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Evaluation of empirical retracking of Cryosat2 sea surface data in the Arctic Ocean

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Waveform retracking of satellite data is used for sea surface height determination. In the Arctic Region, these echo waveforms contain reflections from various cryosphere features such as sea ice, ice sheets, new frozen water etc. Cryosat2 data has Level1b components which record the power waveforms of the echoes as well as Level2 components which provide the sea surface height as developed by the retrackers used by the space agencies. A retracker based on the combination of OCOG (Offset Centre of Gravity) method and Threshold method is used to develop the sea surface height in the Arctic Region. This is to be compared with the Level2 sea surface height components available in the Cryosat2 data.

The threshold retracker uses the statistical properties of the echo waveform to compute two difference thresholds (start and stop) for the neighboring power bins. Next, a loop is run to check the power differences throughout the waveform for neighboring bins. If this power difference is greater than the start threshold, the system records the beginning of a subwaveform. Further when the power difference of neighboring bins of this sub-waveform is less than the stop threshold, this is recorded as the end of the subwaveform. As a result the power waveform is divided into various subwaveforms each having one peak. The first subwaveform corresponds to the peak for the leading edge. Next, the OCOG method is used to determine the center of gravity of the first subwaveform. This provides the position of the leading edge and thereby the sea surface height is obtained. It is observed that applying the OCOG method on just the leading edge subwaveform results in improved sea surface determination as compared to its application on the complete waveform.

The retracked data is subsequently evaluated for its ability to determine geophysical changes related to bathymetry and compared with existing marine gravity surveys in the Arctic Ocean. This presentation will also give an outline of the contest of the further work in which it is intended to develop a sea surface height climate for the Arctic Region using the above mentioned retracker and compare it with the sea surface height climate as observed through the Cryosat2 Level2 data.