Science and Beyond:

Capturing the Full Spectrum of Heliophysics Mission Impact Through End User Engagement

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ABSTRACT

Heliophysics missions deliver far more than scientific discovery. They provide the environmental awareness and technical resilience required for humanity's expanding presence in space, from forecasting and crew safety, to commercial operations, to national security. Yet stakeholder needs beyond science are not well documented. By systematically identifying, engaging, and resourcing end user relationships, we aim to improve mission value and support critical resources.

1 The Challenge

Heliophysics missions serve a vast stakeholder community. To fully capture their impact, we must identify who depends on our missions, understand which capabilities matter most to them, and pinpoint the highest-value targets for improvement.

Evaluation gap
Quantitative scientific impact measures are well-established. However, there are many end users who rely on Heliophysics mission data, and the means of evaluating the impact are qualitative.

Limited engagement mechanisms
We lack a systematic means of identifying non-science end users, understand their use cases, and track the critical data resources that they rely upon.

Passive data delivery model
The primary means of data delivery to end users is passive flow through general repositories. However, customized resources and more active engagement with missions could result in a tremendous improvement of service and utility.

Expertise disconnect
Data from science missions can be challenging to interpret, and new discoveries can provide important insight into space weather processes. Yet there is no formal liaison between mission data experts and end users; this limits both utility and capability.

2 Who Depends On Us: A Testbed Case

An End User inventory was conducted by the SDO Mission. The survey was conducted to understand which resources provided by the mission were being used by end users and for what purpose.

The primary means of access used by end users was pulling from a fixed site or repository. In general, there was no engagement with the mission team unless the end user directly contacted us.

The evolving landscape of PROSWIFT, Artemis, and increasing dependence on space weather data caused the team to launch the SDO End User Inventory.

Most of the information came from inquiries sent to the project during data outages - an unintended but powerful indicator of who truly depends on mission data. Any user who relied on SDO data for purposes other than publishable scientific research was included, ***producing a catalog of nearly 100 end users.***

Analysis of the inventory resulted in five general categories of end user, shown below. Efforts are underway to map the users to the specific sources that they rely upon. The Heliodata website was updated to provide 42 citable SDO data resources: ***helio.data.nasa.gov/mission/SDO***

The SDO inventory serves as a test case that can be leveraged in producing a general end user inventory and expanding end user support for all Heliophysics missions.

~100 **non-research end users** identified in the SDO End User Inventory, *suggesting similar unidentified cases across the entire Heliophysics mission fleet*

SDO End User Inventory Categories

- **Blue** Space Weather & Operations
- **Green** Models & Augmented Products
- **Red** Science Planning / Other Missions
- **Yellow** Community, Public, Education
- **Orange** Commercial & Public Sector

3 Proposed Effort

Three interlocking pillars formalize **work that many missions already do informally**.

Tracking and Engagement
Identify & Support End Users

- Map the full stakeholder community, not just scientists
- Enable mission engagement with operational & commercial users
- Track mission value across all end user domains

Observational Awareness
Real time awareness of space weather

- Shift from passive data delivery, include active evaluation of data and situational assessment
- Maintain real-time awareness of major SWx activity across all missions
- Provide operational mission status and updates through dashboard interface

Active Support for End Users
Expert Forecasters Receive Expert Support

- Dedicated liaison for every operationally critical dataset
- Participation in briefings and assistance in data assessment
- Support for understanding Research-to-Operations (R2O) challenges, new models, and advances in data interpretation

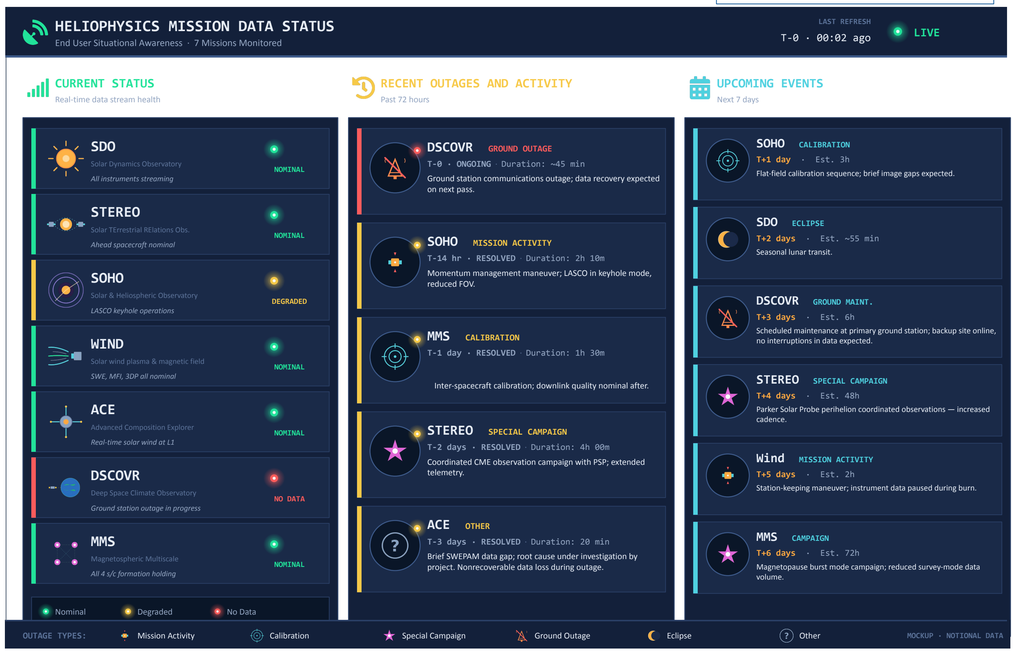
4 Future Directions

Many end users are only aware of outages and changes to data access when they experience a failure to obtain expected data.

Our team is working on resources and services that will provide up-to-date information and assistance to users via the HelioData site.

Below is a prototype mission data status dashboard developed for the HelioData website. We are seeking information on what additional resources would be most effective to support end users. Please help us by filling out our survey.

We need your help!! Enter your use cases, provide guidance, or make suggestions at tinyurl.com/HelioEndUsers



THE HELIODATA STAKEHOLDER ECOSYSTEM

THE BIG THREE
Full value of missions: science + national interests · Every mission knows and engages its end users · Forecasters receive critical science support

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