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Validation of the retracked Jason l,2 -altimeter water levels over Gorky Reservoir of the Volga River.

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Standard altimetry data processing developed for the open ocean conditions can be inapplicable for the case of inland waters, especially in for narrow elongated water bodies and rivers, where the distance between shores is less than 5-10 km (while the eliminated area within the gain of the radar antenna for Jason-1,2 is about 50 km). These conditions are typical, for example, for the majority of reservoirs of the Volga river cascade (with one exception, Rybinskoe Reservoir). Under these conditions only a few telemetric impulses fit the validity criteria, which causes a severe loss of data. Besides, errors in the water level retrieved from the altimetric measurements are enormous, as it was demonstrated on the basis of comparison of in situ measurements at hydro gauging stations for the water level of Gorky Reservoir of the Volga River and all available along track 10Hz TOPEX / Poseidon altimetry data and 20Hz Jason altimetry data over the reservoir area.

The problem of minimization of the errors can be resolved by retracking. For justification of the optimal retracking algorithm the average impulse response of the statistically inhomogeneous surface were calculated theoretically based on the works of Brown, 1977 and Barrick and Lipa, 1985 for the model of the terrain in the vicinity of Gorky Reservoir. The model represents the main typical features of the waveform examples (e.g., high peaks or irregular complex shape), the modeled waveforms are in good agreement with the Jason-1,2 waveforms for the same area. It was shown, that for Gorky Reservoir significant wave height (SWH) did not exceed 0.5 m (corresponding to the width of the leading edge less than 1 telemetric gate). Since the meaningful value for monitoring of water level in inland waters is variations of the water level from the averaged, the retracking algorithm based on the detection of the beginning of the leading edge is preferable under these conditions. Comparing with the data of in situ measurements at hydro gauging stations for the water level of Gorky Reservoir shows that retracking dramatically increases the number of data involved in monitoring and significantly improves measurements of the water level. Validation of retracked data of water level by comparison Jason-2 and Jason-1 after maneuver measurements for Gorky Reservoir is also carried out.

General principals of retracking algorithms for complex area (land, coastal zone, inland waters, etc) bases on calculations of the waveform taking into account statistical inhomogeneity of the reflecting surface adjusted to a certain geographic region are discussed on the example of Gorky Reservoir.