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Volume 22, Algorithm Updates for the Fourth SeaWiFS Data Reprocessing

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Chapter 3

Changes to the Vicarious Calibration of SeaWiFS

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ABSTRACT

The SeaWiFS Project vicariously calibrates the visible bands of the instrument against in-water measurements from MOBY in order to achieve the necessary calibration accuracy for the SeaWiFS retrievals of water-leaving radiances. The SeaWiFS CVT implemented several changes in the vicarious calibration procedure for the fourth reprocessing of the SeaWiFS mission data set. The most significant change is the use of stray light corrected MOBY data in the vicarious calibration. More stringent data quality screening criteria were also implemented for both MOBY and SeaWiFS data to determine the vicarious calibration matchups. Finally, an inverse vicarious calibration procedure was implemented in which the vicarious gains are computed at the top of the atmosphere. The SeaWiFS TOA radiances are compared with MOBY water-leaving radiances that have been propagated to the top of the atmosphere using the SeaWiFS-retrieved atmospheric correction parameters. These changes to the vicarious calibration procedure enabled the production of a more robust set of vicarious gains for the fourth reprocessing of the SeaWiFS mission data set.

3.1 INTRODUCTION

The SeaWiFS CVT implemented several changes in the SeaWiFS vicarious calibration procedure for the fourth reprocessing. The *in situ* measurements are provided by stray light corrected MOBY data. The SeaWiFS data is composed of 101×101 pixel extracted scenes (subscenes) centered on MOBY. More stringent data quality screening criteria were imposed on both the MOBY and SeaWiFS data sets. Vicarious gains were generated using the inverse calibration procedure. These changes are detailed in the following sections of this chapter.

3.2 STRAY LIGHT CORRECTION

In vicariously calibrating SeaWiFS, the assumption is made that the uncertainties in the MOBY radiances are small (Eplee et al. 2001). Analyses of the MOBY data performed by the MOBY Project has shown that stray light within the instrument is biasing the MOBY measurements in the blue end of the visible spectrum (Clark et al. 2001). As part of an ongoing intra-agency collaboration,

the MOBY Project is working with NIST to characterize the stray light within the MOBY spectrometers and to develop stray light corrections for the MOBY data. The MOBY Project plans to reprocess the entire MOBY time series, starting with the more recent data. The full set of stray light corrected data over the time range of November 1999 to March 2002 were implemented, along with targeted match-up data from September 1997–November 1999, into the vicarious calibration for the fourth reprocessing. The revised vicarious gains provide water-leaving radiances (L_W) that are higher for bands 1 through 5 (555 nm), compared with the gains for the third reprocessing.

3.3 DATA SCREENING PROCEDURES

Before matchups between MOBY and SeaWiFS can be used in vicarious calibration, both data sets must be screened for data quality. The data screening procedures for both data sets have been enhanced for the fourth reprocessing.