



Improving the Accuracy of Coastal Sea Surface Heights by Retracking Decontaminated Radar Altimetry Waveforms

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Abstract: Due to the complex coastal topography and energetic ocean dynamics effect, the return echoes are contaminated while the satellite footprint approaches or leaves the coastline. Specular peaks are often induced in the trailing edges of contaminated waveforms, thus leading the error in the determination of the leading edge and associated track offset in the waveform retracking process. We propose an improved algorithm base on Tseng's modification method to decontaminated coastal (0-7 km from coastline) waveforms, thus improving both the utilization and precision of coastal sea surface height (SSH). Using the Envisat/Jason-2 SGDR data, the shortcoming of Tseng's method is pointed out and the novel algorithm is proposed by revising the strategy of selecting reference waveform and determining weight for removing outlier. The reference waveform of the decontaminated technology is closer to the real waveform of the offshore area, which avoids the over-modification problem of Tseng method. The sea-level measurements from tide gauge station and geoid height from EGM2008 model were used to validate the retracking strategy. Experimental results show that decontaminated waveform was more suitable than original and Tseng modified waveform and has uniform performance in both compare to the tide gauge and geoid. The retrieved altimetry data in the 0-1km and 1-7km coastal zone indicate that threshold retracker with decontaminated waveform have STD of 73.8cm and 33cm as compared with in situ gauge data, which correspond to 62.1% and 58% in precision compared to the unretracked altimetry measurements. The retracked SSHs are better in two coastal (0-1 km and 1-7km) zones, which have STD of 11.9cm and 22.7cm as compared with geoid height. Furthermore, the comparisons shows that the precision of decontaminated technology improve 0.3cm and 3.3cm than the best result of PISTACH product in coastal sea. This work is supported by the National Natural Science Foundation of China (Grant Nos. 41174020, 41174021, 41131067) and the open fund of Guangxi Key Laboratory of Spatial Information and Geomatics (Grant No. 15-140-07-26).

Index Terms: retracking, Envisat, Jason-2, Coastal sea, decontamination.