Title: Enabling Consistent Calibration of Multispectral Solar Reflective Imager Data for Climate Data Record Development Using the Moon

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To develop Climate Data Records (CDRs) by aggregating multiple observational datasets from different instruments on the same or different platforms requires that the instruments be calibrated to a consistent scale and that the calibration be maintained over the instruments' lifetime. This can be challenging for reflected solar radiometer sensors, e.g. Earth observing satellite imagers, due to the degradation of optics and on-board calibration systems suffered in the space environment. A methodology for using the Earth's moon as a reference light source has been developed at the U.S. Geological Survey under NASA sponsorship. The USGS lunar calibration system has demonstrated the capability for stabilizing satellite sensor calibration at the 0.1% per year level, and for inter-calibration at the sub-percent level. This meets calibration requirements for measuring climate change from space (NISTIR-7047, ASIC3).

The proposed activity will develop guidance procedures to implement the results of lunar calibration analysis in the framework of CDR development, to assure stable and consistent calibration of the observational data used to construct CDRs. Source datasets will include current and historical operational sensors such as geostationary imagers and the NOAA AVHRRs, and possibly extend to research satellite sensors (e.g. from the NASA EOS program). Application to future instruments such as the Advanced Baseline Imager on GOES–R and VIIRS on NPP will be discussed. Deliverables will include assessments of sensor calibration biases based on reference against the Moon, quantitative evaluation of the uncertainty in these assessments, and recommendations for validation of calibration consistency and stability for CDR constituent data.