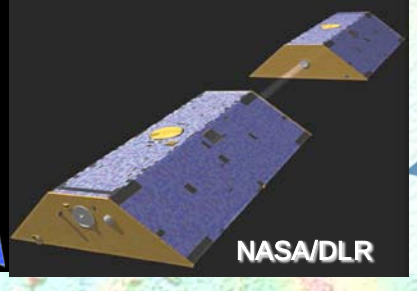

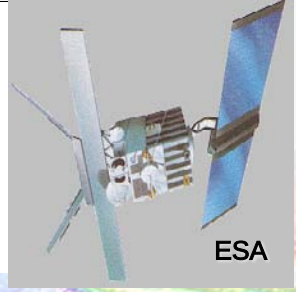

Evaluation of Contemporary Ocean Tide Models

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Ocean Surface Topography Science Team Meeting

Venice-Lido, Italy

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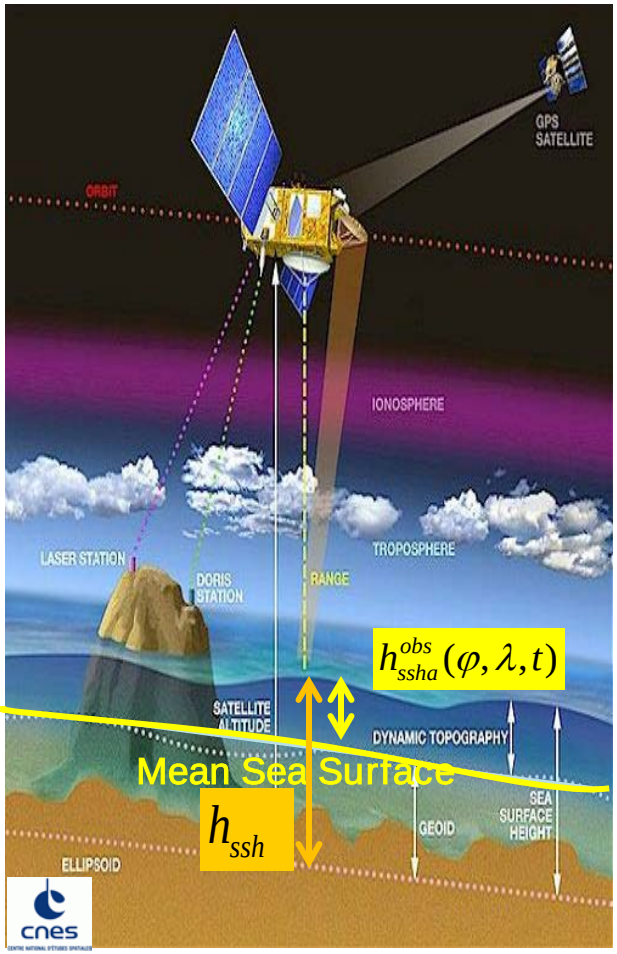
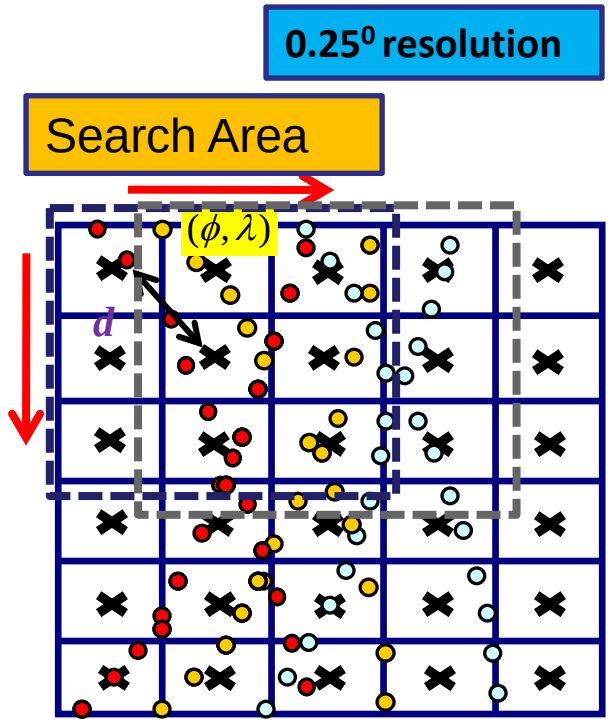
Empirical Ocean Tide Solutions





(ϕ_c,λ_c) Gridded Tidal Solution locations

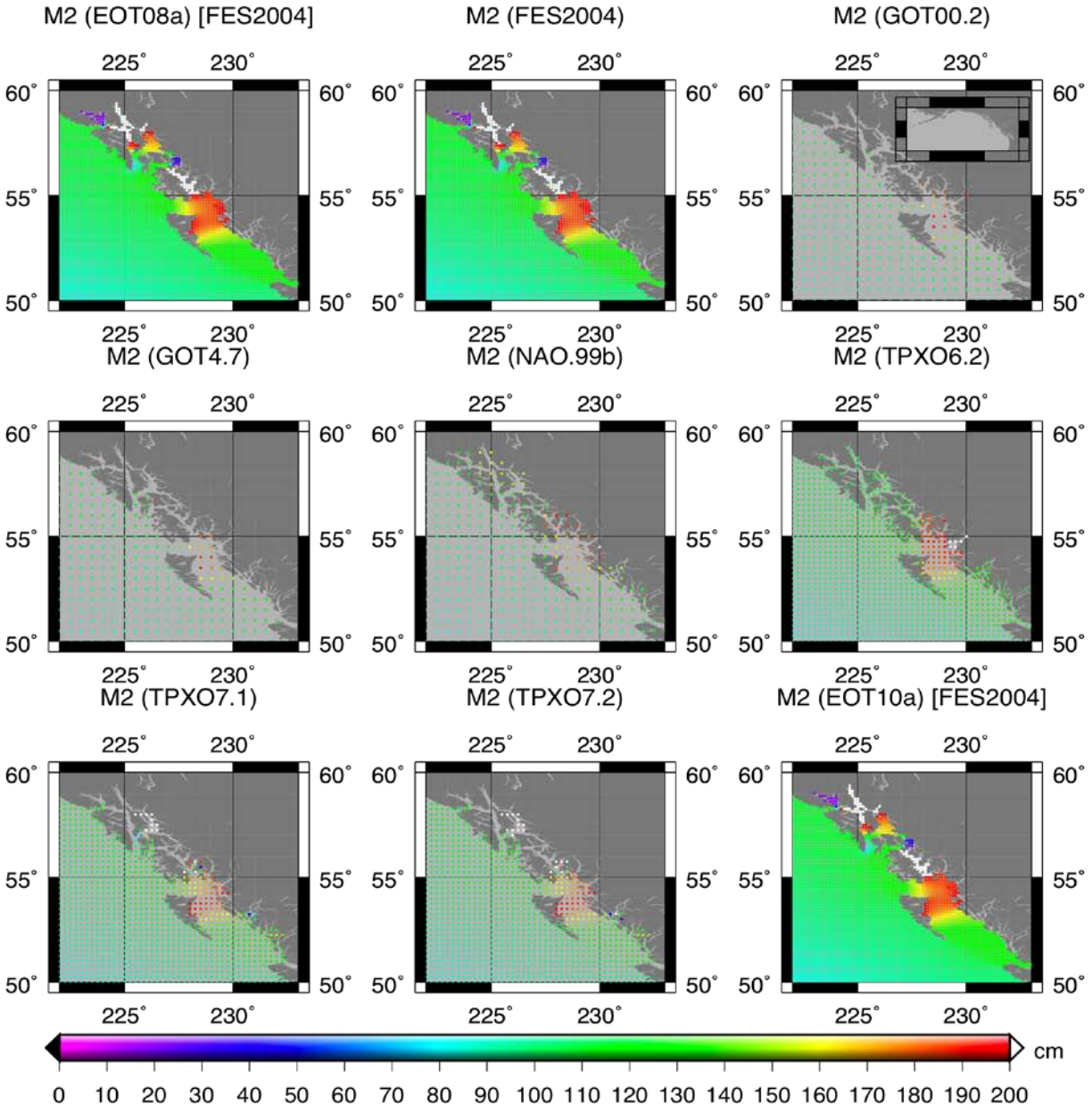
➢New weighting method consider both ***spatial and temporal weight*** in the solution process (OSUsw)

➢ One employs **variance component estimator** (spatio-temporal modeling, OSUvce)

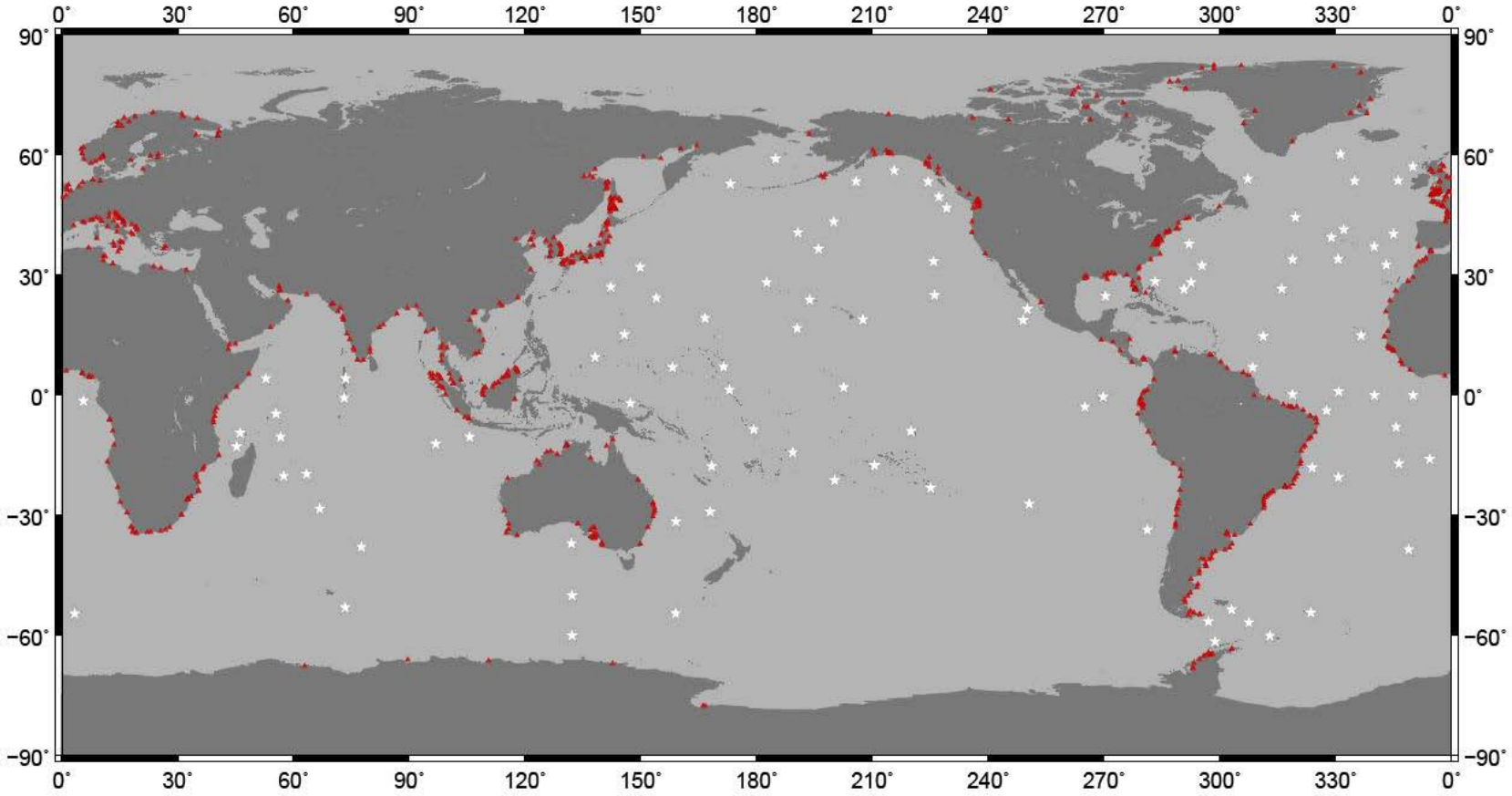
TOPEX/Poseidon (9/1992–9/2005); GFO (01/2000–11/2007); Envisat (11/2002 – 07/2009); Jason-1 (01/2002–01/2009); Jason-2* (07/2008–01/2010);* Used for model evaluation ONLY

* Note that the location for each altimetry data time series are **NOT** reduced to grid center a-priori, but weighting in the solution process.

Model resolution and potential land flagged region



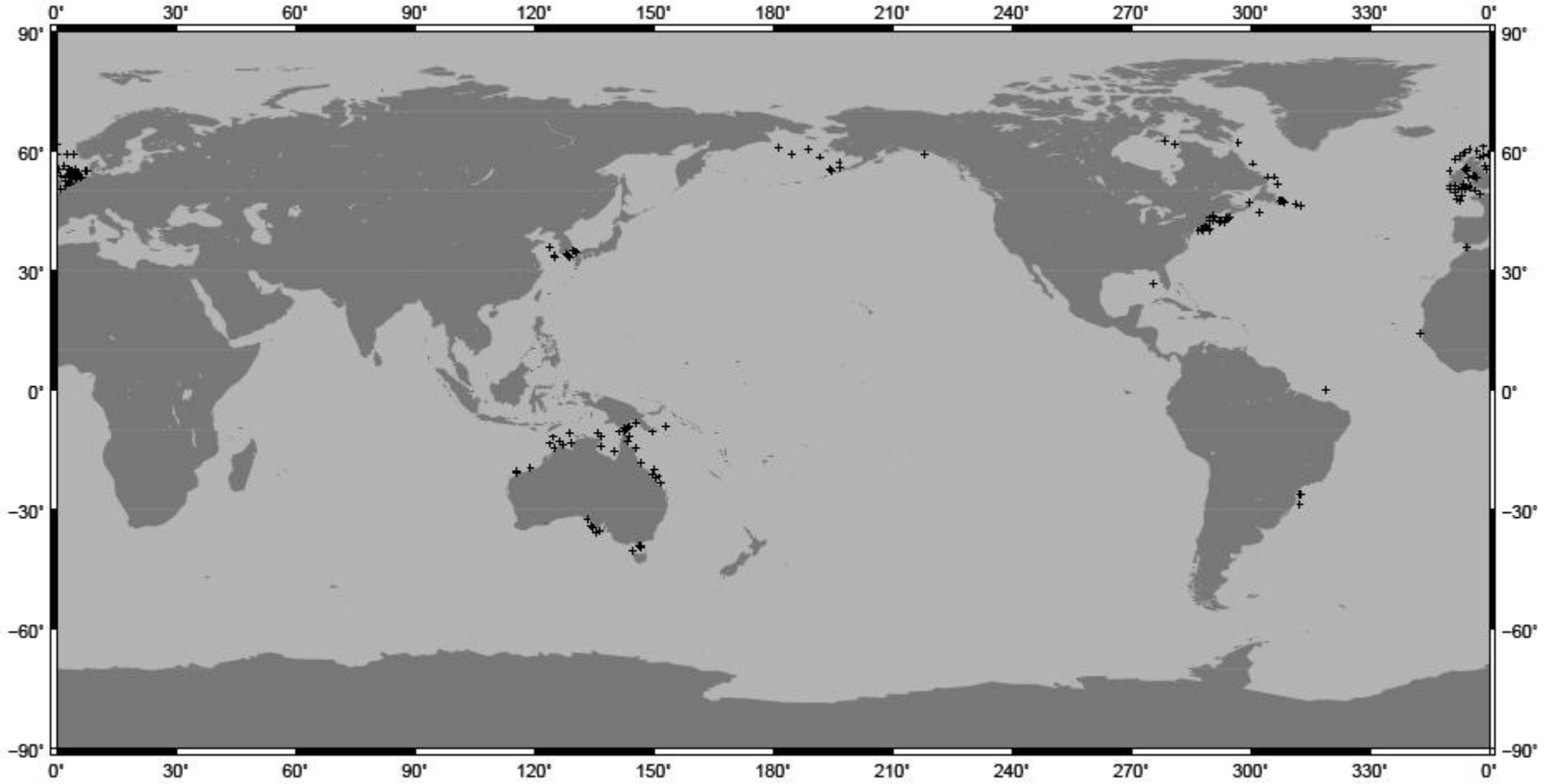
Tide gauge locations (pelagic and coastal)



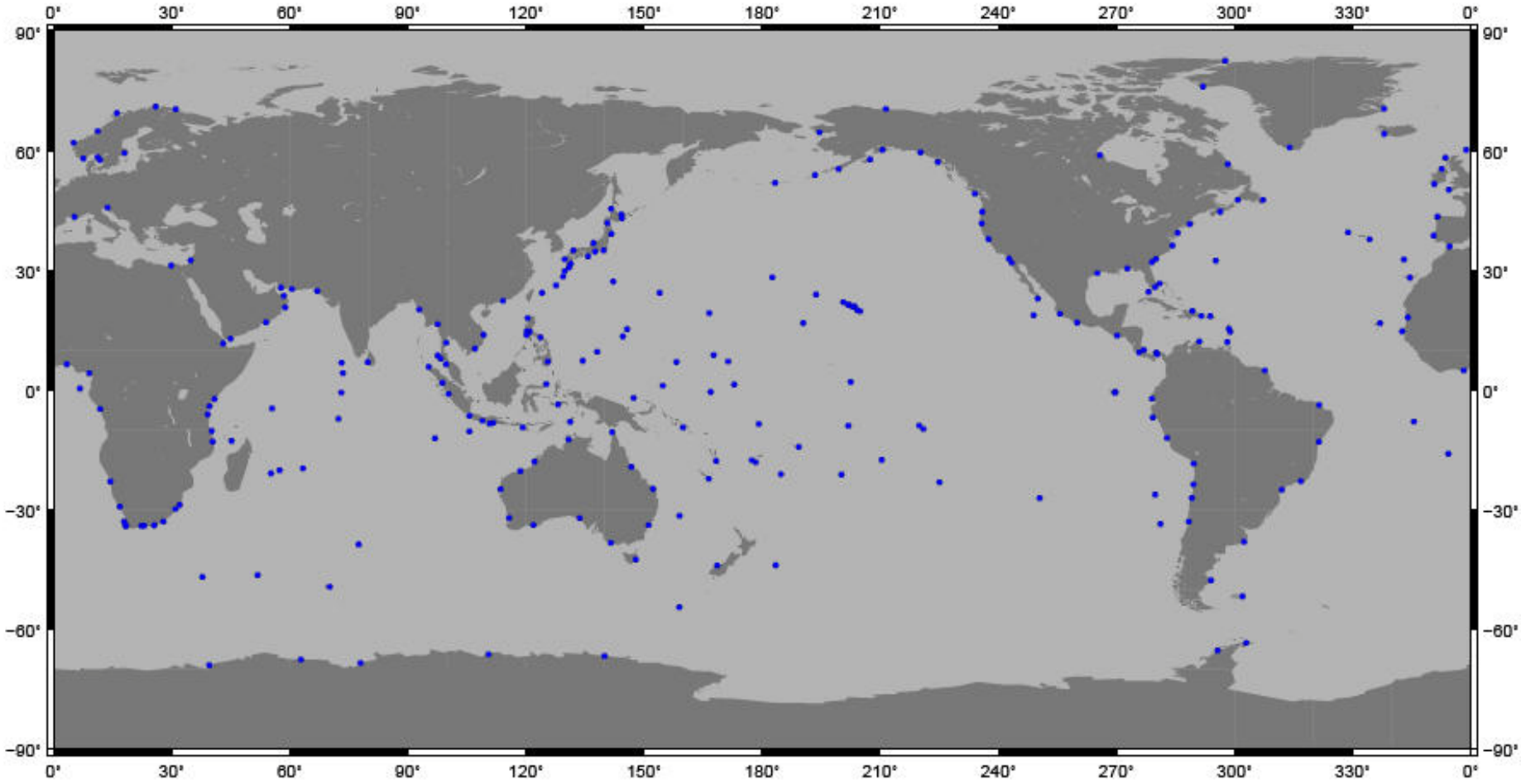
Coastal tide gauge locations

Pelagic tide gauge locations

Tide gauge locations (SW179)

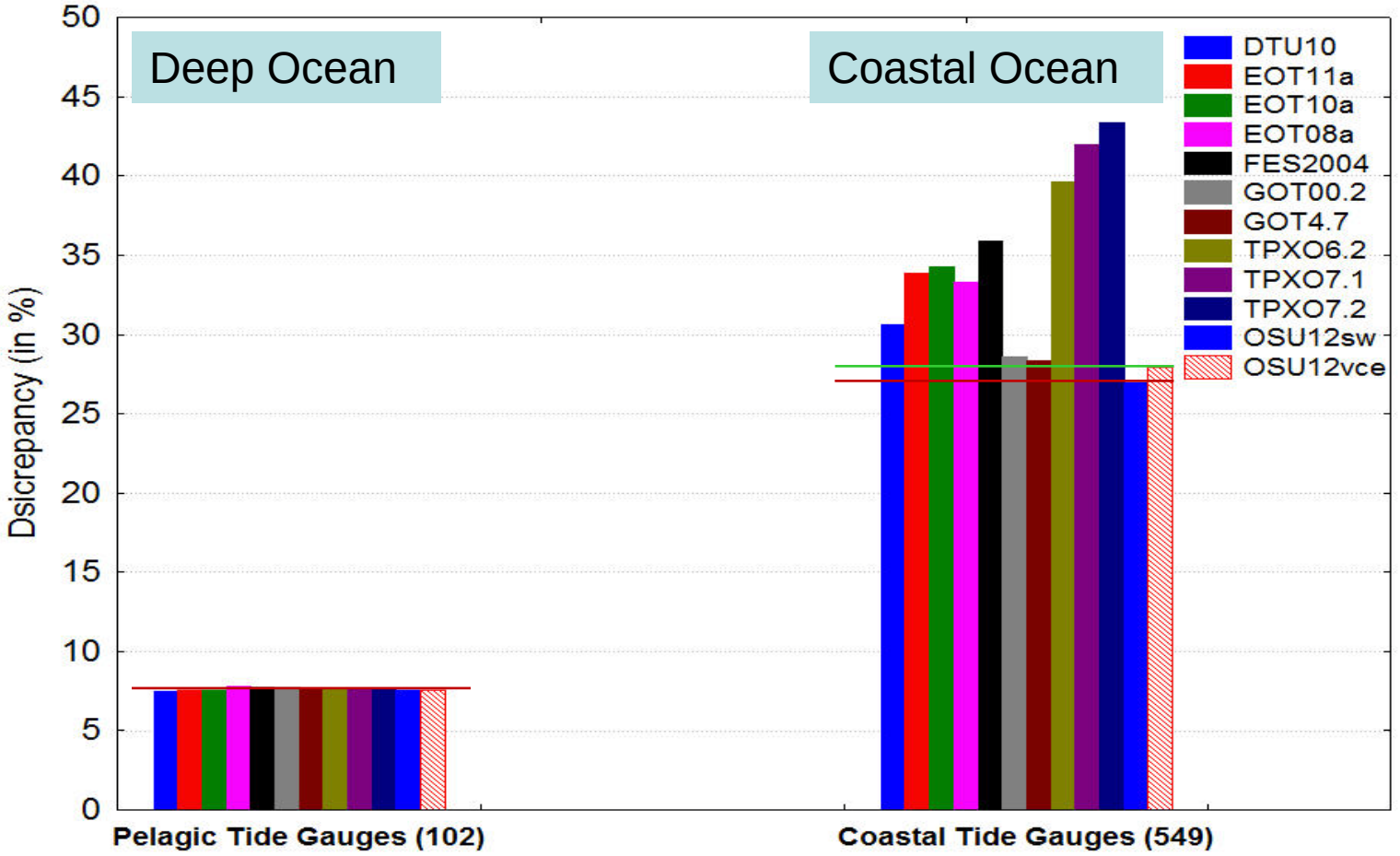


Tide gauge locations (GLOSS)

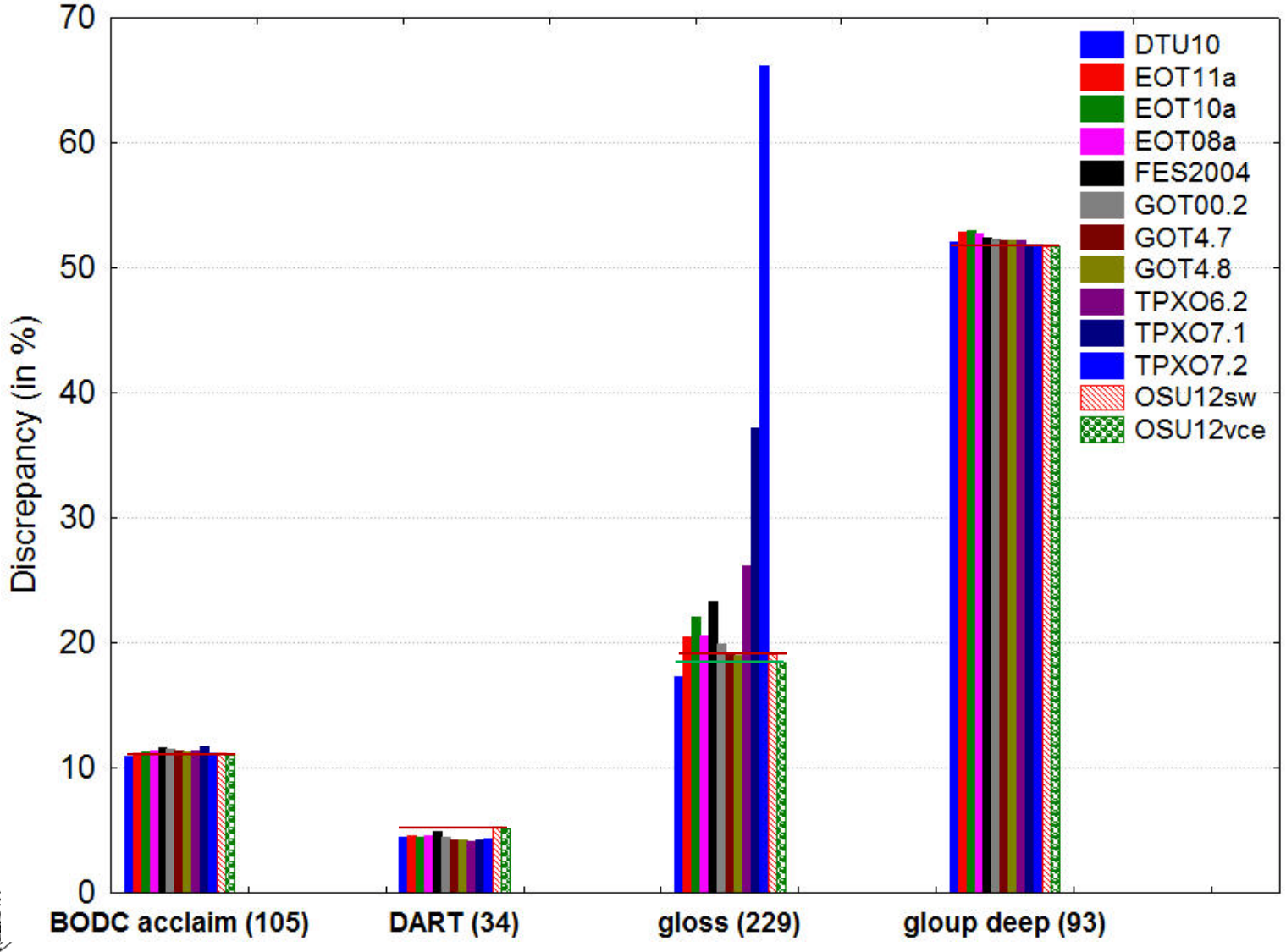


Global accuracy assessment – using tide gauge data

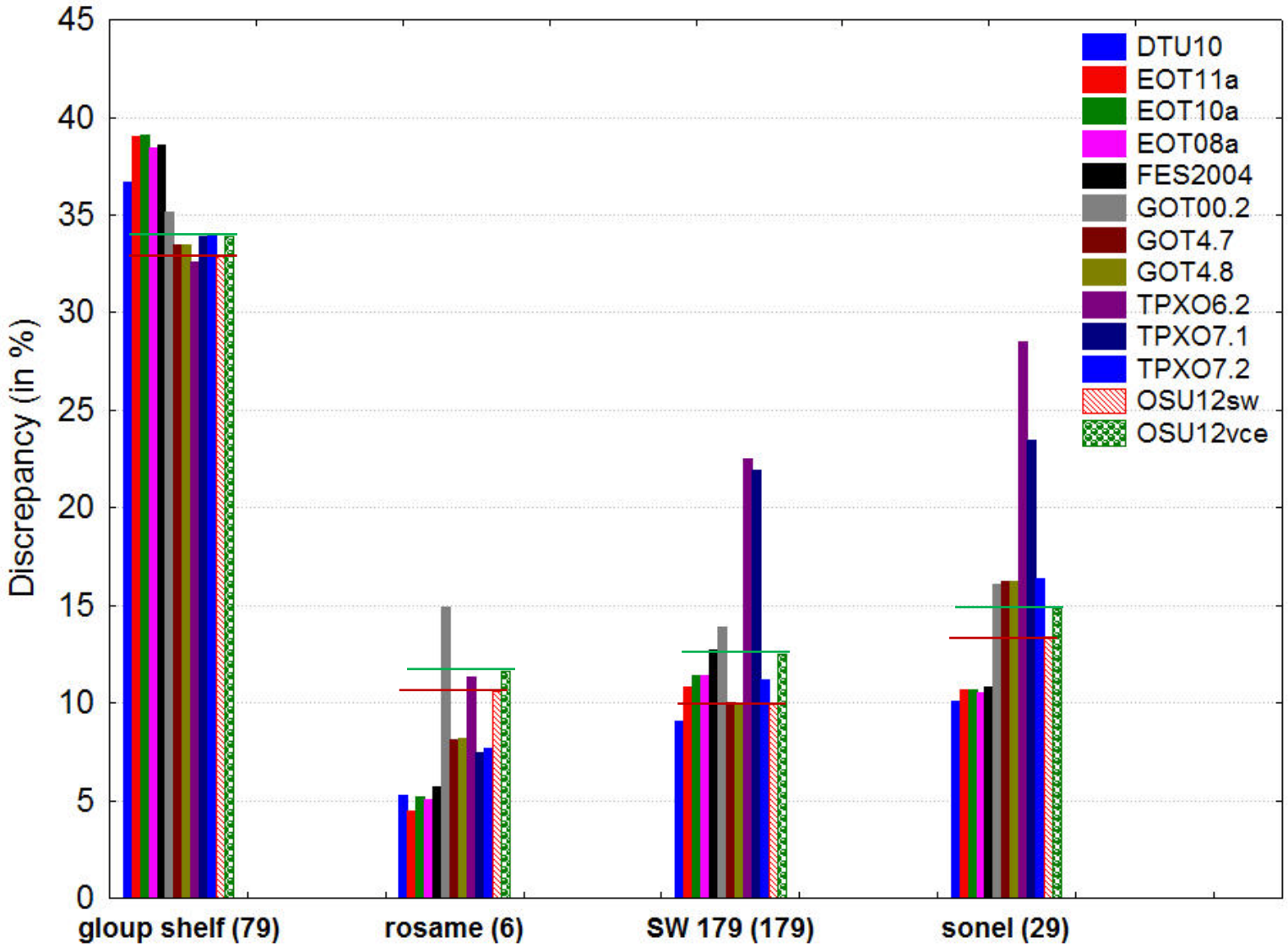
The smaller the discrepancy, the better the models.



Global accuracy assessment – using tide gauge data



Global accuracy assessment – using tide gauge data

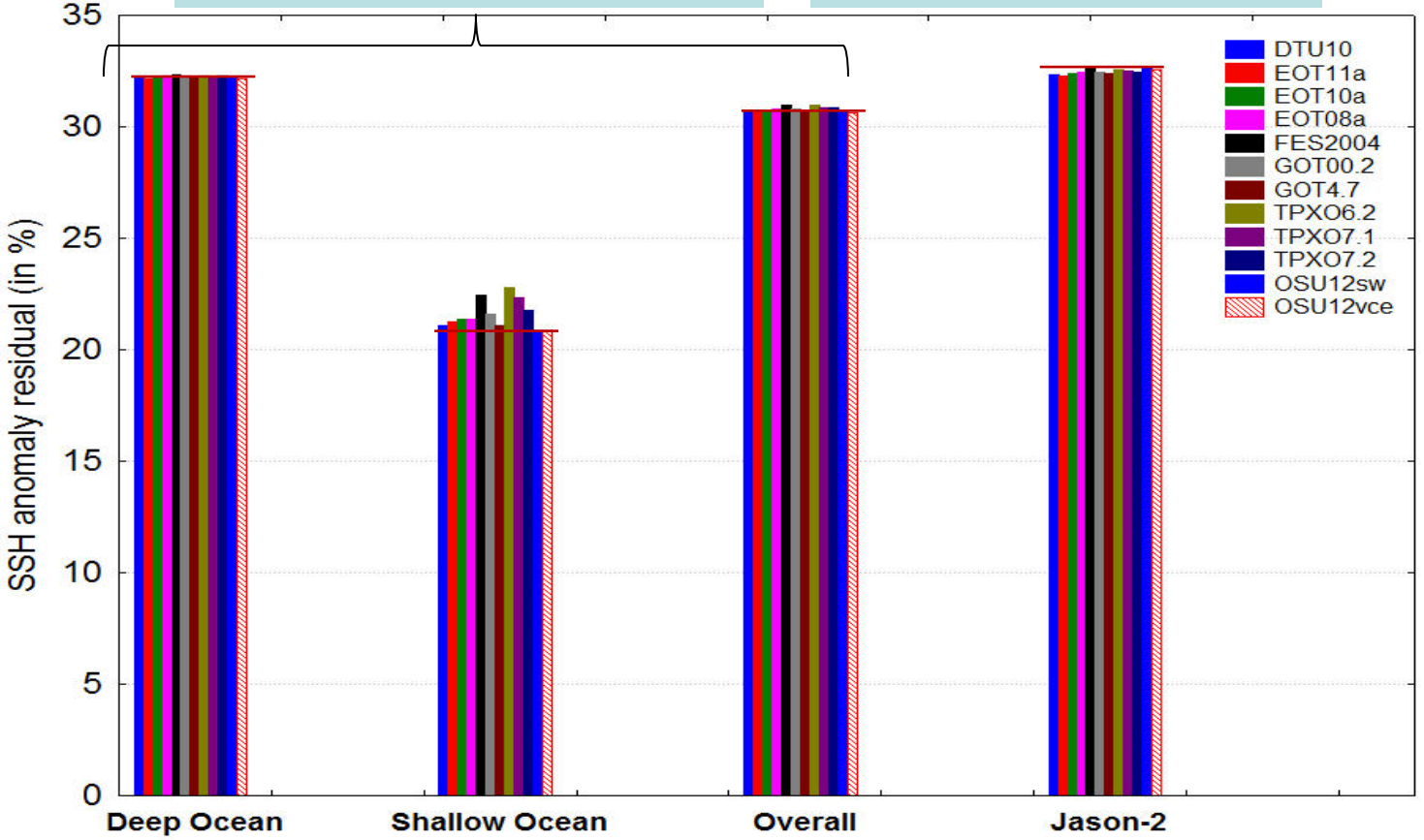


Global accuracy assessment – using altimetry data

The smaller the percentage, the better the models.

All altimetry data are used

All Jason-2 data ONLY

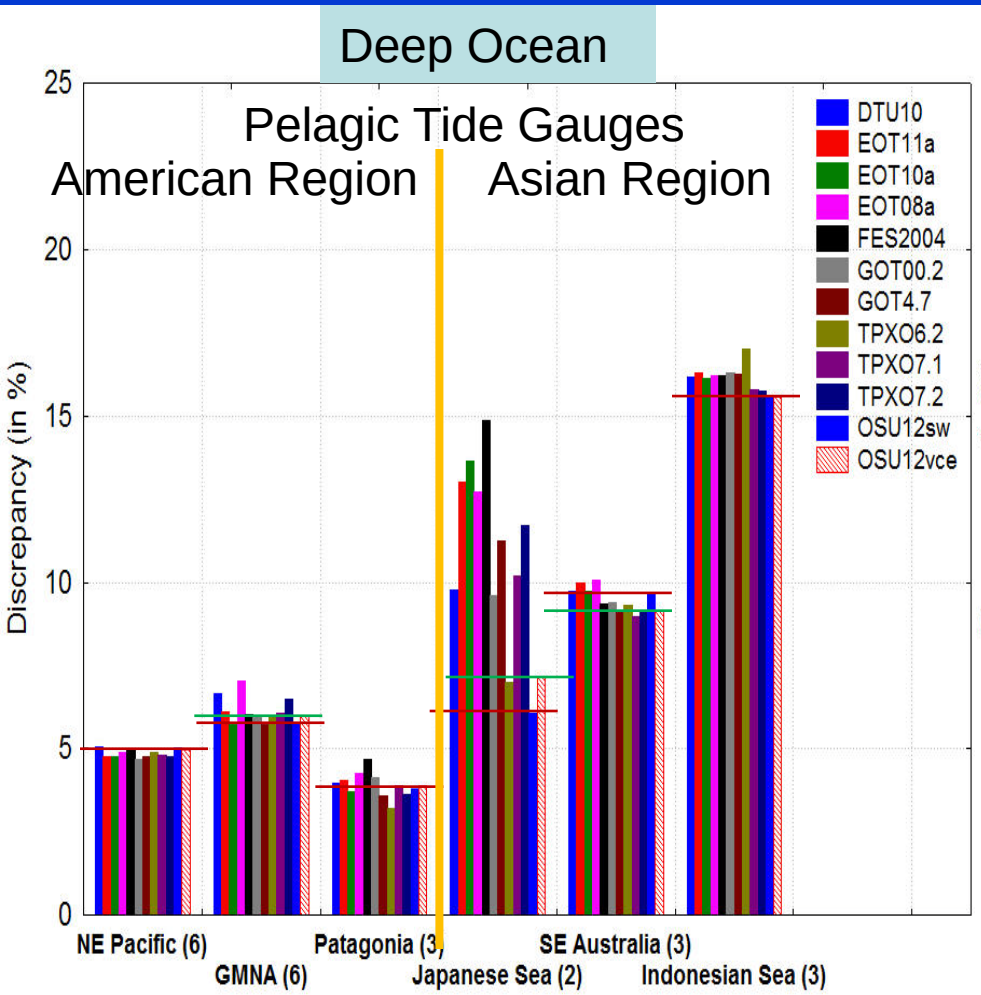


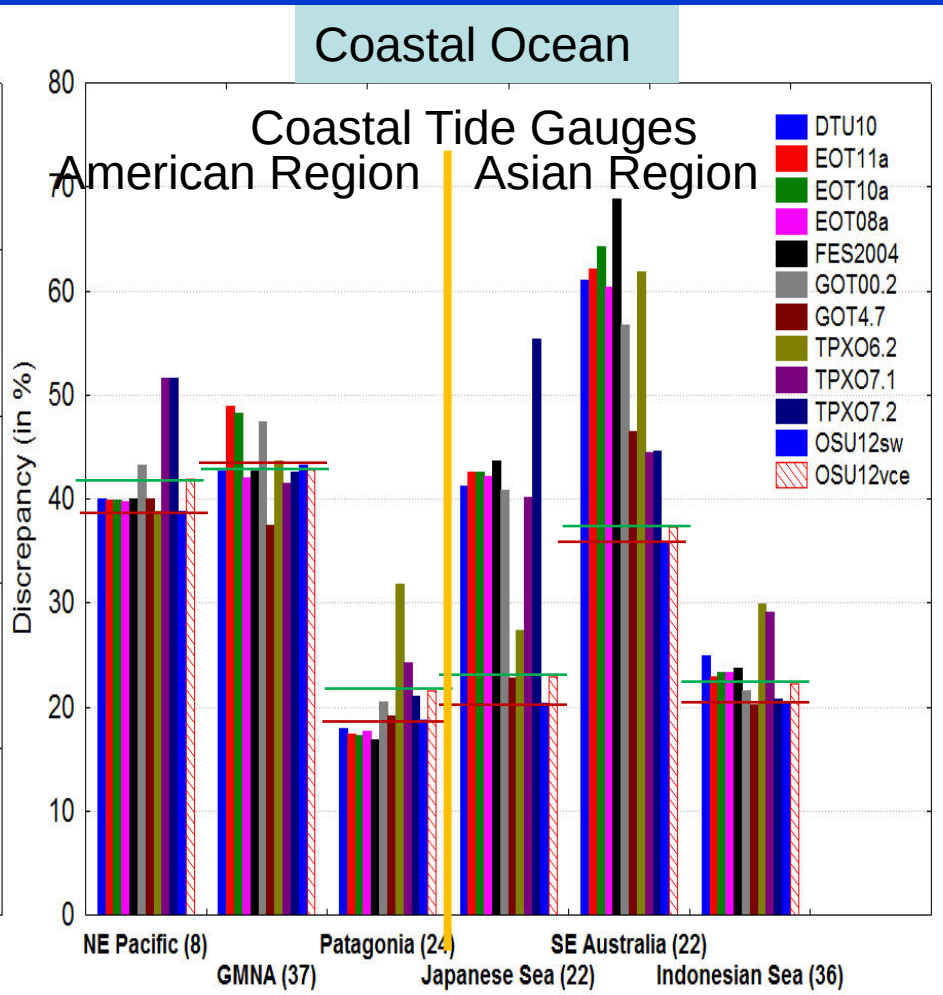
Depth> 1000m

Depth< 1000m

*** Jason-2 data are independent**

Regional accuracy assessment – using tide gauge data





* Note that GOT00.2/4.7 **model** include several regional hydrodynamic models in **shallow and inland seas**, in addition to a-priori **FES model** (Ray, 1999)

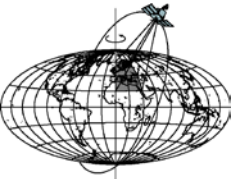
Regional Result – Overall variance explained by ocean tides

Shallow Ocean with depth <1000 m

Region	R (%)
Gulf of Mexico and Northwest Atlantic	~69%
Patagonia Shelf	~81%
Southeast Australia	~78%
Indonesian Sea	~74%
Northeast Pacific	~82%
Japanese Sea	**~50%**

Deep Ocean with depth >1000 m

Region	R (%)
Gulf of Mexico and Northwest Atlantic	**~47%**
Patagonia Shelf	**~50%**
Southeast Australia	~71%
Indonesian Sea	~72%
Northeast Pacific	~83%
Japanese Sea	**~45%**



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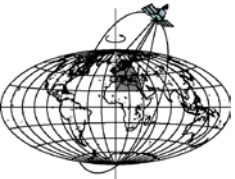
Conclusions

- Evaluation of contemporary ocean tide models indicate that all models have comparable performance, despite regional dependence. However, analysis indicates that one could differentiate the 'better' models.

- Gulf of Mexico/NW Atlantic and Japanese regions exhibit the least altimetry sea-level anomaly reduction (~46%) after tides are removed, implying that the higher ocean variability in these regions likely degraded tide solutions. The Indonesia Sea, surprisingly shown a high (73%) altimetry sea-level reduction using current tide models/

- Coastal ocean tide modeling remains a CHALLENGE in the near future.



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