

## **Climate Change Accuracy: Observing Requirements and Economic Value**

**Bruce Wielicki**<sup>1</sup> [b.a.wielicki@nasa.gov], R. Cooke<sup>2</sup>, A. Golub<sup>3</sup>, R. Baize<sup>1</sup>, M. Mlynczak<sup>1</sup>, C. Lukashin<sup>1</sup>, and K. Thome<sup>4</sup>

<sup>1</sup> NASA Langley Research Center, Hampton, VA, USA

<sup>2</sup> Resources for the Future, Washington, DC, USA

<sup>3</sup> American University, Washington, DC, USA

<sup>4</sup> NASA Goddard Space Flight Center, Greenbelt, MD, USA

Higher than normal accuracy is required to rigorously observe decadal climate change. But what level is needed? How can this be quantified? This presentation will summarize a new more rigorous and quantitative approach to determining the required accuracy for climate change observations (Wielicki et al., 2013, BAMS). Most current global satellite observations cannot meet this accuracy level. A proposed new satellite mission to resolve this challenge is CLARREO (Climate Absolute Radiance and Refractivity Observatory). CLARREO is designed to achieve advances of a factor of 10 for reflected solar spectra and a factor of 3 to 5 for thermal infrared spectra (Wielicki et al., Oct. 2013, BAMS). The CLARREO spectrometers are designed to serve as SI traceable benchmarks for the Global Satellite Intercalibration System (GSICS) and to greatly improve the utility of a wide range of LEO and GEO infrared and reflected solar passive satellite sensors for climate change observations (e.g. CERES, MODIS, VIIRS, CrIS, IASI, Landsat, SPOT, etc.).

Providing more accurate decadal change trends can in turn lead to more rapid narrowing of key climate science uncertainties such as cloud feedback and climate sensitivity. A study has been carried out to quantify the economic benefits of such an advance as part of a rigorous and complete climate observing system. The study concludes that the economic value is ~ \$12 Trillion U.S. dollars in Net Present Value for a nominal discount rate of 3% (Cooke et al., 2013, J. Env. Sys. Dec.). A brief summary of these two studies and their implications for the future of climate science will be presented.