Three-dimensional of coastal front reconstruction using RADARSAT-1 SAR satellite data

Abstract:

Natural phenomena that are imaged using remote sensing satellite data can be reconstructed in 3-D. This process can be accomplished either by active or passive methods. The active methods interfere with the reconstructed phenomena, either mechanically or radiometrically. The radiometric methods reconstruct the 3-D from the reflected or backscattered information about the specific objects or phenomena. However, passive methods use a sensor to measure the radiance reflected or emitted by the object's surface to infer its 3-D structure. 3-D reconstruction of natural phenomena plays tremendous role to understand a complex system such as the dynamic processes of coastal waters. Three-dimensional (3D) computer visualization has tremendous demands for complex phenomena studies. Coastal waters are considered as complex system because of they are dominated by complex system. In this regard, this study aims to present a method that is based on fuzzy B-spline to reconstruct 3D of coastal water phenomena such as front from two-dimensional RADARSAT-1 SAR data. In doing so, fuzzy B-spline algorithm is integrated with Volterra model and velocity bunching model. Volterra algorithm is used to determine the sea surface current along the front zone while velocity bunching model implemented to acquire the information about significant wave height. 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.