



EXPLORE SOLAR SYSTEM & BEYOND NASA Heliophysics Space Weather Program

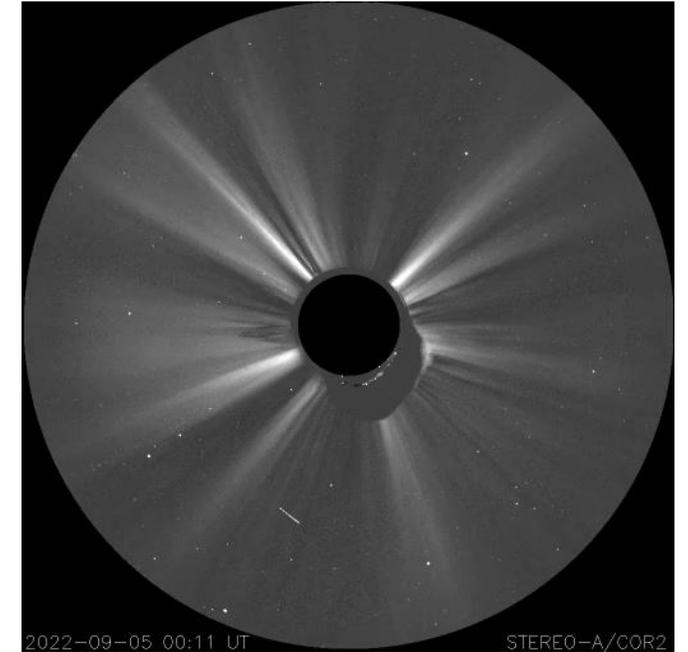
Dr. James Spann

Space Weather Lead, Heliophysics Division, NASA HQ

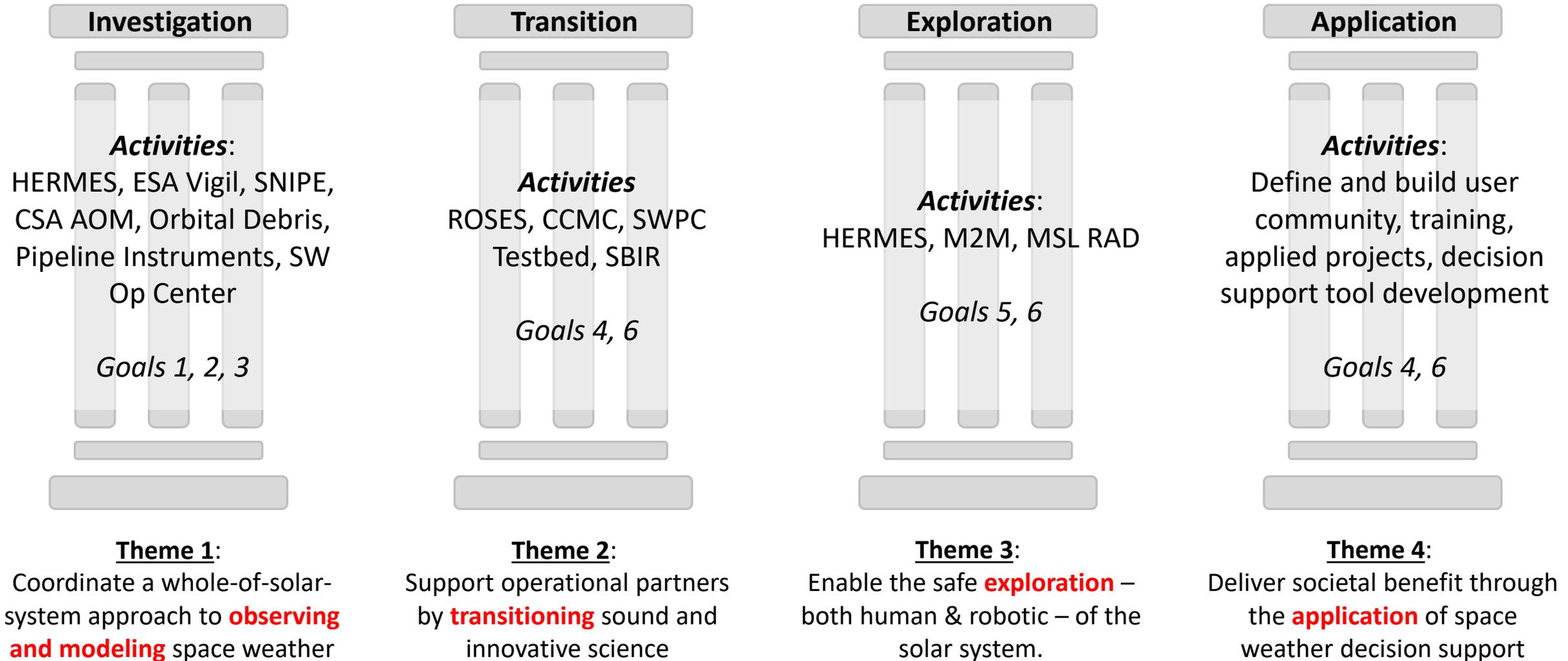
NASA Space Weather Program (NSWx)

Space Weather Program Vision: Advance the science of space weather to empower a technological society safely thriving on Earth and expanding into space.

- NASA plays a vital role in space weather research by providing unique, significant, and exploratory observations and data streams for theory, modeling, and data analysis research, and for operations.
- NASA's Heliophysics Division is uniquely poised to support needs of the National and International space weather enterprise and the Agency's Artemis.
- Various executive (NSW SAP) and legislative (PROSWIFT Act) mandates direct NASA to address research and application aspects of space weather which allows NASA to do what NASA does best – push the envelope by pursuing forward-leaning developmental activities.
- Making use of NASA's unique capabilities and directly addressing the legislative mandate, HPD has established the new NASA Space Weather Program, a national resource to unify space weather research and drive our understanding of its risks, impacts and mechanisms into new realms.



Space Weather Program Pillars



Space Weather Program Activities

Flight Missions

HERMES & Gateway

- The NASA space weather instrument suite, led by HPD, will observe solar particles and the solar wind. A second scientific payload is a radiation instrument package, built by the European Space Agency.
- Serves as a pathfinder mission for future missions to establish an earth-independent space weather capability for long duration missions beyond the earth-moon system
 - NASA Suite: HERMES (Heliophysics Environmental and Radiation Measurement Experiment Suite)
 - ESA Suite: ERSA (ESA Radiation Sensors Array)
 - ESA/JAXA Suite: IDA (Internal Dosimeter Array)

GDC

- Near Real time space weather data

IMAP

- I-ALiRT

Artemis Program

- Ongoing conversations with potential international partnerships

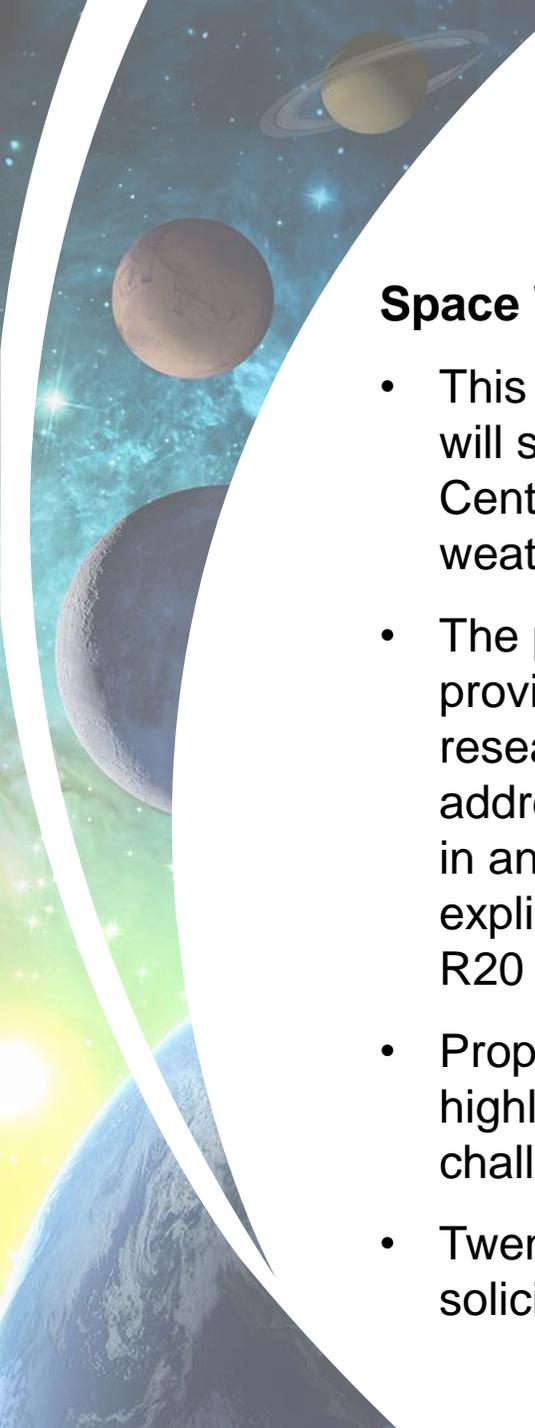
International Collaborations

- Vigil: ESA
- AOM: CSA
- SPORT: NASA/AEB
- SNIPE: KASI
- Aditya: ISRO

Space Weather Research to Operations / Operations to Research (R2O2R)

- ROSES-22 focused topics:
 - High-Latitude Radiation Exposure
 - Downstream Updating of Solar Wind & CME Forecasts
- R2O2R Framework and Quad-Interagency Agreement

NOAA/Interagency Partnerships



Space Weather Program Activities Cont.

Space Weather Centers of Excellence

- This is a new element in ROSES-22. There will structural similarities to DRIVE Science Centers, but this is not "DRIVE for space weather".
- The purpose of these Centers will be to provide significant long-term investment in research and infrastructure development to address major challenges in space weather in an integrated multidisciplinary fashion, explicitly and fundamentally incorporating R20 and O2R.
- Proposed Center efforts will need to be highly ambitious and should address critical challenges in space weather.
- Twenty proposals received in inaugural solicitation

Small Business Innovation and Research (SBIR)

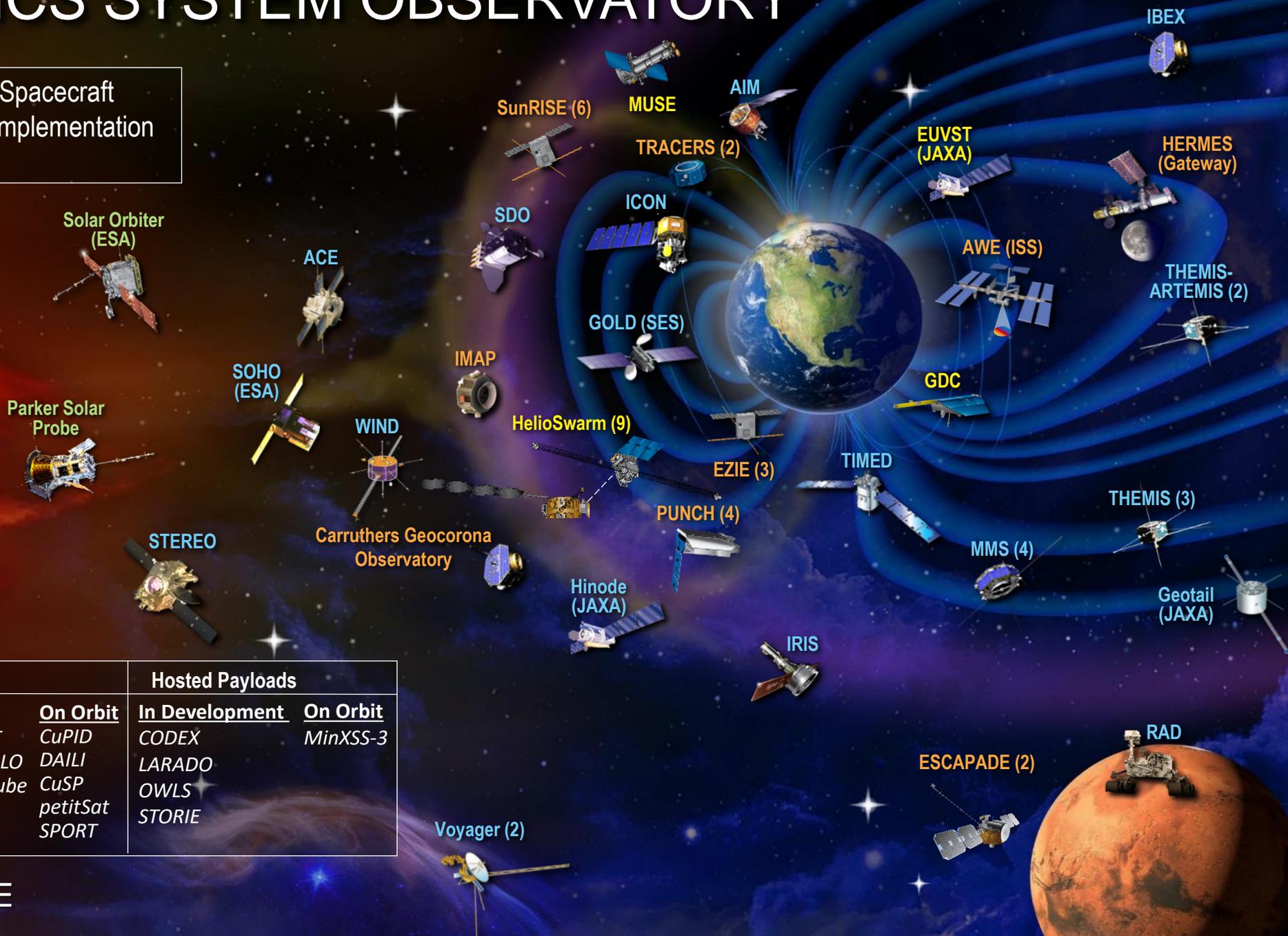
- NASA's SBIR program seeks to transform scientific discovery into products and services through innovations that have the potential for infusion into NASA programs and missions, the potential for commercialization into NASA relevant commercial markets, and that have a societal benefit.
 - Phase II Selections: (1) Parallelization Toolkit for NASA CCMC (2325), (2) Advanced Climatology Innovations for Space Radiation Environments (3081).

Heliophysics System Observatory

- Effectively leverage current and forthcoming HPD Observatory assets to address Space Weather goals

HELIOPHYSICS SYSTEM OBSERVATORY

- 20 Operating Missions with 27 Spacecraft
- 13 Missions in Formulation or Implementation
- 1 Under Study



- FORMULATION
- IMPLEMENTATION
- PRIMARY OPS
- EXTENDED OPS

CubeSats				Hosted Payloads		
In Development				On Orbit	In Development	On Orbit
AEPEX	GTOSat	CubIXSS	SunCET	CuPID	CODEX	MinXSS-3
AERO / VISTA	ICOVEX	REAL	DYNAGLO	DAILI	LARADO	
CIRBE	LAICE	PADRE	WindCube	CuSP	OWLS	
CURIE	LLITED			petitSat	STORIE	
Dione				SPORT		

OPERATING & FUTURE