INTRODUCTION

NASA’s Ocean Biology Processing Group (OBPG) provides the global processing and distribution of ocean color products from MODIS, SeaWiFS, and other ocean color capable sensors. The OBPG developed the Multi-Sensor Level-1 to Level-2 code (MLSL12, Franz 2006) to standardize the atmospheric correction and production of ocean color products from various space borne sensors. The MODIS instrument was designed with 36 spectral channels to support observations of clouds and land as well as the ocean. The traditional channels used for ocean color observation are the 9 bands in the visible to near infrared (NIR) spectral regime from 412-686 nm, which have a spatial resolution of approximately 1 km at nadir. These ocean bands were designed with high sensitivity over the range of reflectance typical of ocean observations with maritime atmospheric conditions. Over high turbid coastal and inland waters it is possible for this dynamic range to be exceeded, such that the bands saturate and the true signal is unknown. Other bands on MODIS were specifically designed for land and cloud observations, with both increased spatial resolution and reduced sensitivity over a broader dynamic range. These land/cloud bands overlap the spectral range of the ocean bands and extend into the short-wave infrared (SWIR), from 649 to 2130 nm, with a spatial resolution of 250 to 500-meters at nadir. A number of investigators have looked to exploit this additional information for ocean processing. Recently, Wang & Shi (2005) demonstrated an approach for utilizing the SWIR bands to improve the performance of the Gordon & Wang (1994) atmospheric correction algorithm over turbid or highly productive waters typically found in coastal environments. The OBPG has now enhanced MLS12 to support the 250 and 500-meter (HIRES) bands of MODIS (Table 1). This effort included characterization of the radiometric response of the HRIES bands in a manner consistent with that done for the standard ocean bands (e.g. relative spectral response, polarization sensitivities, vicarious calibration). The appropriate software and tables were created to facilitate the atmospheric correction and retrieval of oceanic optical properties at the additional wavelengths. A mechanism was also developed for accessing the increased spatial resolution, and options were added for utilizing the SWIR information for atmospheric correction. The OBPG is distributing these enhanced capabilities through the SeaWiFS Data Analysis System (SeDaS) software package (http://oceans.csc.nasa.gov/seadas/) to provide the research community with a tool for evaluating and developing applications of the HRIES bands to ocean remote sensing. Here we demonstrate the application of these new capabilities to the coastal and inland waters of the Chesapeake Bay region.

PROCESSING EXAMPLES

A series of MODIS/Aqua scenes for the Chesapeake Bay was processed to derive OC3 chlorophyll concentration, with processing performed using both the standard NIR atmospheric correction based on Gordon & Wang (1994) and Stumpf (2003) (herein referred to as GWNIR) and a modified Gordon & Wang correction using the SWIR bands at 1240 and 2310 nm to determine the aerosol properties (GWSWIR). The dataset was then geographically stratified into upper, middle, and lower regions of the Bay, and Monthly mean chlorophyll retrievals from all available, relatively cloud free scenes were generated for each region. The resulting time-series was compared to contemporaneous in situ measurements collected by the Chesapeake Bay Program (1993) and Harding et al. (2003).