Geophysical Research Abstracts
Vol. 20, EGU2018-3585, 2018
EGU General Assembly 2018

Correction of Inter-Calibration Errors due to Angle Mismatch for CLARREO

Wan Wu
(wan.wu@nasa.gov)

Wan Wu1, Xu Liu2, Qiguang Yang1, Susan H. Kizer1
1Science Systems and Applications, Inc, USA
2NASA Langley Research Center, USA

The Climate Absolute Radiance and Refractivity observatory (CLARREO) will provide SI- traceable decadal change observations with unprecedented, absolute accuracy to address the critical needs for climate trend studies. CLARREO may either directly observe some climate variables or provide in-orbit calibration for other sensors. The inter-calibration accuracy of sensors is dependent on the matching accuracy of space, time, spectral sampling and viewing geometry. CLARREO's challenging calibration requirement imposes a rigorous requirement to match both viewing zenith and azimuth angle, which significantly limits the number of useful inter-calibration matches. The magnitude of the calibration error due to angle mismatch is determined by the anisotropy in radiation fields. We demonstrate that the information provided by a hyper-spectral measurement can be used to predict the observation difference in top-of-atmosphere (TOA) radiance due to a small angle mismatch via a regression relationship based on radiative transfer modelling. By accounting for the observation difference, the calibration error introduced by an angle mismatch can be greatly minimized. Benefiting from the most recent development in fast radiative transfer modelling, an accurate angular dependent regression relationship can be obtained via the computationally intensive simulations under a wide range of atmospheric, surface, and cloudy conditions. The application of the methodology does not require an accurate scene identification, but can benefit from using additional atmospheric and surface property information to provide a better constrain in regression training. The methodology can greatly relax the angle matching requirement, enabling more matches to be used for inter-calibration between CLARREO like hyper-spectral instruments and other sensors.