

3-D coastal water front visualization using RADARSAT-1 SAR satellite data

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Abstract This paper presents work done to utilize RADARSAT-1 SAR data to reconstruct 3-D of coastal water front. Three algorithms of velocity bunching, Volterra and fuzzy B-spline are used to reconstruct 3-D coastal front. The velocity bunching algorithm modeled significant wave height, Volterra algorithm simulated coastal current movement while fuzzy B-spline implemented the significant wave height to reconstruct 3-D coastal front. The study shows the significant wave height varied between 0.7m to 1.3m across the front. The front is dominated by strong tidal current that ranged between 0.9 m/s to 1.5 m/s. This front occurred in water depth of 20 m. Additionally, fuzzy B-spline reconstructed 3-D front with smooth graphic feature. Indeed, fuzzy B-spline tracked the smooth and rough surface. Finally, fuzzy B-spline algorithm can keep track of uncertainty with representing spatially clustered gradient of flow points across the front. In conclusion, the fuzzy B-spline algorithm can be used for 3-D front reconstruction with integration of velocity bunching and Volterra algorithm.

Keywords Algorithm modeled; B-spline; Coastal currents; Coastal waters; RADARSAT 1; SAR data; Satellite data; Significant wave height; Tidal currents; Velocity bunching; Volterra; Water depth