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Ocean surface wave patterns on TerraSAR-X images and follow-on applications

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The TerraSAR-X (TS-X) satellite provides images of wave patterns at the ocean surface which are of great scientific value. With the relatively low orbit of the platform, SAR specific non-linear imaging effects of the moving sea surface play a minor role. As a result, TS-X is able to image ocean waves down to around ~30 m length. Data on the ocean wavelength and wave direction are inferred directly from the image spectra, i.e. without inversion techniques. In the Stripmap mode, TS-X image sequences may extend in length up to several hundred kilometres. Detecting the spatial variation of wave parameters is the basis for different follow-on applications. We present selected use cases including the validation of sea state forecast models and a recent study on wave properties in the marginal ice zone. Another potential application to be included, is the estimation of coastal bathymetry from ocean wavelength variations.