FINITE DIFFERENCE MODEL FOR MODELING SEA SURFACE CURRENT FROM DIFFERENT RADARSAT-1 SAR MODE DATA

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1. INTRODUCTION

Because the imaging mechanism of ocean surface current gradients by synthetic aperture radar (SAR) is complicated due to its nonlinearity. This makes a difficult task to retrieve sea surface current information using a surface Doppler velocity [1,3]. In this paper we address the question of tidal impact on inducing sea surface current movement and the possibilities of computing sea surface tidal current using RADARSAT-1 SAR Standard-2, High Extende 6 and Wide 3 mode data. Two hypothesis examined are: (i) Doppler Centroid can be acquired accurately by using the Wavelength Diversity Ambiguity Resolving algorithm (WDAR) and Multi Look beat Frequency (MLBF) [2], and (ii) the robust model is providing accurate estimation of sea surface current from RADARSAT-1 SAR data, and (iii) Lax-Wendrof scheme can be used to determine the spatial variation of sea surface current in SAR data[4].

2. METHODOLOGY

Real time in situ current measurements have been collected by using wave rider buoy (AWAC). RADARSAT-1 SAR Doppler frequency shift is computed by the ambiguous estimation and Wavelength Diversity Ambiguity Resolving algorithm (WDAR) and Multi Look beat Frequency (MLBF). The current velocity then estimated by conversation of residual Doppler Centroid by performing second order polynomial model. The second-order accurate dispersive Lax-Wendrof is used to determine the spatial variation of sea surface current in different RADARSAT-1 SAR mode data.

3. RESULTS AND CONCLUSION

The study shows that there is a significant relationship between in situ current measurements and sea surface current estimated by WDAR and MLBF techniques. Standard-2 mode data shows highest accuracy is with mean root mean square error (RMSE) of ± 0.11 m/s. High Extende 6 mode data, however, shows lowest r^2 value of 0.02 as compared to standard-2 and Wide-3 mode data. In fact, High Extende 6 mode shows poorest Doppler spectra. It can be concluded that the integration between WDAR and MLBF techniques and second-order accurate dispersive Lax-Wendrof model is good tool for modelling sea surface current variation in RADARSAT-1 SAR standard-2 and wide-3 mode data.

4. REFERENCES

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