TerraSAR-X (TSX) is a high resolution right looking radar satellite, launched on June 15, 2007. TSX carries a high frequency X-band SAR sensor that can be operated in different modes (coverage and resolution) and has quad polarization and dual receive antenna mode used for along track interferometry (ATI) experimental acquisitions.

The satellite design is based on technology and knowledge achieved from the Synthetic Aperture Radar missions X-SAR and SRTM. The sensor operates in the following modes:

- the "Spotlight" mode with 10 x 10 km scenes at a resolution of 1-2 meters,
- the "Stripmap" mode with 30 km wide strips at a resolution between 3 and 6 meters,
- the "ScanSAR" mode with 100 km wide strips at a resolution of 16 meters.
- additionally TerraSAR-X supports the reception of along track interferometric radar data for the generation of current maps and quad polarisation.

TerraSAR X Radar Images are of particular interest for oceanographers due to the fact that the sea surface can be observed through clouds and independent of illumination by sunlight.

Several TerraSAR X ocean images acquired over coastal areas are investigated. The images are used to measure the wind field and sea state to a high resolution and are thus well suited to investigate the variable conditions in coastal areas. The changing wind field caused by coastal topography can be observed as well as spatial wind field variability and shoaling waves.

From the radar images ocean wave length, direction and significant wave height is determined. Main algorithms developed and demonstrated are

- General image analysis
- Wind field generation
- Sea state parameters
- Coastlines and morphodynamics
- Ship detection and wake analysis

In the talk an overview of new TSX imagery of interest for meteorology, oceanography, ship and oil detection are given.

Case studies include tropical and extratropical storms, e.g., hurricane Fred, investigation of ocean wave generation and shoaling, as well as oil spills at European platforms.