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Poster
Thanks to its current accuracy and maturity, altimetry is considered as a fully operational observing system dedicated to scientific and operational applications. In order to access the targeted ocean signal, altimeter measurements are corrected for several geophysical parameters among which the ocean tide correction is one of the most critical. Global ocean and loading tide models GOT and FES are operationally used in present altimeter GDRs. FES is a finite elements hydrodynamic model which assimilates altimeter and in situ data, while GOT model is build as an empirical adjustement based on altimeter data of a prior atlas (such as FES).
The accuracy of tidal models has been much improved during the last 20 years. Still, significant errors remain mainly in shelf seas and in polar regions. A new global tidal model FES 2012 has developed taking advantage of longer altimeter time series, improved modelling and data assimilation techniques, and more accurate ocean bathymetry. Special efforts have been dedicated to address the major non-linear tides issue and to the determination of accurate tidal currents.
Several validation diagnostics have been performed, versus in situ data and altimetry (Jason missions, ENVISAT), and will be presented in detail. Global spectral validation versus tidal gauges and along-track analyses, shows a clear improvement on M2 compared to DTU10 and GOT4V8 models, particularly on shelves regions, although FES2012 does not assimilate tidal gauges yet. Temporal validation versus tidal gauges and altimetry (crossovers and along-track residuals) also shows a clear improvement compared to FES2004, and a weaker improvement compared to GOT4V8 model, still with a stronger variance reduction in some continental shelves regions. We have identified a few regions were the new model tends to raise the residual variance; some of these problems can be explained by some local bathymetric issues (such as the Hudson bay). Concerning climatic purposes, FES 2012 allows reducing the residual signal at the 58.74 days period if compared to both FES2004 and GOT4V8.
We also present the future improvements envisioned in a forthcoming FES 2014 version. First, FES 2014 will benefit from recents developments in the physical and numerical modelling (T-UGOm) and that already allow for dividing the error of the pure hydrodynamic model by a factor 2. Additional upgrades will be carried out, such as a larger assimilation dataset (including tidal gauges), and local increases of the resolution, which would be of great interest for coming SWOT mission.
Note that FES2012 tidal atlas (elevations and currents) is available on a regular grid of 1/16° and can be downloaded on the AVISO website.
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