Inter-Calibrating Satellite Remote Sensors Using High Accuracy NASA CLARREO Pathfinder Instrument

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NASA is planning to launch a highly accurate hyperspectral sensor to measure Earth-reflected solar radiances from the International Space Station in 2023. The Climate Absolute Radiance and Refractivity Observatory (CLARREO) Pathfinder (CPF) instrument will have an absolute calibration accuracy of 0.3% (1-sigma), which is about a factor of 5 to 10 more accurate than current satellite reflected solar instruments. We will describe the CPF approach developed to inter-calibrate the Clouds and Earth's Radiant Energy System (CERES) and Visible Infrared Imaging Radiometer Suite (VIIRS) instruments. A Principal Component-based Radiative Transfer Model (PCRTM) is used to perform high fidelity CPF radiance spectra simulation and to extend the spectral range of the CPF to match that of the shortwave CERES reflected solar radiation. The PCRTM model can also be used to correct small errors due to imperfect angular matching between the CPF/CERES and CPF/VIIRS observation angles. Examples of inter-calibration uncertainty that is anticipated will be demonstrated using simulated CPF data.