



## **Towards a U.S. Continuity Framework for Satellite Observations to Support Environmental Security**

September 2022

Annual losses from weather and climate disasters have quintupled over the past 30 years, from around \$30B/year in the 1990s to \$150B/year (CPI-adjusted) in recent years; costs are expected to climb further, largely because of climate change, but also because development practices increasingly put lives and property in harm's way. Space-based Earth observations have become essential to assess and predict risks of climate and weather hazards, to mitigate what is avoidable and to adapt to what is not in a proactive and cost-effective manner. The need to provide a continuum of reliable observing platforms that enable short-term (< ~2 weeks) weather predictions is well established. But few plans exist to ensure a reliable observational basis for informing decisions about the longer-term climate and environmental risks that are a growing source of losses of property and life.

To begin a dialogue about longer-term observing systems needs, the Keck Institute for Space Studies (KISS; [kiss.caltech.edu](https://kiss.caltech.edu)) is convening a Study Program in the late summer and early fall of 2022. The goal of this study program is to help accelerate discussions and plans for a greater and more impactful U.S. contribution to the global observing system that will support decision-making about climate and environmental hazards. Study team participants include a diverse group of 24 established and seven early career scientists and engineers, representing different academic institutions and agencies in the U.S. and abroad. Objectives of the study include: 1) establishing consensus around the needs and challenges associated with "continuity", considering the needs for climate science, mitigation, and adaptation, and 2) identifying technical, programmatic, and observing architecture design opportunities and challenges. The study is reviewing current and planned Earth observations in the national and international landscapes, to identify gaps in the program of record and suggest a framework for evaluating priorities for U.S. contributions to critical observing systems. For one or more priority climate areas, the study intends to identify suites of observations and initial architecture designs and associated technology roadmaps to address continuity. In addition, the study will develop a set of best practices for the stewardship of these vitally important datasets, including their findability, accessibility, and usability by diverse stakeholders in government and the private sector. Findings and recommendations from the study will be developed into a KISS study report anticipated to be available by the end of 2022 and submitted for publication.

For more information, see [https://kiss.caltech.edu/programs.html#satellite\\_observations](https://kiss.caltech.edu/programs.html#satellite_observations)

## High Level 1<sup>st</sup> KISS Study Week Outcomes

- I. Examined the study objective from three perspectives (see figure below):
  - A. Science and application priorities, a framework for evaluating priorities, and considerations for framing in terms of national and environmental security.
  - B. Architecture considerations, technology road mapping, NGO trends and opportunities.
  - C. Data stewardship, including archiving, uncertainty quantification, accessibility and making the data analysis ready etc.
- II. Brought seven early career participants into the challenge, greatly co-benefiting from their participation.
- III. Established three separate Study subgroups to take deeper dives into I A, B, C in the weeks intervening the two 1-week study periods.
- IV. Second of two Study Weeks planned for the week starting November 14.

