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Time series over the Brahmaputra River from CryoSat-2/SIRAL altimetry

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CryoSat-2 was launched in 2010 with the purpose of monitoring polar ice caps, but the satellite has also proven to be useful for studies at lower latitudes. CryoSat-2 carries a new type of instrument, the SIRAL altimeter, which implements SAR and SARIn mode in addition to the standard LRM. In these modes the along-track resolution is 300m, giving rise to new opportunities for inland water altimetry, which requires a high along-track resolution in order to accurately capture the return signals from the water bodies.

Here, we have investigated the possibilities for monitoring river water levels with CryoSat-2 as a part of the EU FP7 LOTUS (Preparing Land and Ocean Take Up from Sentinel-3). The LOTUS project will develop new methodologies, data processing chains, and applications of the SAR mode data for the inland water levels in rivers and lakes.

Time series analysis for CryoSat-2 altimetry is not straightforward due to the satellite's very long repeat period of 369 days. It is therefore necessary to take new methods into use. Using slope correction, i.e. taking advantage of the drifting orbit, we have derived time series from retracked heights in all three modes of the CryoSat-2 altimeter over the Brahmaputra River. From the time series we can estimate the amplitude and the seasonal signal of the flow in the river. Presented here is a comparison of the results between modes and with Envisat time series.