Optimizing Climate Observations for Targeted Results

Elizabeth Weatherhead [1,2] *[betsy.weatherhead@colorado.edu], Susan K. Avery* [2]*, Bruce Wielicki* [3]*, and V. Ramaswamy* [4]

[1] *CIRES, University of Colorado – Boulder, CO, USA*
[2] *Susan Avery Consulting, Boulder, CO, USA*
[3] *NASA Langley Research Center, Hampton, VA, USA*
[4] *NOAA Geophysical Fluid Dynamics Laboratory (GFDL), Princeton, NJ, USA*

Solar and climate observations are the critical foundation for understand the current and future Earth. The current observing system is inadequate to address the multitude of questions that need to be addressed about seasonal variability and long-term changes. The scientific community is addressing prioritization in order to assure that the most important climate observations will be gathered in the future. One method for prioritizing observations was presented in Weatherhead et al. (2017) and suggests that observations should be planned around the seven World Climate Research Program's "Grand Challenges." The framework suggests that three types of observations should be considered: long-term observations such as those that can be used for trend detection; short-term observations—including campaigns—that can be used to understand processes; and those observations that are critical to supporting seasonal forecasting.

This prioritization will assure that the most important scientific challenges related to climate will be addressed. The WCRP Grand Challenges include water availability, climate sensitivity, carbon cycle, extreme events, melting ice, seasonal forecasting and coastal impacts remain a serious challenge for current and future Earth observations. These priorities represent the most serious societal and scientific challenges facing the world. Without innovation and careful planning of observations, these challenges will not be met in a timely manner. By identifying the critical observing needs—especially if the appropriate observing capability does not exist—innovation may arise to meet the needs.

This effort to prioritize needed observations should not be limited by current technologies or current budgets. Any proposed technology should, however, be rigorously evaluated by independent evaluation to assure that the observing system is sufficient for the proposed goals. Significant care needs to be taken with spatial coverage and long-term accuracy to meet the needs of climate research and products.