



A Data-Assimilative Tide Model of the Northwest Atlantic

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A three-dimensional tidal model for the Northwest Atlantic is developed for eight leading semi-diurnal (M2, S2, N2 & K2) and diurnal (K1, O1, P1, & Q1), based on the Princeton Ocean Model (POM). Multi-mission altimetric tidal data were assimilated into the model. Results from barotropic experiments, with and without assimilation, are compared. The assimilative model reproduces the M2, S2, N2, K1 and O1 tidal elevations to an accuracy of 2.1, 1.6, 0.9, 1.2 and 0.9 cm respectively excluding the Bay of Fundy and Gulf of Maine region. Otherwise, the accuracy is 10.7, 2.8, 2.5, 1.3 and 1.1 cm respectively. Assimilation improves the accuracy of the model tidal elevation by a factor of 40-60% and that of the tidal currents by 20-30%. The semi-diurnal tidal currents agree better with observations than do the diurnal constituents. The agreement is best in the Georges Bank region indicating the model's capability to handle strong tidal current variability. An enhancement of the K1 and O1 tidal currents on the shelf edge of Labrador is found in the model solutions, qualitatively consistent with theory and observations but quantitatively overestimated.