

## **Distribution and dynamics of intertidal geo-morphological structures and habitats - application of TerraSAR-X data for environmental monitoring of the Wadden Sea combined with extensive in-situ verification (WiMo)**

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### **ABSTRACT:**

Satellite synthetic aperture radar (SAR) has a high potential for remote sensing in intertidal areas because of its independence from sun illumination and weather conditions, which considerably raises the opportunity to get satellite acquisitions during low water time. To investigate intertidal structures images from the X-band SAR TerraSAR-X (TS-X) in spotlight mode with up to 1m resolution proved most suitable. Due to smooth relief and the diversity of intertidal surface structures extensive in situ observations are required for a validated interpretation of the TS-X data. To this aim more than 50 TS-X acquisitions taken 2011-2014 in the main area of investigation - the tidal flats south of Norderney, have been visually interpreted and verified with extensive in-situ GPS- and RTK measurements and habitat mapping.

Typical structures and habitats and their reproduction by TS-X imaging were followed over the period of the study: Musselbeds, shell-detritus, gully structures, mudfields and bedforms of the Island-flats. The genesis and informative value of these bedforms with regard to factors like currents, wave-action, wind or potential sediment transport mechanisms are not yet identified. But while their specific characteristics may differ, these bedforms are present on every East-Frisian Island-flat as a regular pattern of crests and permanently water-covered troughs. Their orientation in the higher flats directly bordering the islands is South-West to North-East, while in the lower flats also cross-profiles can appear. In the western Norderney area the crest-to-crest distance lies in the range of 30-150m, the length up to 500m. Height differences amount to 10-15cm. First investigations on the sediment structure have been done and periodic RTK-measurements of positions and height along defined transects are carried out since the beginning of 2014. In consequence of the high frequency TS-X data acquisition for the first time a shifting of the bedforms in easterly direction could be detected.

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