MSS at the coast.
What Cryosat-2 revealed about existing MSS + Ocean Tide models in coastal & Arctic regions

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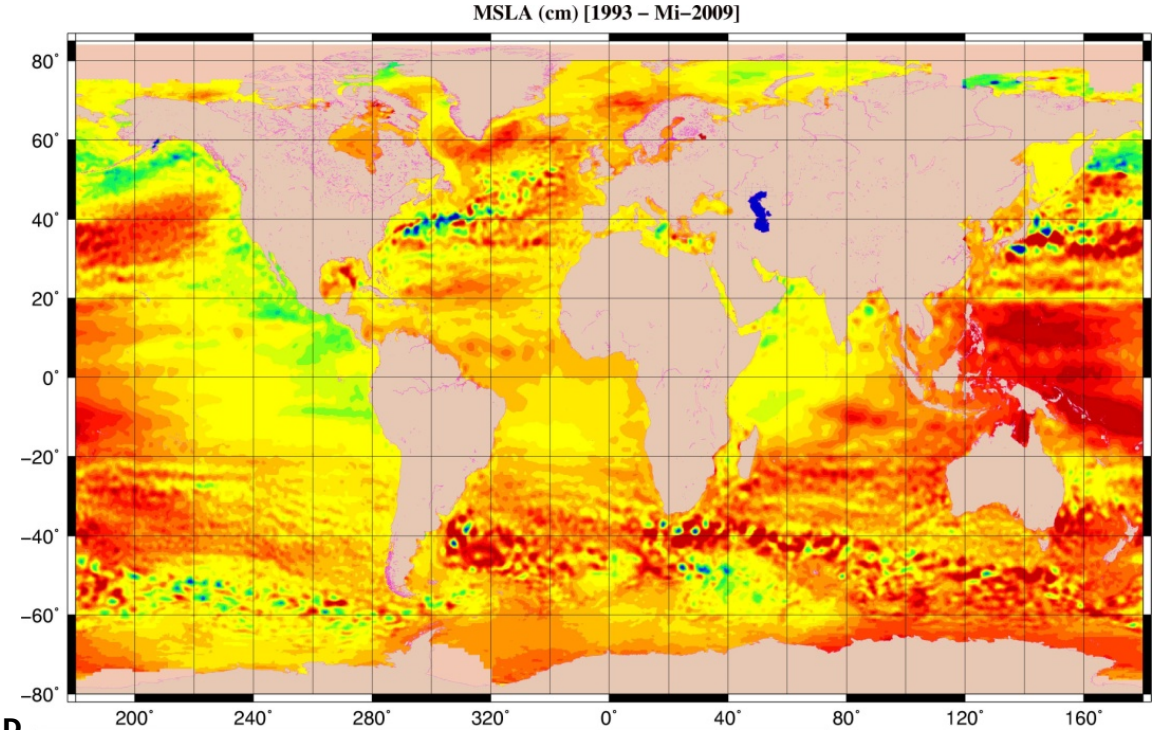
Overview

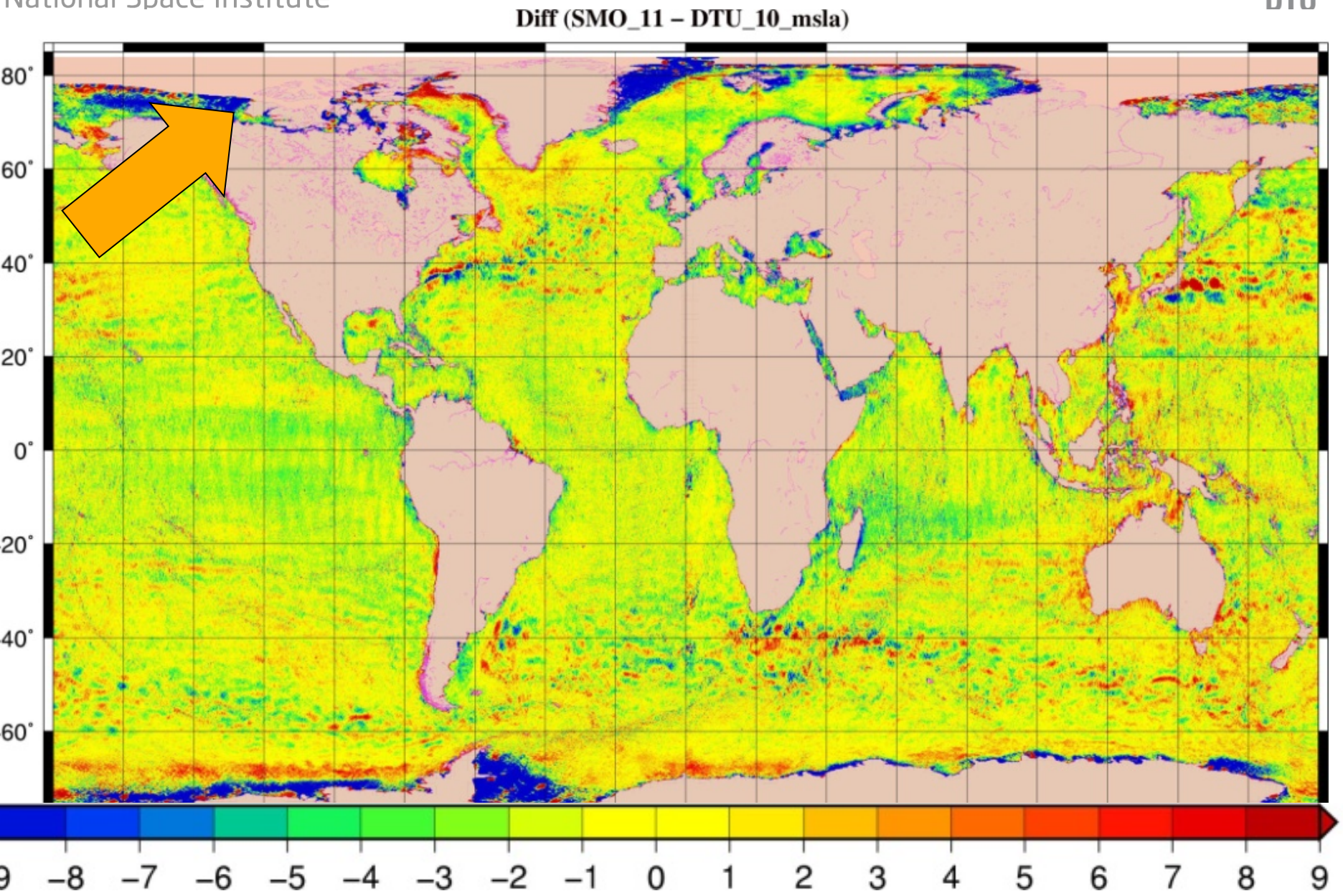
- **Cryosat and MSSH determination in the Arctic Ocean.**
- **MSS evaluation using 5 repeats of Cryosat-2**
- **Coastal MSSH – Denmark – The Ocean Tide issue**
- **Coastal MSSH - Greenland**
  - **Editing (Very Strict)**
  - **The use of Cryosat-22 SAR-in.**
- **Conclusions.**

Comparing MSS Models.

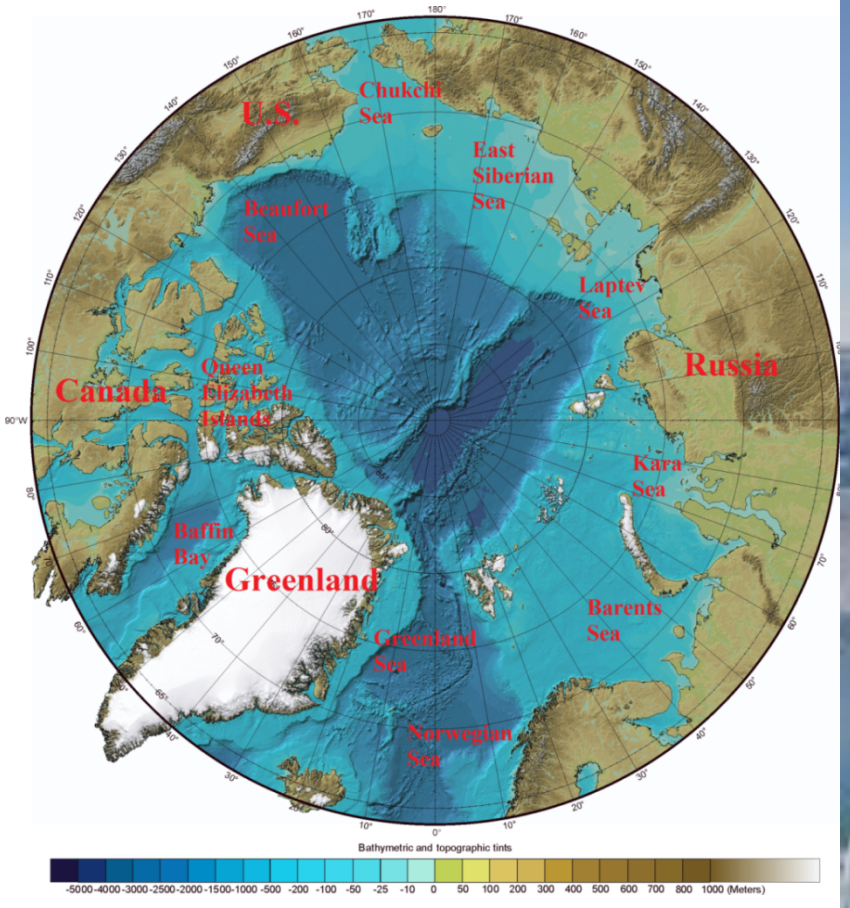
- Initially you will have to correct for ”period”.
- DTU10 (base period = 1993-2009) = 17 years.
- DTU13 (base period = 1993-2012) = 20 years
- CLS01 (base period = 1993-1999) = 7 years
- CLS11 (base period = 1993-1999) = 7 Years.

- MSS




Diff (SMO_11 – DTU_10_msla)
80°
60°
40°
20°
0°
20°
40°
60°
9 −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8 9

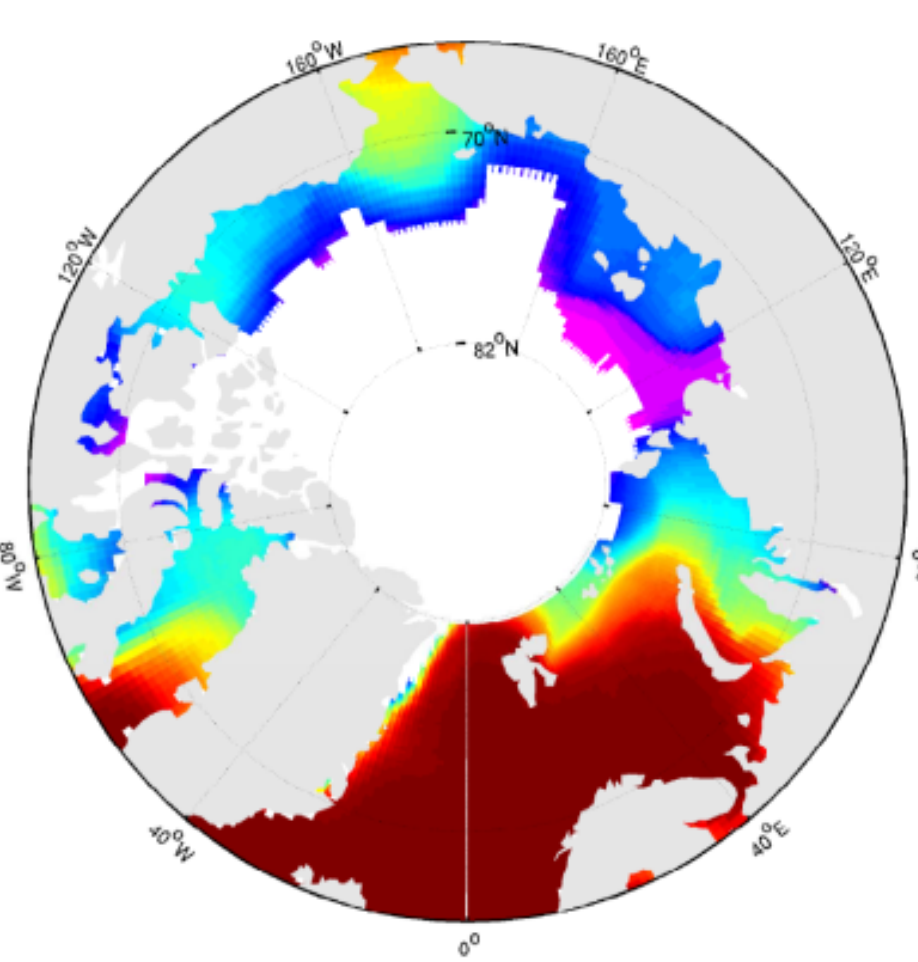
Arctic

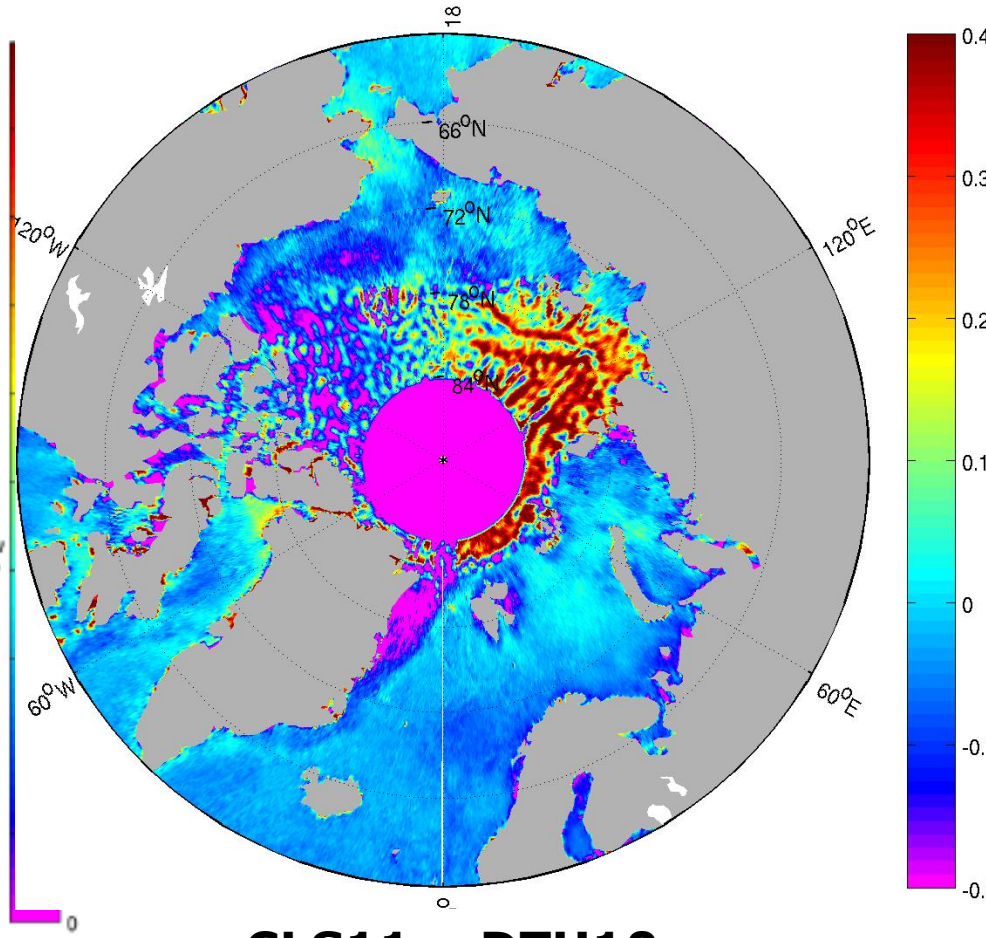


http://geology.com/world/arctic-ocean-bathymetry-r

"Only" ERS-1/ERS-2/ENVISAT/ICESAT/CryoSat-2 (+Hy-2/AltiKa) available

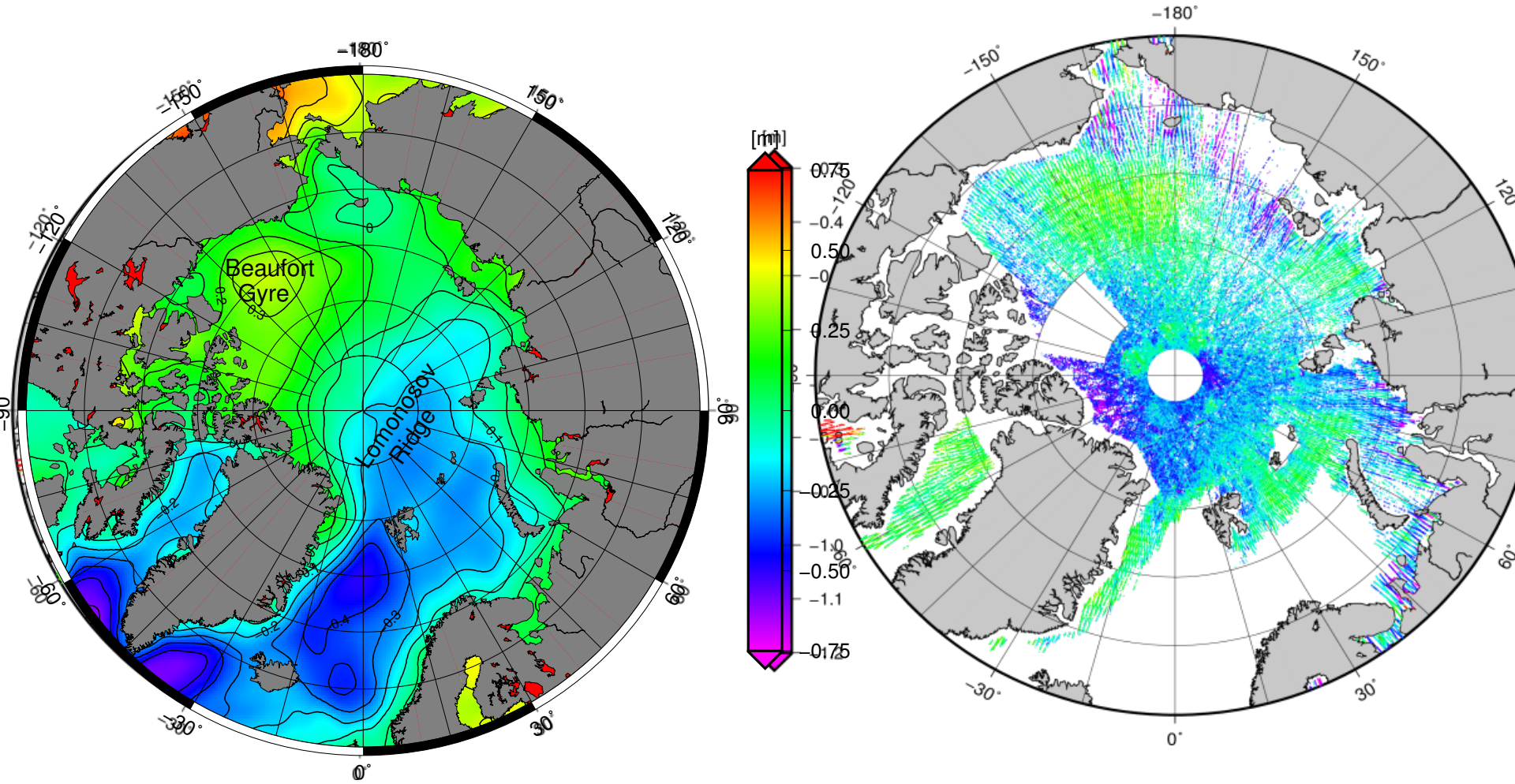
CLS MSS01 (improved to) CNES/CLS11





CLS11 – DTU10

MSSH difference with 1 year of Cryosat-2



UCL04 (Default Cryosat-2)

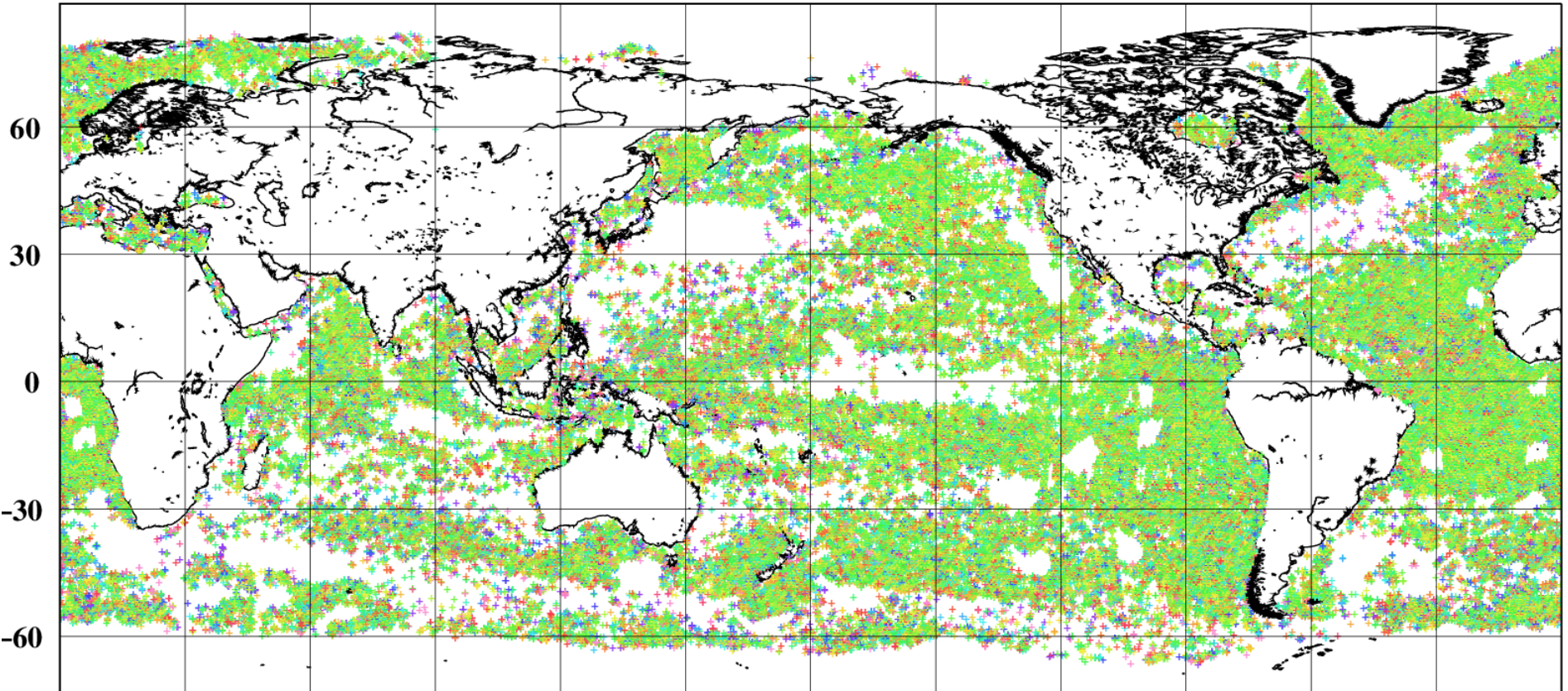
DTU 10 -> DTU13

Cryosat-2 "mean" SSH differences

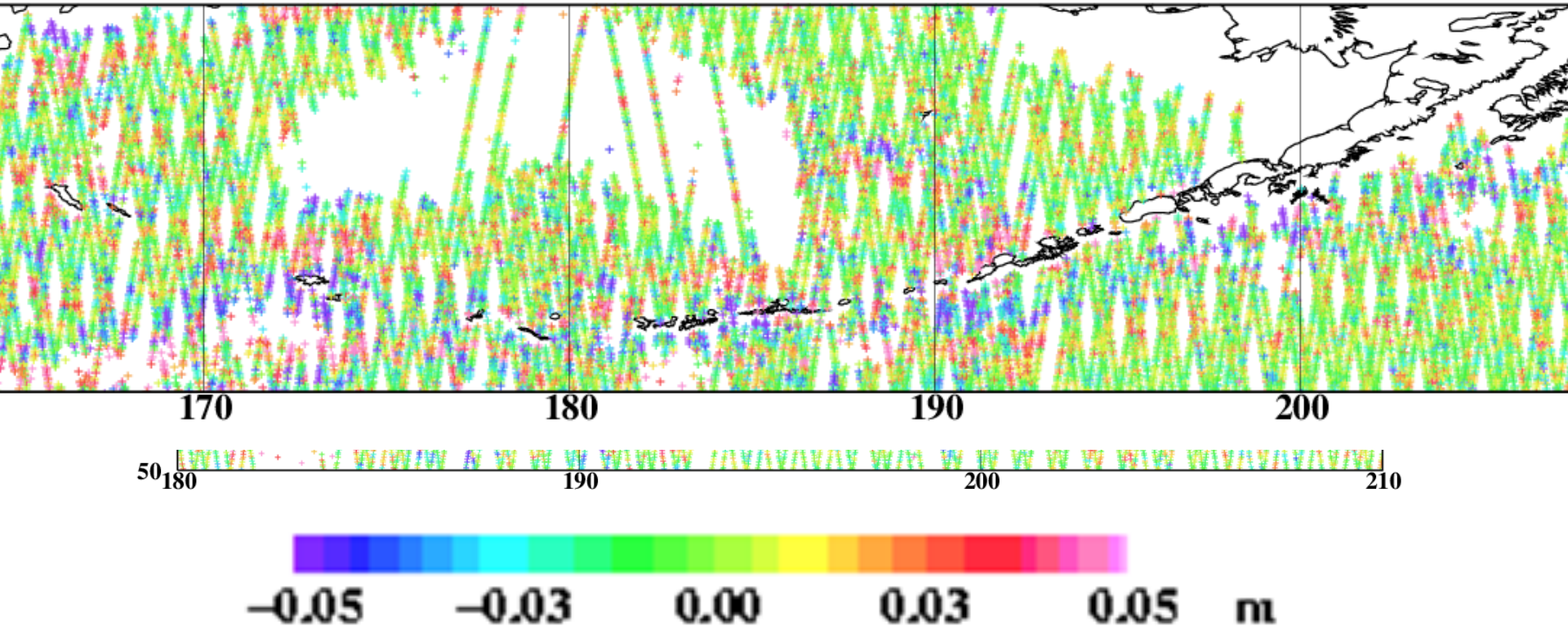
Using 5 repeats of Cryosat-2 (july + august) – Baseline B data – minimum 4 years.

Compute mean and std. Only plot mean when std is < 20 cm

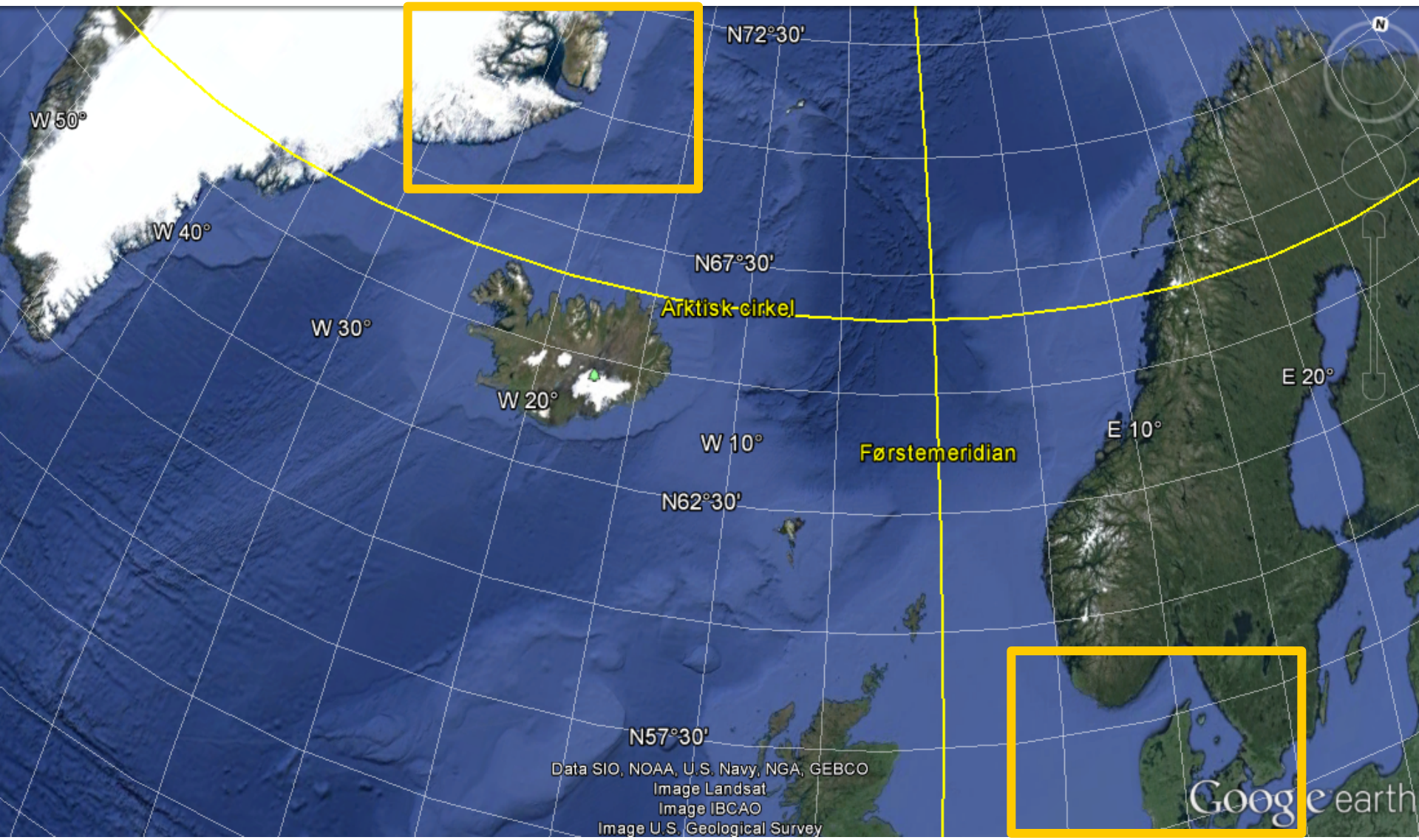
Then along track filter to only look at wavelength < 100 km



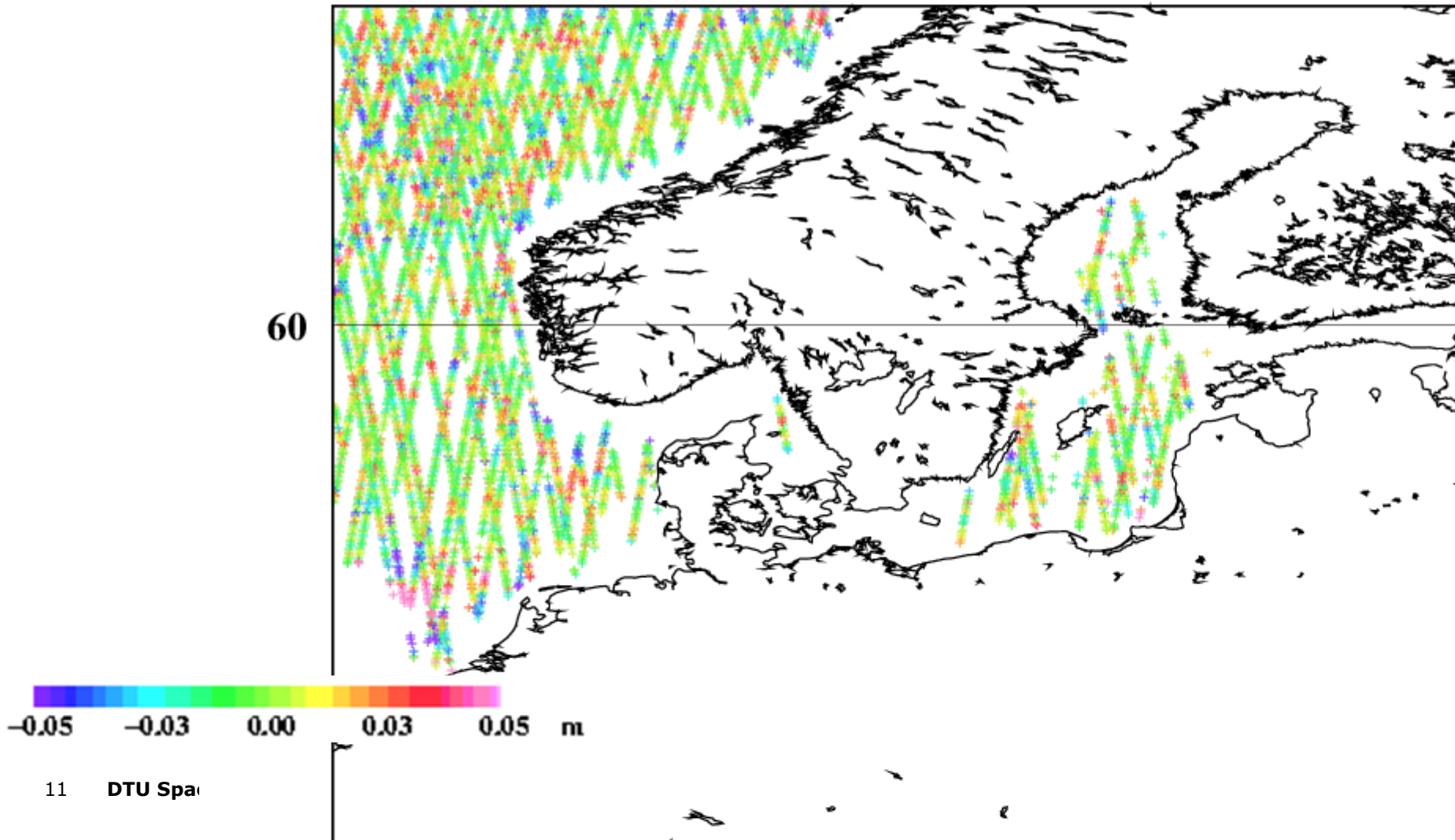
Aleutian island chain shows some consistent residual MSS signal.



Lets go to the Coast
Danish + Greenland Cases...



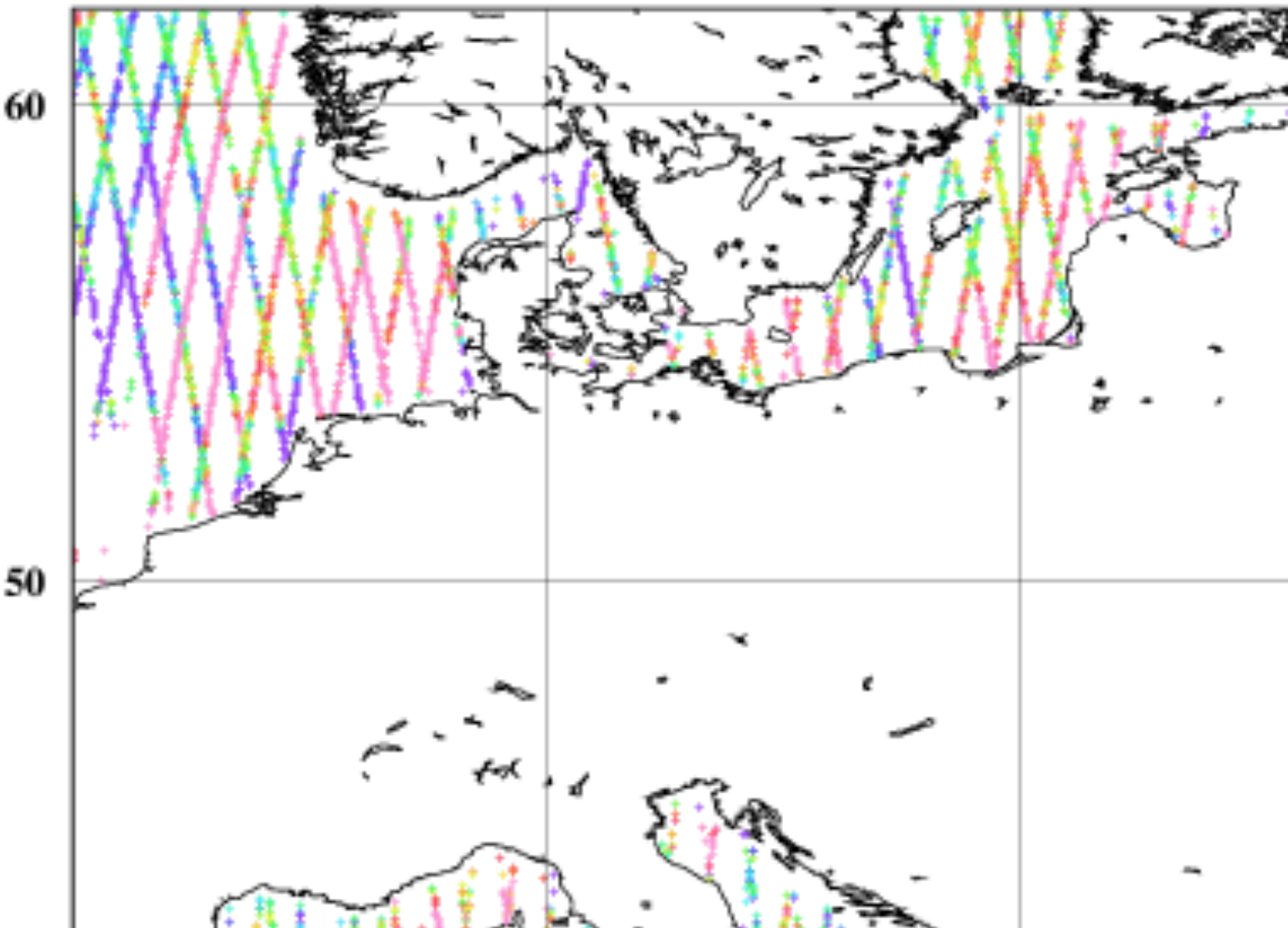
Europe / North Sea



Using FES2012

- Improved
- Spatial
- Coverage.

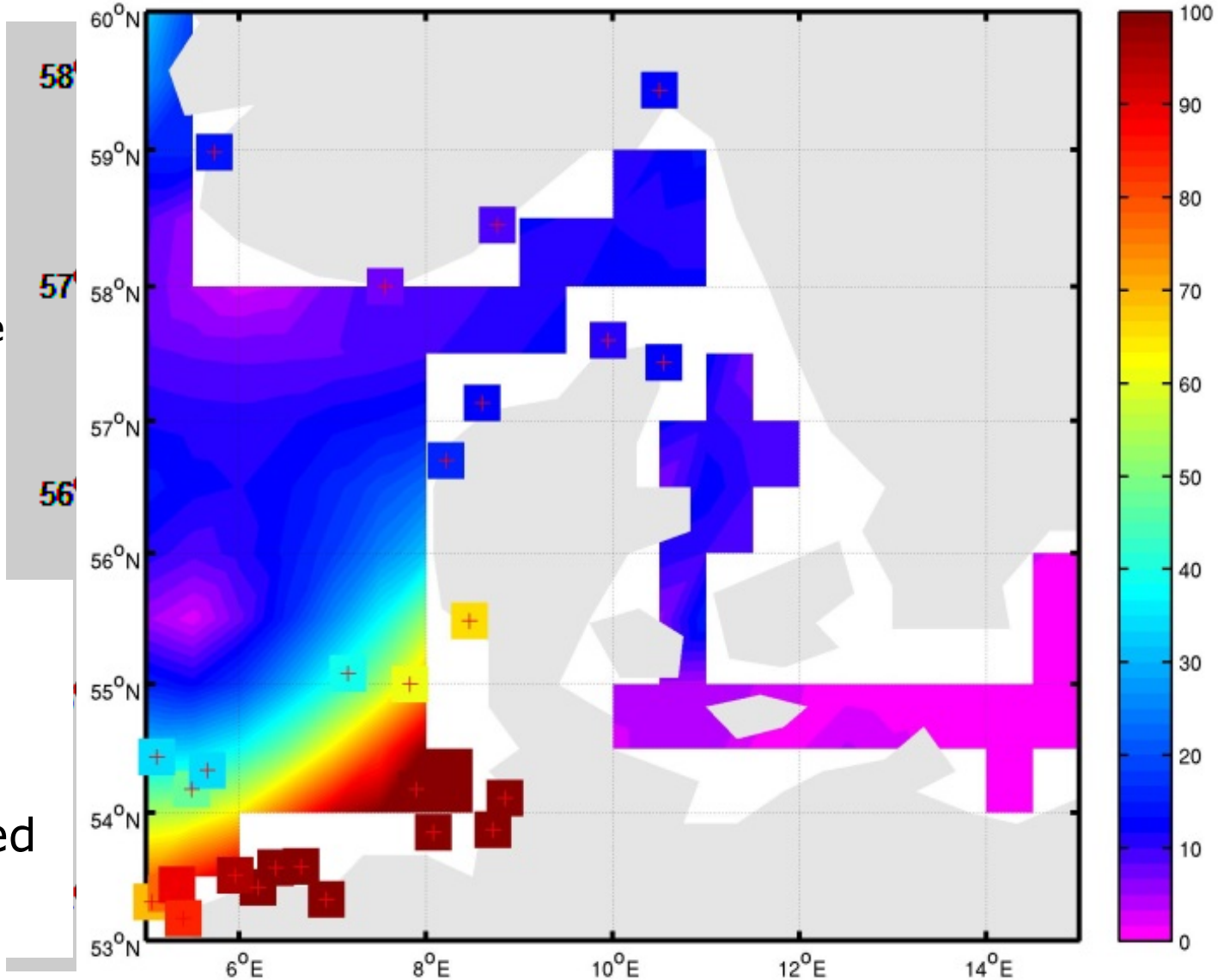
- However
- Poorer
- S2



Evaluating GOT 4.8

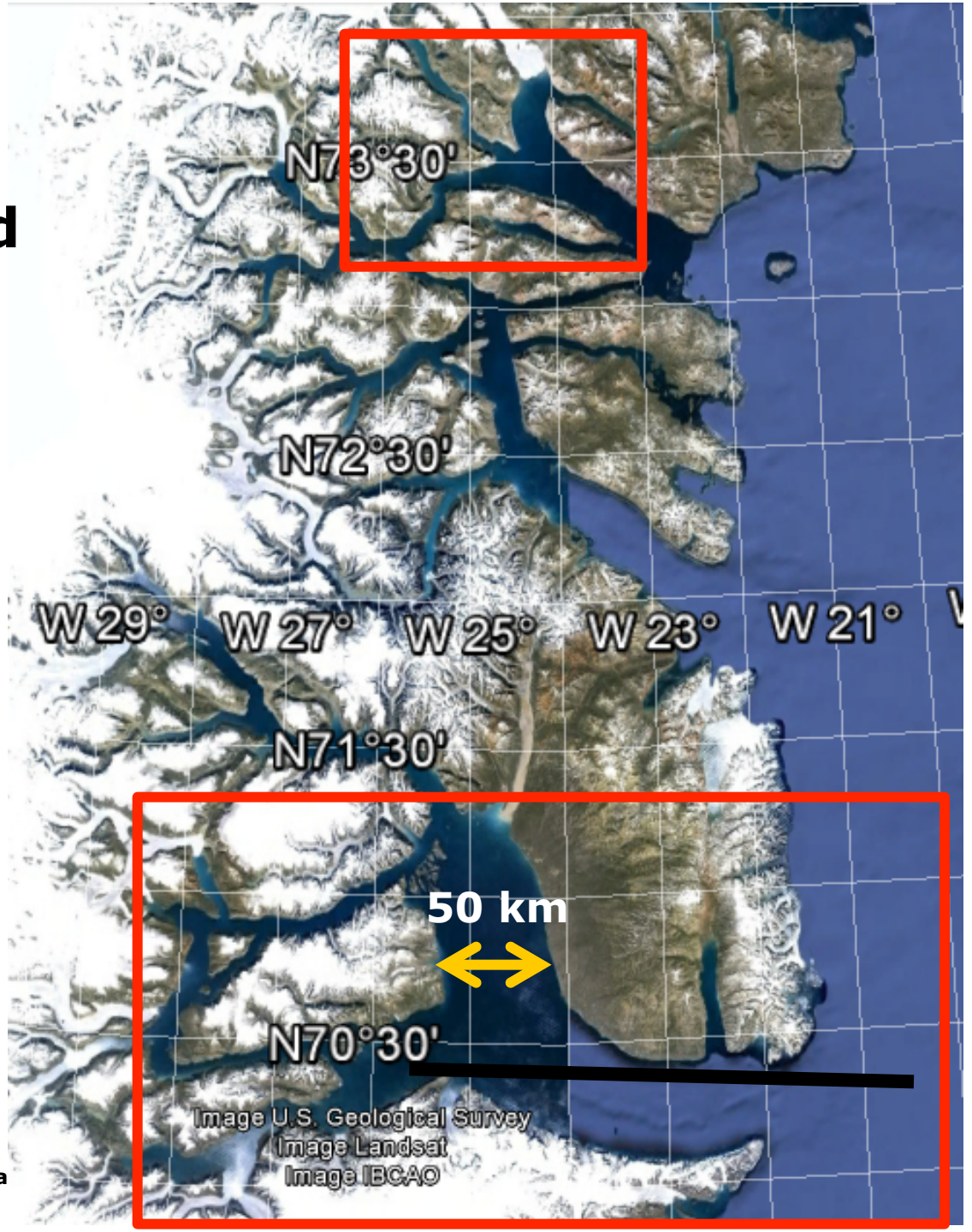
Cryosat-2
Observations
With ”zero” tide
Correction.....

GOT4.8
Mask
(data rejected
by RADS)

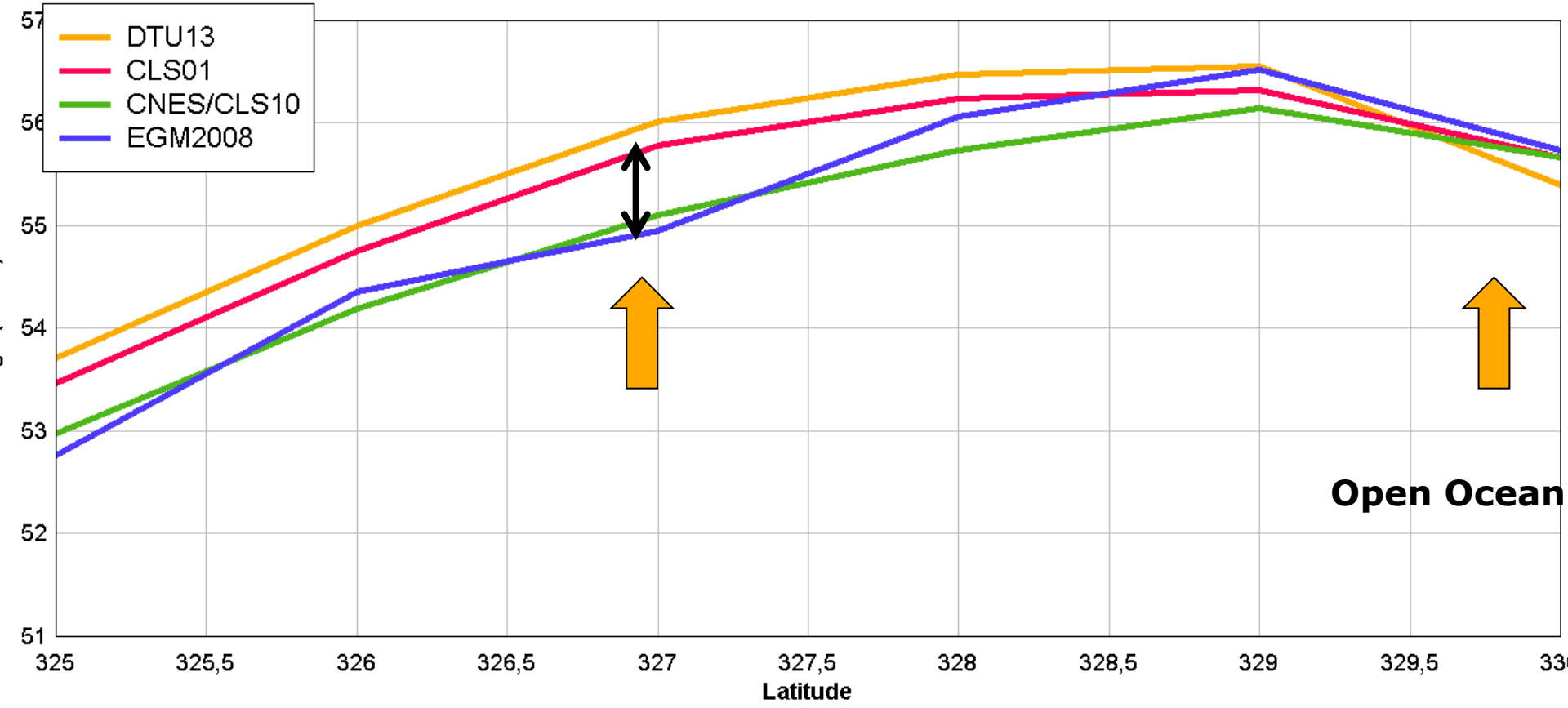


Huge Fjords in Eastern Greenland

- Study these as requested
- By marine authorities to
- Investigate MSS for
- Vertical reference.



MSSH differences up to 1 meter



ERS-Geodetic Mission

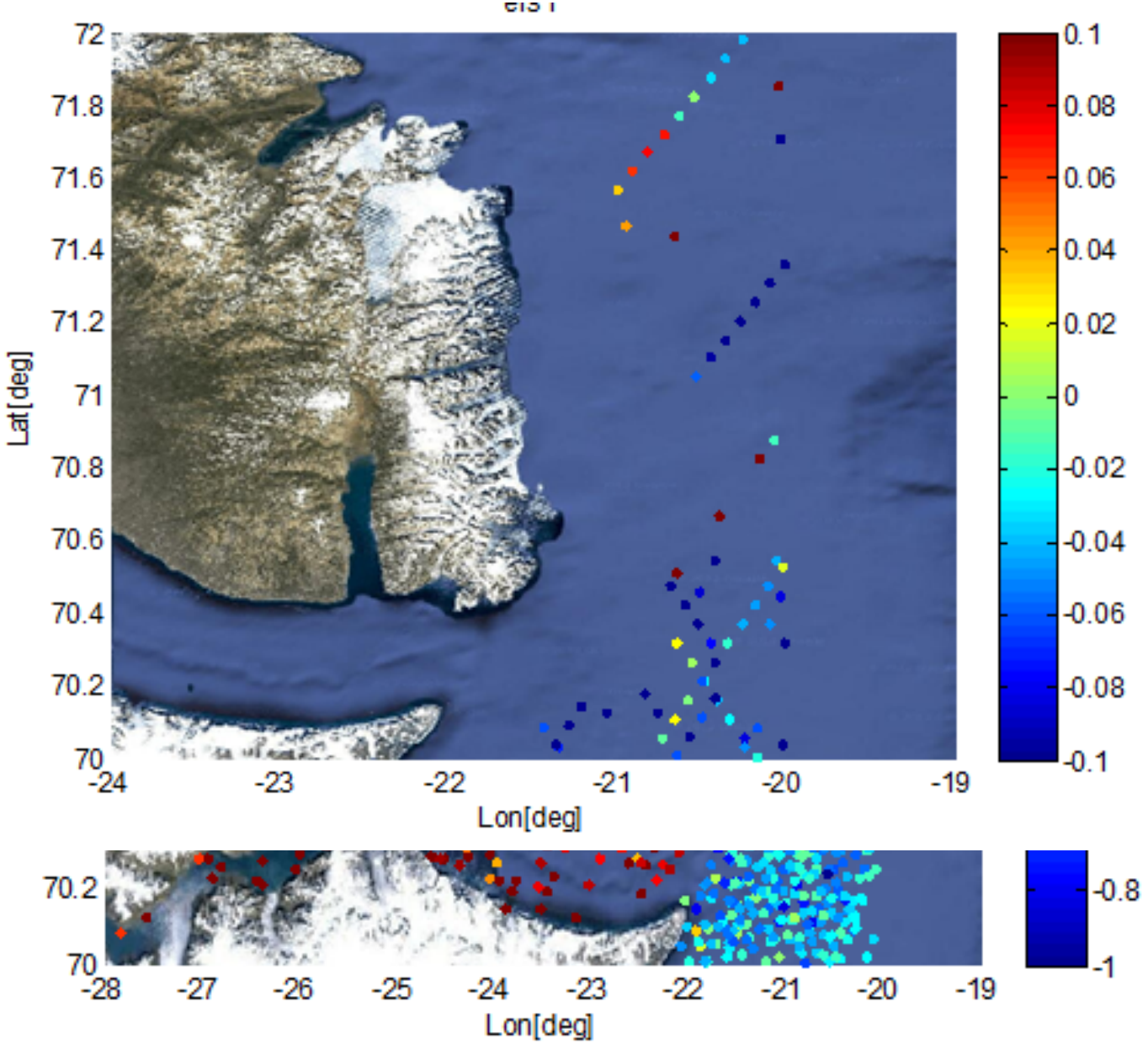
RADS default

Edited data.

P. Berry

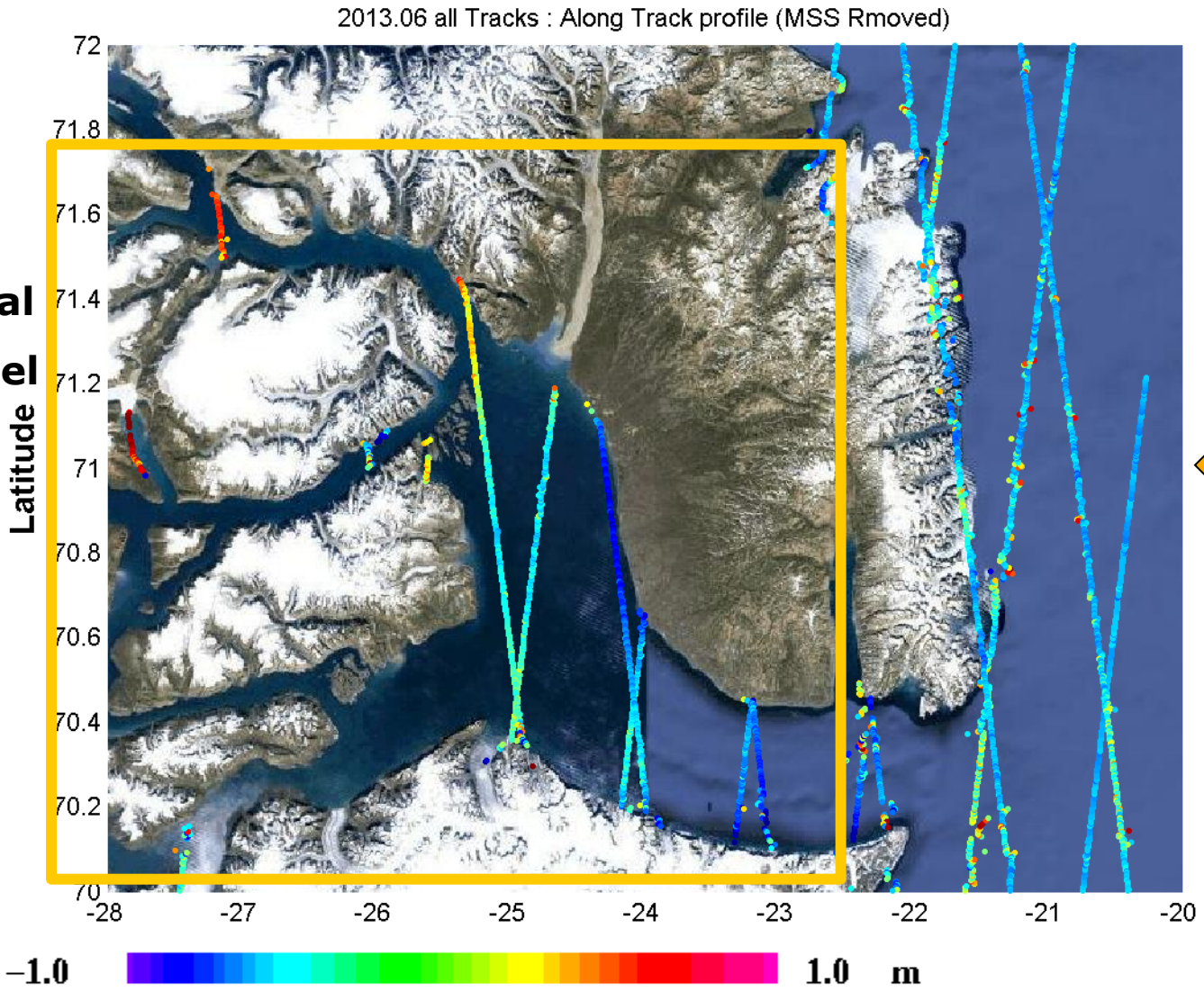
Retracked GM

Data for DTU MSS.



Cryosat-2 SAR-in

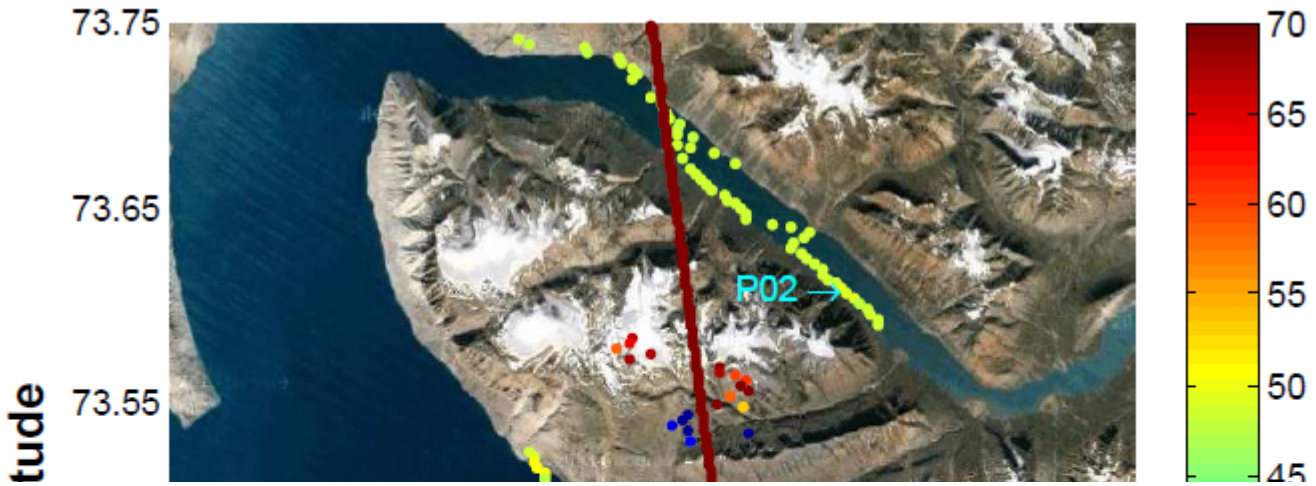
None of The Global Tide Model Covers Here

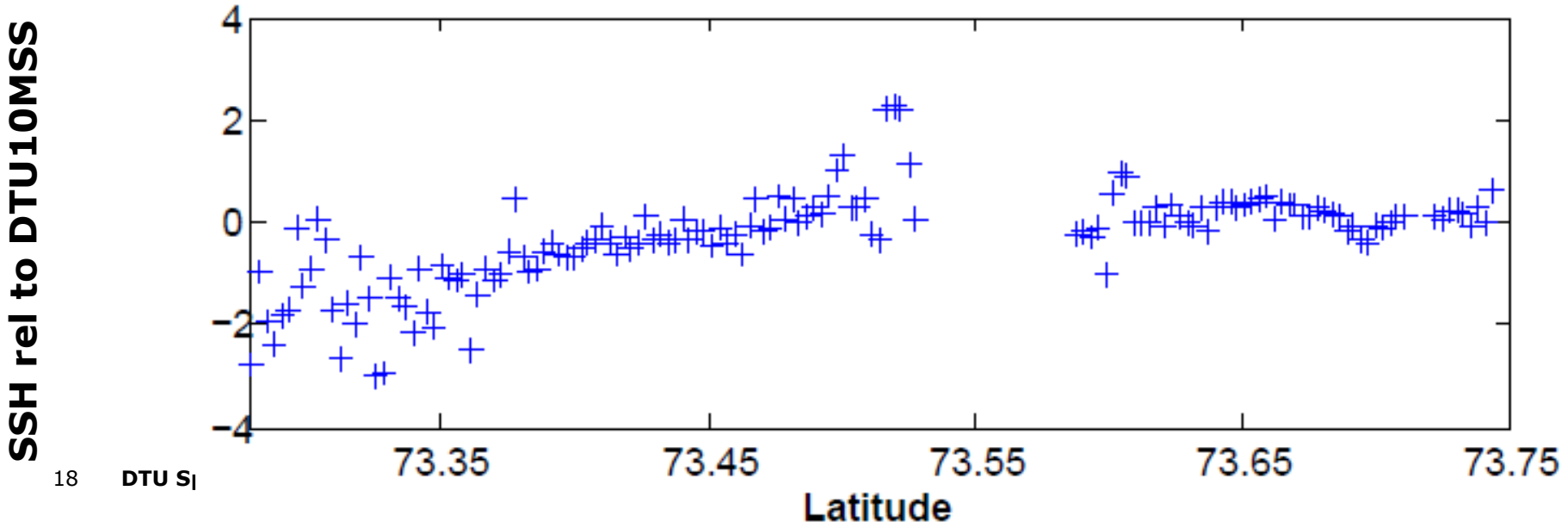


SAR-in height bias not accounted for here.

Northern Fjord.

- Correcting for
- Phase wrap
- In SARin.
- We retrieved
- Coastal SSH
- When Cryosat
- Flies up to
- 13 km INLAND





Summary.

- **CLS11/DTU10/DTU13 are very similar in the global ocean.**
- **Large voids in both CLS01 and CLS11**
- **In Coastal regions missing/erroneous Ocean tide model is problematic for MSS evaluation.**
- **In coastal regions Data Editing for MSS determination is critical. Retracking is nessesary to obtain MSS at coast....**
- **Standard editing in archives (i.e., RADS is VERY restrictive)**
- **SAR-in should really be exploited more for the coast.**
- **Conclusions.**