High temporal resolution optical and physical time series data: Coastal Mixing and Optics and LEO-15

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High-resolution time series of bio-optical and physical data were obtained using moored and bottom-mounted instruments on the southern New England continental shelf in 70 m water depth during the Coastal Mixing and Optics (CMO) experiment from July 1996 through June 1997. The most prominent physical and bio-optical signals observed during the experiment were associated with seasonal variability. However, several important events interrupted the seasonal cycle. These episodic events appear to have had a great impact on biogenic and non-biogenic matter. Hurricanes and storms passed over or near the CMO site, resulting in reduced stratification of the water column, particle redistribution, and sediment resuspension. Changing hydrographic conditions that resulted from the influence of several water mass intrusions affected particle concentration on time scales of days to several weeks. The bottom boundary layer processes had a large influence on particle movement in the water column and along the seafloor, affecting the inherent optical properties and subsequently, phytoplankton biomass distributions and primary productivity in the upper water column following storms and hurricanes. The results suggest that there is considerable interannual variability in both the bio-optics and physics because of active and diverse physical forcing. This experiment sets the context for comparing our CMO results with other coastal ocean sites (LEO-15) as well as with previous open ocean findings. Time scales of optical variability (e.g., changes in phytoplankton spectral shapes of absorption) are generally shorter for the CMO coastal environment (on scales of days to weeks) as compared with open ocean optical variability (on monthly to seasonal scales). We hypothesize that time scales of optical variability at the LEO-15 site (New Jersey shelf in 15 m water depth) will be less than those found at the CMO site because of greater dynamical forcing in shallower shelf waters.