**Bering Sea Optical and Biological Properties from MODIS-Aqua**

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The Bering Sea is characterized by unique bio-optical properties, which cause unsatisfactory performance of global ocean color algorithms for retrieval of chlorophyll-a (Chl-a). In this presentation, we evaluate the normalized water-leaving radiance *nLw*(*λ*) and Chl-a in the eastern Bering Sea that are derived from MODIS-Aqua by comparing them to in situ data. The MODIS-derived *nLw*(*λ*) showed good agreement with in situ-measured *nLw*(*λ*). The mean ratios between them for wavelengths 412, 443, 488, and 551 nm ranged from 1.097–1.280, with reasonably accurate blue-green radiance ratios in *nLw*(*λ*) that were used as input for deriving Chl-a. However, compared to in situ data, existing global and regional Chl-a algorithms either overestimate or underestimate Chl-a in the eastern Bering Sea. Therefore, we propose a new algorithm for estimating Chl-a using a blended approach that was tested and applied to MODIS-Aqua images. The histogram distributions of MODIS-Aqua-derived and in situ-measured Chl-a data show that Chl-a data derived using the new algorithm agree reasonably well to in situ measurements. Annual, seasonal, and monthly composite *nLw*(*λ*) and Chl-a images are produced for the period of 2003 to 2013 in order to interpret the long-term spatial and temporal patterns of *nLw*(*λ*) and Chl-a. The *nLw*(*λ*) spectra show strong spectral dependence on seasonal variability with distinct spatial patterns. Although strong seasonal and interannual variability has been observed in Chl-a, there is no apparent trend of either increase or decrease in phytoplankton biomass associated with variability in the physical environment for the 11 years of the study period.