ABSTRACT

Optical remote sensing of a multitude of oceanic processes with regional significance, the establishment of time-series stations at many different sites would be desirable. However, it is not feasible to maintain a research commitment to numerous sites of interest. An alternative, made feasible by the increased availability and ease-of-access to NASA remotely-sensed oceanographic data, is to use time-series data to simulate time-series stations. The NASA Giovanni system (http://giovanni.gsfc.nasa.gov) facilitates time-series investigations by providing remotely-sensed ocean data products under the NASA Ocean Biology Processing Group (OBPG). We devised a simple optical classification system using the three apparent optical property parameters now available in Giovanni: absorbance coefficient of dissolved and detrital matter (b_d), the absorption coefficient of phytoplankton (b_p), and the backscatter coefficient (b_s). In order to create a three-component classification system, b_d was multiplied by a factor of 10. This classification system is not a true optical model, but rather it is intended to show the Eel River outflow relative to the available AVHRR and MODIS data. For the period July 2002 to December 2011, time-series were generated for several different data parameters in Giovanni for the two study sites. Results of the regression analysis (slope and significance F-test) are shown in Table 1.

RESULTS

OBSERVATION OF THE EEL RIVER PLUME OPTICAL SIGNATURE

We attempted to use an apparent optical property classification system that uses the three apparent optical property parameters now available in Giovanni: absorbance coefficient of dissolved and detrital matter (b_d), the absorption coefficient of phytoplankton (b_p), and the backscatter coefficient (b_s). In order to create a three-component classification system, b_d was multiplied by a factor of 10. This classification system is not a true optical model, but rather it is intended to show the Eel River outflow relative to the available AVHRR and MODIS data. For the period July 2002 to December 2011, time-series were generated for several different data parameters in Giovanni for the two study sites. Results of the regression analysis (slope and significance F-test) are shown in Table 1.

The optical water mass classification results for the Coastal Waters site indicate that the site is not influenced by the Eel River outflow. In the summer months at the Coastal Waters site, the Eel River water is distinguishable during the rainy winter months at this site. Under the low summer water conditions, the water at the Eel River Plume site is optically similar to the Coastal Waters site.

DISCUSSION

The simulation has provided highly interesting results worthy of further investigation. Two years of data, to identify the optical signature of the Eel River outflow, already seem to have been demonstrated. The third goal is to evaluate these three-time series in comparison to independent truth data.

The results demonstrate that the Eel River outflow is distinguishable during the winter months due to elevated b_d. The elevated b_d values are related to the high sediment load carried by the Eel River in the winter time. The optical classification for the Eel River Plume site is very similar to the optical classification at the Coastal Waters site.

TIME-SEASONAL TRENDS AT THE COASTAL WATERS SITE

Using the regression analysis function in Excel, the slope for the data parameter time series and the significance F-test are calculated. The coefficient of determination (R^2) is shown for each parameter. The slope and significance F-test are shown in Table 1 along with the correlation coefficient (r).

Optical water mass classification results for the Eel River Plume site. Left: All months. Center: Winter months. Right: Non-winter months. The winter month water is optically similar to the non winter month water at the Coastal Waters site, indicating that the site is not influenced by the Eel River outflow.