The DTUUH22MDT combined mean dynamic topography model.

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Contents:

Early this year we had the opportunity to update:

1. The geodetic MDT using a new MSS and geoid
2. The combined MDT by improving the inversion integrating the geodetic MDT with drifter velocities.

The geodetic DTU22MDT

Update models:

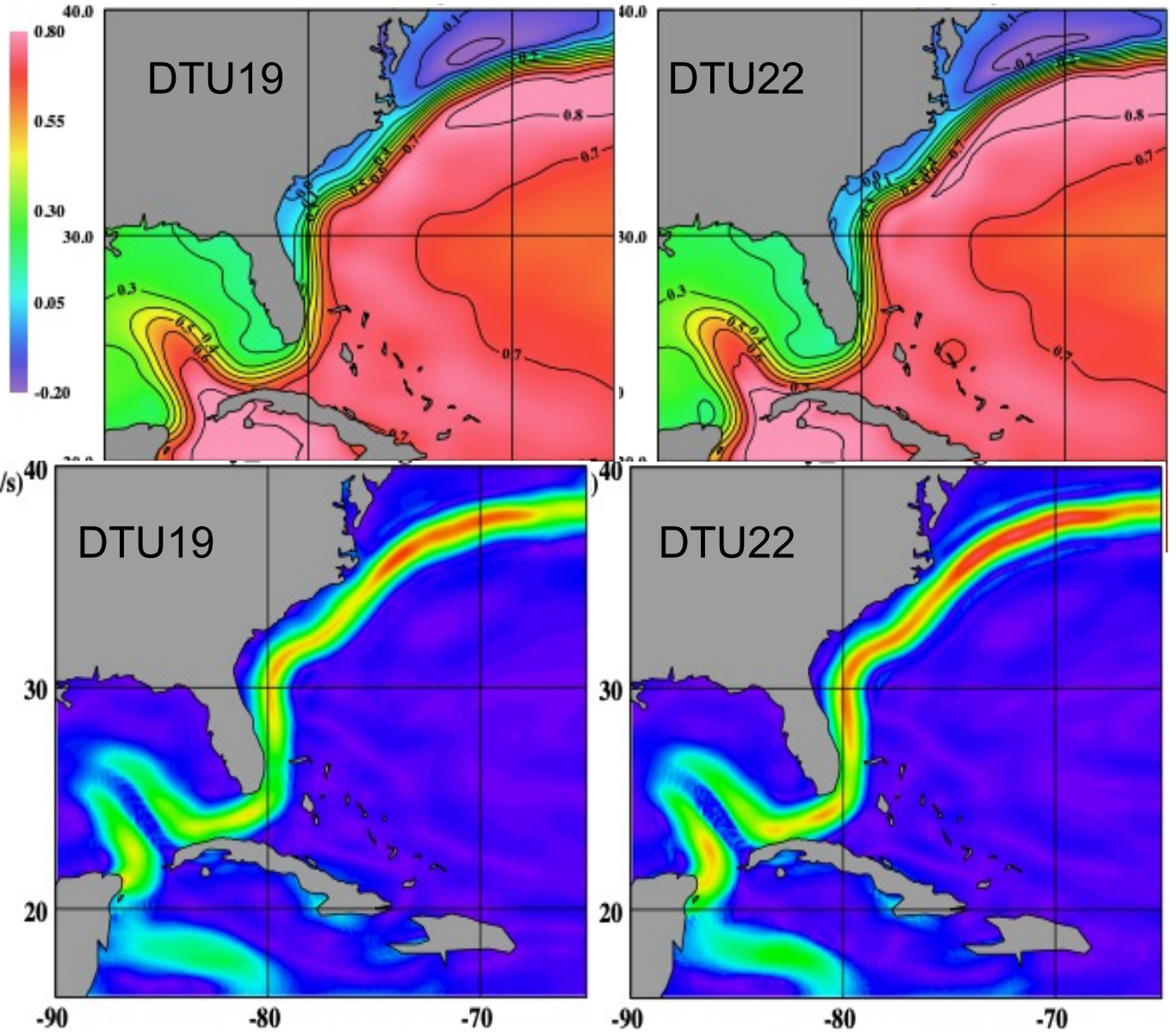
	Mean Sea Surface	Geoid
DTU13MDT	DTU13MSS	EIGEN-6C3stat
DTU15MDT	DTU15MSS	GOCO05S-EIGEN-6C4 hybrid
DTU16MDT	DTU15MSS	GOCO05C-EIGEN-6C4 hybrid
DTU17MDT	DTU15MSS	OGMOC hybrid
DTU19MDT	DTU18MSS	OGMOC hybrid
DTU22MDT	DTU21MSS	XGM2019e

- New Mean Sea Surface DTU21MSS (more data and fixes)
  - Still 20 years average period (1993-2012)
- New geoid model XGM2019e complete to d/o 2160.

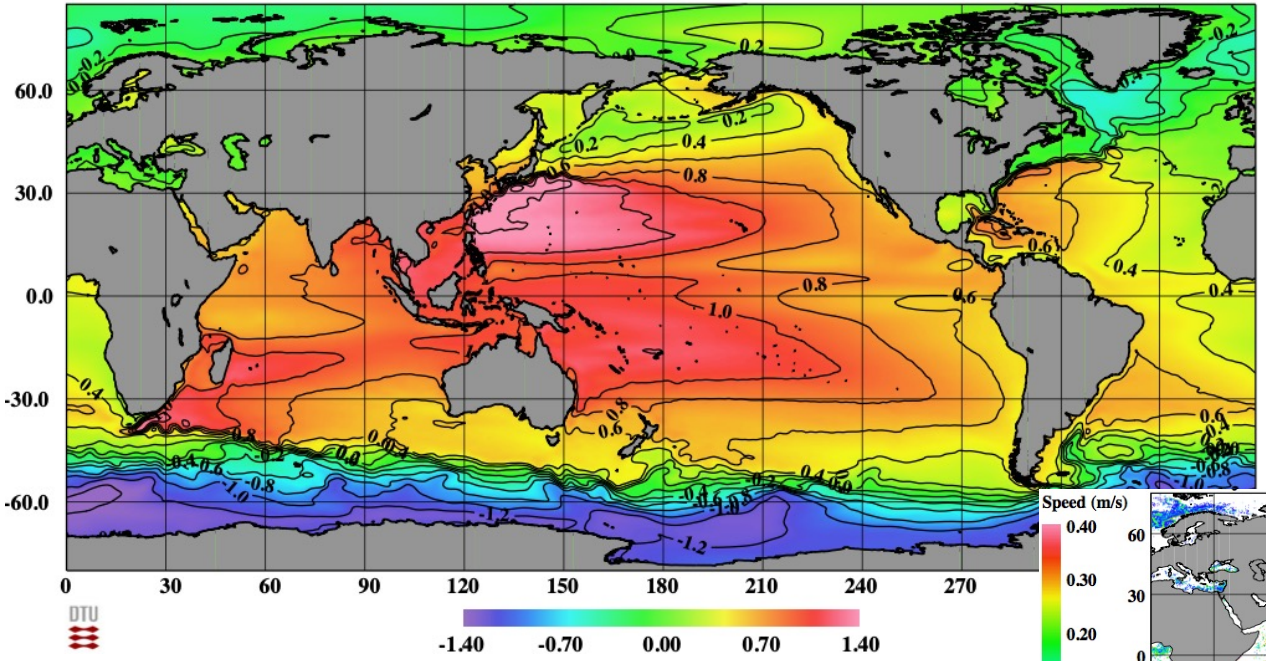
DTU22MDT

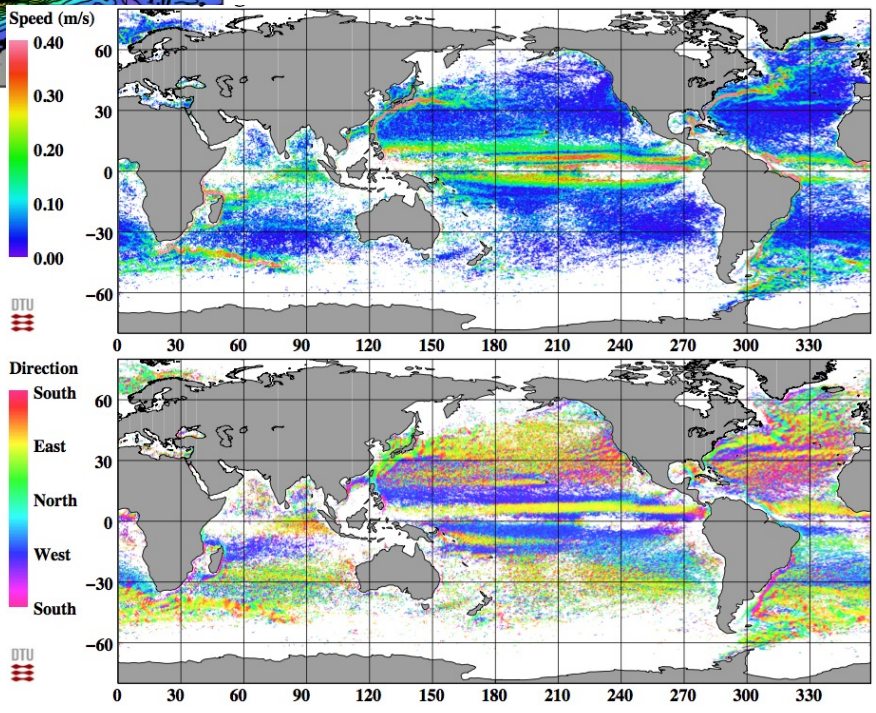
Improvements:

Combine optim
coastal areas



DTU22MDT





Comparison with drifter means

- Stats: [cm/s]

Lat 10-30		Lat 30-50	
u	v	u	v
4.7	5.3	4.7	4.5

The combination model DTUUH22MDT:

Build on DTU22MDT - a purely geodetic MDT.

Derive mean drifter velocities:

- Processing of drifter velocities (Ekman + Aviso GCA (20y)),

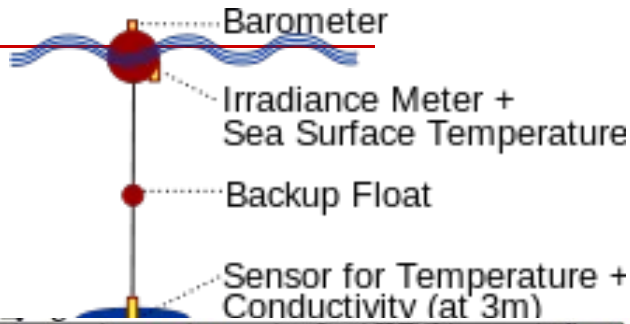
Comparisons and error assessment (MDT and mean velocities),

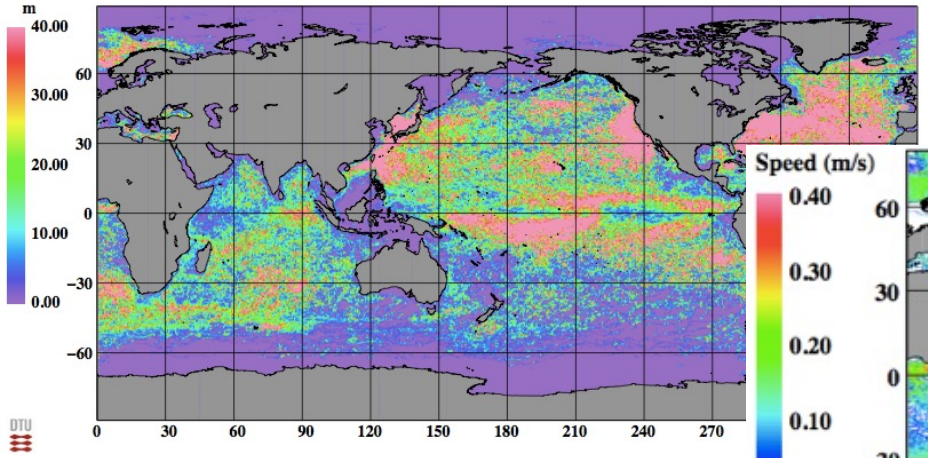
Improve the integration through inversion:

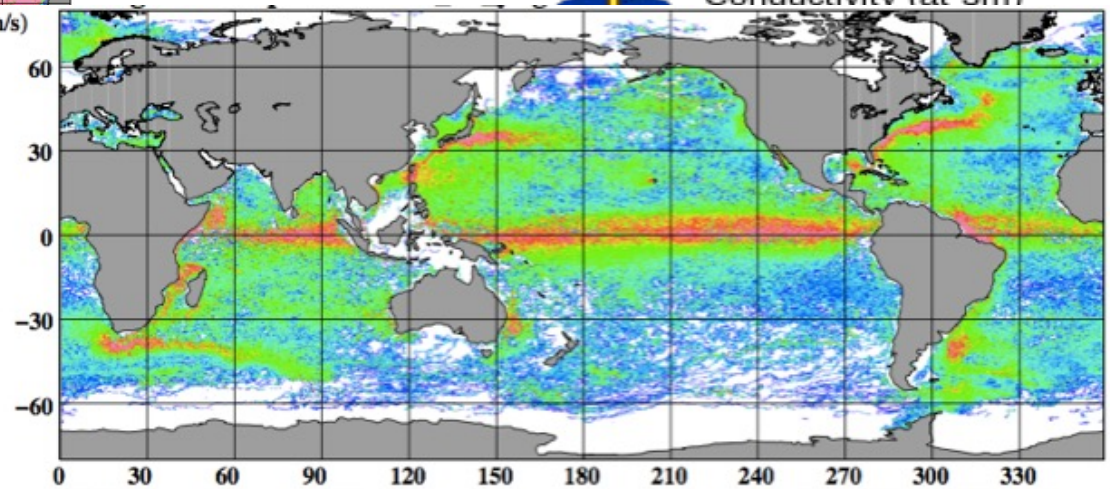
- Higher resolution,
- Consider MDT error covariances,
- Add constraints wrt smoothing, coast lines..

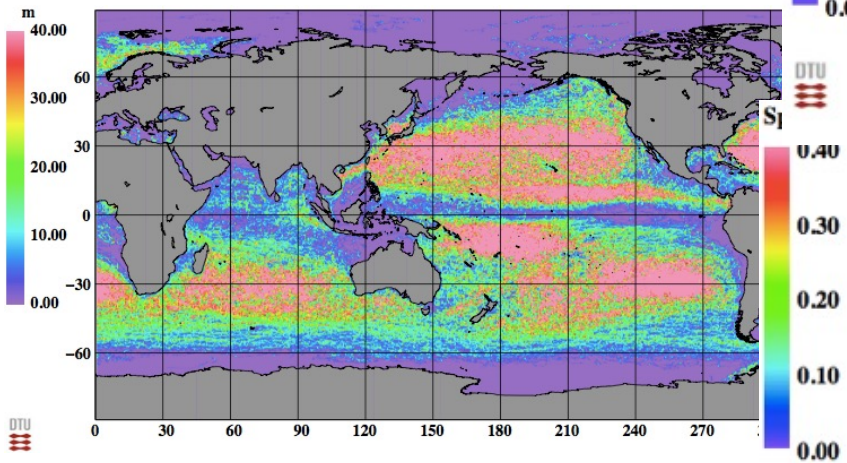
Processing of drifters

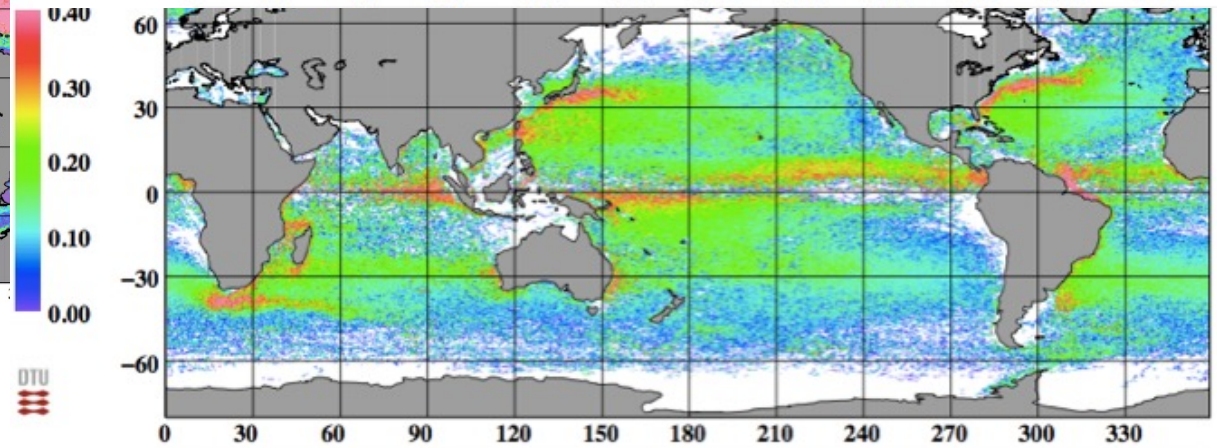
Drogued and un-drogued drifters.



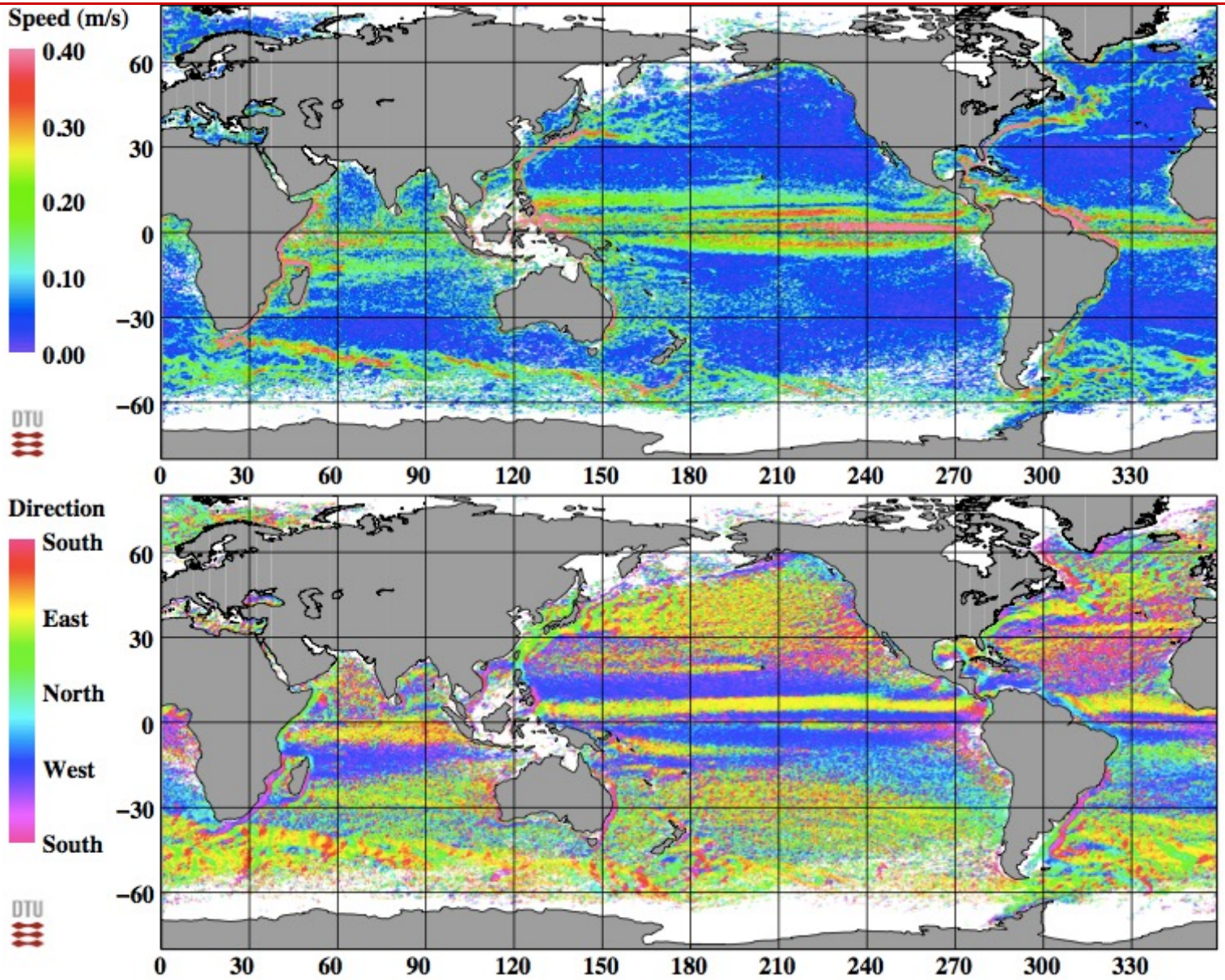








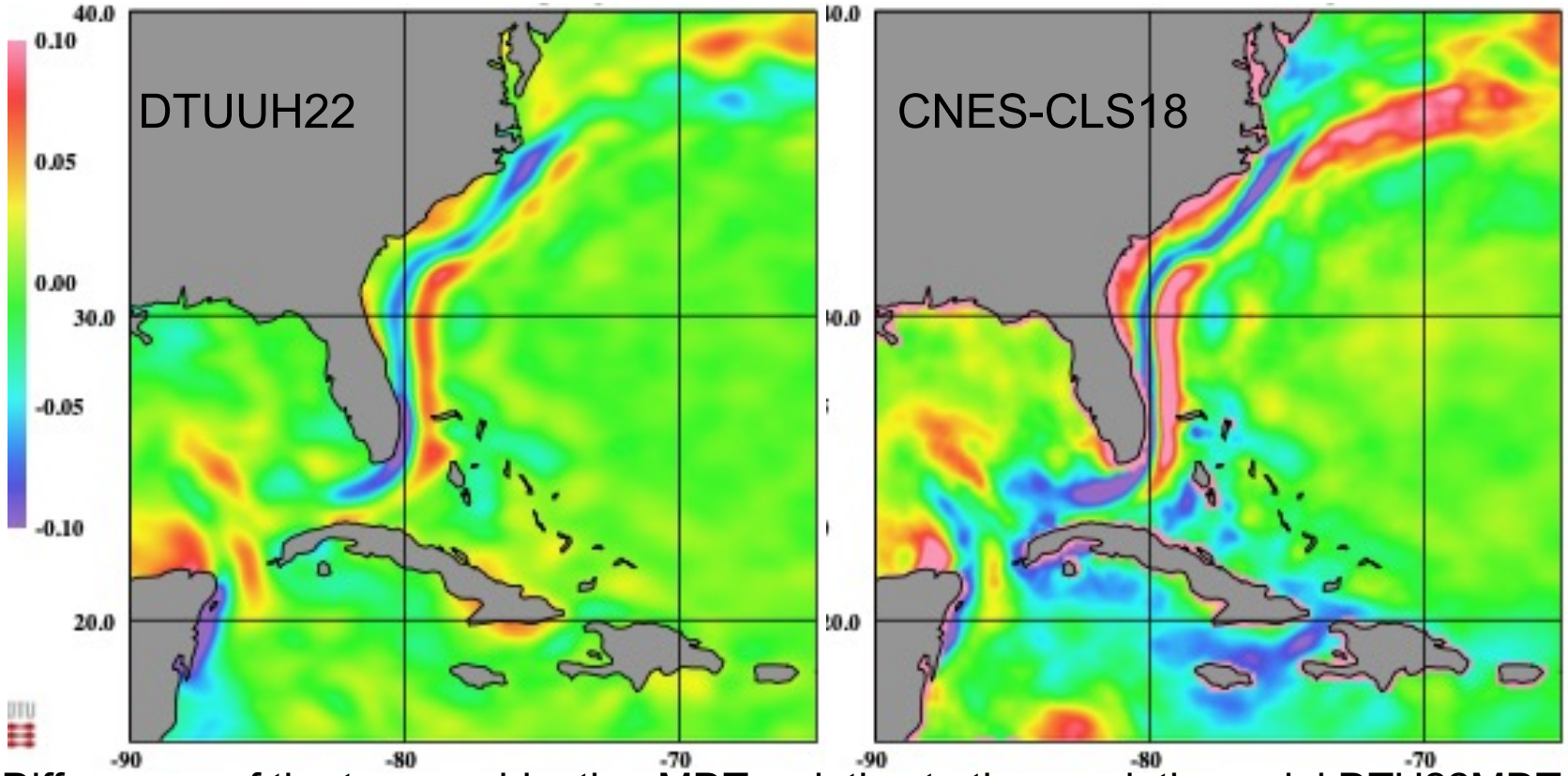
Merged set of mean drifter velocities



Inversion

Model: MDT heights at nodes of a regular 1/8 by 1/8 deg grid.

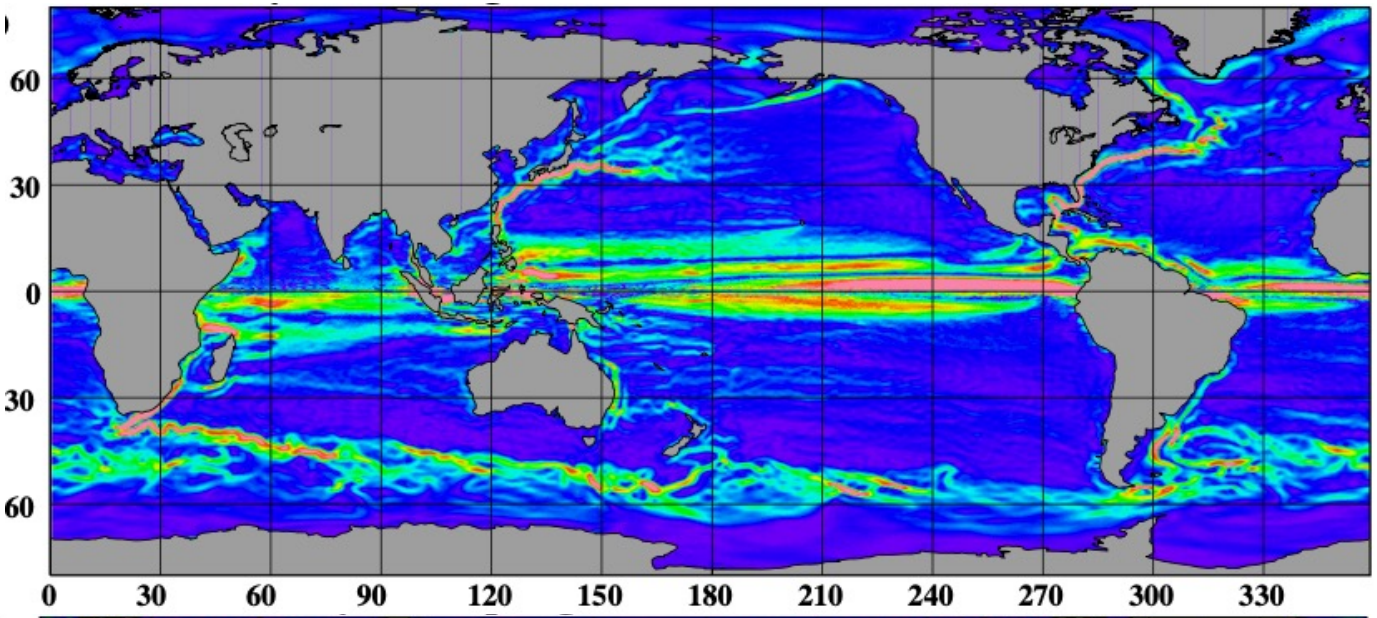
Experimenting with: Weights; Smoothness, MDT error covariances.



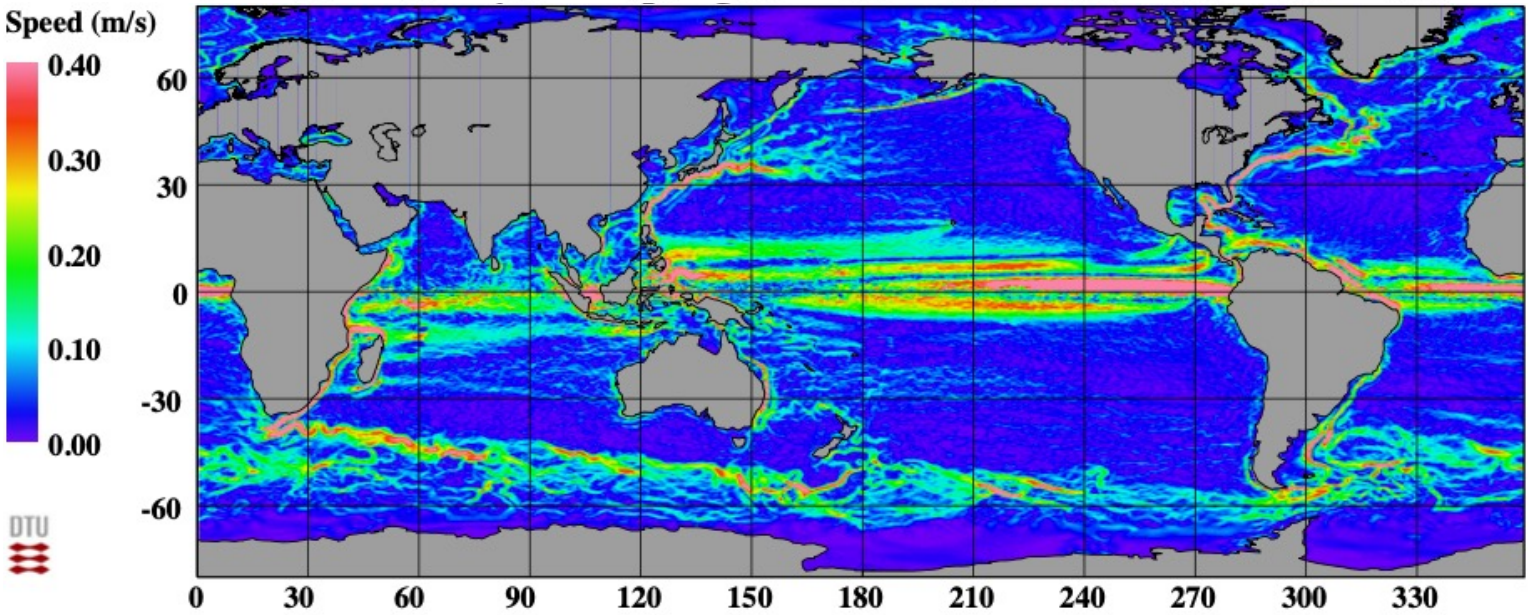
Differences of the two combination MDTs relative to the geodetic model DTU22MDT

Results

DTU22MDT >



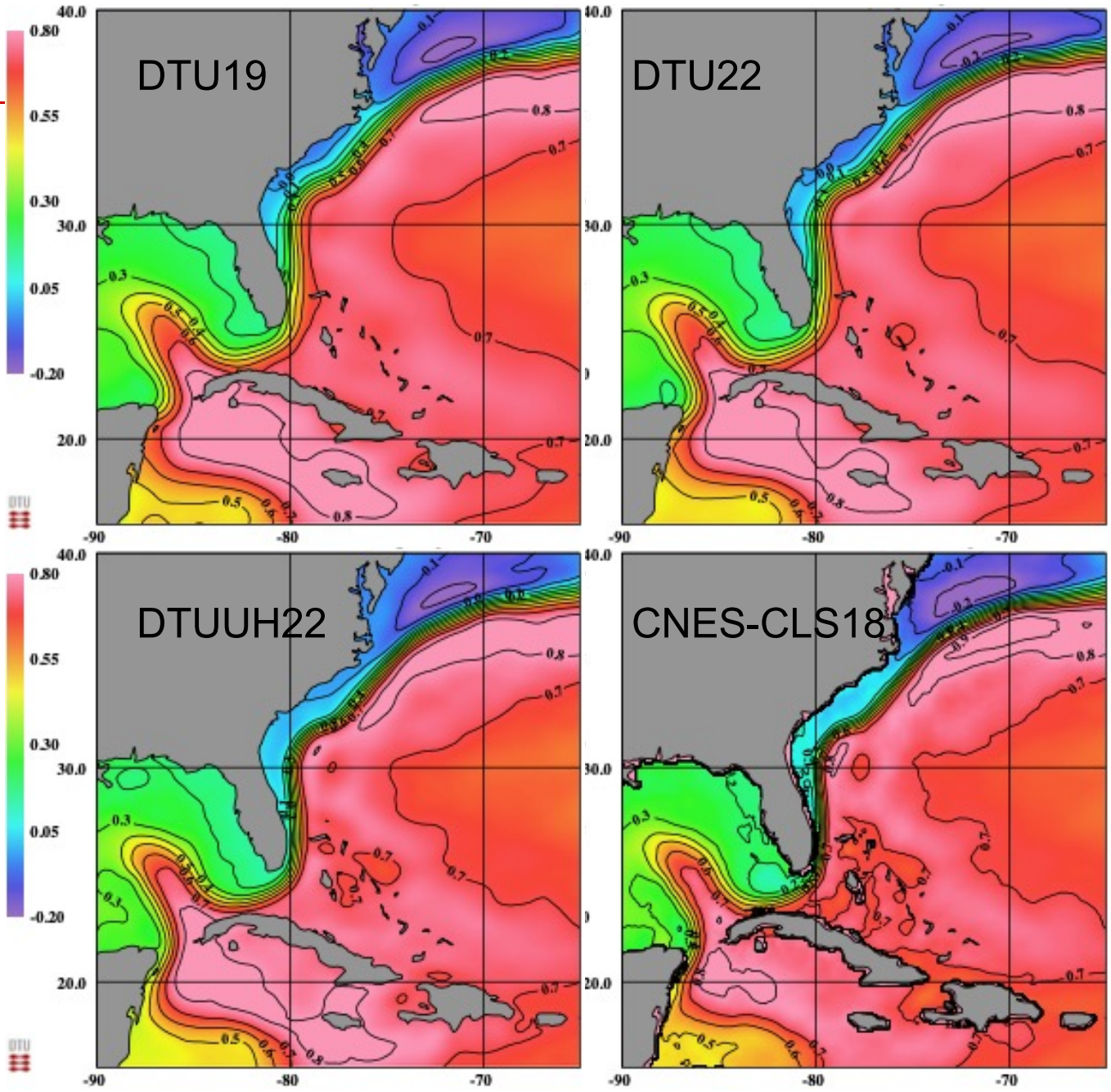
DTUUH22MDT



Results

Geodetic MDTs >

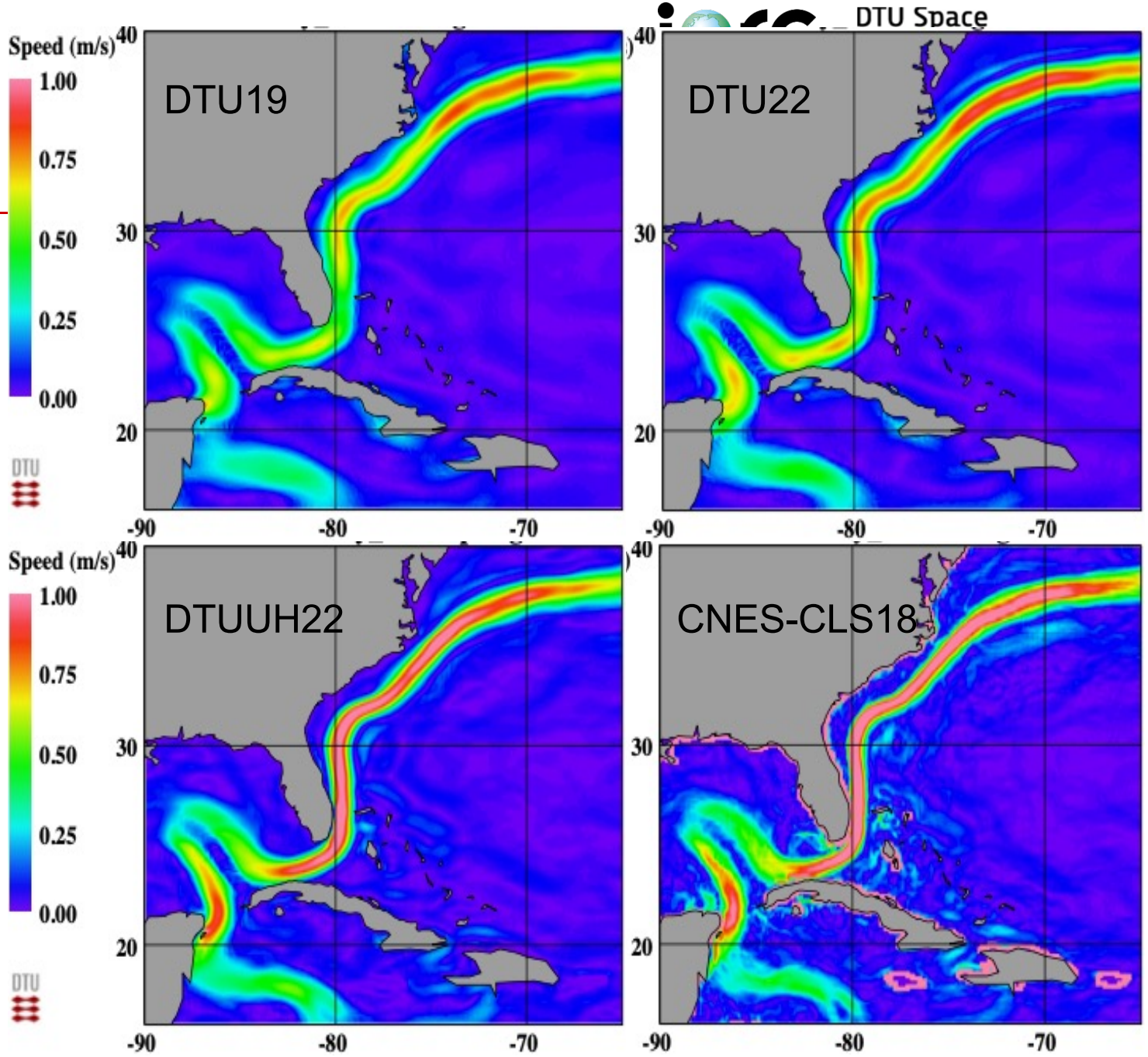
Combination MDTs



Results

Geodetic MDTs >

Combination MDTs



Geostrophic surface current

Summary

The geodetic model:

- DTU22MDT has been derived

The combined model:

- DTUUH22MDT has been derived.

- Still need to:
  - Assess errors,
  - Experiment with weights and regularization/smoothing.

Both models are available here:

https://ftp.spacecenter.dk/pub/DTU22/MDT/