



River and Lake Level Observation from Radar Altimetry

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Satellite altimetry has been used for many years to measure the height of inland water bodies; this paper assesses the contribution of the EnviSat RA-2 to global inland water monitoring. A full waveform analysis of cycles 10 to 85 of the EnviSat RA-2 SGDR dataset has been completed over inland water, retrieving over 822,000 crossings. The results confirm that the unique dynamic mode-switching capability of the RA-2 has enabled the instrument to maintain lock over rapidly varying terrain, thus acquiring a huge database of echoes over inland water. The vast majority of these targets were acquired in 320MHz 'ocean' mode, enabling precise retracking and allowing generation of 25636 time-series of inland water heights. Analysis reveals that of these, 15067 have successfully retrieved the target signature.

A mature pilot demo has been running since 2005, generating river and lake height time series disseminated to the end users within 3 days of satellite overpass; this paper includes an analysis of the user base. The data currently available in the River & Lake system are derived from conventional EnviSat and Jason-2 altimeter waveforms. The new generation of SAR type altimeters (on CryoSat and Sentinel-3) will require new processing techniques to produce accurate heights. To this end an analysis is made of 1800Hz EnviSat individual echoes, to determine what results can be obtained with a much higher pulse repetition frequency. This analysis reveals that even small pools of water can be identified, and height time-series successfully retrieved from as few as 7 IEs.