Coastal Shoreline Extraction from Very High Resolution (VHR2) Satellite SAR Imagery

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Shoreline vectors are extracted from TerraSAR-X imagery based on the identification of peak backscatter intensity levels. The vectors are being catalogued and analysed to assess the accuracy/suitability of SAR imagery for identifying coastal erosion hotspots and for monitoring coastal change as input to forecasting models. The technique is being developed, tested and refined using data collected from three study sites on the west coast of Ireland (Brandon Bay; Clew Bay; Galway Bay).

The shoreline vectors are extracted from both archived and tasked TerraSAR-X imagery. The extracted shorelines are being validated using a combination of: 1) panchromatic and multispectral satellite imagery (VHR1 & VHR2), 2) panchromatic and RGB aerial imagery (VHR1), 3) LiDAR data and 4) repeat DGPS field survey data. In addition, these shoreline vectors are also being compared with equivalent extractions from other very high-resolution X-band SAR imagery (Cosmo-SkyMed) and high-resolution C-band and L-band SAR imagery (RADARSAT-2, ALOS PALSAR). The spatial accuracy of the extracted shorelines from tasked acquisitions will be further assessed using temporarily installed corner reflectors at a selection of the study sites.

SAR acquisition parameters (orbit pass direction, incidence angle, polarisation) and a selection of speckle noise reduction filters (e.g. Boxcar, Frost, Lee) were evaluated to determine the optimum combination for coastal sites with different physical characteristics.

Results are presented in high-definition video format using a combination of GIS, Earth browser and 3D visualisation platforms.