EOT20: A new global empirical ocean tide model derived from multi-mission satellite altimetry.

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EOT20 is the latest in a series of empirical ocean tide (EOT) models derived using residual tidal analysis of multi-mission satellite altimetry at DGFI-TUM. The amplitudes and phases of seventeen tidal constituents are provided on a global 0.125-degree grid based on empirical analysis of eleven satellite altimetry missions. The EOT20 model shows significant improvements compared to the previous iteration of the global model (EOT11a) throughout the ocean, particularly in the coastal and shelf regions, due to the inclusion of more recent satellite altimetry data as well as more missions, the use of the updated FES2014 tidal model as a reference to estimated residual signals, the inclusion of the ALES retracker and improved coastal representation. In the validation of EOT20 using tide gauges and ocean bottom pressure data, these improvements in the model compared to EOT11a are highlighted with the root-square sum (RSS) of the eight major tidal constituents improving by ~3 cm for the entire global ocean with the major improvement in RSS (~3.5 cm) occurring in coastal regions (<1 km to the coast). Compared to the other global ocean tidal models, EOT20 shows a clear improvement of ~0.4 cm in RSS compared to the closest model (FES2014) in the global ocean. Compared to the FES2014 model, the RSS improvement in EOT20 is mainly seen in the coastal region (~0.45 cm) while in the shelf and open ocean regions these two models only vary in terms of RSS by ~0.005 cm. The significant improvement of EOT20, particularly in the coastal region, provides encouragement for the use of the EOT20 model as a tidal correction of satellite altimetry in coastal sea level research.