



Meteo-marine parameters from the TS-X satellite on a near-real time basis and wave model forecast validation

Claus Gebhardt (1), Lehner Susanne (1), Andrey Pleskachevsky (1), Sven Jacobsen (1), Wolfgang Rosenthal (1), Peter Hoffmann (2), Jens Kieser (2), and Thomas Bruns (2)

(1) German Aerospace Center (DLR), Remote Sensing Technology Institute, Maritime Security Lab, Bremen, Germany, (2) German Meteorological Service (DWD), Hamburg, Germany

The TerraSAR-X satellite (TS-X), which was launched in 2007, hosts a state-of-the-art X-band Synthetic Aperture Radar (SAR). As a result of its relatively low orbit (ca. 500 km), it has improved properties against SAR-specific image distortion of the ocean surface. Being a SAR sensor, its observations are independent of sun light and cloud conditions. Meteo-marine parameters are provided on a near real time basis. Both sea state and wind conditions are derived from the radar images.

This is accomplished by empirical retrieval algorithms. For the wind retrieval, the backscatter coefficients of radar scatterometers for different wind speeds and directions are utilised (XMOD2). For the wave retrieval, the empirical algorithm XWAVE has been developed as transformation of the radar images into two dimensional wave spectra. Spectral properties like the peak wavelength, peak period, and significant wave height are derived from the wave spectra.

In our presentation, we give an overview on the TS-X wave and wind retrieval algorithms (XWAVE and XMOD2). The quality of the sea state results from TS-X is demonstrated by comparisons to collocated buoy measurements. In the German Bight, the forecast quality of the high-resolution coastal wave model CWAM of the German Meteorological Service (DWD) is validated using TS-X results. The comparison of the numerical model hindcasts with TS-X satellite data complements and extends the conventional validation by in-situ data. This is because of the large areal coverage and in-situ sensors cannot be easily deployed in certain regions, e.g. in locations with strong ship traffic.