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Utilizing Libya-4 to intercalibrate overlapping sensors in the same sun-synchronous orbit

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The NASA CERES observed SW and LW broadband fluxes are utilized by the climate community for monitoring the Earth's energy imbalance and for climate model validation. The SNPP and NOAA20 CERES instruments and associated VIIRS imagers were launched into the same 1:30 PM mean local time sun-sun-synchronous orbits as well as the future NOAA22 Libera broadband instrument and VIIRS imager. The overlapping sensor records need to be intercalibrated to enable consistent broadband fluxes and imager cloud retrievals. The overlapping satellites are typically placed a half an orbit apart, thus preventing any simultaneous nadir overpass (SNO) events required for time-matched inter-calibration strategies. A Pseudo Invariant Calibration Site (PICS), such as Libya-4, can provide overlapping sensor radiometric scaling factors without the use of SNOs.

The clear-sky Libya-4 observed radiances were characterized both spectrally and angularly and corrected for atmospheric effects. The Libya-4 natural variability was found to be consistent across the CERES and VIIRS records. This fact reveals that the sensor onboard calibration anomalies are smaller than the Libya-4 natural variability. By mitigating the Libya-4 natural variability will reduce the radiometric scaling factor uncertainty needed to provide both broadband flux and cloud retrieval continuity across the overlapping sensor records.