Geophysical Research Abstracts
Vol. 19, EGU2017-16669, 2017
EGU General Assembly 2017

Two Highly-Complementary Future Instruments for Climate Studies

Greg Kopp (1,2) and Peter Pilewskie (1)

(1) University of Colorado / LASP, United States (greg.kopp@lasp.colorado.edu), (2) Max-Planck-Institut für Sonnensystemforschung, Göttingen, Germany

Measurements of the total solar irradiance (TSI) provide the most accurate knowledge of the net energy powering the Earth's climate system and thus give the incoming side of the Earth's radiative energy balance. The spectral distribution of this radiant energy, the spectral solar irradiance (SSI), determines how that incoming energy interacts with different components of the Earth's coupled ocean-atmosphere-surface climate system. Spatially- and spectrally-resolved Earth-reflected measurements of this shortwave radiation indicate the relative amount of the incident sunlight that is absorbed by different spatial regions and ecosystems around the globe. Particularly if very accurate and acquired over sufficiently long periods of time, those outgoing radiance measurements can lead to improved quantification of and physical understandings of the local and global processes causing climate change.

Two upcoming and very complementary missions provide these measurements. The soon-to-be-launched Total and Spectral Solar Irradiance Sensor (TSIS) acquires the solar-irradiance measurements, with the Total Irradiance Monitor (TIM) providing highly-accurate values of the TSI and the Spectral Irradiance Monitor (SIM) measuring the SSI. The recently-selected CLARREO Pathfinder (CPF) is a technology-demonstration mission that measures the solar-reflected radiation via spatially- and spectrally-resolved observations of Earth scenes from its HyperSpectral Imager for Climate Science (HySICS), a spaceflight version of a high-altitude balloon-flight imaging spectrometer that achieves high radiometric accuracies via in-flight cross-calibrations directly tied to the SSI. We give an overview of the TSIS and the CPF, describing their instruments, the high complementarity of their measurements and intended uncertainties, and their planned timelines and current status.