Retracking and validation of pulse-limited and SAR altimetry in coastal zone

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Introduction

Improved methods of re-tracking and the new SAR technique allow the use of altimeter data in the coastal zone. We investigate the quality of altimeter data at distances of less than 10 Kilometers from the land. The altimeter waveform are first classified and based on the classification are processed with different retrackers to derive the improved sea level and significant wave height. A validation of the improved data pulse-limited and SAR data is performed against in-situ data and Level 2 products in the coastal zone of the German Bight and in the Tonle Sap Lake in the Mekong area.

Data and Methodology

Satellite Altimetry
- Envisat, SARAL/AltiKa, CryoSat-2
In-situ data
- Minute-tide gauge data (TG) in 2011-2012 made available by WSV [2]

Finding the optimal retracker

To identify the optimal retracker we simulate waveforms of the two most common classes in inland water (Class21/Class22). These echoes were retracked with a number of different retracker to test the ability to reconstruct the parameters of the simulated signals. We use the root mean square error (RMSE) which is averaged over 300 Monte Carlo runs to rate the retrackers. An example for each class with their parameter are shown in Table 1 and Figures 3 and 4 [3].

Classification of Waveforms

Aim of the classification is to group similar waveforms and to use the best retracker for each considered class. We classify the waveforms according to their shape by using the maximum Likelihood Classifier [4]. We consider the 11 most frequently classes that we numerate according to PISTACHO [5]. Table 2 gives an example of a classification and the retracker selected.

Conclusions

- our new retracking algorithms retain more usable SSH in coastal zone and near the lakesides.
- Altimetric water height from SARAL and Envisat show a similar behavior over the short common interval with better resolution for SARAL/AltiKa (higher data frequency and smaller footprint).
- The in-situ validation identify biases for both SARAL/AltiKa and Envisat
- Inland water observations from Envisat and SARAL/AltiKa agree to few cm in seasonal cycle
- Outlook
  - In German Bight: validation with previous mission data to detect errors and uncertainties in long-term sea level change
  - In Mekong: improved re-tracking and validation

References


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