



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

September 2022

What is this? A study sponsored by the Keck Institute of Space Studies (kiss.caltech.edu) to codify best practices, articulate successes, and identify challenges and opportunities in the prioritization, acquisition, curation, and stewardship of long-term space-based environmental records. The goal of the study is to accelerate discussion and plans for a greater and more impactful U.S. contribution to the global satellite observing system that will support decision-making regarding climate change and environmental hazards and security.

Why study this? Space-based Earth observations enable us to understand the wonder and complexity of the planet we live on. They also provide society with situational awareness of local-to-global environmental conditions and predictive guidance for near-term weather and hydrological extremes. While these capabilities are indispensable to safeguarding life and property – as well as supporting trillions of dollars in economic and resource management decisions – there are needs and opportunities to greatly expand their utility and impact. Society's growing reliance on environmental information supporting the connectivity and complexities of our food, water, transportation, shipping, energy, communications, and health sectors, along with the growing impacts of climate change on these sectors, suggest an increasing need for continuous monitoring, enhanced user access and data discoverability, and authoritative long-term data stewardship.

Who is involved? The Keck Institute of Space Studies, a privately-funded think-tank based at Caltech, is funding and hosting the study. The study team is composed of 30 experts on environmental sensing technology and methods, Earth prediction modeling, and data stewardship across academia, industry, government, and international organizations.

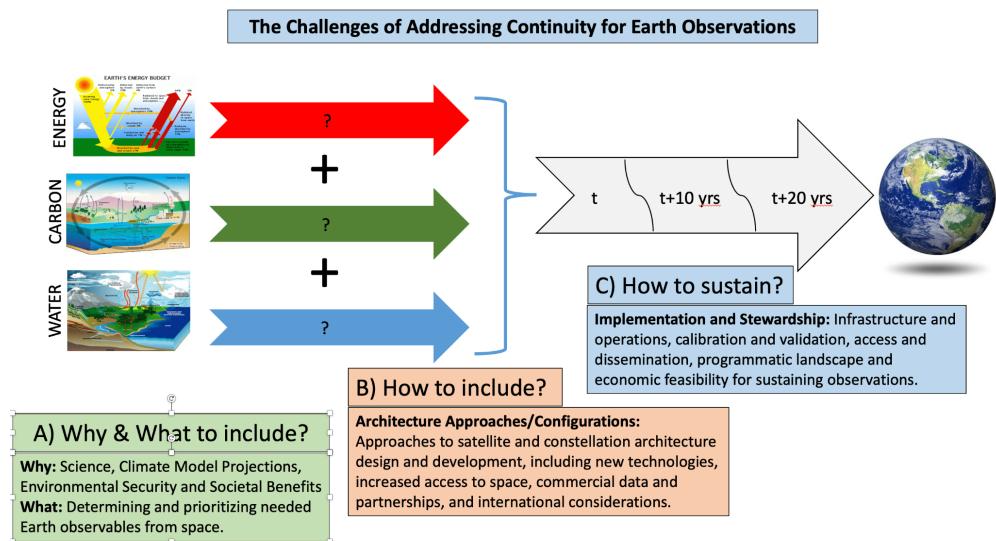
Why now? This study seeks to capitalize on the confluence of several key factors, including: a maturing user community for long-term climate data records; the availability of affordable and scalable cloud computing; the development of new business models and partnership opportunities in earth observations; the enhancement and miniaturization of earth observation technologies; and the emergence of a programmatic window for formulating the next generation of observatories. Together, these factors provide a unique opportunity for the U.S. and the world to provide improved climate and environmental situational awareness and support decisions aimed at safeguarding life and property and improving societal resilience.

What is the timeline? The Keck Institute has hosted a number of mini-symposia since the beginning of the year covering several topics on Earth observations and the associated science, technology and programmatic landscapes. In August 2022, the full study team convened in Pasadena, CA for a week to kick off the study process. During September and October, the study team is undertaking deeper dives in a number of areas and seeking community feedback in advance of a second study week, scheduled for November 2022. A full report documenting findings is expected by year end 2022.

For more information, see https://kiss.caltech.edu/programs.html#satellite_observations

High Level 1st 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.



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