

National Aeronautics and
Space Administration



2024 NASA SCIENCE

**NASA Heliophysics
Division Update to HPAC**

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Heliophysics Division Director
June 18, 2024



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NASA Heliophysics Division Leadership



**Dr. Joseph (Joe)
Westlake**
Division Director



Margaret (Peg) Luce
Deputy Division
Director



Nicole (Nicki) Rayl
Associate Director
for Flight



**Dr. Therese Moretto
Jorgensen**
Director of Research





Credit: NASA/Keegan Barber

APRIL 8, 2024: TOTAL SOLAR ECLIPSE

400+

NASA employees
across 14 locations
engaging with the public



12,328,645

NASA Broadcast
viewers – English

4,603,238

NASA Broadcast
viewers – Spanish



17,535

News stories with
an estimated
publicity value of
\$54.5 million

 AP News
<https://apnews.com/hub/eclipses>

Eclipses

Looking at a solar eclipse can be dangerous without eclipse glasses. Here's ... About 20,000 eclipse chasers have witnessed a ra...

 Space.com
<https://www.space.com/news/s...>

Solar eclipse 2024: Live updates

May 22, 2024 — On Oct. 2, 2024, an annular solar eclipse will be visible across parts of the South Pacific, southern Chile and Southern...

 NBC News
www.nbcnews.com

Total solar eclipse 2024 highlights: Live coverage,...

Apr 8, 2024 — News and updates from the 2024 total solar eclipse: Tens of millions of people were treated to stunning views as the moon passed between ...



2M+

glasses distributed

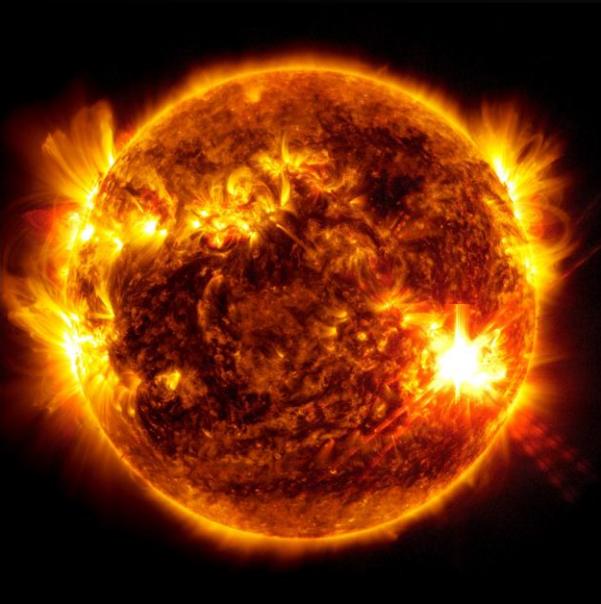


Tens of Thousands

Of engagements with Barbie, Cookie
Monster, Elmo, Snoopy, LEGO and more



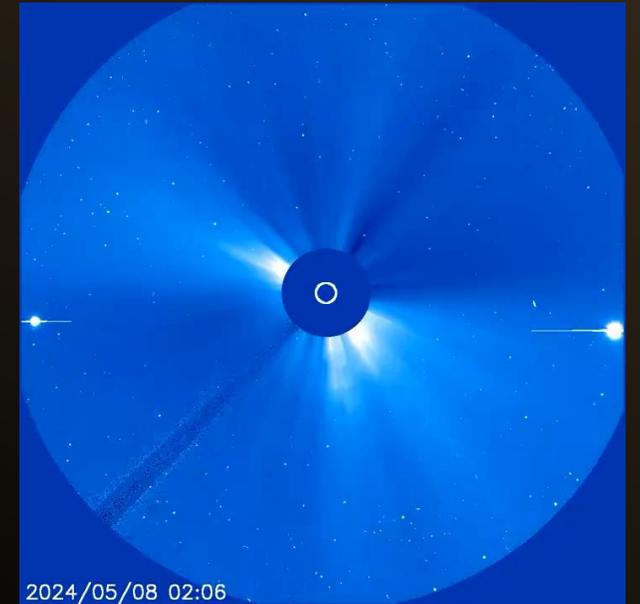
Geomagnetic Solar Storm



NASA's Solar Dynamics Observatory (SDO) captured this image of an X5.8 solar flare peaking at 9:23 p.m. EDT on May 10, 2024. The image shows a subset of extreme ultraviolet light that highlights the extremely hot material in flares.
Credit: NASA SDO

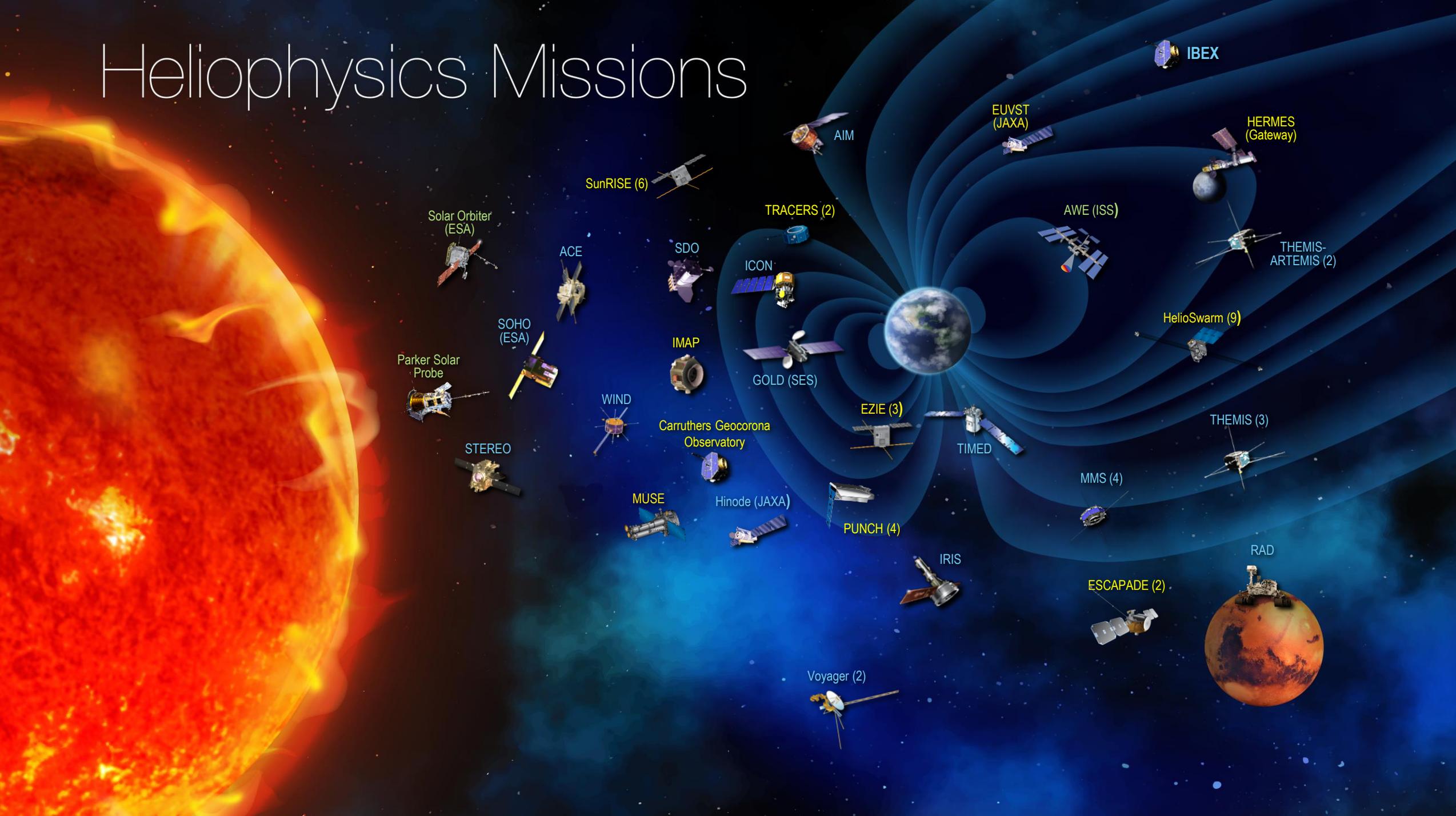


A coronal aurora appeared over southwestern British Columbia on May 10, 2024.
Credit: NASA/Mara Johnson-Groh

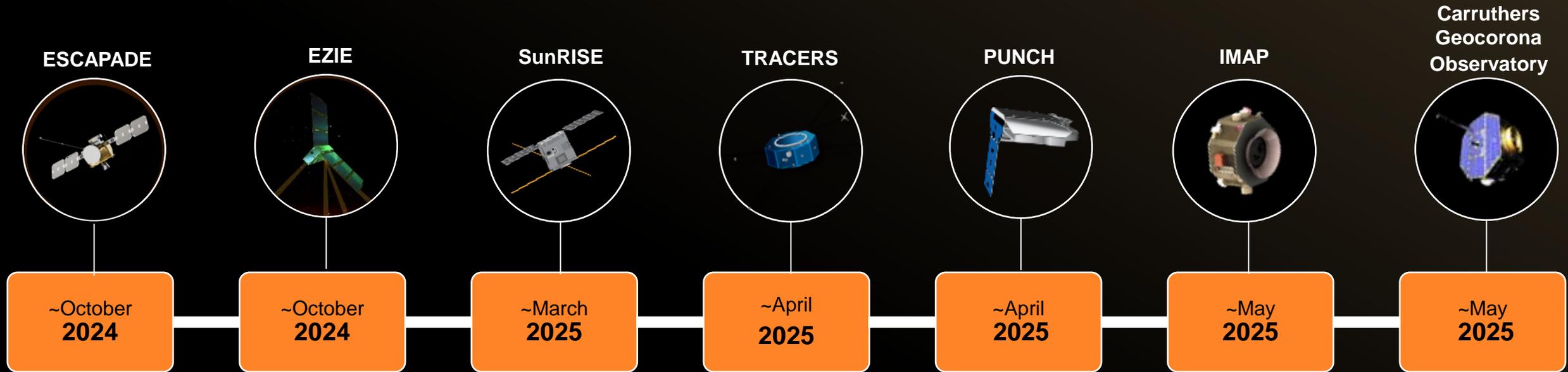


A series of CME's are launched from the Sun on May 8th, as captured by SOHO's LASCO instrument
Credit: NASA SOHO

Heliophysics Missions



Helio Mission Launch Timeline





HPAC Findings, HPD Recommendations, & HPD Response: November 2023



GDC & Dynamic

HPAC Finding

We (the HPAC Committee) commend HPD for its effort to continue implementing GDC and DYNAMIC despite all the difficulties. All instruments of GDC have been selected. One or more DYNAMIC Phase A proposals will be selected. HPD recognizes that the science goals of GDC and DYNAMIC complement each other. However, HPAC is disappointed that GDC is paused and delayed due to HPD funding constraints. GDC is the only unaddressed mission concept from the 2013 Decadal Survey. DYNAMIC is also unresolved, and recommended by the Committee. Both missions offer incredible opportunities to nurture the field and a whole new generation of instrument scientists. Improved understanding of ionosphere and thermosphere physics enabled by GDC/DYNAMIC is essential for space weather applications.

HPAC Recommendation to HPD

We recommend HPD explores all options for ensuring that GDC and DYNAMIC science is pursued with high priority in the given budget reality.

HPD Response

NASA concurs with this recommendation. NASA has been exploring options for supporting GDC and DYNAMIC science within the federal budget process. At this time, we will continue to work on this internally and do not request additional advice from HPAC.

HSO Infrastructure Missions

HPAC Finding

In the last Senior Review, NASA transitioned six Heliophysics missions to Heliophysics System Observatory (HSO) Infrastructure. HPAC recognizes that this is a reasonable way to allow missions to keep operating and produce data useful to the community within a limited budget.

HPAC Recommendation to HPD

In the Heliophysics Senior Review Call for proposals it is stated that “HSO Infrastructure Mission continues operations as an extended mission and does not receive funding to execute a scientific research plan. It only receives funding necessary to continue operations and associated activities (e.g., data validation, archiving).” We recommend that HPD communicates better to the broader community the implications of a mission’s transition to HSO infrastructure. For example:

- *Are HSO infrastructure mission teams allowed to re-organize their limited budget (e.g., by reducing management) in order for science to be produced (e.g., science publications) even if they are not explicitly required to do so?*
- *Can a mission move from the infrastructure category to the Science Investigation category if new data acquisition can lead to specific proposals of new scientific tasks?*

We recommend HPD to track any correlation between the transition of certain missions to HSO infrastructure and the number of proposals submitted to R&A programs using data from those missions. If the R&A programs are burdened with those transitions, we may simply be shifting the limited budget problem from one area of Heliophysics to another.

HPD Response

- Q1 Response: We have received feedback from missions that were placed into the infrastructure mode for the HSO and generally adjusted to ensure that scientific quality data products are produced for the use of the whole community. Some missions have indicated that the defining line between scientific work and science operations needs to be reset and we have worked with these teams to better set these baselines.
- Q2 Response: There is currently no pathway for missions that have been placed into HSO infrastructure to be brought back into their previous mode, however this does not change that these missions continue to be operated and continue to produce scientific observations that are available for the entire community to use in their scientific investigations.
- One of the major goals of HSO infrastructure is to open the data provided by missions that have completed their primary mission and many extended missions to the broader scientific community as suggested by the Senior Review. Ideally, we will see new and novel uses of our HSO fleet in the R&A program and we very much look forward to seeing the creativity and innovation from the community given these new opportunities.
- More information on the HSO infrastructure will be given during this HPAC meeting

R&A Funding Level

HPAC Finding

HPD worked hard to address budget realities and providing good rationale for preserving the R&A budget in order to optimize science return and the health of the community.

HPAC Recommendation to HPD

We recommend sharing this and other decision-making rules, guidelines and rationale used to determine priorities within the HPD budget more broadly with the community.

HPD Response

HPD thanks the HPAC for their acknowledgment of the hard work that goes into the HPD budget. HPD does and will continue to present the budget to the community at a variety of Town Halls and a variety of community meetings. For the guidelines and rationale used to determine priorities within the HPD budget we follow the recommendations of the Decadal Survey, which defines the relative importance of the R&A budget with respect to the rest of the HPD portfolio.

SWC Activities

HPAC Finding

HPAC recognizes SWC for undertaking an impressive array of activities over the past year, spanning 4 tasks. They provided a thorough, informative, and easy-to-digest report on their findings. Work on each task resulted in actionable recommendations. The SWC played an important role in coordinating between the SWC, SWAG, Space Weather Roundtable, and Heliophysics Decadal Survey. A key to coordination has been having members that are joint on two or more of these committees, ensuring tighter communication between the committees. The SWC synthesized Gap Analysis reports from NASA and NAS Space Weather Workshops, and considered needed next steps. The SWC provided recommendations to HPAC regarding the NASA Artemis and Space Biology programs. The SWC provided recommendations to HPAC for improved interagency coordination (NASA / NOAA / NSF / DOD / non-US) on space weather efforts.

HPAC Recommendation to HPD

Continue to coordinate with other space weather groups and report on their activities to HPAC/HPD. Encourage the relevant committees (SWC, SWAG, Space Weather Roundtable) to continue to utilize the 'joint membership model' going forward, even after current members move out of their various roles. Report on what worked well and what could be improved for Decadal panel communication. Discuss the possibility of a space weather gap filling analysis and provide recommendations to HPAC on the study's scope. Continue to report on space weather aspects of the Moon to Mars program and provide recommendations on space weather needs and opportunities. Continue R2O2R discussions and provide additional recommendations to make the process more accessible to proposers. Continue exploring NASA-NSF collaborations, and international collaboration opportunities such as COSPAR and the IASWCG.

HPD Response

HPD thanks HPAC's acknowledgment of all the hard work of the Space Weather Council. HPD appreciates the coordination with the other space weather groups and they are actively working with these groups. HPD doesn't request further information on this topic. Topic 2: Space Weather Gap filling analysis- HPD isn't ready to commission this study at this time. We can return to HPAC when we are. Topic 3: We will continue to update the Moon 2 Mars program at Town Halls and other public forums. HPD does not request further information on this topic. Topic 4: R2O2R discussions are ongoing with other Agencies and end users. At this time, we will continue to work on this internally and do not request additional advice at this time.

HPD requests HPAC to summarize what NASA should consider with the recent discussion on revisions of Space Weather Scales and the impact on science research, modeling, and any observations or instrumentation going forward.

R202R

HPAC Finding

HPAC commends HPD for efforts to improve cross-agency cooperation on R2O2R. In particular, programs such as the Space Weather Centers and R2O2R leverage knowledge gained by NASA missions and research to improve space weather preparedness. These efforts enhance predictions and provide opportunities to grow essential capabilities needed to protect the nation's assets in space. However, we note that the R2O process remains difficult to navigate and it is a barrier for many researchers seeking to participate in these programs.

HPAC Recommendation to HPD

We recommend HPD explore ways to streamline this proposal process, taking advantage of “lessons learned” from the Earth Science R2O efforts.

HPD Response

HPD has continued to pull in lessons learned from our Earth Science colleagues on the R2O efforts. At this time, we will continue to work on this internally and do not request additional advice from HPAC.

Reporting Proposal Success Rates

HPAC Finding

HPD reported recent R&A proposal success rates to the committee researchers seeking to participate in these programs.

HPAC Recommendation to HPD

To further improve the information content in the messaging, we recommend that HPD include information on the success rates with respect to highly-rated proposals. For example, the success rate for proposals that were evaluated as VG-E (Very Good - Excellent) and E (Excellent) will provide valuable information on how many proposals of the highest quality could not be funded.

HPD Response

HPD strives to continue to support the R&A community and provide transparency to the community.

Dual Anonymous Peer Review

HPAC Finding

HPAC applauded HPD on the Dual Anonymous Peer Review (DAPR) for many competed research opportunities, as well as the ongoing efforts to shed light on the assessment of DAPR impacts towards the intended objectives.

HPAC Recommendation to HPD

We recommend that HPD continue the assessment and tracking of the impact of DAPR implementation in order to attain statistically significant data allowing meaningful comparisons. Furthermore, we recommend that HPD expand appropriate metrics used for characterizing DAPR's effects on both the intended objectives (e.g., broadening support of first-time and early-career PIs), as well as potential unanticipated consequences, for example on the assessment of scientific return and achievement of project success.

HPD Response

Data describing the impact of DAPR is published annually by the DAAR's office in SMD. The data is collected by both the DAAR's office and the R&A Leads in their respective Divisions. See <https://science.nasa.gov/researchers/dual-anonymous-peer-review/> for more details.

IDEA Activities

HPAC Finding

HPAC commends HPD's IDEA activities, which have been presented to the committee in a very clear fashion, by a highly capable, enthusiastic and dynamic team.

HPAC Recommendation to HPD

We recommend that the IDEA team lead the development of metrics to assess the success and/or impact of their activities, within the limiting environment of the Paperwork Reduction Act, and present them to a future HPAC meeting.

HPD Response

NASA HPD continues to evaluate our IDEA efforts. HPAC will see many metrics and impact statements throughout our presentations.

Big Year

HPAC Finding

We find the Heliophysics Big Year (HBY) to be an exciting and potentially important theme for the Heliophysics community to build upon during solar maximum 25 and the total solar eclipse in 2024. We note that capitalizing on unexpected geostorms, new technologies, citizen science, and NASA's Heliophysics Mission Fleet (Heliophysics System Observatory), and the idea of creating workshops internal and external to NASA are good ideas.

HPAC Recommendation to HPD

We recommend to continue to review lessons learned from the International Geophysical Year (IGY) and International Heliophysical Year (IHY). We recommend that the newly designed HBY activities mentioned above leverage and build on activities already planned by heliophysicists and educators in 2024 (e.g., activities in solar eclipse and citizen science programs and DRIVE Centers). We recommend engaging the NSF in HBY activities given its investment in ground-based Heliophysics research and broadening impact activities. We recommend involving the outer heliosphere science community, particularly for large solar events around solar maximum which affect the heliosphere. We recommend exploring the coordination of relevant activities with industry affected by space weather (e.g. SpaceX, Google, AWS).

HPD Response

HPD thanks the HPAC for the recommendations and they will be evaluated by the HBY team. At this time, we will continue to work on this internally and do not request additional advice from HPAC.

HESTO

HPAC Finding

We commend the HPD on the forward-looking activities that have culminated in the establishment of HESTO and recognize its valuable role in cultivating innovations in sensing technologies for space flight hardware development that can contribute significantly to the advancement of HPD's observational capabilities.

HPAC Recommendation to HPD

We recommend that HESTO consider a broadened exploration of additional strategic technologies that can similarly benefit the scientific objectives of HPD. For example, both academic and commercial communities have embraced the disruptive power of new paradigms for data-enabled computational technologies that extract information from large amounts of unstructured data produced by physical sensors and systems, explore patterns, and make discoveries, robust predictions, and critical decisions using a variety of emerging methodologies including machine learning. Similar approaches to novel strategic technologies utilizing rich heliophysics data (e.g., HSO) have the potential to propel heliophysics scientific exploration and discovery. While we understand that the current scope of HESTO does not preclude such endeavors, a concerted effort toward identifying and highlighting inherently multi-disciplinary research themes in advancing such technologies would have transformative potential for heliophysics science. SWAG made a similar recommendation to SWORM (R.13.4).

HPD Response

HPD's HESTO office is primarily focused on technologies to support our future missions. We are concerned about the specificity of this recommendation in that it points to a specific technology. At this time, we will continue to work on this internally and do not request additional advice from HPAC.

Digital Resource Library

HPAC Finding

HPAC commends the Heliophysics Digital Resource Library in their effort to unify access to HSO data resources to streamline the process for users to find data and/or tools they require more easily, and to create an Open Science infrastructure.

HPAC Recommendation to HPD

We recommend that the Heliophysics Digital Resource Library continue their efforts to develop ways for users to search for desired data from specific missions, etc., beyond providing links to individual HSO websites, such as keywords, science topic areas, etc. We recommend the development of a resource that will allow the search of selected proposals and the resultant deliverables. A funded proposal query resource, in particular, will help early career researchers in identifying relevant opportunities. As an example, see <https://www.nsf.gov/awardsearch/>. We recommend that the Heliophysics Digital Resource Library website track the usage of data analysis tools with the goal of gauging how broad the community finds it useful. This may allow future improvements of the Library's access and ease of use for the heliophysics community. We recommend HPD engages with the space weather community and partner agencies to develop a plan to address space weather data accessibility across the numerous datasets these users regularly employ, and can include data from NASA, NSF, NOAA, DoD, USGS, commercial ground, commercial airborne, commercial spaceflight and civilian sources. This recommendation connects to the SWAG recommendation to SWORM, "Continue to identify and release novel and underutilized data sets that improve space weather products" (R.13.5) and "Improve access to space weather data" (R.13.2).

HPD Response

HDRL is continuing to work on improving and developing new and better ways to find relevant heliophysics data including exploration by mission or heliosphere region. We appreciate the recommendation and will explore options for Heliophysics Research and Analysis as well as solutions within SMD. As part of improving and developing ways for the community to interact with data, we will explore options to highlight popular or useful heliophysics tools. HPD is always looking to build stronger connections with the space weather community and look for opportunities to expand data usage and interoperability. Currently, HPD is working with NSF, NOAA, and DoD on the Interagency Heliophysics Data Working Group (IHDWG) to promote common data standards.



HPAC Findings, HPD Recommendations, & HPD Response: February 2024



GDC & Dynamic

HPAC Finding

The GDC mission was highly recommended in the last Decadal Survey and continues to be important to HPD. GDC continues to be on hold due to budgetary constraints laid out in the FY24 Presidential Budget Request. We find that the heliophysics community has concern that this mission will be unable to be implemented with the new Decadal Survey release imminent.

HPAC Recommendation to HPD

We recommend that HPD continues to communicate with the community about the status and future of GDC.

HPD Response

NASA concurs with this recommendation. The status of GDC is discussed at Agency presentations in NASA Town Halls, at science conferences, and with other committees. At this time, we will continue to work on this internally and do not request additional advice from HPAC.

HPD Budget

HPAC Finding

We are concerned about the level of funding resources for the Heliophysics Division both now and in the notional out years. Funding issues run the risk of compromising the division's ability to achieve its goals and risk disrupting the balance of the division's portfolio.

HPD Response

HPD works within the budgetary constraints to produce the most scientific impact to answer the bold scientific questions raised by the National Academies Heliophysics Decadal Survey and to address the NASA Science Strategy. As stewards of this budget, we are always working to get the most science from the funding that we receive. At this time, we will continue to work on this internally and do not request additional advice from HPAC.

HSO Infrastructure

HPAC Finding

We find that there is confusion in the community, resulting in concern, about the implications of the forthcoming changes to the HSO infrastructure mission model/concept.

HPAC Recommendation to HPD

We recommend that HPD respond proactively to the concerns of the community by clearly communicating information on several topics. These include: Details on how this model is being implemented and what changes are being considered, whether, by whom, and to what extent scientific analysis is allowed to be proposed and conducted using infrastructure mission funding. The resulting implications and possible pathways for funding of early career researchers, and whether/how there will be a transition period from the current model to the new paradigm for some missions. Appropriate venues for communication of this information should be considered.

HPD Response

HPD will be briefing the HSO infrastructure during the HPAC. NASA concurs with the need for strong communication with members of the community affected by changes within the portfolio. HPD is also planning a community town hall on the HSO in the coming months to roll this out to the community.

R&A Program

HPAC Finding

We commend HPD for continuing to make R&A a priority. We recognize that, while fewer people have been applying to the R&A in recent years, there was a large jump in applications in some R&A opportunities in 2023. The jump in applications had an impact on the fraction of successful applicants in some R&A opportunities, perhaps in part leading to selection rates as low as 14%.

HPAC Recommendation to HPD

We recommend that HPD continues its efforts to understand the main reasons behind the variation in the number of proposal submissions and award rates. This may include the possible effects of previous congressional funding plus-ups, expiration of extended COVID era projects, etc. We recommend that HPD present the results of the above investigation to HPAC.

HPD Response

NASA does not fully concur with this recommendation. NASA does examine proposal submission information to understand trends in its programs but does not intend to publicly present the results of any investigation at this time. At this time, we will continue to work on this internally and do not request additional advice from HPAC.

R&A Portfolio

HPAC Finding

We find that HPAC continues to lack sufficiently detailed information about the HPD R&A portfolio that would enable the committee to provide advice to HPD.

HPAC Recommendation to HPD

We recommend that HPD provide detailed information annually to HPAC about the R&A portfolio in 5 areas, listed in priority order:

- The overall R&A budget and its trend with time (in real year dollars and beyond, such as some representation of supported FTEs)
- The balance of the portfolio across different parts of the R&A program
- Whether there are inequities in funding rates for community members from differing demographic categories
- High-quality “proposal pressure” (i.e., fraction of non-selected, highly-rated proposals)
- Information about planned R&A funding allocation and distribution in future years. We recommend that the first three areas listed on the previous slide (overall budget, balance, demographics) be treated with the highest priority.
- While the fourth area requested by HPAC (high quality proposal pressure) is a lower priority, it is likely assessed easily.
- We recommend that “demographics” include (but not be limited to) assessment of early career scientist and minoritized group participation in the R&A program as an indication of the future health of the community.
- We recommend that “high-quality proposal pressure” include the funding rate for proposals ranked “Excellent”, “Excellent/Very Good”, and “Very Good”.

HPD Response

HPAC's scope of activities includes providing recommendations based on NASA requests for input for internal considerations regarding the heliophysics portfolio. At this time, we will continue to work on this internally and do not request additional advice from HPAC.

Space Weather

HPAC Finding

We find some members of the community have a perception that connecting the relevance of a research or mission proposal to space weather will be more competitive than proposals that do not connect to space weather. This has led to community concern that the overall HPD portfolio balance will tend towards topics related to the science behind space weather. This community perception is independent of HPD's actual plans or selection criteria

HPAC Recommendation to HPD

We recommend HPD provide clearer messaging to the community about whether or how space weather, or other "broad impact" statements, are applicable to the call and provide instructions to both proposers and evaluators.

HPD Response

HPD's communication to the community has been clear regarding space weather and whether it is connected to specific proposal selections. This communication has occurred both in public forums and also in the ROSES solicitations all of which communicate the scientific goals of the specific program. HPD calls upon the community to review proposals within our R&A program and we give guidance to follow the solicitation. HPD would benefit from specific examples of poor communication or confusing language in the ROSES program from the HPAC.

Space Weather Council

HPAC Finding

We find the Space Weather Council (SWC) members have effectively addressed the tasks assigned to them by HPAC. They have provided a thorough and informative report from their May 2023 meeting, and HPAC will pass along the SWC's report to HPD. We acknowledge the tremendous amount of work required to compile this report and commend the SWC members for their efforts.

HPAC Recommendation to HPD

For the next HPAC meeting, we recommend that HPD/Space Weather Program provide recommendations on topics for the SWC to discuss (in particular M2M program topics). HPAC emphasizes the SWC recommendation for an observational gap-filling analysis and recommends this be part of the agency's response plan to the upcoming Heliophysics Decadal Survey. HPAC provides SWC with the following tasks following their February 2024 meeting: Task 1 - Advisory Group Coordination: Continue to coordinate with other advisory committees and report on items of interest to HPD. Task 2 - Gap Analyses: Report on the results of the Space Weather TableTop exercise (TTX) to be held at APL in May 2024. Task 3 - M2M: Hold until further guidance is provided by HPD. Task 4 - Agency Coordination: Continue to report on domestic and international partnerships and opportunities to expand coordination. (NEW) Task 5 - R2O2R: Report on ways HPD can make the R2O2R program more accessible to proposers by gathering feedback from PIs.

HPD Response

Thank you for the acknowledgement of all the hard work of the Space Weather Council. HPD appreciates the coordination with the other space weather groups and they are actively working with these groups. HPD doesn't request further information on this topic. Topic 2: Space Weather Gap filling analysis- HPD isn't ready to commission this study at this time. We can return to HPAC when we are. Topic 3: We will continue to update the Moon 2 Mars program at Town Halls and other public forums. HPD does not request further information on this topic. Topic 4: R2O2R discussions are ongoing with other Agencies and end users. At this time, we will continue to work on this internally and do not request additional advice at this time.

HPD requests HPAC to summarize what NASA should consider with the recent discussion on revisions of Space Weather Scales and the impact on science research, modeling, and any observations or instrumentation going forward.

Space Weather Tabletop Exercise

HPAC Finding

We commend and strongly encourage NASA-NOAA collaborative efforts on space weather as well as keeping the Space Weather Council informed on their activities. We find the End-to-End Space Weather TableTop Exercise (TTX) planned for May 2024 is an impactful way for stakeholders to engage across the space weather enterprise and make progress towards the Implementation Plan released in December 2023.

HPAC Recommendation to HPD

We recommend HPD continue to support planning for this TTX activity and seek additional opportunities to engage across the Space Weather enterprise in scenario-planning activities. We recommend attention be paid to space weather drivers from above as well as from below, if not in this TTX, then certainly in follow-on TTX activities. We recommend that HPD/Space Weather Program incorporate the results of the TTX in their prioritization decisions for filling the identified modeling and observational gaps.

HPD Response

The first Space Weather Tabletop Exercise was successfully held on May 8 – 9, 2024. A brief, public document describing the exercise and outcomes is expected in summer 2024, and a more detailed write-up will be released later in 2024. HPD and the Space Weather Program plans to support the planning for and participation in future tabletop exercises, and we will continue to keep the community aware of that planning, exercise outcomes, and incorporation of lessons learned in NASA planning.

Community Feedback

HPAC Finding

We commend HPD's efforts to solicit feedback from the heliophysics community on issues related to R&A funding opportunities, etc., using virtual town halls with an anonymized input capability. We find that there may be a lack of participation in the virtual town halls, which could hinder HPD from hearing about issues, or common issues that many people deal with but not conveyed at the town hall meetings.

HPAC Recommendation to HPD

We recommend that HPD continues using virtual town halls to convey information to and hear issues from the heliophysics community. We recommend that HPD consider alternative ways to gather feedback from the community in addition to the town halls.

HPD Response

NASA concurs with having multiple avenues through which the heliophysics community can provide feedback. Currently, NASA can also hear from community members in public forums at the Heliophysics Advisory Committee and the Committee for Solar and Space Physics (both advertised, open meetings), at NASA appearances at community events (e.g., AGU Fall Meeting, CEDAR, SHINE, GEM), and via email to individual Program Scientists.

Science Nuggets

HPAC Finding

We commend HPD's efforts at communicating heliophysics science achievements and results to the general public via "Science Nuggets." We find that this an important way to engage the public and to promote heliophysics science and its societal impact.

HPAC Recommendation to HPD

We recommend that HPD continue to support science communication in this way. We also recommend that HPD continue to make the submission process simple, so that it does not become a barrier for the science community to submit entries.

HPD Response

HPD is in full agreement with this recommendation. To this end, HPD has established a new email inbox to collect "Science Nuggets" and science highlights from missions and programs: HQ-HelioHighlights@mail.nasa.gov. The intent is to share this email inbox widely at industry events, workshops, and meetings as a simple data call opportunity for HPD to solicit continuous science achievements from the Heliophysics community. This will in turn allow HPD to not only have awareness and insight of key scientific results but also be able to promote and amplify mission impacts more broadly.

HISFM Program

HPAC Finding

There are members of the community who are concerned about recently announced changes to the Heliophysics Internal Scientist Funding Model (HISFM) program, specifically including reports that significant decisions about which projects get funded as part of the Step 1 process will be made by a committee of administrators as opposed to a peer-review process. Responses from HPD during the HPAC meeting conflicted with these report

If there is a significant down select at the Step 1 stage that is carried out by a committee of administrators, it could be inconsistent with the IDEA efforts being undertaken by HPD.

HPAC Recommendation to HPD

If there is a significant down select at the Step 1 stage, we recommend reconsidering this approach in favor of one that is consistent with HPD's IDEA efforts. We recommend that HPAC be briefed at the next HPAC meeting about the changes to the HISFM program, with particular focus on the issue listed above.

HPD Response

NASA does not concur with this recommendation. The HISFM program has been undergoing changes to improve strategic returns to NASA's investments. At this time, we will continue to work on this internally and do not request additional advice at this time.

Legacy Datasets

HPAC Finding

We find that there are funding gaps for research opportunities using Heliophysics legacy datasets from completed NASA missions and historical observations. Currently, there are restrictions on which NASA programs can make use of these data. er efforts.

HPAC Recommendation to HPD

We recommend that HPD investigate broadening the opportunities for supporting new research projects using these legacy datasets, or inform HPAC of the rationale for not broadening the opportunities.

HPD Response

The HSR program supports proposals that make use of publicly available data sets whether they be in the SDAC, SPDF, or at no cost from an equivalent, publicly accessible archive. The program encourages data from current or historical NASA missions. Given the broad nature of this program it is not clear that there is a gap that needs to be addressed at this time.

EUROPA Clipper & JUICE

HPAC Finding

Europa Clipper and JUICE are upcoming missions to Jupiter and some of its moons including Europa sponsored by NASA and ESA. Clipper and JUICE will be traveling through the solar wind (plasma and interplanetary magnetic fields) together for over 5 years and will be within Jupiter's magnetic field and in the solar wind. We find this to be an excellent opportunity to leverage these missions to advance understanding of small- and large-scale physics relevant to HPD goals.

HPAC Recommendation to HPD

We recommend HPD continue discussions regarding potential scientific collaborations between these two missions and Heliophysics missions. We recommend that HPD work with PSD to encourage the JUICE and Europa Clipper teams in continuing to investigate the feasibility for high-value science cases during the cruise phase.

HPD Response

At this time, we will continue to work on this internally and do not request additional advice from HPAC.

HPD Broad Portfolio

HPAC Finding

We find that we could benefit from improved clarity on how HPD determines, prioritizes, and balances the broader HPD portfolio. Understanding the rationale and guiding principles behind these decisions, as well as the motivation and linkage to HPD overarching objectives, are necessary for us to provide useful recommendations and guidance to HPD.

HPAC Recommendation to HPD

We recommend that HPD provide clarification to us on:

- How the overall budget distribution (e.g., the sandchart figure) is determined (e.g., set by the President's budget, negotiated, etc).
- How the recommendations from the Decadal Survey are digested and implemented in alignment with HPD objectives.

HPD Response

HPD uses the Decadal Survey to guide our budgetary and strategic decisions. Specifically the decision rule recommendations given on page 131 of the 2013 Decadal Survey have served as our guiding rules for things going forward.

Inclusion Plans

HPAC Finding

We find inclusion plans have great potential to improve the intentionality of inclusion objectives within Heliophysics teams. We find there is disparity in institutional resources that potential proposers can leverage to support the development of these plans. This could negatively impact potential proposers from institutions with fewer inclusion resources.

HPAC Recommendation to HPD

We recommend providing additional training to potential proposers on inclusion best practices and approaches to developing inclusion plans in order to mitigate concerns that institutions and proposers do not have equal access to inclusion resources. HPD's efforts would benefit from this training going beyond the list of best practices available on the website and in town halls.

HPD Response

At this time, we will continue to work on this internally and do not request additional advice from HPAC.

IDEA Implementation

HPAC Finding

We find that there may be conflicts in guidance/requirements placed on PIs on federal grants/proposals with respect to IDEA implementation and restraints placed on them for the same from some ideologically opposing state laws/guidelines. A similar situation existed in the past, during the COVID masking/vaccination era, and could exist again for other topics.

HPAC Recommendation to HPD

We recommend that HPD consult NASA counsel and provide guidance to grantholders that find themselves in such conflicting situations between federal and state laws/guidance.

HPD Response

NASA does not provide legal counsel to grantees. Each grantee is responsible for ensuring that their proposal and work to-be-executed complies with all applicable state and federal laws and regulations.

NASA's Office of General Council only provides legal advice to NASA. It is the grantees responsibility to speak with their organization's Sponsored Research Office or their institution's Counsel office if they feel the NASA inclusion Plan requirement is in conflict with their local state laws.

Get Involved & Stay Informed!

Stay in touch and help us find new ways to highlight your work and keep you in the loop!

Submit science highlights to us here:
HQ-HelioHighlights@mail.nasa.gov

 NASA.gov/sunearth

 facebook.com/NASASunScience

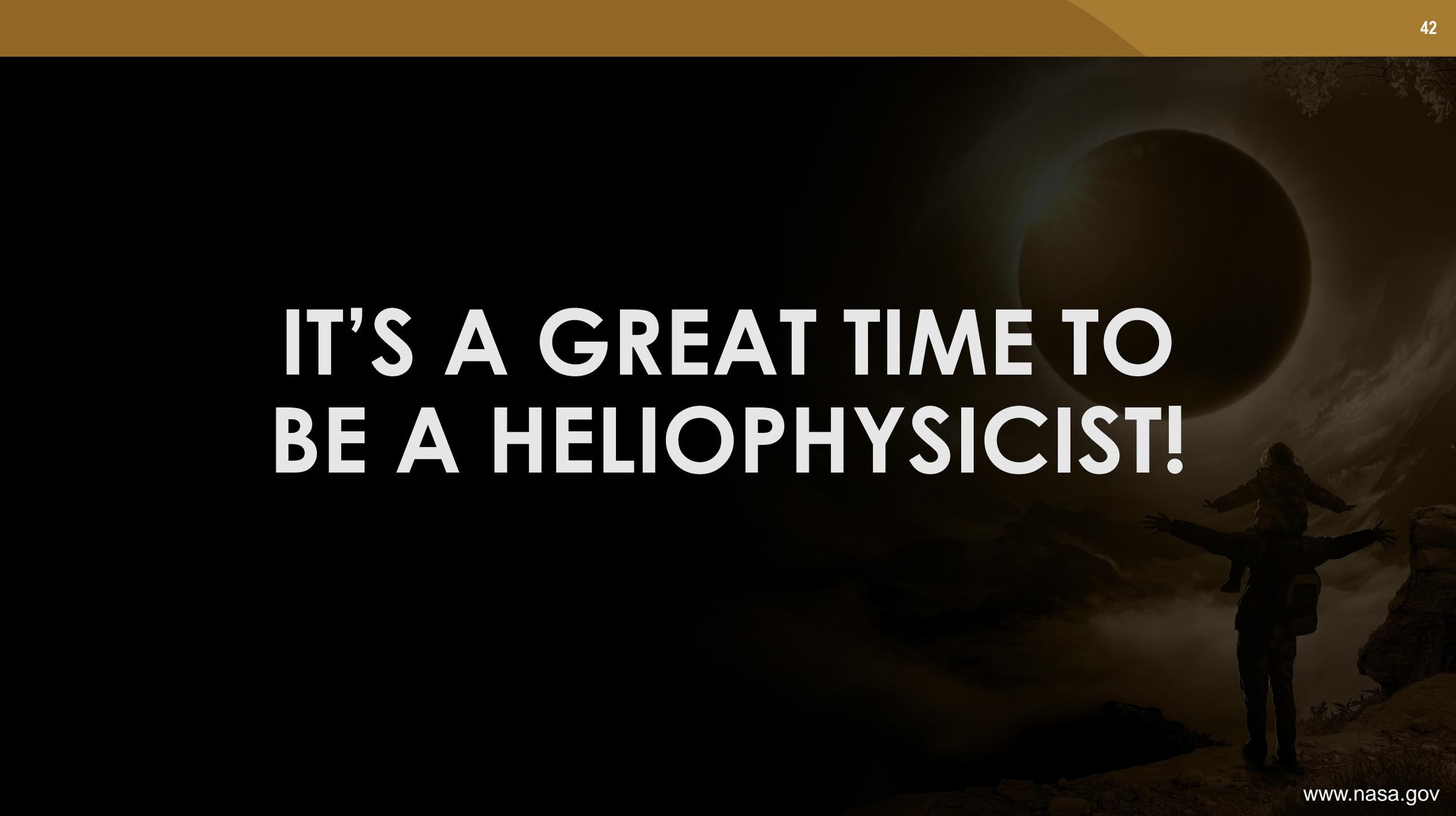
 blogs.nasa.gov/sunspot

 [@NASASun](https://twitter.com/NASASun)

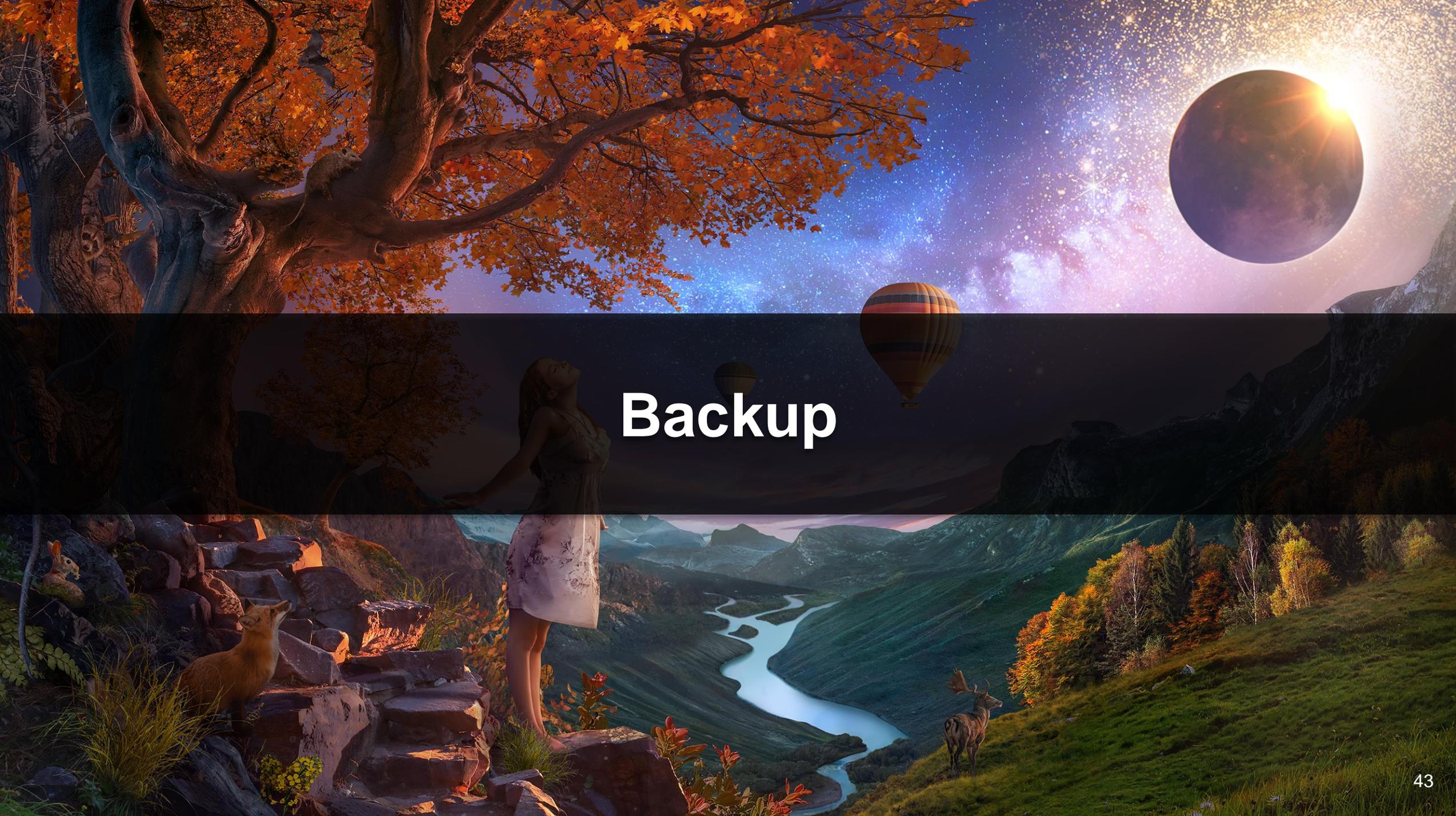
Tune Into Our Town Hall @ 12 PM ET for More Updates on the Following:

- State of the Union
 - Staffing Updates
 - Awards Recognition
 - Budget Updates
 - Recap
- Heliophysics Recent Events
- Heliophysics System Observatory (HSO)
- GDC & DYNAMIC
- Question & Answer Session

Join via the [HPAC Agenda](#) or [Town Hall WebEx Link](#)

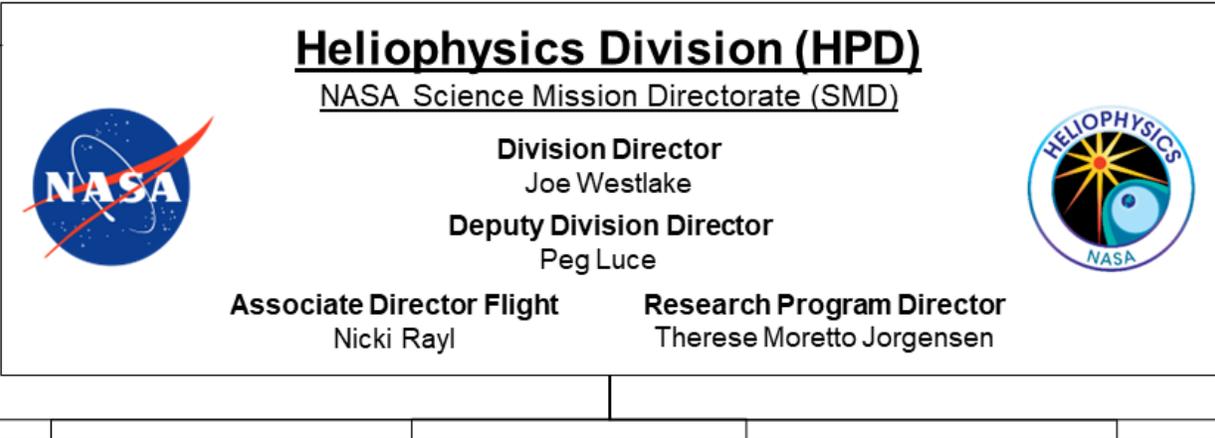
A silhouette of a person carrying a child on their shoulders, standing on a rocky outcrop with arms outstretched, looking at a large planet in a dark sky. The scene is set against a dark, atmospheric background with a large, glowing planet or moon in the upper right. The overall mood is contemplative and awe-inspiring.

**IT'S A GREAT TIME TO
BE A HELIOPHYSICIST!**



Backup

15 May 2024



Communications & Outreach

Erin Mahoney¹ – Lead
 Carolina Ravinskas¹ – Strategic Communications Lead
 Sarah Frazier - Comms Manager (GSFC)
 Leslie Garrison¹ – Outreach Coordination Lead

Division Operations

Kennedy Novak (XO)¹
 Amy Marshall (EA)¹
 Jess Calles (Flight EA/XO)¹
 Wynette Hoskins (Research EA)¹

Mission Services Integration
 Paulette Woods

GETTING UPDATED VERSION

Tara Roberts¹ - Lead
 Julia Kaner¹
 Roger Sanchez¹

IT: Heliophysics Advanced Library (HAL)/SharePoint Online (SPO)

Aadel Ragaban¹ - Lead
 James Bruniany¹
 Mazin Rasmi¹
 Vyjayanthi Sunkara¹

Jamie Favors
 Heather Futrell
 Skyler Kleinschmidt²
 Aly Mendoza-Hill
 Asal Naseri
 Ursula Rick
 Ezinne Uzo-Okoro⁴
 Brad Williams
 Alan Zide

Reiner Friedel
 Lika Guhathakurta
 Roshanak Hakimzadeh
 Patrick Koehn
 Kelly Korreck
 Janet Kozyra
 Jared Leisner
 Elizabeth MacDonald²
 Matt McClure
 John McCormack
 Dan Moses
 Simon Plunkett
 Arik Posner
 Ennio Sanchez
 Esayas Shume³
 Katya Verner¹
 Amy Winebarger²
 Lisa Winter²

Space Weather
 Jamie Favors - Director
 Ursula Rick - Program Executive
 Walter Twetten¹

Technology
 Dan Moses - Chief Technologist
 Roshanak Hakimzadeh - Deputy

Domain Leads
 Susanna Finn - Outer Heliosphere
 Reiner Friedel - Magnetosphere
 Lika Guhathakurta - Inner Heliosphere
 John McCormack - Ionosphere, Thermosphere, Mesosphere

Division (RMD)
 David Darbouze
 Carol Peterson
 Dan Walsh

Rideshare Office
 Aly Mendoza-Hill
 David Cheney
 Alan Zide
 Katie Nelson¹

Sounding Rockets & Range
 Jamie Favors
 Dan Moses

SMD Interfaces

International & Interagency Interface
 Gib Kirkham - SMD Lead
 Betsy Goldemen - HPD Lead

Office of Legislative & Intergovernmental Affairs Interface
 Andy Rowe - HPD Lead

Policy
 Nathan Boll²
 Kayla Rillo

Presidential Innovation Fellow
 Ha-Hoa Hamano

Key

1: Contractor
 2: Detailee
 3: IPA
 4: Detailed Out

New/Incoming
 Outgoing



NASA Heliophysics Overview

Heliophysics Objectives

- Solve the **fundamental physics** mysteries of heliophysics: Explore and examine the physical processes in the space weather environment from the Sun to the Earth and throughout the solar system including the interface with the interstellar medium
- Build the **knowledge to forecast space weather** throughout the heliosphere: Develop the knowledge and capability to detect and predict extreme conditions in space to protect life and society and to safeguard human and robotic explorers beyond Earth
- Understand the **nature of our home in space**: Advance our understanding of the connections that link the sun, the Earth, planetary space environments, and the outer reaches of our solar system

Major Activities

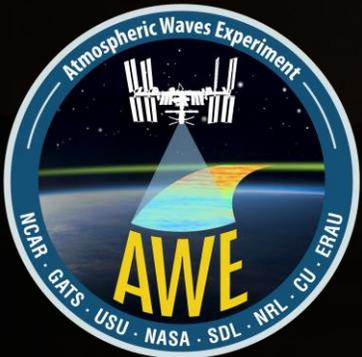
- Address broad heliophysics priorities and advance US leadership through a robust **R&A program** and continued implementation of competed (PI-led) missions, as recommended by 2013 Decadal Survey
- Prepare to respond to the recommendations from the **2024 Solar and Space Physics Decadal Survey**
- Support **National and Agency priorities** and Interagency partnerships through investments in Space Weather, Orbital Debris and Space Situational Awareness (OD/SSA), and Artemis (HERMES)
- Engage the public through “**Heliophysics Big Year**” which leverages three major Heliophysics events in 2023-2025 (two solar eclipses, solar maximum, and Parker’s closest approach to the Sun)

Heliophysics Mission Highlights

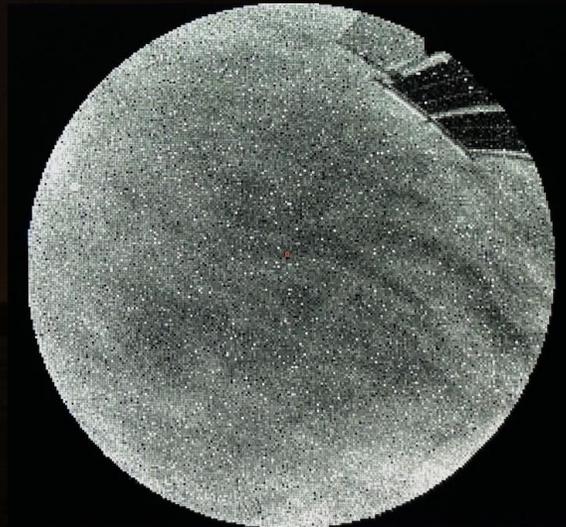
A person carrying a child on their shoulders, standing on a rocky outcrop and looking out over a vast, hazy landscape under a large, dark, circular celestial body in the sky.

Atmospheric Waves Experiment (AWE)

- AWE is the first NASA mission dedicated to characterizing global properties of atmospheric gravity waves (GWs) at the edge of space.
- AWE is the first Helio mission to fly on the International Space Station.
- AWE is the first HPD mission to launch during the Helio Big Year.



Installation on ISS



First light from one of four telescopes

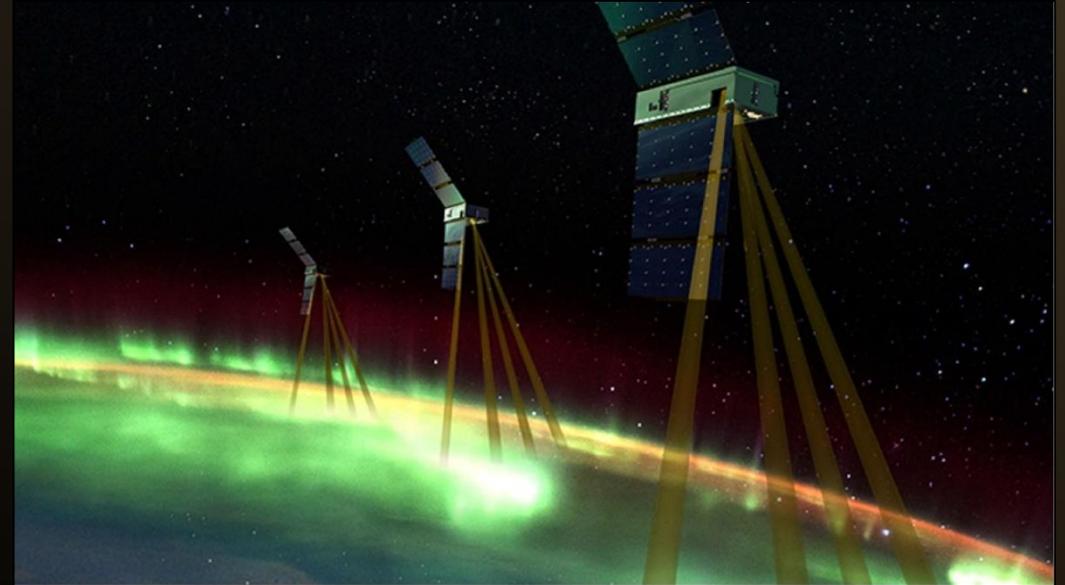
AWE launch 10 November 2022

Electrojet Zeeman Imaging Explorer (EZIE)

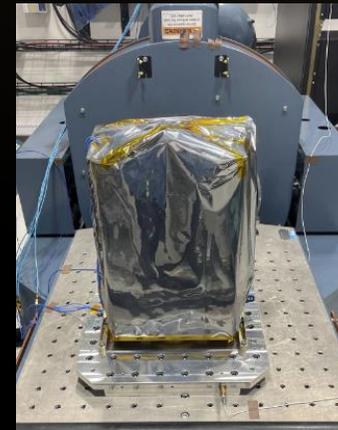
- Three 6U CubeSats will study the auroral electrojets flowing at 100-130 km above the poles, linking Earth's magnetosphere and ionosphere to solar activity and space weather.
- EZIE will employ a Zeeman splitting of 118 GHz O₂ emissions to answer decades-long debate on how the auroral electrojet behaves during geomagnetic storms.
- Launch no earlier than October 2024.

Recent Updates

- EZIE is in Phase D (assembly, integration, and testing)
- EZIE-Mag Education & Outreach Program is developing hands-on magnetometer kits for middle & high school students
- More EZIE info at <https://science.nasa.gov/missions/ezie>



Credit: APL/NASA



Credit: Blue Canyon Technologies

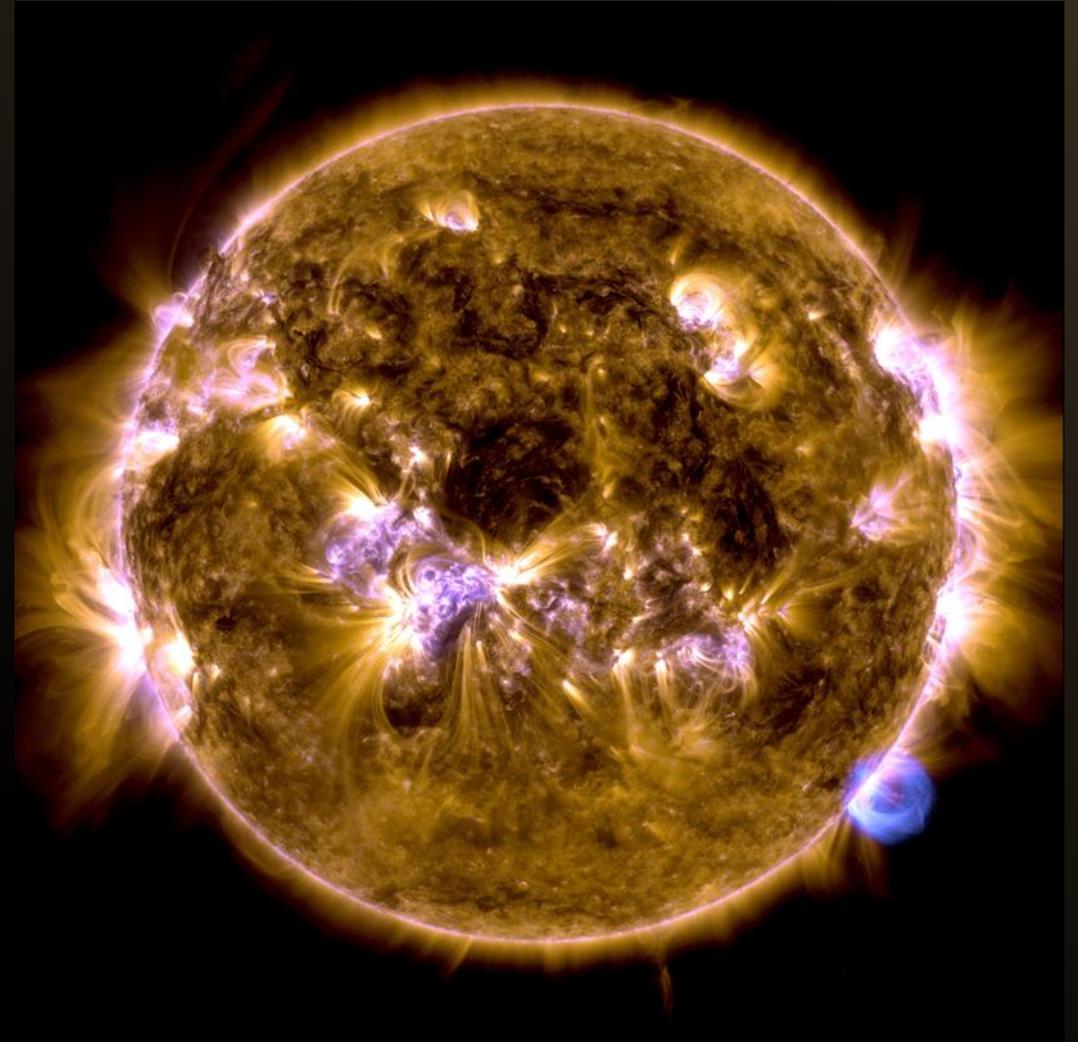


Microwave Electrojet Magnetogram Instrument (MEM) Credit: Jet Propulsion Laboratory

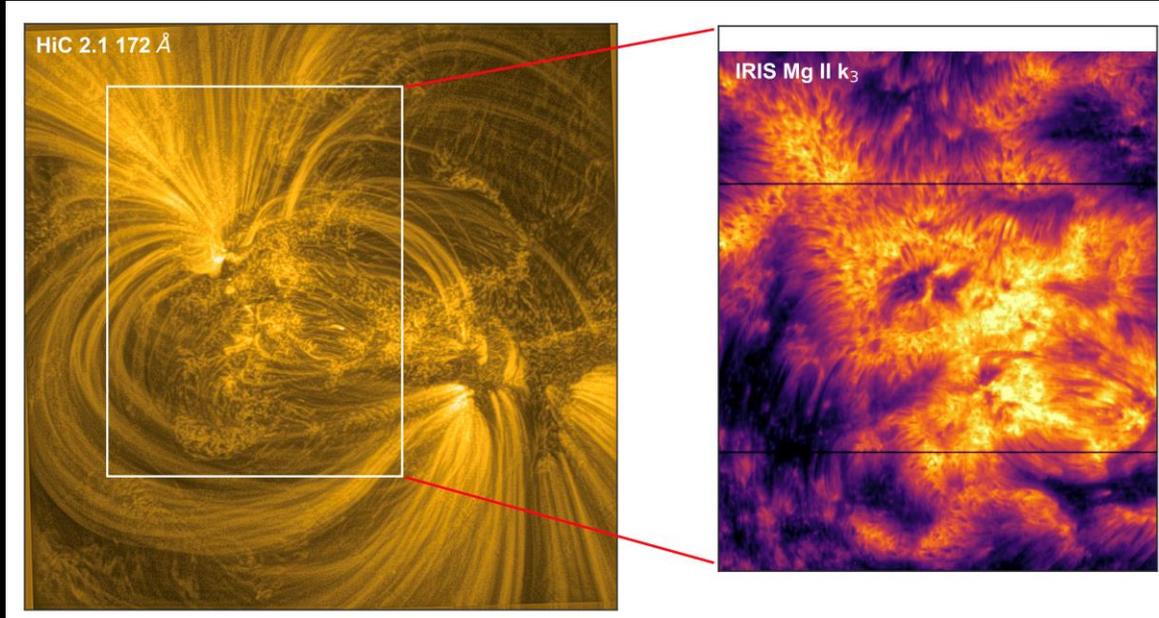
Science Storytelling

- Share your science!
- We want to advocate for compelling “science nuggets” from the Heliophysics community
- Pull science results and captivating images from reports that can be easily shared

HQ-HelioHighlights@mail.nasa.gov



Science Nugget: Solar Moss



Read the Paper:
<https://www.nature.com/articles/s41550-024-02241-8>

IRIS and HI-C take a closer look at super heating mechanisms within sunspots

Scientists have named a small-scale, bright, patchy structure made of plasma in the solar atmosphere “moss.” The moss blossoms around the center of a sunspot group, where magnetic conditions are strong. Observations from IRIS and HI-C combined with complex 3D simulations have now revealed that electrical currents may contribute to heating the moss. Throughout this region there is a mess of magnetic field lines, like invisible spaghetti. This tangle of magnetic spaghetti creates electrical currents that can help heat material to a wide range of temperatures from 10,000 to 1 million degrees Fahrenheit.

Heliophysics Programmatic Updates



Research & Analysis Update

RECENT ROSES-23 SELECTIONS

HSR 2023 (notified 10.20.23)	HGIO 2023 (notified 1.08.24)	HFOS 2023 (notified 1.25.24)	HTIDES 2023 (notified 1.25.24)	LWS 2023 (notified 5.01.24)
<ul style="list-style-type: none"> • 161 proposals received • 24 selected • 14% selection rate 	<ul style="list-style-type: none"> • 82 proposals received • 19 selected • 23% selection rate 	<ul style="list-style-type: none"> • 6 proposals received • 1 selected • 17% selection rate 	<ul style="list-style-type: none"> • 26 proposals received • 6 selected • 23% selection rate 	<ul style="list-style-type: none"> • 62 proposals received • 16 selected • 26% selection rate

ROSES-2023 solicitation provided the greatest scope ever offered for NASA Heliophysics

- New Technology Program and Space Weather Program
- Growing number of Cross-Divisional programs

Intend to maintain robust R&A program through solicitation of 25 ROSES-24 elements

Heliophysics Strategic Technology Office (HESTO)



The Heliophysics Division created the Heliophysics Strategic Technology Office (HESTO) to help manage the Heliophysics technology program, which works closely with the Sounding Rocket Program and Balloon program.

Recent Accomplishments:

- Launched the Heliophysics Technology website (www.hesto.smce.nasa.gov)
- Released the first annual Heliophysics Technology report

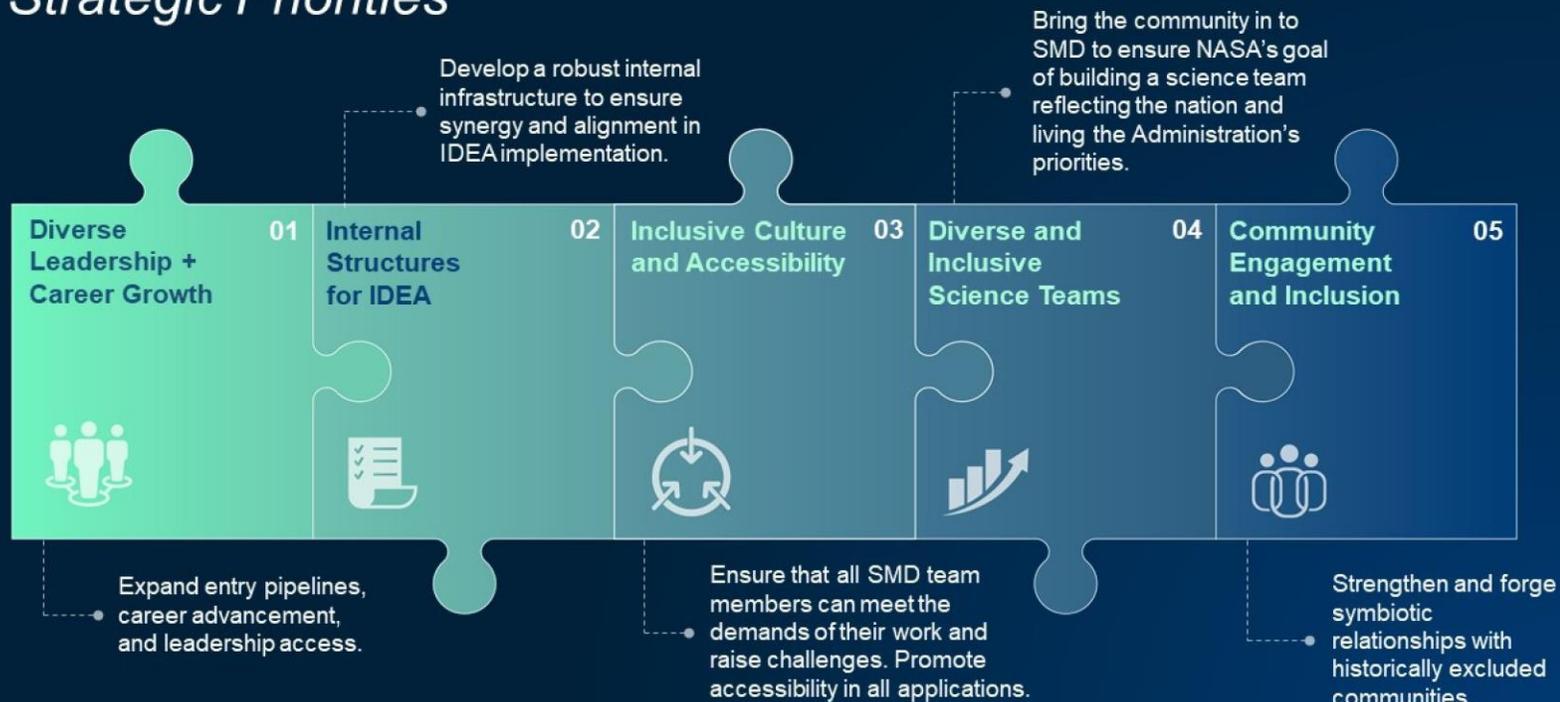
Looking Ahead:

- The 2024 Heliophysics Technology Symposium will be held on September 18-19, 2024 at the Wallops Flight Facility

IDEA: Inclusion, Diversity, Equity, & Accessibility

SMD aims to create an environment where each team member is valued for their diversity of thought, unique background and whole selves.

SMD Inclusion, Diversity, Equity, Accessibility (IDEA) Strategic Priorities



Activity Highlights to Date:

- Launch of SMD Bridge Program to develop sustainable partnerships among institutions historically under-resourced
- PI Launchpad to support first-time proposers, the annual PI Launchpad workshop provides resources and insight into the proposal process.
- Adoption of dual-anonymous peer review for ROSES proposals to ensure that the review of proposals is performed in an equitable and fair manner.

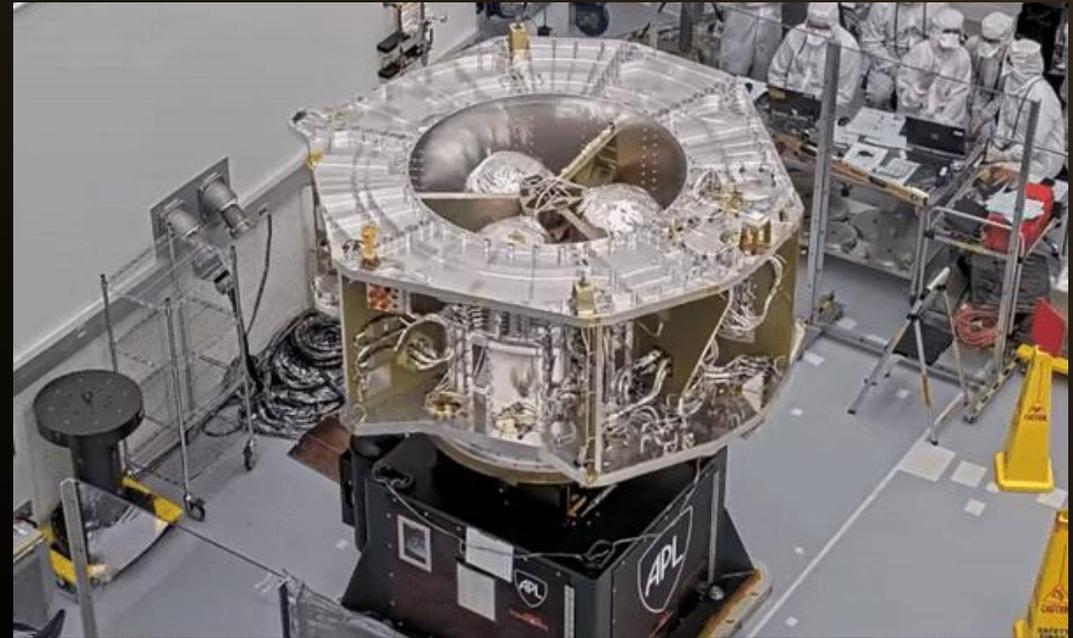
Heliophysics Budget Update



Heliophysics Budget Priorities

Innovate/Partner/Inspire

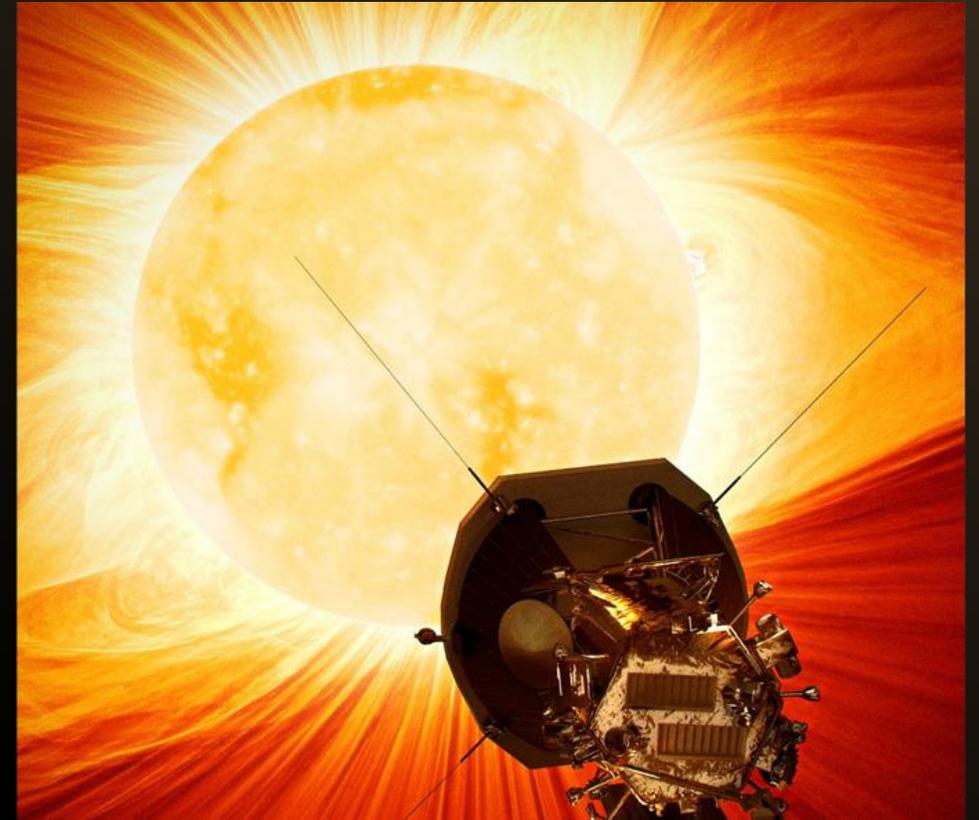
- Maintain a **balanced mission portfolio** - ensuring the success of missions currently in development, stewarding the operating Heliophysics System Observatory, and enabling future missions to the extent possible
- Nurture a vibrant and inclusive **R&A** program
- Support **partnerships** with international space agencies
- Support **National priorities** in Space Weather, Orbital Debris and Space Situational Awareness



CAPTION: IMAP spacecraft integration.

Heliophysics Budget Highlights

- Advances **ESCAPADE, EZIE, SunRISE, TRACERS, PUNCH, Carruthers, and IMAP** toward launch in 2024-2025
- Supports a healthy cadence of PI-led Explorer missions
 - **MUSE** and **HelioSwarm** confirmations in 2024 and 2025
 - Final **SMEX** selections planned for 2025
 - Future Explorer solicitations in FY25 (MIDEX) and FY28 (SMEX)
- Provides NASA contributions to **partnerships**:
 - **Space Weather** program includes **HERMES** instrument for Gateway and contribution to **ESA Vigil** mission
 - Explorers **EUVST** instrument for **JAXA Solar-C** mission
 - **CODEX** being developed through NASA-KASI partnership for launch to ISS
- Proposes cancellation of **GDC** rather than a 3 year pause in recognition of outyear budget constraints



...traveling disturbances in the solar wind — an invisible field to bend back on itself — an ... help scientists uncover more ... from the Sun.

Heliophysics Budget Highlights

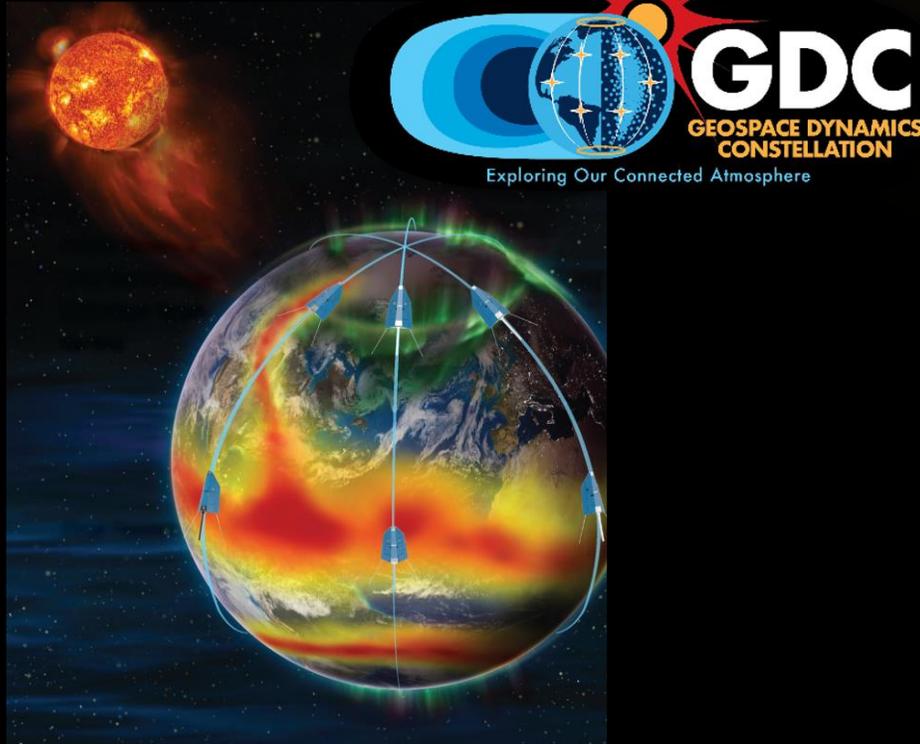
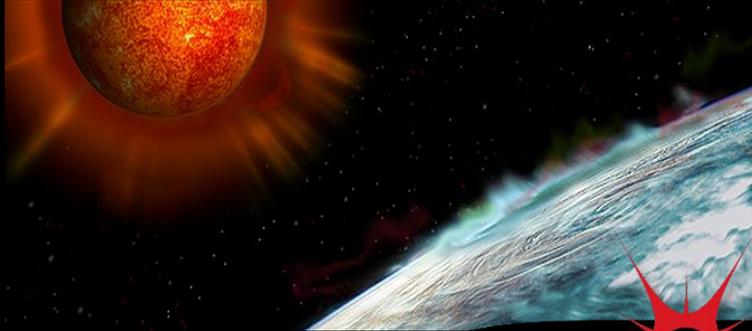
- **Supports** Space Weather Centers of Excellence and quad-agency efforts in R2O2R to advance space weather research and applications within the **Space Weather** program
- Provides agency capabilities in **Research Range** and **Sounding Rockets** in support of innovative small payloads
- Invests in advancement of Heliophysics technologies
- Supports demonstration of technologies for characterizing **orbital debris**
- Supports continued scientific discovery through the Heliophysics DRIVE Science Centers
- Increases funding for **CubeSats** and open science initiatives within R&A



CAPTION: A sounding rocket soars skyward at Launch Complex 36 at White Sands Missile Range in New Mexico on Oct. 14 to capture data on the annular solar eclipse.

Photo Credit: U.S. Army by Judy Hawkins/Released

Geospace Dynamics Constellation (GDC) and Dynamical Neutral Atmosphere-Ionosphere Coupling (DYNAMIC)



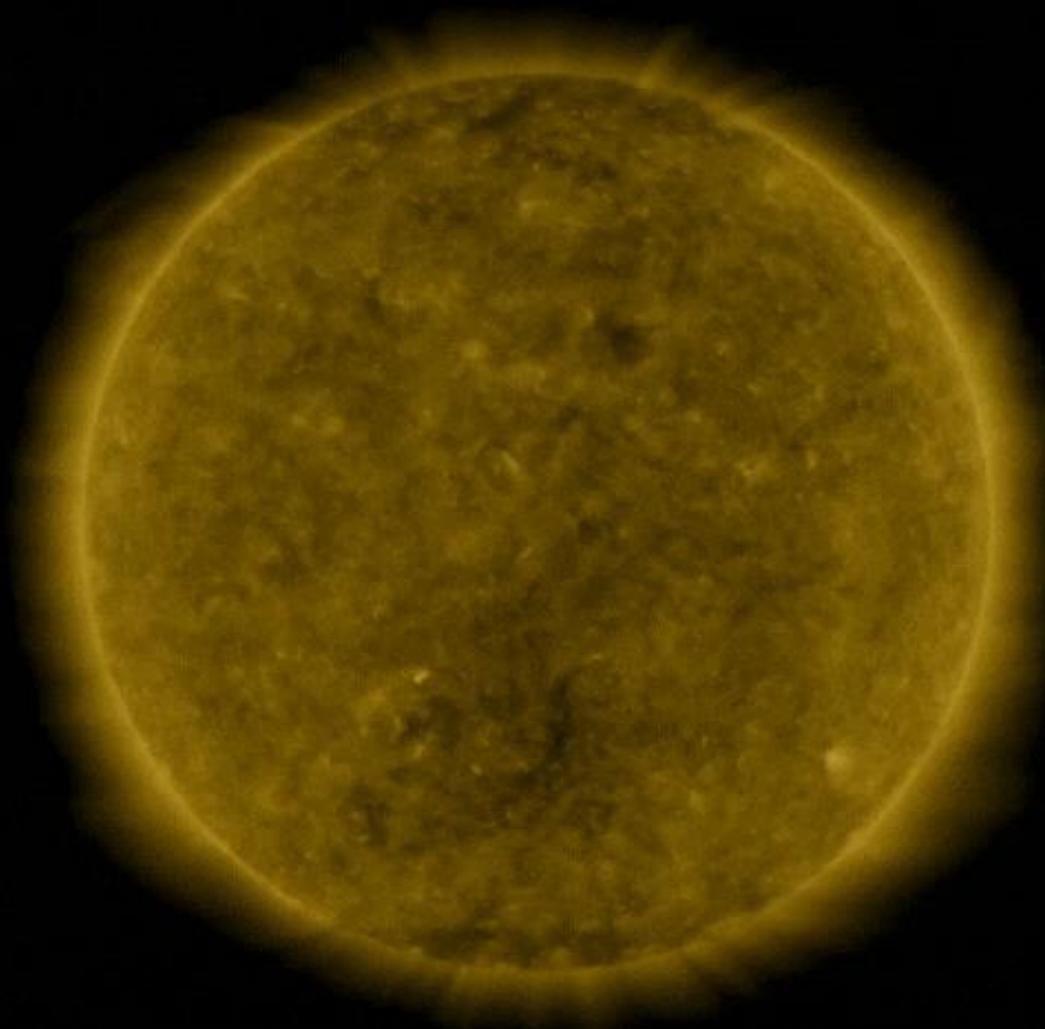
GDC and DYNAMIC provide a whole-system study of upper atmospheric dynamics by combining their scientific and technical capabilities

- In science...
 - GDC: Understand the upper atmosphere's internal processes and dynamics, and response to energy inputs from Earth's space environment (*energy from above*)
 - DYNAMIC: Understand the effect of lower atmosphere variability on the processes and dynamics of the upper atmosphere (*energy from below*)
- In architecture...
 - GDC: Provides in situ measurements above 300 km
 - DYNAMIC: Provides remote sensing of vertical profiles below 300 km altitude, leverages GDC measurements

DYNAMIC AO

- AO released May 2023
- Selections in June 2024

SOLAR MINIMUM



SOLAR MAXIMUM

