Analysis and Retracking Altimeter Coastal Sea Waveform in Chinese and Neighbouring Seas (SG.4 - 028)

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Abstract:
One looking factor of tropical atlantics is that most data in the coastal seas are flagged as useless partly due to land contamination of the altimeter return waveforms. Retracking algorithms are employed to derive geophysical parameters instead of the standard processors. In this paper, we comparatively retrack Ocean, Ice-2, OCG (Offset Centre of Gravity), Threshold, and Beta5 using one year (March, 2006 to February, 2007; cycle 155 to cycle 188) Jason1 waveform around the China coast (14~45°N, 105~130°E). In order to compare five retrack algorithms, we select Jason1 Sea Surface Height (SSH) measurements from tide-gauge stations are used. However, only the range is determined by the retracking algorithms and the altimetry SSH is derived from range, atmospheric and other geophysical corrections. It is necessary to verify the retracking results (indirectly) because of the altimetry Significant Wave Height (SWH) is determined by the waveforms leading edge slope of the return signal and not affected by the atmospheric and ocean conditions, we calculated additional SSH using Gaussian fitting algorithm again and compare the altimetry retrack SWH results with coast in situ SSH measurements.

1. INTRODUCTION
Most coastal altimetry data are useless because of the effect of the surrounding land on the radar echo; the proximity of the land also makes it impossible to perform some geophysical corrections, such as wet troposphere correction, ocean tide corrections, atmospheric high frequency boiling corrections, and so on. In order to obtain more usable waveforms, we need to develop appropriate algorithms. In this study, we developed a coastal altimetry retrack algorithm using the Jason1 waveforms leading edge slope measurements. However, the retriever measurements are also affected by land signals over coastal water. To deal with the problem of ocean retracker development, we choose the Jason1 coastal altimetry waveform data near the coastal area, we derived retrecker parameters using the standard edit processing, and the black ones represent where they are retained.

2. WAVEFORM ANALYSIS
The flagged distances of Jason1 cycle 164 measurements are in Table 1. It can be seen from the second and third columns of Table 1 that areas, where distances to land are near and more than 10 km are flagged, because the longer range of retrievers are affected by coastal signals. The distances where the retriever measurements shall be affected by land is around 10 km.

3. WAVEFORM RETRACKING ALGORITHMS
Accurate range retrievals are obtained using refined procedures known as altimeter waveform retracking. Many retracking algorithms are developed for specific surfaces. The performance Ocean, Ice-2, OCOG, Threshold, and Beta5 retracking algorithms using one year Jason1 waveform measured in Chinese and neighboring seas are used.

4. RESULTS
In order to compare five retrack algorithms, in situ Sea Surface Height (SSH) and Significant Wave Height (SWH) measurements from tide-gauge stations are used. The information of tide gauge stations are in Table 4.

4.1 Jason1-Ground Comparison of SSH
The Sea Surface Height measured by Jason1 is calculated by

\[ H_c = \frac{1}{2} \left( P_0 - P_{alt} \right) \]

Where \( H_c \) is the corrected SSH, \( P_0 \) is the sea air pressure, \( P_{alt} \) is the altimeter pressure measurement, and \( \frac{1}{2} \) is a constant factor.

The SSH from Jason1 waveform is used to compare with in situ Sea Surface Height at the tide gauge stations. The Jason1 SSH is calculated using the Correspondence coefficients and standard deviation of the two results with in situ data. The Jason1 SSH are the inside the figure. Fig. 4 shows the results between tide gauge station and Jason1 SSH. The correlation coefficient is 0.8, and the standard deviation is 0.04. The results of the two algorithms are good, because the Jason1 SSH is very close to the in situ data.

5. CONCLUSIONS & FUTURE WORK
Because the altimeter sea surface height is derived for the large range measured by retriever and the range corrections, we can derive remote altimetry SSH with ease in land areas. In this study, we show the Jason1 SSH is good when the distance to land is more than 10 km. However, because of the limited number of comparing data, more in situ data needs to be needed to make a solid conclusion.