

Characterization of MODIS and SeaWiFS Solar Diffuser On-orbit Degradation

X. Xiong^a, R.E. Eplee, Jr.^b, J. Sun^c, F.S. Patt^b, A. Angal^c, and C.R. McClain^a

^aSciences and Exploration Directorate, NASA/GSFC, Greenbelt, MD 20771, USA

^bScience Applications International Corporation, 4600 Powder Mill Road, Beltsville, MD 20705

^cScience Systems and Applications, Inc., 10210 Greenbelt Road, Lanham, MD 20706

ABSTRACT

MODIS has 20 reflective solar bands (RSB), covering the VIS, NIR, and SWIR spectral regions. They are calibrated on-orbit using a solar diffuser (SD) panel, made of space-grade Spectralon. The SD bi-directional reflectance factor (BRF) was characterized pre-launch by the instrument vendor with reference to the NIST reflectance standard. Its on-orbit degradation is tracked by an on-board solar diffuser stability monitor (SDSM). The SeaWiFS on-orbit calibration strategy uses monthly lunar observations to monitor the long-term radiometric stability of the instrument and applies daily observations of its solar diffuser (an aluminum plate coated with YB71 paint) to track the short-term changes in the instrument response. This paper provides an overview of MODIS and SeaWiFS SD observations, applications, and approaches used to track their on-orbit degradations. Results from both sensors are presented with emphasis on the spectral dependence and temporal trends of the SD degradation. Lessons and challenges from the use of SD for sensor on-orbit calibration are also discussed.

Keywords: MODIS, SeaWiFS, radiometer, calibration, solar diffuser, solar diffuser stability monitor