CENTER FOR COASTAL PHYSICAL OCEANOGRAPHY

OLD DOMINION UNIVERSITY

Coastal Ocean *and* Atmosphere Time-Series *at the* Chesapeake Light Tower

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The Chesapeake Light Tower (CLT) is ~25 km offshore from the mouth of Chesapeake Bay and Virginia Beach, VA. The atmosphere at CLT is often more continental than marine. The 11 m water column is nominally case 2 and optically thick, but it can be clear with the bottom visible. The Clouds and Earth's Radiant Energy System (CERES) project has a CERES Ocean Validation Experiment (COVE) site at CLT. COVE maintains a Baseline Surface Radiation Network site, and NASA's Aerosol Robotic Network (AERONET) has a CIMEL sun photometer at CLT. Marine bio-optical observations have also been made by Old Dominion University. These observations are compared with retrievals from NASA's Sea-viewing Wide Field-of-view Sensor (SeaWiFS).

AERONET aerosol optical thickness (AOT) values provide ground truth for the satellite estimates (Fig. 1). Model 1 regression lines with 90% prediction limits are shown in all figures. About 85-90% of the variance is explained in the visible but only 79% in the near-infrared (NIR). The slopes are significantly lower for the blue-green and greater than unity for the NIR. Overcorrection by atmospheric algorithms in the blue-green bands can be problematic in turbid waters.

Above-water R_{rs} measurements with a Satlantic Surface Acquisition System III were corrected with the latest optical protocols (Zibordi et al., in press) and compared with satellite retrievals (Fig. 2). Soluble absorption a_s by colored dissolved organic materials (CDOM) averages ~0.14 m^{-1} at 443 nm near CLT. The 412 nm band is compromised by CDOM, and so is the 443 nm band but to a lesser degree. Bands 1-5 (412-555 nm) have slopes close to unity but tend to fall below. Maximum band ratios at CLT always include bands 3-5, and explain most of the variability (Fig. 3). Chlorophyll retrievals account for almost three quarters of the variance (Fig. 4), but overestimate in situ values. An interim coastal chlorophyll algorithm (Fig. 5A) falls well below global SeaWiFS algorithms. Satellite chlorophyll retrievals are often twofold higher than the coastal predictions (Fig. 5B). While relatively small these datasets illustrate the utility of obtaining time-series information at fixed platforms, especially with simultaneous atmospheric and ocean observations.

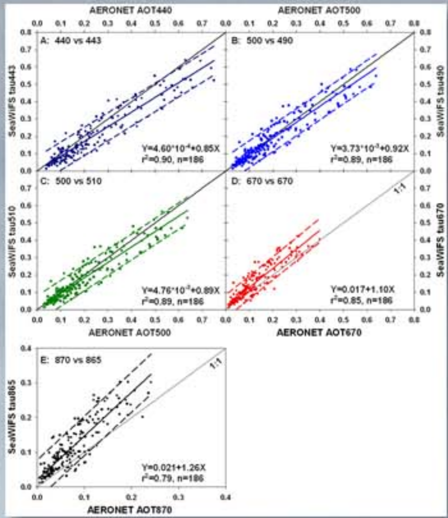

Figure 1. Surface AERONET observations versus SeaWiFS retrievals of aerosol optical thickness.

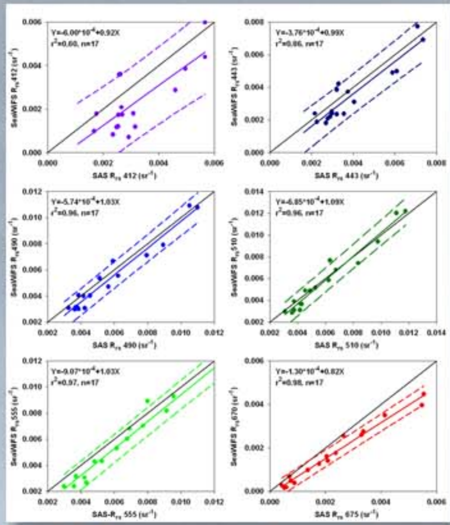

Figure 2. Remote sensing reflectance Rrs from CLT and SeaWiFS.

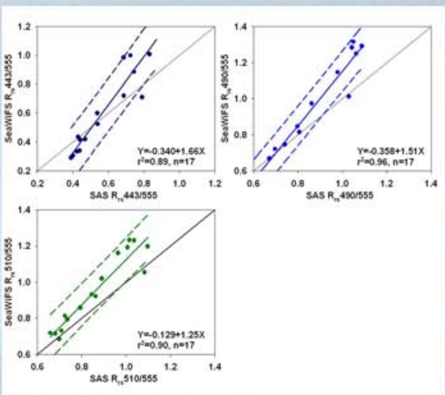

Figure 3. Band ratios of Rrs from CLT and SeaWiFS.

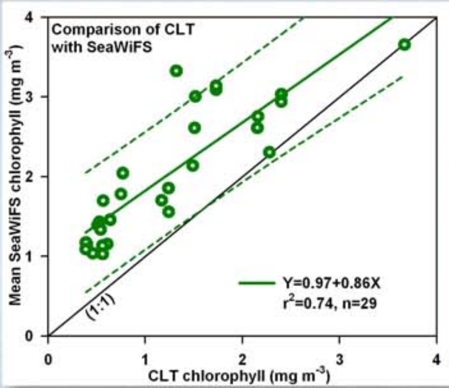

Figure 4. Measured chlorophyll concentrations versus retrieved values.

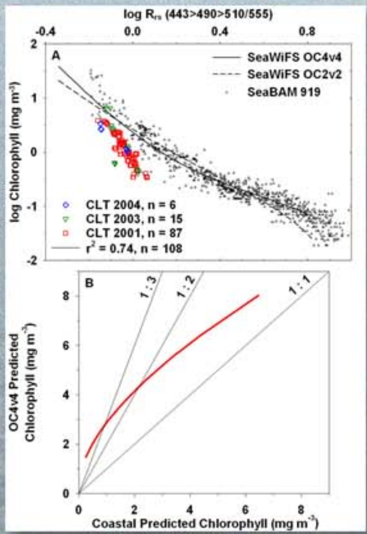

Figure 5. Our coastal chlorophyll algorithm and SeaWiFS algorithms.

Poster prepared by Graphics, Old Dominion University