MODIS LEVEL 1B CALIBRATION AND DATA PRODUCTS

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ABSTRACT

The Moderate Resolution Imaging Spectroradiometer (MODIS) is an Earth-viewing sensor that is currently operating on the EOS-Terra and EOS-Aqua satellites. Each MODIS instrument has 36 bands. Data are received from 490 detectors in these reflective Solar and infrared emissive bands. Calibration of the 490 channels on each MODIS instrument is performed by the MODIS Characterization Support Team (MCST), which works closely with the members of the MODIS Science Team to provide a calibration product that is useful for their geophysical products. The MODIS Level 1B (L1B) algorithm performs radiometric calibration for the duration of each mission. The L1B input files, output data products, and the emissive and reflective calibration algorithms are described. The Look-up Tables (LUTs) that provide the instrument characterization needed to run the L1B software are also described. We briefly present the L1B code standards, properties, and enhancement process. Lastly, "lessons learned" are discussed.

Keywords: MODIS, calibration software, MCST, Look-up Tables

1. INTRODUCTION

The Moderate Resolution Imaging Spectroradiometer (MODIS) is the cornerstone instrument on the National Aeronautics and Space Administration's (NASA's) Earth Observing System (EOS) Terra and Aqua satellites. MODIS/Terra (Protoflight Model, designated PFM) was launched on December 18, 1999, and MODIS/Aqua (Flight Model, designated FM1) followed on May 4, 2002. The Terra and Aqua MODIS instruments view Earth at 10:30 A.M. and 1:30 P.M. equator crossing times respectively from an altitude of 705 km in Sun-synchronous polar orbits. MODIS is a follow-on to the Sea-viewing Wide Field-of-view Sensor (SeaWiFS), the Coastal Zone Color Scanner (CZCS), the Advanced Very High Resolution Radiometer (AVHRR), the High Resolution Infrared Sounder (HIRS), and the Thematic Mapper (TM). The MODIS is designed to support land, ocean, and atmosphere studies.

The NASA Goddard Distributed Active Archive Center (GDAAC) ingests the MODIS binary data (Level 0) files, each holding approximately two hours' data, and reformats each into a set of Hierarchical Data Format (HDF) files containing 5 minutes of data. Each 5 minute segment (or "granule") consists of data from 202 to 204 scans of the MODIS mirror. Following this Level 1A (L1A) processing, the data are radiometrically calibrated and recorded in Level 1B (L1B) HDF data sets. To accommodate differences in the MODIS/Terra and MODIS/Aqua sensors' operational configurations and response changes, separate versions of the L1B software and the numerous Look-up Tables (LUTs) are maintained. Changes in both sets of software and updates of the LUTs are carefully tracked and operational configurations and response changes, separate versions of the L1B software and the numerous Look-up Tables (LUTs) are maintained.

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