



CLARREO: Radiometric Uncertainty of Reference Inter-calibration on Orbit

C. Lukashin, C.M. Roithmayr, P.W. Speth, B.A. Wielicki, and D.F. Young
NASA LaRC, Hampton, Virginia, United States

One of the primary objectives of CLARREO mission is to provide an on-orbit calibration standard for measuring reflected solar radiance with SI-traceable accuracy of 0.3% ($k=2$). CLARREO reference inter-calibration operations are intended to improve rigorous observations over decadal time scales of critical climate change components including reflected broadband radiation (CERES), decadal change in cloud properties (VIIRS), and surface albedo changes including snow and ice albedo feedback.

The CLARREO approach for reference inter-calibration is based on measuring spectral reflectance with high accuracy and establishing an on-orbit reference for operating Earth viewing reflected solar radiation sensors: CERES and VIIRS on JPSS satellites, AVHRR and follow-on imagers on METOP, as well as imagers on Geostationary platforms.

The mission goal is to be able to provide CLARREO reference observations that are matched in temporal and angular domains with measurements from the aforementioned instruments, with sampling sufficient to overcome the random error sources from imperfect data matching and instrument noise. The inter-calibration method is to monitor over time changes in targeted sensor response function parameters: effective offset, gain, non-linearity, spectral response function, and sensitivity to polarization. In this study we used existing satellite data (SCIAMACHY, CERES, PARASOL) and simulation methods to determine requirements for CLARREO inter-calibration sampling and data matching. We applied numeric methods to estimate expected uncertainty for inter-calibration of imaging radiometers such as VIIRS.

Notwithstanding any other copyright notice contained herein, the following notice is applicable to this work: Copyright 2012 United States Government as represented by the Administrator of the National Aeronautics and Space Administration. All rights reserved.