

Can we compute higher resolution AVISO maps?

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The resolution of altimetry maps

- ✓ Copernicus/CMEMS recently took over the routine production of altimetry maps formerly generated by CNES/AVISO
- CNES/AVISO now develops new research products including higher resolution SSH maps
- The standard gridded Sea
 Surface Height (SSH) maps are generated with Optimal Interpolation (OI) merging the multi-satellite data [1]
- ✓ Effective resolution: λ ~ 200 km.
 Maps limited by the inter-track resolution and temporal coverage



Implementation of a Dynamic Interpolator

- A simple non-linear propagator (1-layer QG model) can be effective to mitigate poor temporal SSH coverage [2]
- The implementation of dynamic interpolation to along-track data had been tested in simulations only [3]
 - A 2D Fourier decomposition is propagated with the tangent linear:



Inversion performed in Fourier space: η = (Q⁻¹ + Γ^TH^TR⁻¹HΓ)⁻¹Γ^TH^TR⁻¹y
Unresolved physics parameterized with additional Fourier modes in Γ



Experimental setup in the Gulf-Stream —

What is the effective resolution?

Sample comparison with independent altimetry profile





Illustrations of eddy / meander resolving capabilities



Operational SSH maps (black contours) versus SST (colour background)



- ✓ Eddy trajectories consistently tracked, less affected by gaps in observation
- Qualitative comparisons with independent infrared SST indicate improved resolving capabilities of dynamic interpolation: the SSH contours better match eddy contours and meanders.
- Ocean reanalysis in full operational Primitive Equation (PE) models currently exhibits a larger departure from the observed eddies and meanders. Our dynamic analysis framework (a 1-layer QG model) may be used as a test bench for data assimilation schemes before implementation in future PE models.

Experimental maps with Dynamic Int (black contours) versus SST (colour background)



SSH from operational ocean model (black contours) versus SST (colour background)



Conclusions and outlook

✓ This first experiment with real measurement confirms the potentials of dynamic interpolation to produce higher-resolution SSH maps.

References

- Pujol, M-I., Y. Faugère, G. Taburet, S. Dupuy, C. Pelloquin, M. Ablain, and N. Picot : *DUACS DT2014: the new multi-mission altimeter data set reprocessed over 20 years*. Ocean Sci., 12, 1067-1090, doi:10.5194/os-12-1067-2016, 2016
- [2] Ubelmann, C., P. Klein and L-L Fu : *Dynamic Interpolation of Sea Surface Height and*



Demo

products

available

soon





✓ Improvements expected for eddy tracking and consistency of smaller scale

