JPL Gridded Altimetry Products

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Background

- A NASA "Making Earth System Data Records for Use in Research Environments" ("MEaSUREs") program is partially funding several improvements to altimetry data, such as orbits, sea state bias, etc. The task is led by Josh Willis, and includes Brian Beckley, Richard Ray, Gary Mitchum, Steve Nerem, Doug Vandemark, Zheng Qu and VZ.
- As part of this activity, we are exploring generation of new altimetric grids, which will eventually be produced and distributed as a new, value added altimetry product.

Gridding details

- krigging ~ objective mapping
- $Cov = var*b*exp(-a*r (dt/Lt)^2)$
 - a = 3.33691198
 - $b = 1 + r + r^2/6 r^3/6$
 - $r = \sqrt{((dx-Cx^*dt)/Lx)^2 + ((dy-Cy^*dt)/Ly)^2)}$
 - var = squared rms of alongtrack data
- spatial decorrel. from alongtrack data, rotated using Jacobs 2013. Search:400/1250km
- time decorr: gaussian, 10 days in 5S to 5N, going to 15d beyond 10°. Search: 45/15 days
- **no** propagation of corr
- Jason-2 (4cm noise, 0 LW) and Envisat (6cm noise, 3 LW)
- 1/6°, 1 week maps, 2010-2012
- quality and parameter choices assessed by withholding data for 1 day and comparing.

Alongtrack autocovariances

Alongtrack spectra were computed from T/P, J1, J2, 1993-2012, converted to autocovariance, and their first zero crossing was computed.

The figures compare the computed autocovariances with the analytic ones used by LeTraon et al.



Alongtrack zero crossing length



N-S and E-W length scales

- rotated alongtrack length scale to N-S and E-W using Jacobs (2013) estimates.
- Note that these estimates are somewhat longer than the scales we use, we only use their relative lengths.





1-day difference map minus withheld data

The map shows the difference between the map for 2012-01-08 and the Jason-2 data for that day, which had been withheld from the interpolation. Values are RMS over 15 secs alongtrack



Spectra of difference map-data

Spectra of the alongtrack data, the map interpolated alongtrack, and their difference. The data were NOT used to generate the map.

For this region wavelengths longer than ~ 180km are resolved. RMS diff 8.9cm



Spectra of difference map-data

Spectra of the alongtrack data, the map interpolated alongtrack, and their difference. The data were NOT used to generate the map.

For this region wavelengths longer than ~ 180km are resolved. RMS diff 4.9cm



Spectra of difference map-data

Spectra of the alongtrack data, the map interpolated alongtrack, and their difference. The data were NOT used to generate the map.

For this region (Equator) wavelengths longer than ~ 350km are resolved. RMS diff 4.4cm



Propagation is clear



Animation



Ocean 'zones'



To avoid combining data in different 'correlation zones' (for example, Atlantic and Pacific across Panama), 'zones' were defined. Solid color zones are uncorrelated with another color zone, but can correlate with white. Dotted color zones cannot correlate with any other zone.

Planned Improvements

- ocean zone spatial decorrelation
- use latest GSFC product for TP/J1/J2
- improved time correlation from Jason and Envisat xovers (Fu and Ubelmann, JTech 2013).
- propagation estimated from consec maps
- 22 year time series
- use all altimeters when available
- physical constraints (Ubelmann, 2014)

Backup