Geoid, MSS and MDT
Round Table discussion

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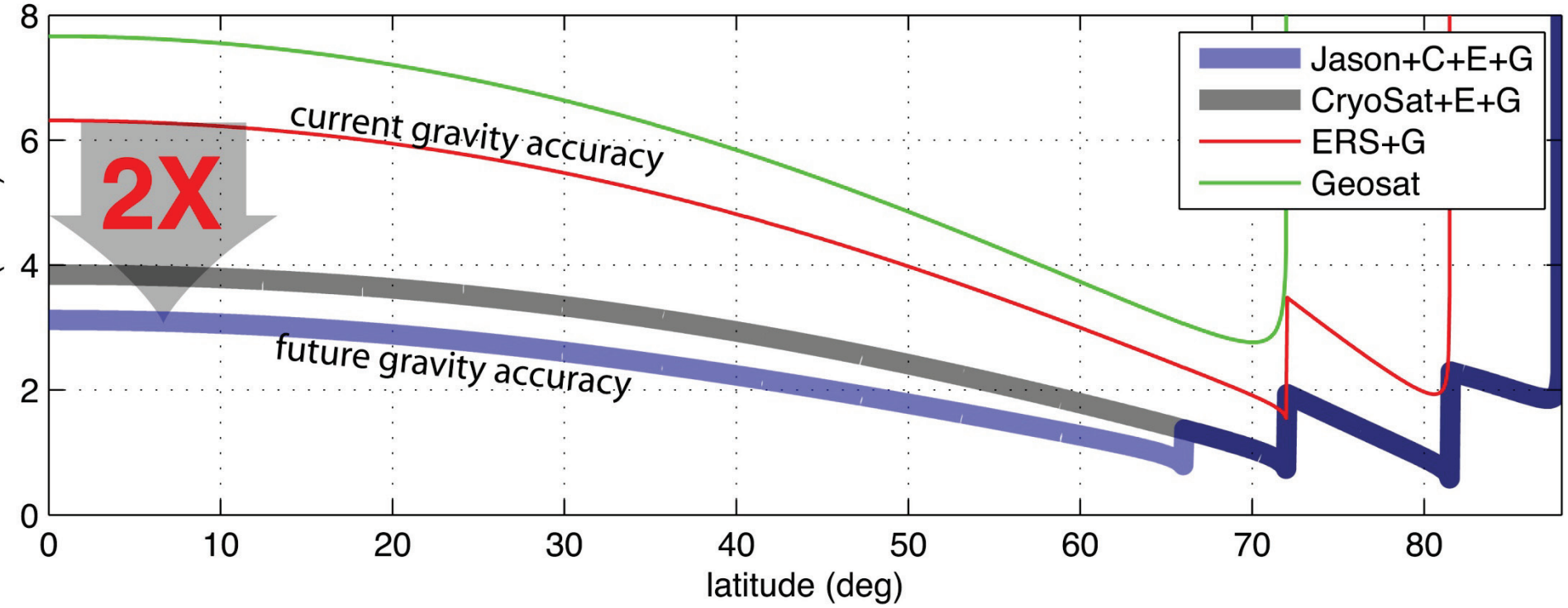
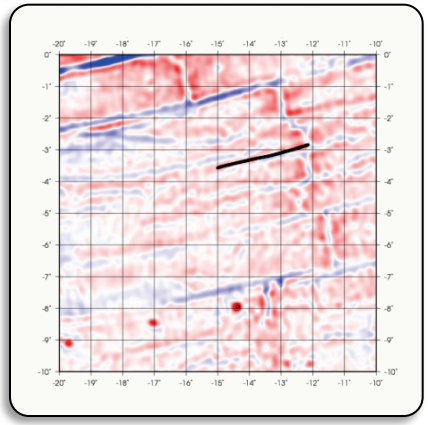
MSS / Geoid

- Impact of geodetic missions for the marine gravity field modeling

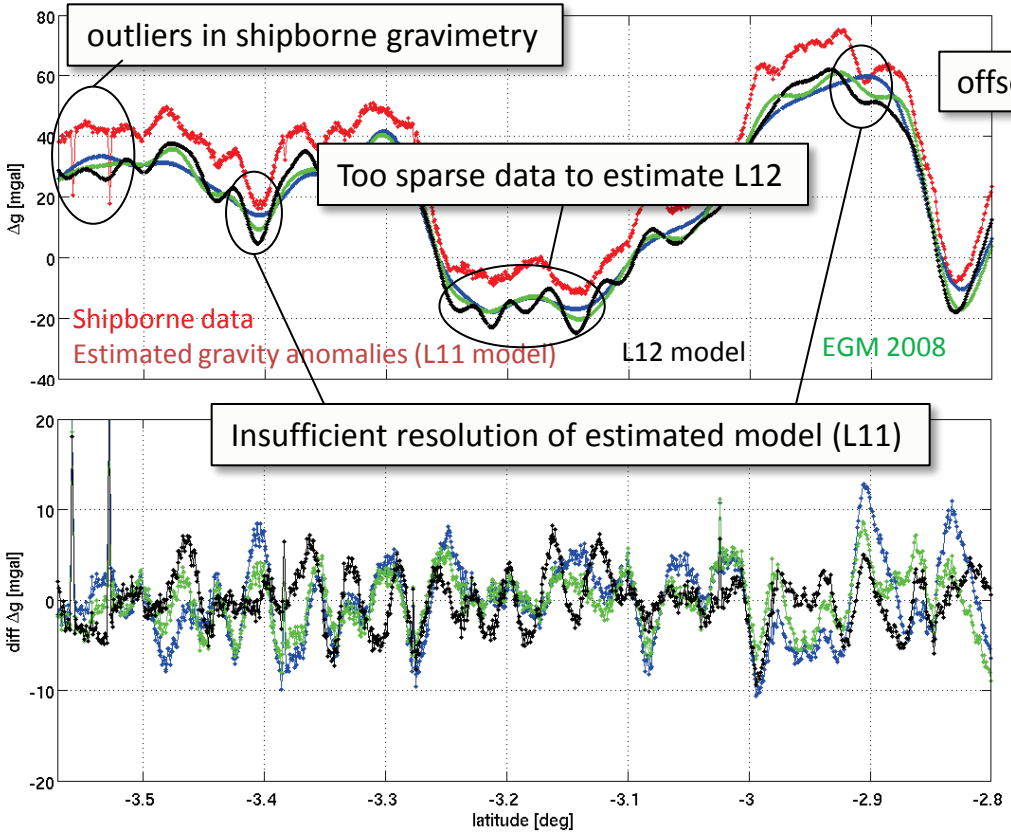


Sandwell and Dibarboure, Thursday

Dettmeier et al: The geodetic mission phase of Jason-1: Benefits for regional marine gravity field modelling– On the importance of the Jason-1 GM



Platform: Robert D. Conrad, 1987
Institution: Lamont-Doherty Geological Observatory
Survey ID: RC2806 (partly), Data Source: NOAA NGDC



$\rho_{L11/ship} = 0.984$

$\rho_{EGM/ship} = 0.992$

$\rho_{L12/ship} = 0.992$

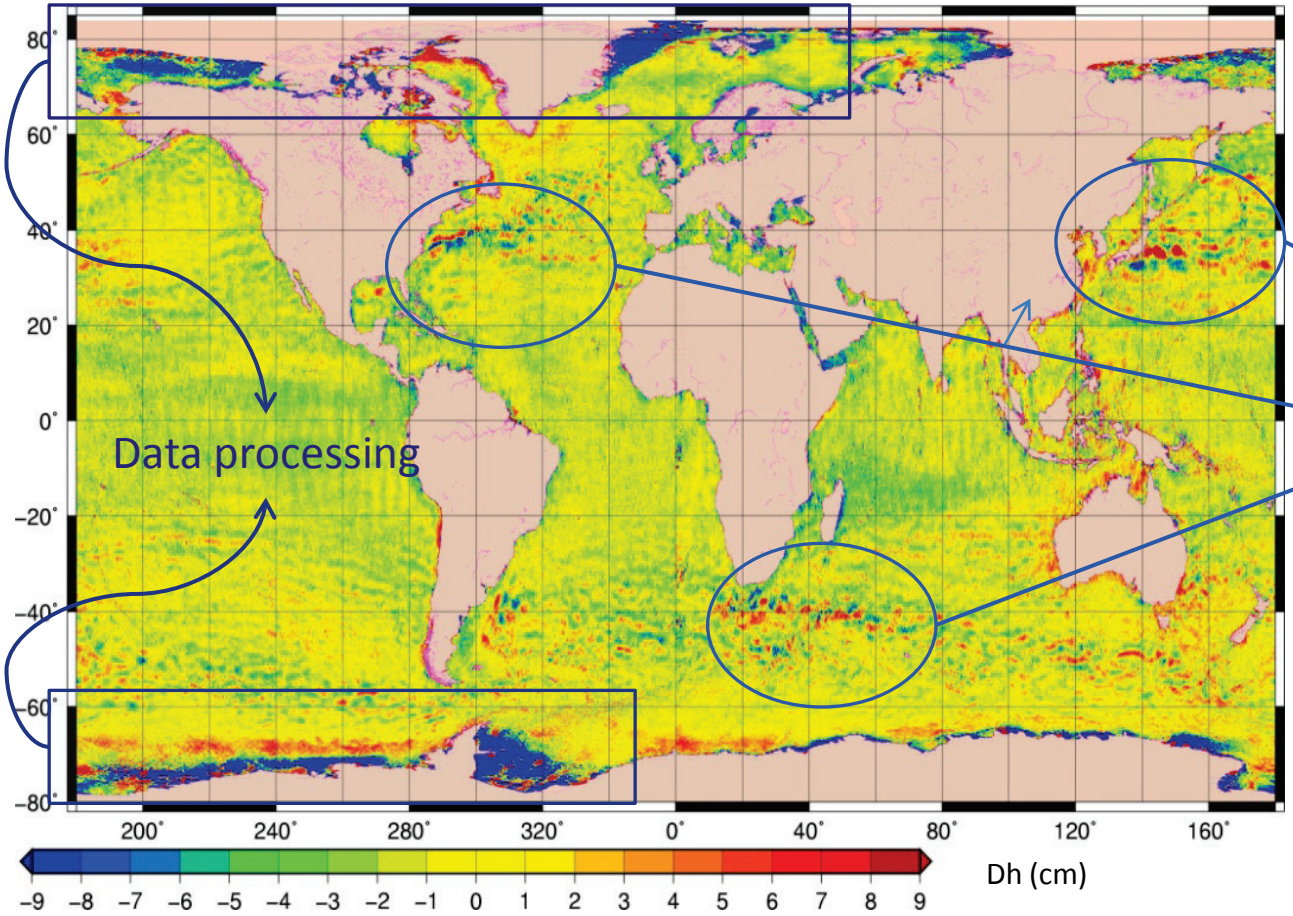
$\sigma_{L11} = 4.3$ mgal

$\sigma_{EGM} = 3.1$ mgal

$\sigma_{L12} = 3.1$ mgal

Altimeter Mean Sea Surface issues

Dif (CNES_CLS11 – DTU10_MSLA)

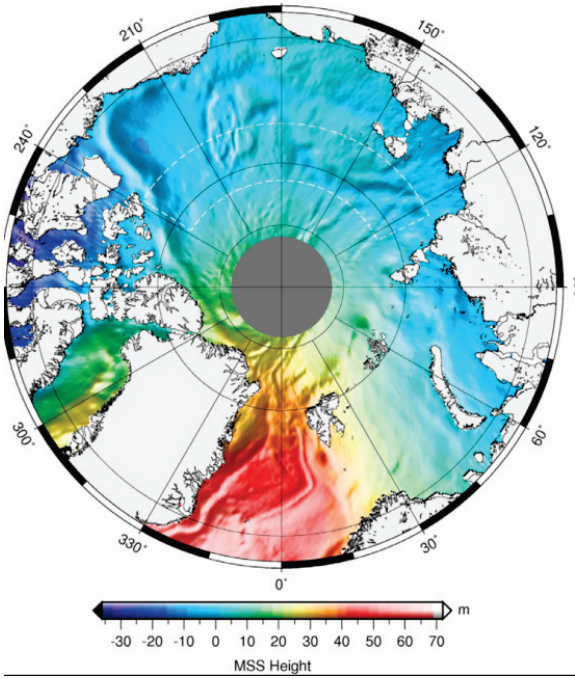


Altimeter Mean Sea Surface issues

- Further removing the Ocean Variability

- Improving the MSS computation in the Arctic Ocean

- Improving the MSS computation in the Coastal Zone.



Farrell et al, 2012

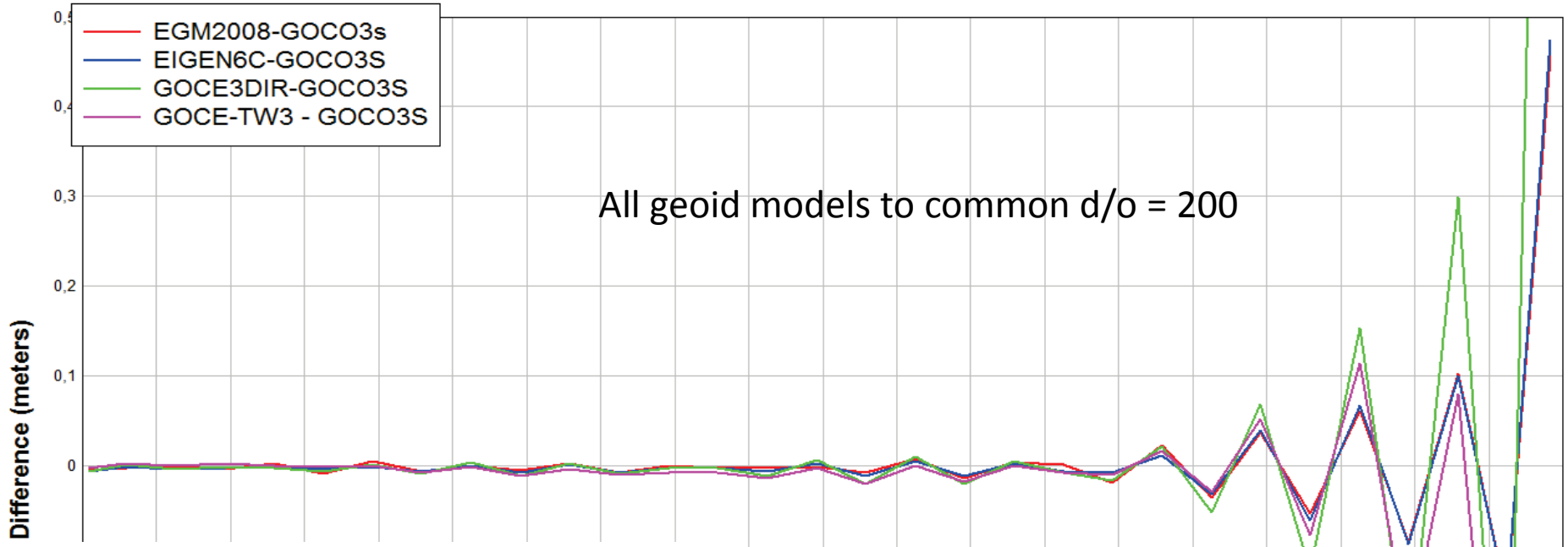
Ingest new geodetic missions: Jason-1 EOL, CryoSat-2

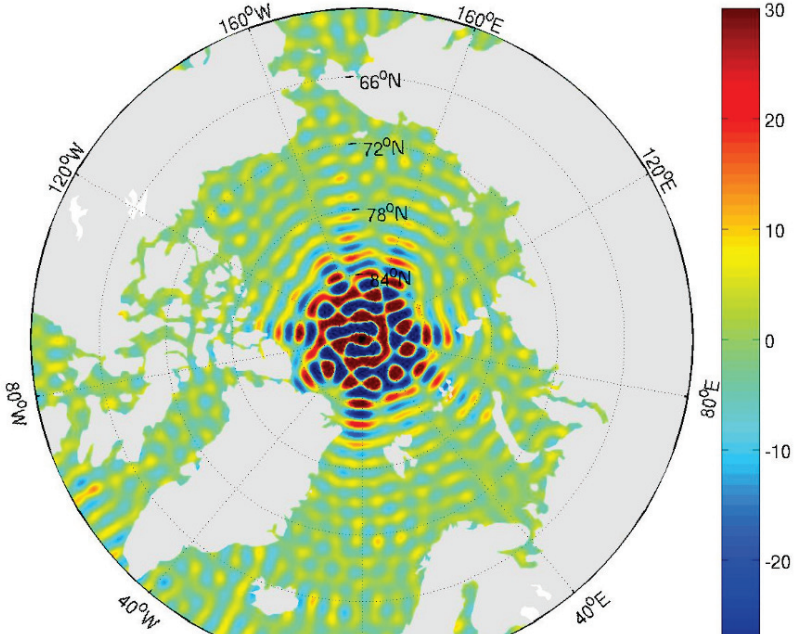
Ingest new ERM missions JASON-3 - Continue time-series

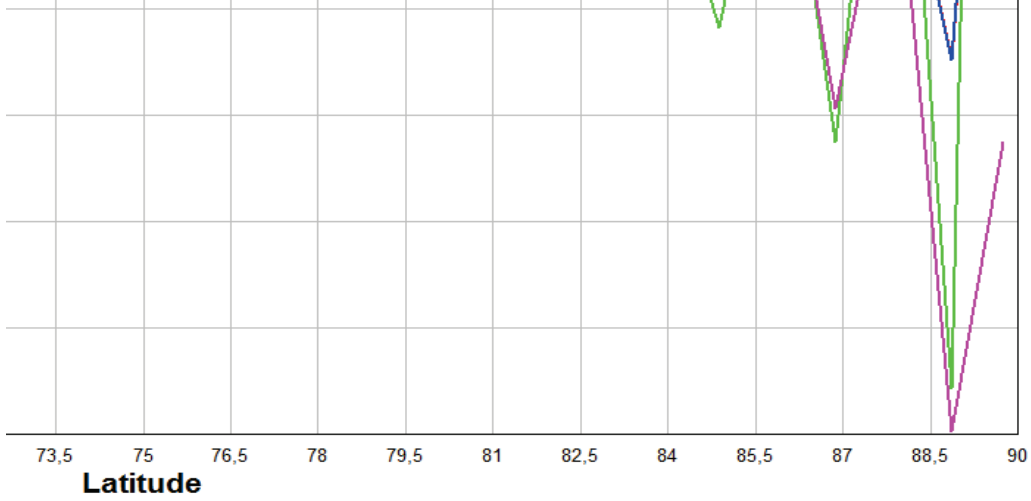
Ingest new ”data” – Cryosat-2, Sentinel-3 , Jason-CS, AltiKa (ocean variability)

Ingest IceSat1-2 data

Arctic Challenge (geoid) Polar Gap



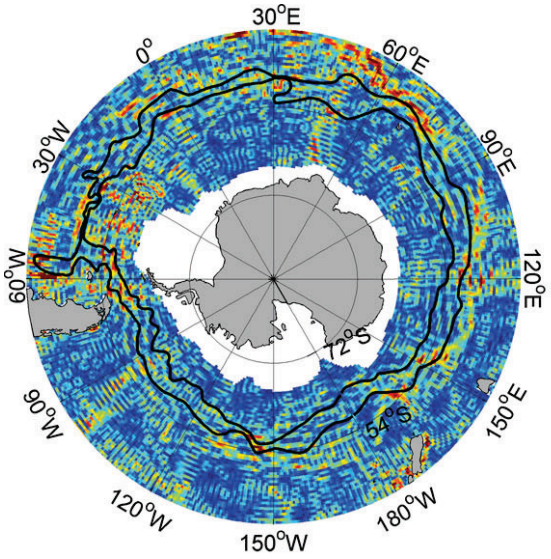




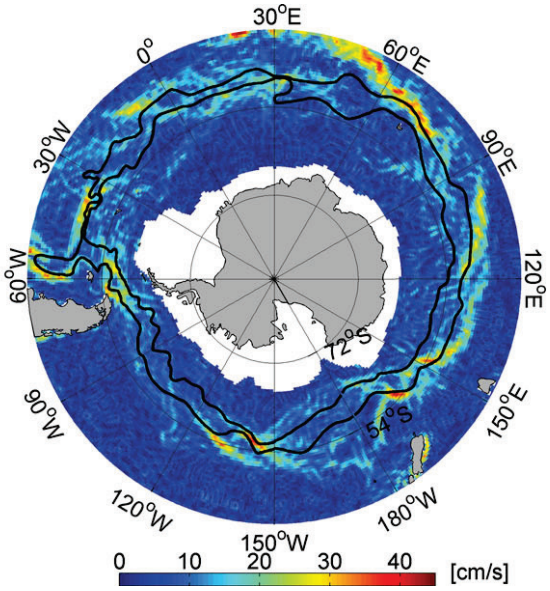
MDT

Strong improvements over GRACE for the computation of the Mean Dynamic Topography and the corresponding mean geostrophic currents

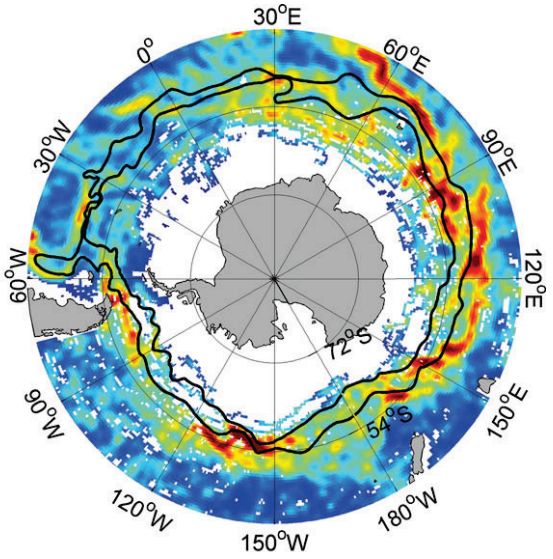
MDT ITG-GRACE2010S (111km)



MDT GOCE-TIMR3 (111km)



Mean geostrophic velocities from drifters



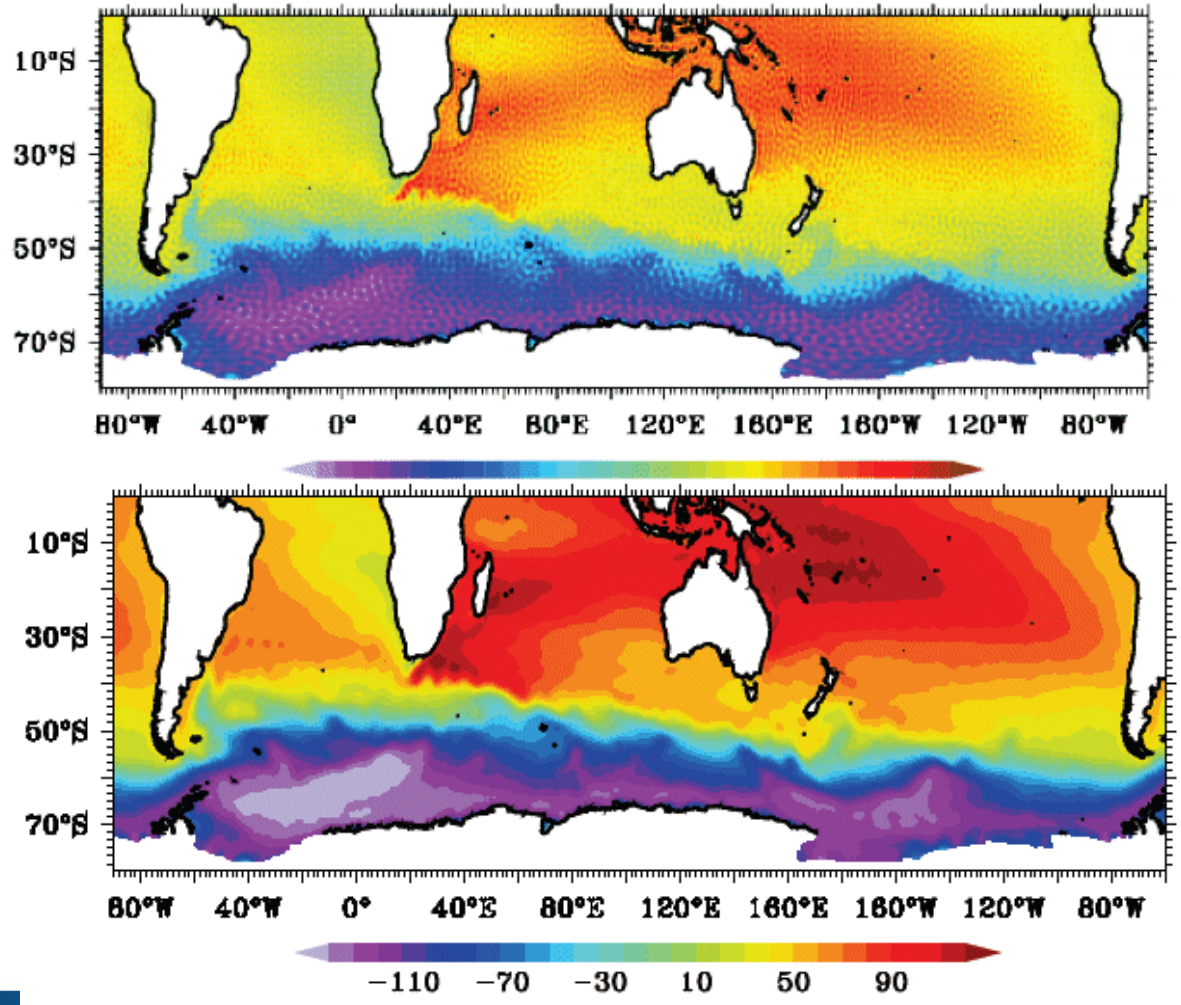
Albertella et al

Sanchez-Reales et al: Assessment of the first three generations of GOCE geoid models through their induced surface geostrophic currents

MDT

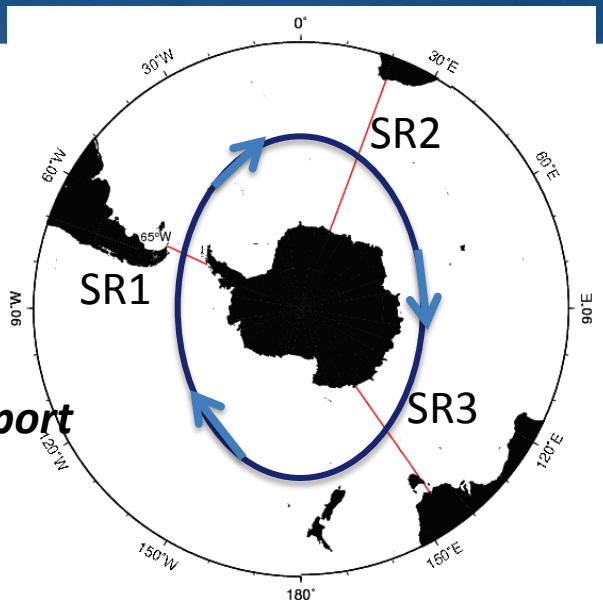
Number of complex filtering methods are now used to extract the maximum information from GOCE (anisotropic diffusive filter (Bingham), enhancing edge diffusion (Sanchez-Reales), Singular Spectrum Analysis based filter (Menezes)

Menezes et al



Impact of MDT on transport computation

A growing number of studies are using absolute altimeter surface geostrophic velocities together with 3D density fields to reconstruct the 3D ocean velocities

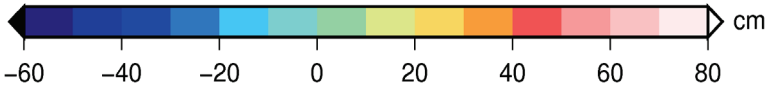


Zajaczkovski 'z talk: inconsistencies were found in the ACC transport computation: significant mass imbalance all along the ACC
- New GOCE based MDT
- Toward the computation of dynamically constrained MDT

Product	SR1: Drake Passage 65° W	SR2: Africa 20.5° E	SR3: Tasma-nia 145° E	SR1 – SR2 ~1 Sv
SOSE (ocean assim.)	147 ± 5	145 ± 15	159 ± 3	2
Maximenko and Niiler	159 ± 4	98 ± 18	187 ± 7	61
AVISO (CNES-CLS09)	172 ± 6	135 ± 31	164 ± 4	37
GRACE (GGM02C)	142 ± 2	188 ± 23	175 ± 3	-46
DOT2008A (EGM08)	151 ± 3	136 ± 13	167 ± 4	15

Novel approach for ADT computation
(poster by Bosch et al, oral by Mulet et al)

Absolute Dynamic Topography in the Arctic Ocean (5 september 2007)

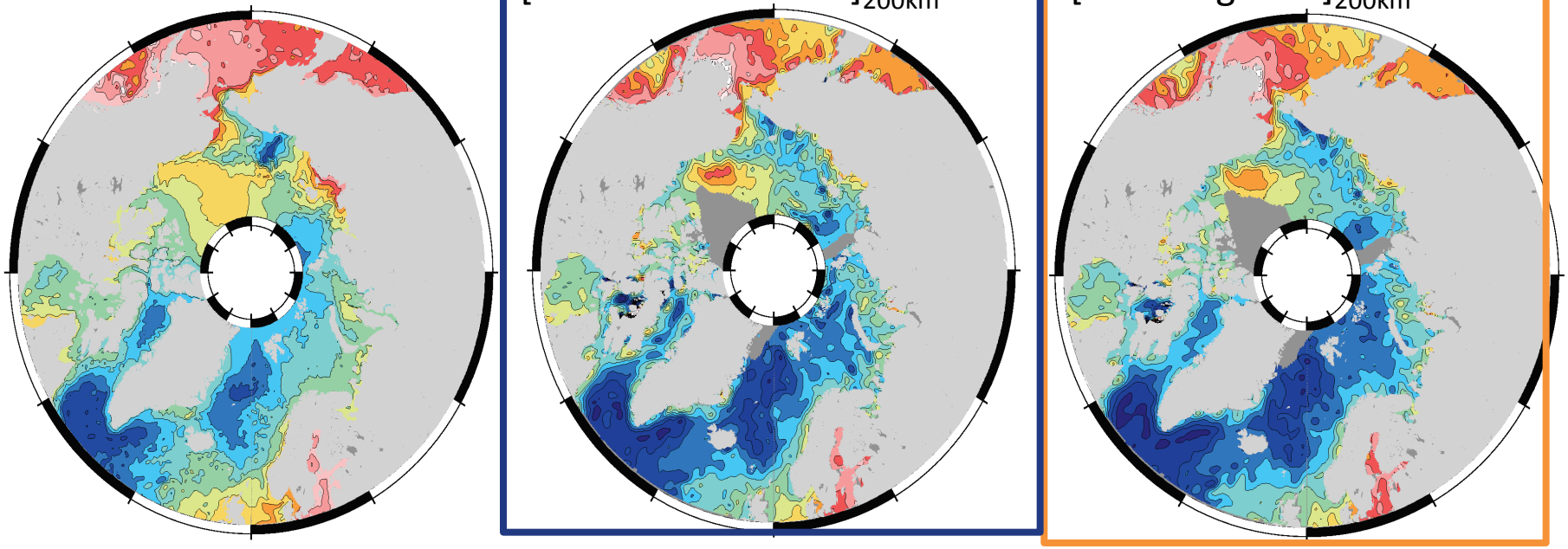


Model reanalysis :
ADT GLORYS2V1

Classical method :
$[\text{MDT DNSC08} + \text{SLA}]_{200\text{km}}$

Direct method :
$[\text{SSH} - \text{Eigen6C}]_{200\text{km}}$

ADT (5 sept. 2007)

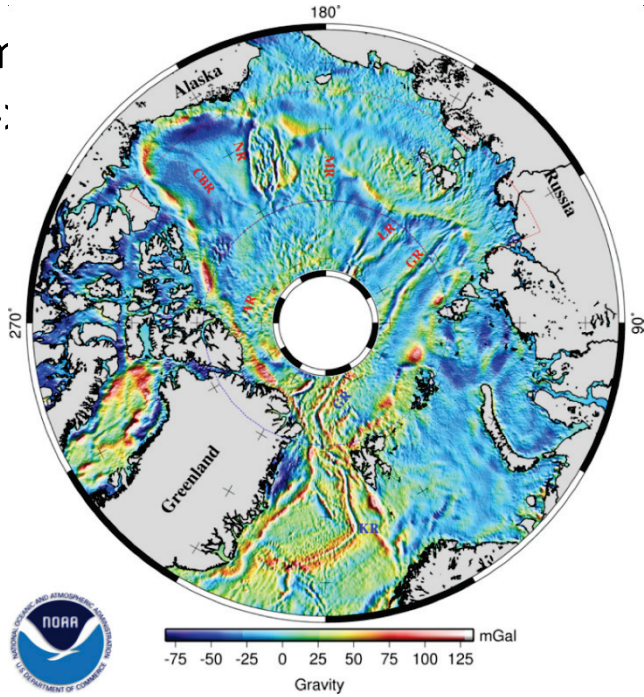


• **Andersen**, O. B. and Knudsen, P. (**2009**). DNSC08 mean sea surface and mean dynamic topography models. Journal of Geo. Res.

Geoid/MDT Issues

How do we improve the Geoid/MDT at short scales in the upcoming context of high resolution altimetry (retacked LRM data, SWOT mission.)..

- Combine altimetry-geoid data with in-situ oceanographic data
- Improve the geoid at short scales by ingesting altim gravimetry data (D. McAdoo + Sandwell + DTU) -:
- Filling the Gap. Using IceBridge.
- Getting better airborne coverrage to get very high resolution geoid at the transition between land/ocean



Galin et al: ***CryoSat-2 Interferometer Performance and Application to Mesoscale Observations of the Kuroshio Current***

- First ever measurement of across track slopes of the marine geoid seen from the SARIN mode of CRYOSAT (oral by N.Galin). After a careful calibration of the interfermeter is performed, the across-track slope estimate of the marine geoid can be estimated with an accuracy of 26 microradians at 10km
- We have developed and demonstrated the use of a numerical model to fit the SARIN cross-product.
- Unfortunately, while the model eliminates the biases in the fitted parameters, the noise on the phase-difference increases.
- We anticipate that the phase noise will be of the order of 5 µrads at scales of 100 km. Consequently, we have **hope** of detecting mesoscale features.
- Currently, we haven't been able to conclusively demonstrate the presence of mesoscale features in the across-track slope. BUT we've only just started looking.