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Comparision of Retrackers' performances over inland water bodies

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The water level of inland water bodies plays an essential role in water balance management. Satellite altimeters can play an important role in monitoring water level, namely in remotely access places. However, satellite altimeters are normally designed to monitor homogeneous surfaces such as oceans or ice sheets, which results in poor performance over small inland water bodies because of the land contamination contribution in the returned waveforms. To improve altimeter range accuracy which relates to water level measurement accuracy, the waveform needs to be retracked precisely to find out the accurate tracking point which locates on the leading edge [Deng and Featherstone, 2006]. Three retrackers including the threshold, OCOG, and 2-step analytical retracker are introduced to find the tracking points precisely from the land contaminated waveforms. The waveform portion selection uses DEM information to locate the waveform portion which comes from nadir.

The aim of the study is to compare the threshold, OCOG and 2-step analytical retracker performance along with the waveform portion selection approach performance over inland water bodies. Our study areas include reservoirs and rivers in Ebre river basin which is challenging to retrieve the water surface height because the water bodies are relatively small (the width of the Ribarroja reservoir is only about 500 meters) and Lake Volta in Western Africa with irregular lakeshore and the islands. The results of the three retrackers are compared with the onboard ocean retracker and in-situ measurements.

The standard deviation for 2-step analytical retracker combined with the waveform portion selection ranges from 0.02m to 0.05m, for OCOG retracker ranges from 0.07m to 0.13m, and for threshold retracker, it ranges from 0.05m to 0.1m over Lake Volta. Over places with land contamination, the analytical 2-step retracker with waveform portion selection performs better than ESA L2. The results show good correlation with the in-situ measurements over Ribarroja reservoir in Ebre river basin. The unbiased root mean square (ubrms) for analytical 2-step retracker is 0.11m, and 0.11m, 0.21m for threshold and OCOG retracker separately. ESA's level-2 gives ubrms in between with the value equal to 0.13m. The bias caused by the geoid model will be normalized in the future.

The preliminary results show good agreement with in-situ measurements, and waveform portion selection works much better than using the whole waveform since the DEM information is induced to eliminate land contamination. Retracking water level from Level-1 waveforms using the combination of the retrackers and waveform portion selection is more robust to land contamination than using Level-2 data directly.