Improvement of Multi-Altimeter Data by Waveform Classification and Retracking: A case study of Taiwan's wetland

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Satellite radar altimetry becomes an irreplaceable tool to provide accurate surface height measurements over open oceans. However, the accuracy decreases when altimeters approach coastlines or non-ocean surfaces due to the improper geophysical corrections and complex returned waveforms. Many algorithms have been developed for waveform retracking that can improve the accuracy of altimetry data; however, the performance still cannot achieve the same accuracy as that in open oceans. In coastal regions, some waveforms reflected from non-ocean surfaces lead to the worse retracking results. Therefore, waveform classification methods are needed to distinguish waveforms which is truly reflected from ocean or not. Waveform classification used in this study includes two steps. The first step is applying Principal Components Analysis (PCA) to waveforms to extract the features for classification. The second step is using Density-Based Spatial Clustering of Applications with Noise (DBSCAN) to separate waveforms into two groups: ocean and non-ocean waveforms. Then, we remove the non-ocean waveform to improve the accuracy before doing retracking. In this study, we use Jason-2, Envisat and Altika altimetry data over Hsiang-Shan wetland, which is located in Northwestern Taiwan. The satellite-derived results are then evaluated using Hsin-Chu tide gauge data. Finally, we expect building an effective classification method and figuring out the most appropriate retracking algorithm applied for this study area.

Keywords: coastal altimetry, waveform classification, waveform retracking, Hsiang-Shan wetland