

Simulation of shoreline change using AIRSAR and POLSAR C-band data

Abstract:

This paper presents a new approach for modeling shoreline change due to wave energy effects from remotely sensed data. The airborne AIRSAR and POLSAR data were employed to extract wave spectra information and integrate them with historical remotely sensed data such as aerial photography data to model the rate of change of the shoreline. A partial differential equation (PDE) of the wave conversion model was applied to investigate the wave refraction patterns. The volume of sediment transport at several locations was estimated based on the wave refraction patterns. The shoreline change model developed was designed to cover a 14-km stretch of shoreline of Kuala Terengganu in Peninsular Malaysia. The model utilized data from aerial photographs, AIRSAR, POLSAR, ERS-2, and in situ wave data. The results show that the shoreline rate of change modeled from the quasi-linear wave spectra algorithm has a significant relationship with one estimated from historical vector layers of aerial photography, AIRSAR, and POLSAR data. With the quasi-linear algorithm, an error of ± 0.18 m/year in shoreline rate of change determination was obtained with C vv band.