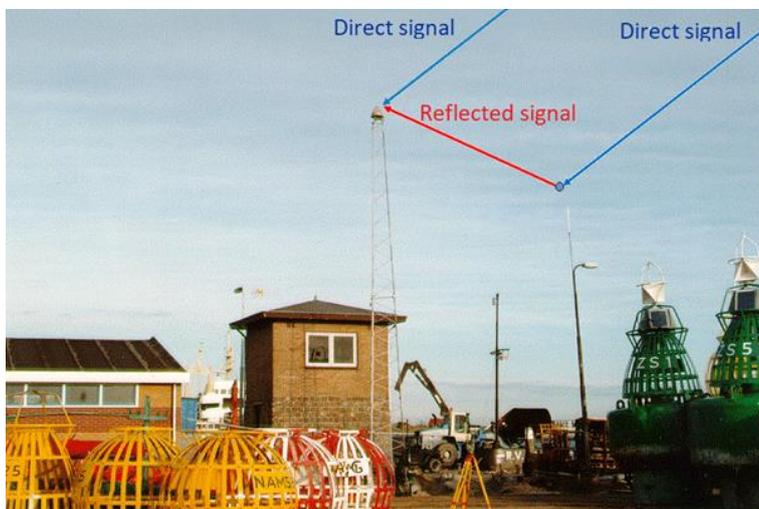


Theme: GNSS and sea-surface monitoring

# GNSS-Reflectometry of Dutch Coastal Zone

The Dutch coastline of the North Sea, consisting of ~290 km of dunes and ~60 km of dikes and dams, is of high socio-economic importance for the Netherlands and has been influenced by the man-made and natural activities such as climate change. Low-lying coastal countries like the Netherlands are subject to man-made and natural hazards due to sediment erosion and coastal storms. GNSS-Reflectometry (GNSS-R) has a wide range of applications in monitoring of the Earth's surface phenomena such as altimetry, oceanography, cryosphere and soil moisture monitoring. Among them, it is quickly maturing to become a viable technique for operational coastal sea-level altimetry in a geocentric reference frame.

The goal is to exploit the existing coastal GNSS sites for reflectometry by means of the reflected GNSS observations. There is intensive research towards the use of this technique in sea level monitoring such as long-term sea level change, tidal analysis and storm surges. As they are all relevant to the Dutch coastal zone, it is highly demanding to investigate the high potential application of this technique for the Dutch coastal zone. The method is based on multipath theory for specular reflections and the use of Signal-to-Noise Ratio (SNR) data. Geodetic-quality antennas are usually designed to measure direct reception from GNSS satellites and to attenuate indirect reflections from natural surfaces. The reflected signals can still be of high potential use to estimate the sea level in a stable terrestrial reference frame. GNSS-R-derived sea levels are required to provide hourly sea level measurements with 1 cm accuracy, and a sub-millimeter accuracy for annual trends to be useable for sea-level rise applications. A few technological and data processing techniques can contribute as a key factor to reach this goal. This also need further investigation in this project.



GNSS receiver at Terschelling tide gauge station and its surrounding. In principle, a GNSS receiver can measure both local land vertical motion, through direct signal, and sea level height, through reflected signal.

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