

# **SIMULATION OF COASTAL VOLUME DEFORMATION USING THREE-DIMENSIONAL SORTING RELIABILITIES ALGORITHM**

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**Abstract:** In the last two decades, scientists have developed a powerful technique to measure the millimeter-scale of the Earth's surface deformation by comparing complex synthetic aperture radar (SAR) data that were acquired a few days or a few years apart. This technique is known as interferometric synthetic aperture radar (InSAR). The paper is focused on simulation of volume deformation of coastal erosion from interferometry synthetic aperture radar (InSAR). In doing so, conventional InSAR procedures are implemented to three repeat passes of ENVISAT ASAR data. Further, three-dimensional sorting reliabilities algorithm (3D-SRA) is implemented with phase unwrapping technique. Consequently, the 3D-SRA is used to eliminate the phase decorrelation impact from the interferograms. The study shows the performance of InSAR method using the 3D-SRA is better than InSAR procedure which is validated by a lower range of error ( $0.06 \pm 0.32$  m) with 90% confidence intervals. The rate of volume of the coastal erosion is  $3000 \text{ m}^3/\text{year}$ . In conclusion, integration of the 3D-SRA with phase unwrapping produce accurate 3-D coastline deformation.

**Keywords:** InSAR, Volume of coastal deformation, three-dimensional sorting reliabilities algorithm (3D-SRA), ENVISAT ASAR, Coastal erosion.