Seasonal Variation of M_2 internal tides and tidal surface currents of the North Atlantic

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Following the global study of Kodaira et al. (2016), a high resolution regional ocean model is used to study the M_2 internal tides of the North Atlantic with a particular focus on their seasonal variation. The regional model has a grid spacing of 1/36 degree and is based on MITgcm. The predicted tidal variation of sea surface height is shown to be in reasonable agreement with altimeter observations. Tidal surface currents are also evaluated by comparing them with estimates based on the recently available hourly drifter dataset of Elipot et al. (2016). The large scale features in the maximum speed of surface tidal current derived from the drifter observations and model predictions are in reasonable agreement, particularly in the vicinity of known generation sites for internal tides. The higher wavenumber variations, previously explained by Kodaira et al. (2016) in terms of phase locking of the barotropic tide and mode-1 baroclinic response, do not line up exactly. Possible explanations are provided. We next examine seasonal variability. Both observed and predicted surface currents change with season. We interpret this variation in terms of seasonal changes in the vertical structure of mode-2 internal tides. By way of contrast, the model predictions indicate only small seasonal changes in the vertically integrated horizontal kinetic energy and the barotropic to baroclinic energy conversion rate.
Kodaira et al., 2016. *JGR Oceans*, *121*(8), 6159–6183.
Elipot et al., 2016. *JGR Oceans*, *121*(5), 2937–2966.

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