5. 'Geodetic SAR for Baltic Height System Unification and Baltic Sea Level Research (SAR-HSU)' was completed in 2019 – 2021 by international consortium. During the project SAR novel active transponders were located around the Baltic Sea. Among the locations, two transponders were placed in Wladyslawowo and Leba, Poland under the care of the Space Research Centre of the Polish Academy of Sciences (SRC PAS).

The installation of permanent radar targets allows for long-term position monitoring. The technique is a particularly interesting for displacement and height changes observations. The research illustrates the results acquired from the electronic corner reflectors operating in Poland. For purpose of this research SAR images captured by the Sentinel-1 are used as ESA offers unrestricted access to all the data acquired at study region. Level 1 SLC products together with geodetic data are the main input for the study. With a repeat cycle of 6 days, the number of Sentinel-1 SAR observations per test site amounts to about 180 measurements for one year.

We present the outcomes of ECR positioning from July 2021 to January 2022 when further tests of active transponders were conducted beyond the end of the project. The research is carried out with the software developed in SRC PAS and designed for purposes of geodetic SAR. Software consists of several modules e.g. for data preparation (including SAR data, EOP, precise orbits, ionosphere and troposphere models) or for processing data related to geodynamic effects and corrections to radar measurements. Here we present results for Absolute Location Error in the azimuth and range. We show our experience in processing data for active transponders and our comments on their maintenance and exploitation.