Seasonal and interannual variability of global internal tides

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In this study, we investigate the seasonal and interannual variability of internal tides in the global ocean using a Hybrid Coordinate Ocean Model (HYCOM) and altimetry data. The variability of internal tides is caused by the time varying stratification, mesoscale activity, large-scale shifts in amphidromic points, and changes in ice cover. The variation in the background fields generates the non-phase locked internal tides which are non-stationary. Non-stationary internal tides are less predictable than stationary tides, complicating regional model forcing with remote internal tide signals and the separation of internal tides from mesoscales. We will use 6 years of steric SSH extracted from a global HYCOM simulation with a horizontal resolution of 8 km and 32 layers to study the variability of internal tides. Our objective is to analyze the spatial and temporal variability of the amplitude and phase of the diurnal and semidiurnal internal tides. The SSH time series will be divided into time segments with different durations. The least-squares harmonic analysis will be used to extract SSH amplitude and phase for M2, K1, O1, and S2 constituents for these time segments. It has been found that the stationary amplitude decreases with an increase in the duration of the time series. We will also use empirical orthogonal functions (EOF) analysis to determine the seasonal and interannual variability in the monthly-mean internal tide amplitude and phase. The global maps of the non-stationarity fraction for the internal tidal constituents will be shown for each season. These results will be compared with 25 years of satellite altimetry data to find out whether similar variance decay trends are observed in the altimetry data.