Geophysical Research Abstracts
Vol. 17, EGU2015-12235-3, 2015
EGU General Assembly 2015

Calibrating coastal GNSS-R instrumentation

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Since 2011, a GNSS-R (Global Navigation Satellite System – Reflectometry) instrument for local sea level observations is operated at the Onsala Space Observatory (Löfgren et al., 2011). The Onsala Space Observatory is the Swedish geodetic fundamental station, located at the Swedish West Coast, and contributes to the Global Geodetic Observing System (GGOS) by a variety of geodetic and geophysical observations. The Onsala GNSS-R instrumentation consists of two GNSS antennas that are mounted back-to-back on a bar at the coastline extending over the open sea in southward direction. One of the antennas is upward oriented and receives the direct satellite signals, while the other antenna is downward oriented and receives the satellite signals that reflect off the sea surface. The antennas are connected to a commercial GNSS receiver each and data are recorded with sampling rate of up to 20 Hz. Satellite signals of several GNSS are received and are analysed with various different analysis strategies to provide sea level results with different temporal resolution and precision (Larson et al., 2013; Löfgren and Haas, 2014). Since the instrumentation uses GNSS signals, it is possible to derive both local sea level, i.e. relative to the coast, and absolute sea level, i.e. relative to the geocentre as realised by the GNSS. The bar carrying the two antennas can be placed in 10 different vertical positions covering a height difference of 2.5 m between the highest and lowest position. We present results from a calibration campaign of the Onsala GNSS-R instrumentation performed in 2014. During this several weeks long campaign the antennas were placed at different vertical positions for several days at each position. The recorded data are analysed with the different analysis strategies, and the results are compared to the results derived from the co-located tide gauge equipment.

References

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