Temporal and Spatial Variability of physical and bio-optical properties on the New York Bight inner continental shelf

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Temporal and spatial variability are examined using an extensive set of physical and bio-optical data collected on the New York Bight (NYB) continental shelf during the summer 2000 Hyperspectral Coastal Ocean Dynamics Experiment (HyCODE). Physical, hydrographic, and bio-optical measurements from a mid-shelf mooring and a bottom tripod (~25 km offshore, 24 m water depth), and two nearshore profiling nodes (~5 km offshore, 15 m water depth) are utilized to quantify and correlate nearshore and mod-shelf variability. Towed shipboard undulating profilers and a Coastal Ocean Dynamic Applications Radar (CODAR) array provide complementary spatial data. We show that water clarity at the mid-shelf was controlled primarily by chlorophyll-bearing particles or colored dissolved organic matter (CDOM). In contrast, nearshore water clarity is influenced by non-pigmented material (non-colored dissolved matter and detritus). Data suggest that dynamical physical processes, mainly water mass advection and tidal oscillations that occur on the NYB inner continental shelf, control bio-optical properties and thus, biological processes. A short-lived coastal jet brought relatively high salinity, low temperature, low particulate water to the nearshore region, increasing water clarity and displaced lower salinity, higher chlorophyll nearshore waters to the mid-shelf region, resulting in increased biomass offshore. Relatively small-scale (on the order of a few kilometers) convergence and divergence zones formed from the interaction of tidal currents with mean currents. This patchiness was more important to bio-optical spatial variability than the presence of a persistent front that separated lower salinity, higher chlorophyll nearshore waters from higher salinity, relatively clearer waters in the mid-shelf region.