Geophysical Research Abstracts
Vol. 13, EGU2011-6483, 2011
EGU General Assembly 2011

Improvements in DTU10 global ocean tide model in Polar Regions from multi-mission altimetry

Yongcun Cheng and Ole Baltazar Andersen
DTU Space, Danish National Space Center, Technical University of Denmark (cych@space.dtu.dk)

A new global ocean tide model DTU10 (Technical University of Denmark) representing all major diurnal and semidiurnal tidal constituents has been developed from the global tide model FES2004 (Finite Element Solutions), with residual tides determined using the response method. Eighteen years of combined T/P+J1+J2 satellite altimetry phase A and four years combined T/P+J1 satellite altimetry phase B observations inside the 66° parallel are combined with ERS-2 (maximum to 155 cycles), GFO (Geosat Follow On, maximum to 172 cycles) and Envisat (maximum to 84 cycles) outside the ±66° is applied to residual response analysis. A novel technique of removing annual signal improves tidal determination of diurnal constituents from the sun-synchronous satellite ERS-2+Envisat in the Polar Regions significantly.

The new global ocean tide model is validated by comparing harmonic constituents with several tide gauge datasets. The results show the new tide model fit the tide gauge measurements favorable over both the deep and shallow water, especially, in the Arctic Ocean and the Antarctic Ocean due to the removal of the annual signals in the altimetry sea level residuals prior to tidal determination. A comparison with 184 tide gauges in the Arctic Ocean shows improvements in the Root Mean Square Error of 8.79%, 1.71%, 3.87% and 7.94% (M2, S2, K1 and O1) for the DTU10 model compared with the FES2004. The improvements are 10.73%, -0.52%, 6.50% and 3.71% (M2, S2, K1 and O1) compared with 37 tide gauges in the Antarctic Ocean, respectively.