

Investigation of the Added Value of a Varying Coherence Threshold for CryoSat-2 Swath Processing

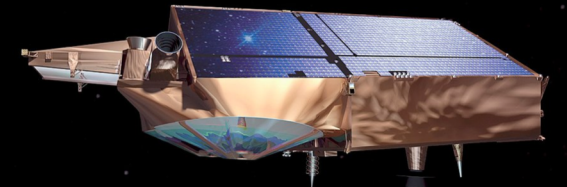
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DTU Space
National Space Institute

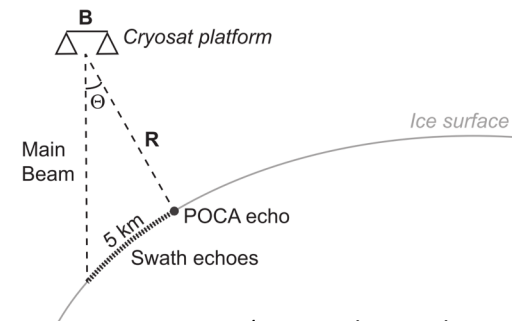


Technical University of Denmark



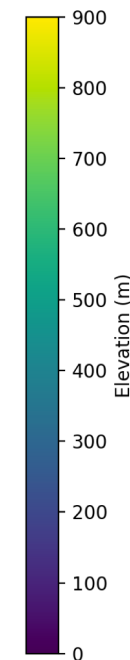
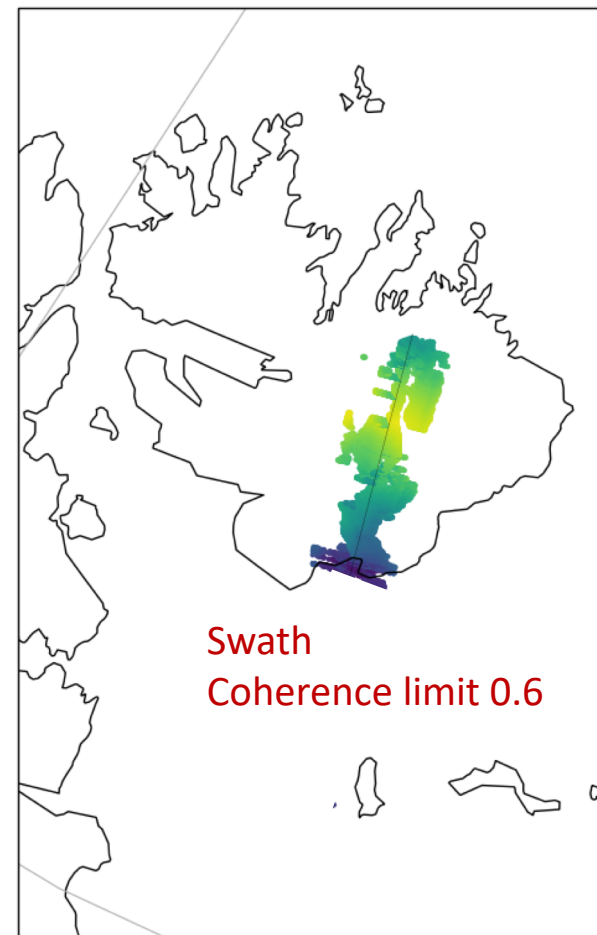
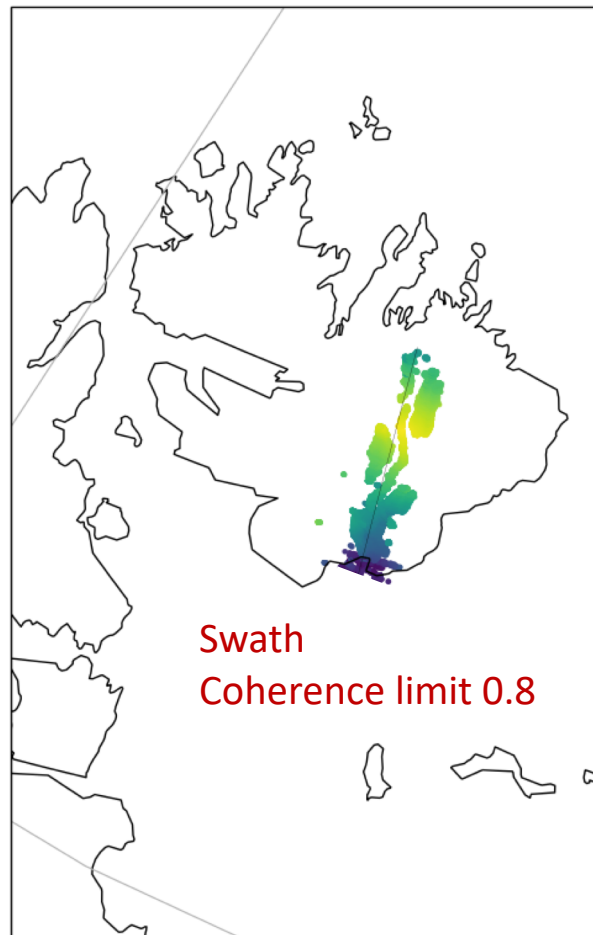
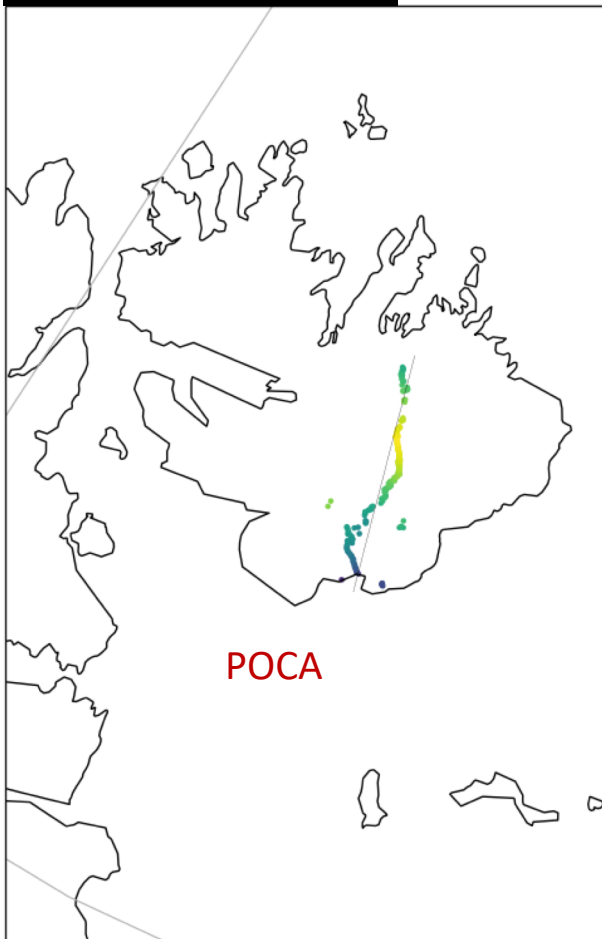
POCA & Swath processing

Swath processing retrieves elevations from beyond the conventional POCA point



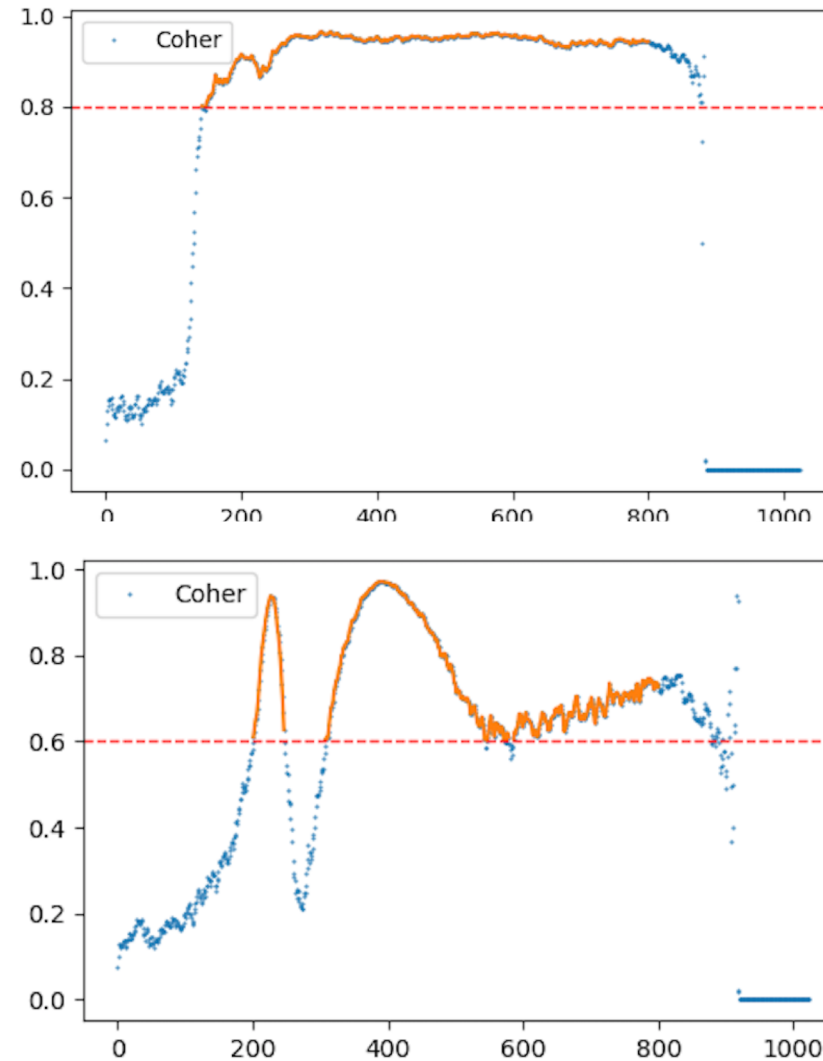
(Gourmelen et al, 2018)

Austfonna Ice Cap
April 19th 2016

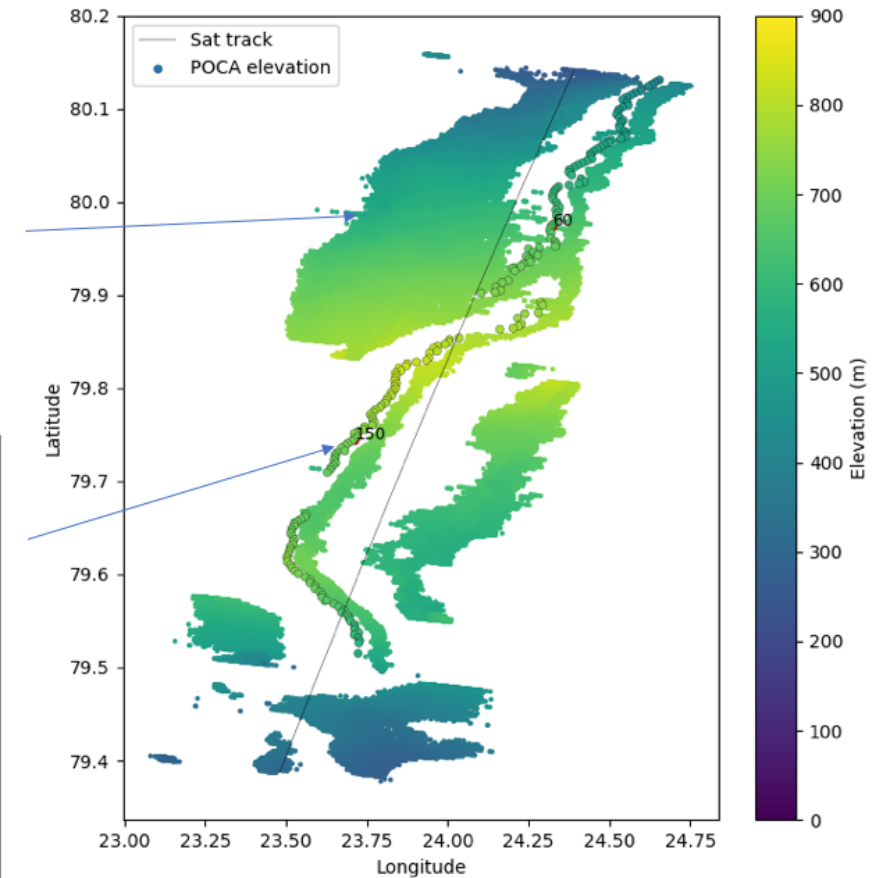


Coherence limit

- Instead of using a retracker to choose the surface, a swath processor uses the coherence to determine what part of the waveform that are suitable for computing the ice surface elevation.
- Varying the coherence limit under suitable conditions can increase the elevation data.
- A high coherence limit will inherently limit the amount of data that is used for further processing and ensure high quality of the data.



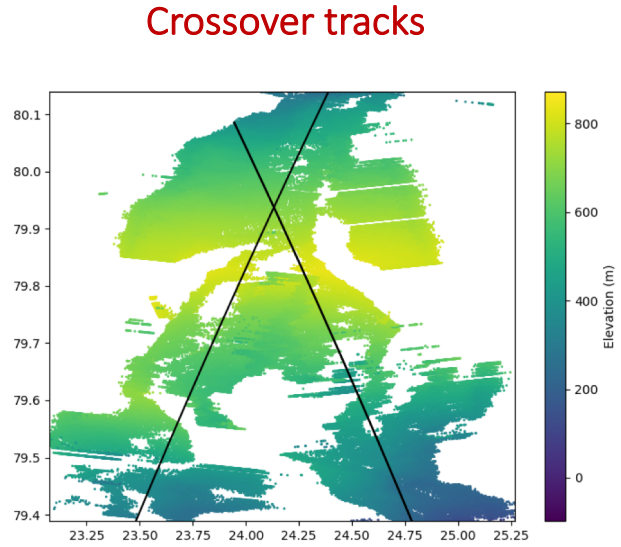
Swath and POCA processing of Cryosat-2 SARin data over Austfonna April 2016



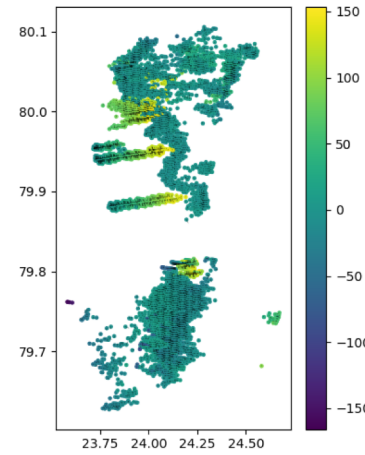
Crossover analysis – Internal

between an ascending and a descending satellite track

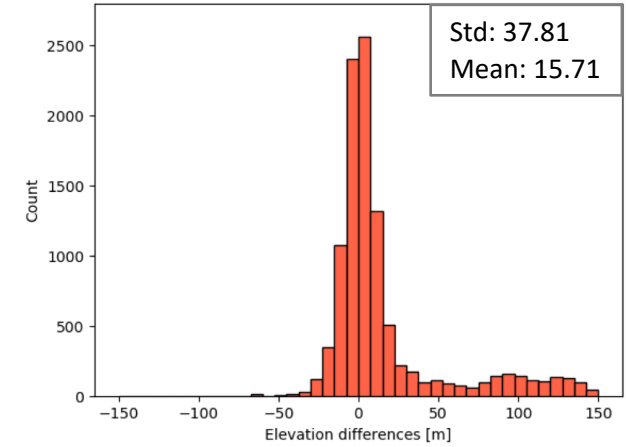
Coherence limit 0.6



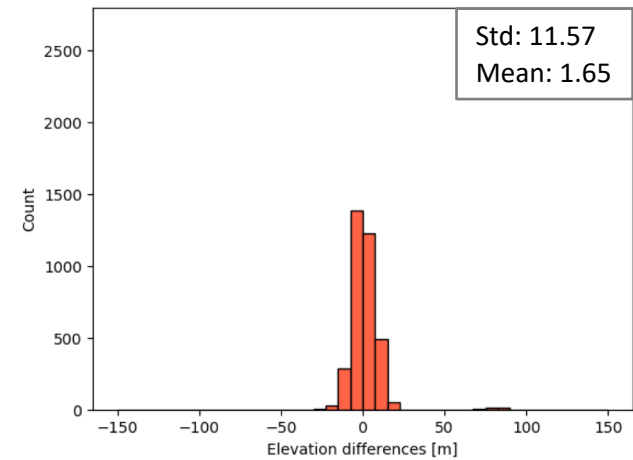
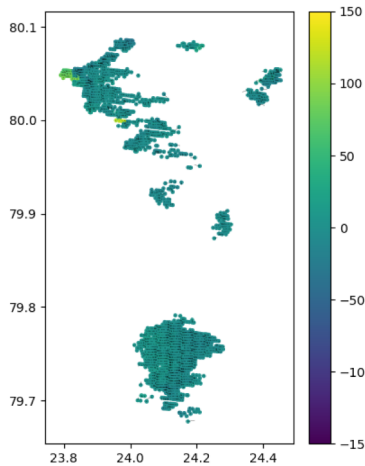
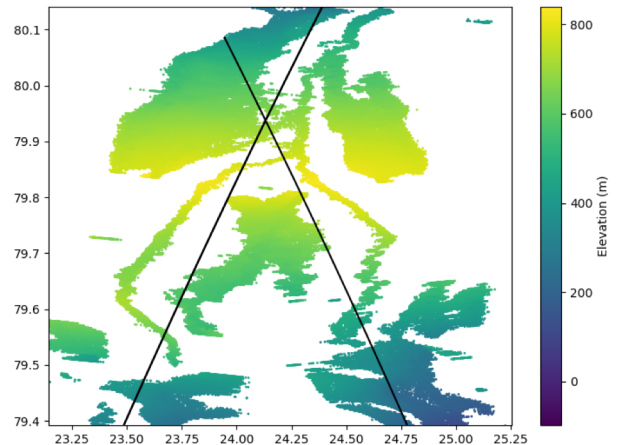
Elevation differences



Histogram of elevation differences

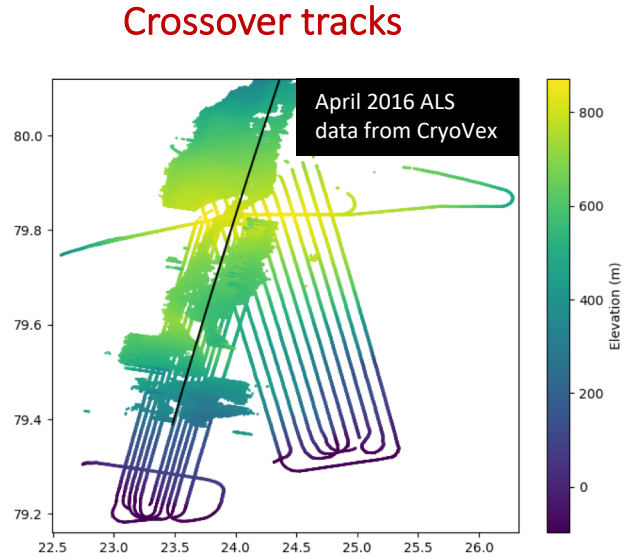


Coherence limit 0.8

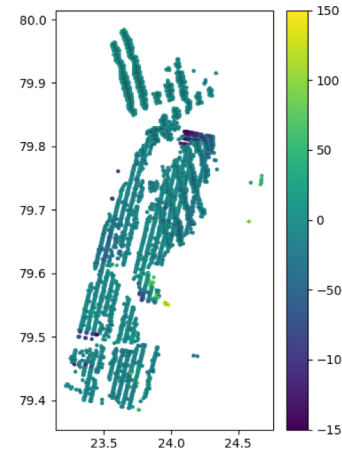


Validation with ALS data - External

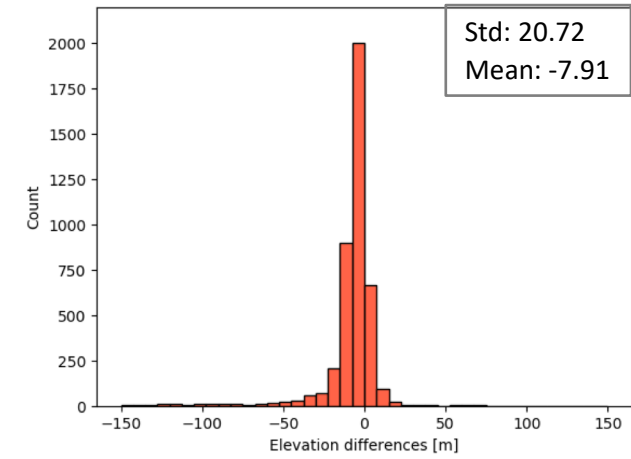
Coherence limit 0.6



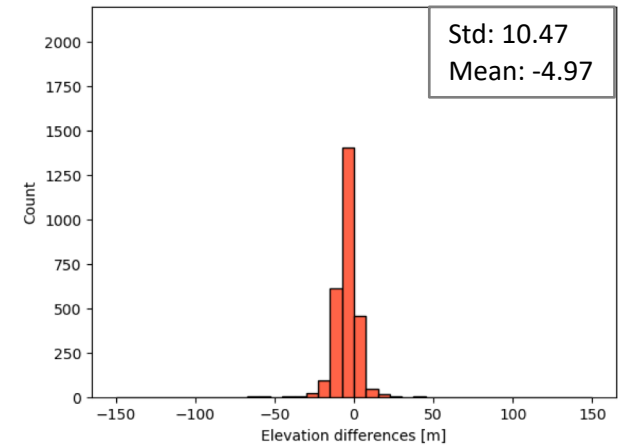
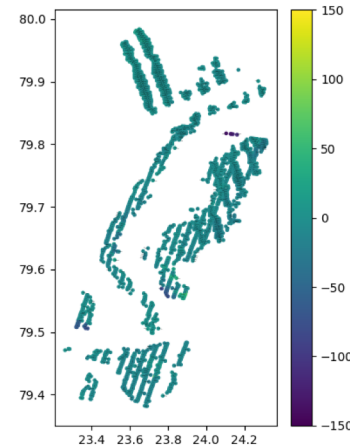
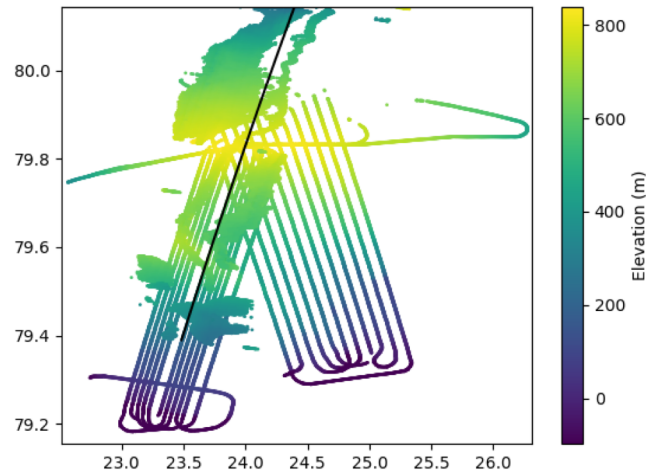
Elevation differences



Histogram of elevation differences



Coherence limit 0.8



Final remarks

- Generic swath processor – one size fits all
Having a swath processor that can generate good elevations in all areas are of course to be desired. However, it will come with some errors.
- Finetuning of swath processor to the study region
Adjust coherence limit and other thresholds to be aligned with the surface topography of the study region in question.
- Validation of low/high coherence elevation data
Making sure that the resulting ice surface elevations are properly validated.
- What is an acceptable amount of noise?
The extra amount of data will inherently be more noisy, since it stems from data with lower coherence.