

Citizen Science Strategy

NASA Science Mission Directorate (SMD) formalized the addition of Citizen Science to the Divisions' research portfolios with [SMD Policy Document 33 \(SPD-33\), *Citizen Science*](#). This document gives the Heliophysics Division's (HPD) high-level strategy for its Citizen Science program to guide the solicitation, support, and ingestion of Citizen Science-produced data and results.

Citizen Science is an emerging area of scientific endeavor recognized by the National Academy of Sciences as a path towards future scientific discovery and for public outreach. By supporting the development and distribution of software and technological tools, science organizations can engage with groups and individuals to increase data sets available for research and for the analyses conducted.

Vision

Leverage public participation in Heliophysics to help drive innovation and diversity in science, society, and education

Mission

Build a robust, dynamic, and engaging Heliophysics citizen science portfolio that fuses natural phenomena, mission opportunities, and the power of people's diverse viewpoints to fuel collective innovation

Goals

NASA plays a vital role in Citizen Science (CS) activities by providing significant space-based observations that can be leveraged by lay scientists and complemented by the latter's own acquired observations and data. With the growing integration of technology into everyday life and the proximity of observable space environment structures and phenomena. NASA is ideally positioned to support Citizen Science contributions through the pursuit of the following goals and objectives:

1. **Grow:** Broaden the reach and scope of Heliophysics and the vitality of the field through citizen science opportunities
 - 1.1 Regularly solicit public and science community input about needs and desires for citizen science (*RFI, NAS Decadal, workshops, committees*)
 - 1.2 Build the capacity and motivation of the community to participate in citizen science (*Seed funding, CS training workshops, internal/external peer discussion*)
 - 1.3 Foster engagement and networking with other communities and science disciplines to cultivate previously unexplored science opportunities (*workshops to introduce NASA scientists to amateur groups, via cross-divisional/Science Activation, etc.*)

NASA Heliophysics Division
Informational Brief

- 2. Execute:** Create and regularly update a robust citizen science portfolio
 - 2.1 Structure opportunities to propose citizen science research within Heliophysics and cross-divisional programs (*ROSES/AO solicitations, seed funding, missions, existing and new targeted proposal opportunities*)
 - 2.2 Balance large versus small projects; also strategic versus open calls
 - 2.3 Regularly revisit strategy and approach; 5-10 year roadmap (*next 5 years outside Decadal*)

- 3. Innovate:** Discover new *aspects* of Heliophysics utilizing the citizen science framework including those that impact life, society, and the process of doing science
 - 3.1 Design opportunities for innovative citizen science participation, e.g. by maximizing impact and engagement by targeting natural events and new methods (*i.e., solar eclipse, solar max, newly launched missions, prizes and challenges*)
 - 3.2 Track program impacts and innovation ranging from scientific to those that connect Heliophysics to societal benefits, STEM engagement, diversity, higher education & science activation (*develop new metrics and codify processes, particularly those that democratize and disrupt*)

- 4. Communicate:** Communicate internally & externally to foster support for & engagement with citizen science
 - 4.1 Internal communications to structure CS as a theme that cuts across all HPD programs (*Educate HPD about citizen science value, impact, quality and about protocols, policies, processes they are being asked to support, work with HPD Communications Group*)
 - 4.2 External communications (*Educate broader Heliophysics community about value, impact, quality of CS as an approach; share demonstrations of high-quality, high-impact CS results; change management, work with HPD Communications Group, track new advances in the field and host on website*)
 - 4.3 Build Heliophysics “citizen science” brand

- 5. Optimize:** Optimize best practices, methodologies, data integrity, and technology infrastructures
 - 5.1 Establish rigorous standards, protocols, and best practices including quality control, data validation, project design and documented project science goals and objectives (*Community working group*)
 - 5.2 Be responsive to emerging technologies and practices that open up new opportunities

- 6. Partner:** Foster mutually beneficial engagement with partners & stakeholders
 - 6.1 Seek diversity, non-traditional/new stakeholders, and diverse viewpoints within industry, academia, museums, and others
 - 6.2 Ties to other Strategic Working Groups (e.g. Technology, Space Weather, Data Management) and NASA efforts (e.g. on innovation, Data Science, and Digital

NASA Heliophysics Division
Informational Brief

Transformation) (*e.g. Ensure access to data archives for citizen scientist stakeholders*)

6.3 Pursue interagency opportunities (*NSF, NOAA, USGS*)

Appendix A

Citizen Science Planning Information

Strategic implementation planning information, which describes the expected activities that will have been completed or will be underway by CY2024. This information will not address collaborative or advisory interactions (e.g. inter-agency coordination, National Academies reports) unless those could potentially result in the initiation of new projects.

All information is notional and do not reflect any project (including procurement) commitments unless otherwise stated.

Objective 2.1: Structure opportunities to propose citizen science research within Heliophysics and cross-divisional programs

- Action: Incorporate explicit Citizen Science support into most-appropriate Heliophysics ROSES solicitations.
 - Activity: Add Citizen Science discussion to ROSES-2021, Appendix B.1, *Heliophysics Research Program Overview*.
 - Activity: Encourage Citizen Science efforts as part of ROSES-2021, Appendix B.17, *Interdisciplinary Science for Eclipse 2021*.
- Action: Create a Citizen Science-specific Heliophysics ROSES solicitation.

Objective 3.1: Design opportunities for innovative citizen science participation, e.g. by maximizing impact and engagement by targeting natural events and new methods.

- Action: Support Citizen Science activities in 2023-2025 centering around major events like the solar eclipses (October 2023, April 2024) and solar maximum (est. 2024-2026).

Appendix B
Citizen Science Strategy Table

For communication purposes, this Appendix includes the strategy table used in internal Citizen Science documents. This table may be used in external documents provided proper attribution is made.

NASA Heliophysics Division
Informational Brief

Citizen Science Strategy by Goal			
Theme	Goal	Objective	
1. Grow	Broaden the reach and scope of Heliophysics and the vitality of the field through citizen science opportunities	1.1	Regularly solicit public and science community input about needs and desires for citizen science (<i>RFI, NAS Decadal, workshops, committees</i>)
		1.2	Build the capacity and motivation of the community to participate in citizen science (<i>Seed funding, CS training workshops, internal/external peer discussion</i>)
		1.3	Foster engagement and networking with other communities and science disciplines to cultivate previously unexplored science opportunities (<i>workshops to introduce NASA scientists to amateur groups, via cross-divisional/Science Activation, etc.</i>)
2. Execute	Create and regularly update a robust citizen science portfolio	2.1	Structure opportunities to propose citizen science research within Heliophysics and cross-divisional programs (<i>ROSES/AO solicitations, seed funding, missions, existing "check box" and new targeted proposal opportunities</i>)
		2.2	Balance large versus small projects; also strategic versus open calls
		2.3	Regularly revisit strategy and approach; 5-10 year roadmap (<i>next 5 years outside Decadal</i>)
3. Innovate	Discover new aspects of Heliophysics utilizing the citizen science framework including those that impact life, society, and the process of doing science	3.1	Design opportunities for innovative citizen science participation, e.g. by maximizing impact and engagement by targeting natural events and new methods (<i>i.e., solar eclipse, solar max, newly launched missions, prizes and challenges</i>)
		3.2	Track program impacts and innovation ranging from scientific to those that connect Heliophysics to societal benefits, STEM engagement, diversity, higher education & science activation (<i>develop new metrics and codify processes, particularly those that democratize and disrupt</i>)
4. Communicate	Communicate internally & externally to foster support for & engagement with citizen science	4.1	Internal communications to structure CS as a theme that cuts across all HPD programs (<i>Educate HPD about citizen science value, impact, quality and about protocols, policies, processes they are being asked to support, Work with HPD Communications Group</i>)
		4.2	External communications (<i>Educate broader Helio community about value, impact, quality of CS as an approach; share demonstrations of high-quality, high-impact CS results; change management, Work with HPD Communications Group, Track new advances in the field and host on website</i>)
		4.3	Build Heliophysics "citizen science" brand
5. Optimize	Optimize best practices, methodologies, data integrity, and technology infrastructures	5.1	Establish rigorous standards, protocols, and best practices including quality control, data validation, project design and documented project science goals and objectives (<i>Community working group</i>)
		5.2	Be responsive to emerging technologies and practices that open up new new opportunities
6. Partner	Foster mutually beneficial engagement with partners & stakeholders	6.1	Seek diversity, non-traditional/new stakeholders, and diverse viewpoints within industry, academia, museums and others
		6.2	Ties to other Strategic Working Groups (e.g. Technology, Space Weather, Data Management) and NASA efforts (e.g. on innovation, Data Science, and Digital Transformation) (<i>e.g. Ensure access to data archives for citizen scientist stakeholders</i>)
		6.3	Pursue interagency opportunities (<i>NSF, NOAA, USGS</i>)