National Aeronautics and Space Administration

Space Weather Centers of Excellence and Open R2O2R

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CCMC Workshop
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Space Weather Centers of Excellence

Space Weather Research and Technology Applications (SPARTA) Center of Excellence

- PI: Keith Groves, Boston College

Space Weather Operational Readiness Development (SWORD) Center

- PI: Thomas Berger, University of Colorado, Boulder

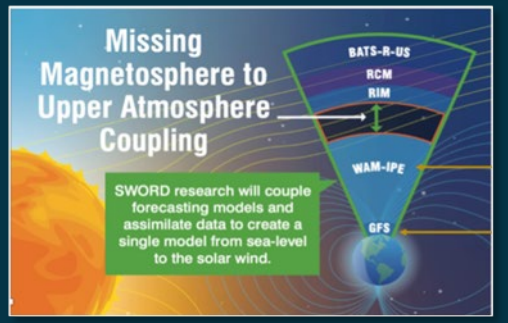
CLEAR: Center for All-Clear SEP Forecast

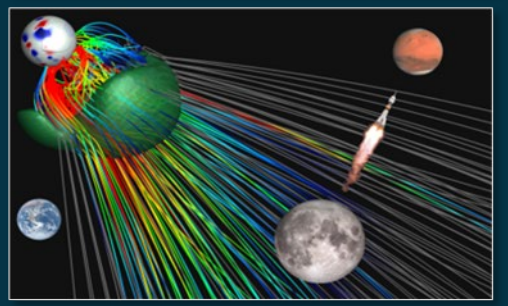
- PI: Lulu Zhao, University of Michigan, Ann Arbor

Joint Selection w/ Department of Commerce

Advanced Forecasting of Drag for Enhanced, Sustainable, and Conscientious Space Operations

- PI: Piyush Mehta, West Virginia University, Morgantown





Purpose of the Centers

The purpose of the Centers is 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 R2O and O2R

- Efforts are highly ambitious and address critical challenges in space weather
- Supports research that cannot be effectively done by individual investigators or small teams
- Requires synergistic, coordinated efforts of a center

Organizations Involved

Boston College
Univ of Colorado Boulder
Univ of Michigan
UCAR
Univ of Iowa
Univ of Alaska, Fairbanks
Catholic University of America
CalTech
University of Alabama Huntsville
University of Arizona
MIT Haystack
Utah State University
Boston University
Cornell University
NASA
NOAA
AFRL
FAA
APL/JHU
NorthWest Research Associates
The Aerospace Corp
GeoOptics, Inc
Flyer Research LLC
Global Aerospace Corp
Muon Space Inc
LeoLabs
Lockheed Martin
SpaceX
Space Science Institute
Spire Global
University of Birmingham
University of New Brunswick
Space Science and Engineering LLC
UK Met Office
SANSA
National Institute of Information and Communications Technology (Japan)
INGV (Italy)
Deutsches Zentrum Fuer Lefut-Ind Raumfahrt E.V. (Germany)

Over 100 people involved across the Centers

NASA & Advisory Team

NASA SW Centers of Excellence Program Official: Genene Fisher

NASA SMEs: John McCormack–SWORD, Simon Plunkett–CLEAR, Esayas Shume–SPARTA

NASA Communications: Sarah Frazier and Desiree Apodaca

Transition & Technology Readiness Advisors (TTR)

SPARTA:

- TTR: Jonah Colman, AFRL
- SWPC: Tzu-Wei Fang, Tim Fuller-Rowell
- CCMC: Min-Yang Chou/Jia Yue

SWORD:

- TTR: Howard Singer/Astrid Maute
- CCMC: Masha Kuznetsova

CLEAR:

- TTR: Katie Whitman, NASA/SRAG
- SWPC: Eric Adamson, Hazel Bain
- CCMC: Leila Mays

Heliophysics Division (HPD) Science Data Management Policy

This policy is a supplement to SMD Policy Document (SPD)-41a: Scientific Information Policy for the Science Mission Directorate

Overarching principles essential to achieving the goals of HPD programs are:

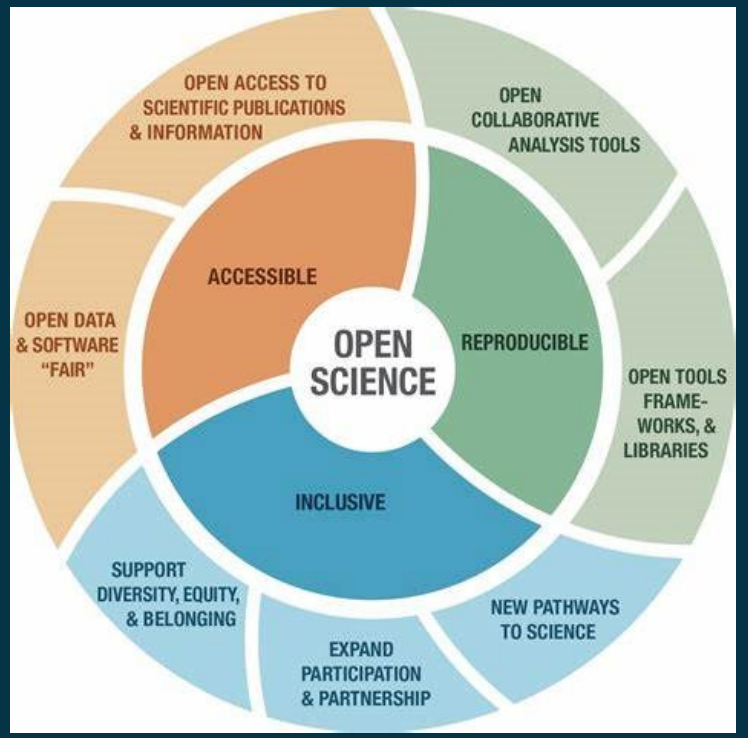
1. Implementing NASA's open data policy of making high-quality, high spatial and temporal resolution data publicly available as soon as practical
2. Adhering to the goal of early and continuing scientific data usability, which requires uniform descriptions of high-quality data products, adequate documentation, sustainable and open data formats, easy electronic access, appropriate analysis tools, and care in data preservation

Serves to articulate the governing principles and standards of the Heliophysics Digital Resource Library (HDRL) https://hdrl.gsfc.nasa.gov/

Heliophysics Data Policies - 1

1. HDRL shall commit to the full and open sharing of heliophysics data obtained from NASA HPD-sponsored programs with all users as soon as data become available.

2. HDRL and any HPD-funded missions and R&A activities will plan and follow data acquisition policies that ensure the collection and usability of long-term data sets needed to satisfy the research requirements of HPD.



Heliophysics Data Policies - 2

3. HDRL will collect a variety of metrics intended to measure or assess the efficacy of its data systems and services and assess user satisfaction. HPD will make those data available for review.

4. HDRL will enforce a principle of non-discriminatory data access so that all users will be treated equitably.

5. All NASA HPD missions, projects, and grants and cooperative agreements shall document their implementation of these data management policies.

- Research projects shall generate an Open Science and Data Management Plan (OSDMP)

Centers - Data Management Plan

- Data Management plan describes how Centers will store, access, share and archive data, with emphasis on data sharing across collaborative teams
- Features such as how each team member will gain access to data in real-time
- How data will be archived and validated
- How new members will be integrated into plan in ways that enhance collaboration and synergy

HPD-SWxC Cooperative Interactions – Open Science

Permanent archive for the Center datasets, software, publications

Repository of recommendations and lessons learned contributed by the Center, other Centers, NASA, and team science researchers

Transition

Legacy output from the Centers

NASA-Centers Statement of Collaboration

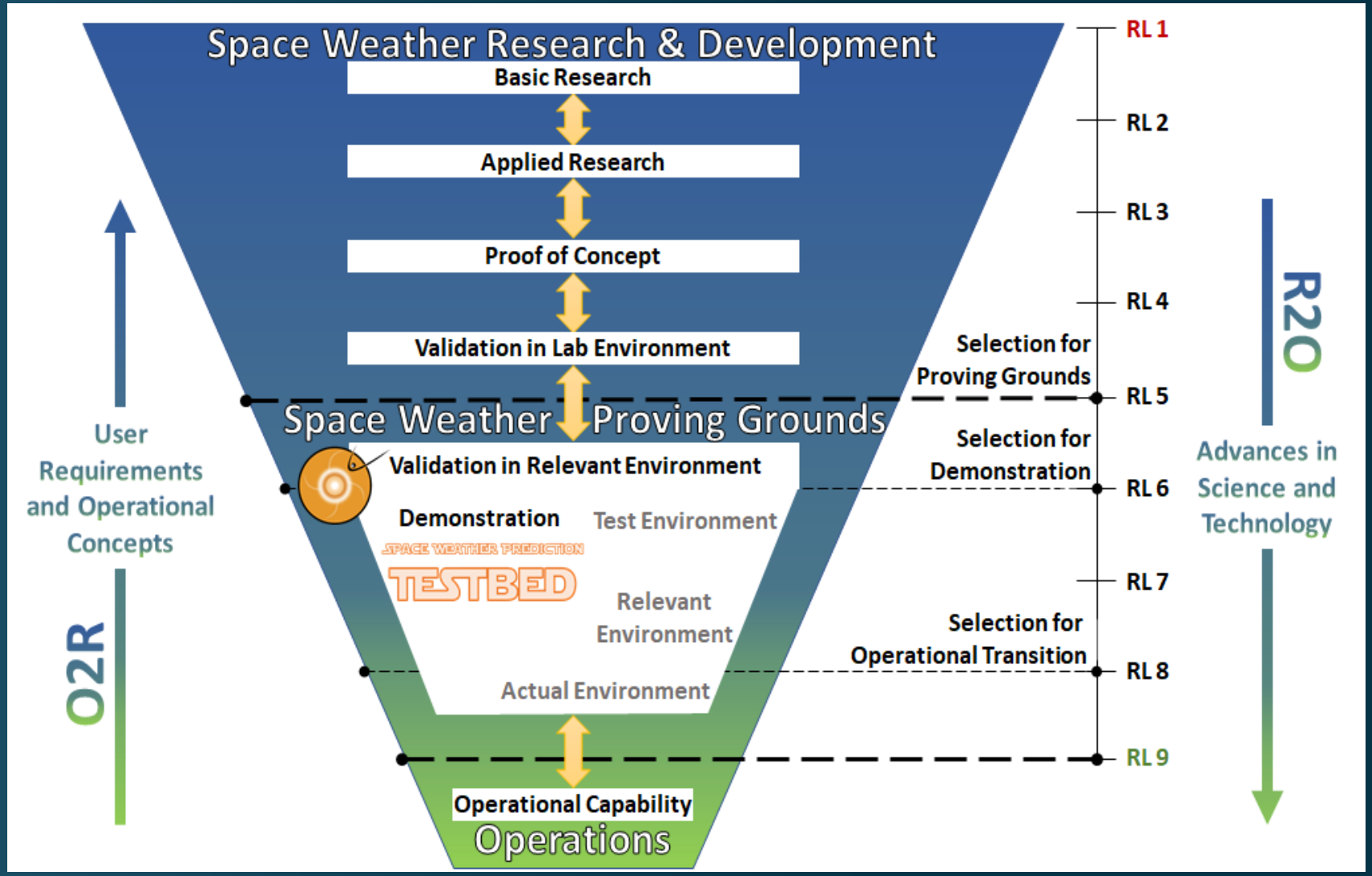
Cooperative Interaction	SW Centers	NASA
Permanent Archive	Work with NASA to create a living archive of legacy data, publications, software, models, and model output from Center to be completed by year 5.	Work with Centers to permanently archive data, publications, software, models, and model output to be completed by year 5.
Recommendations and Lessons-learned Repository	Contribute information about lessons-learned and recommendations periodically from the perspective of the Center with the aim of creating a comprehensive repository by year 5.	Contribute information from the Agency perspective. Combine with information from Centers and team science researchers to create a valuable comprehensive repository of recommendations and lessons-learned by year 5.

NASA-Centers Statement of Collaboration

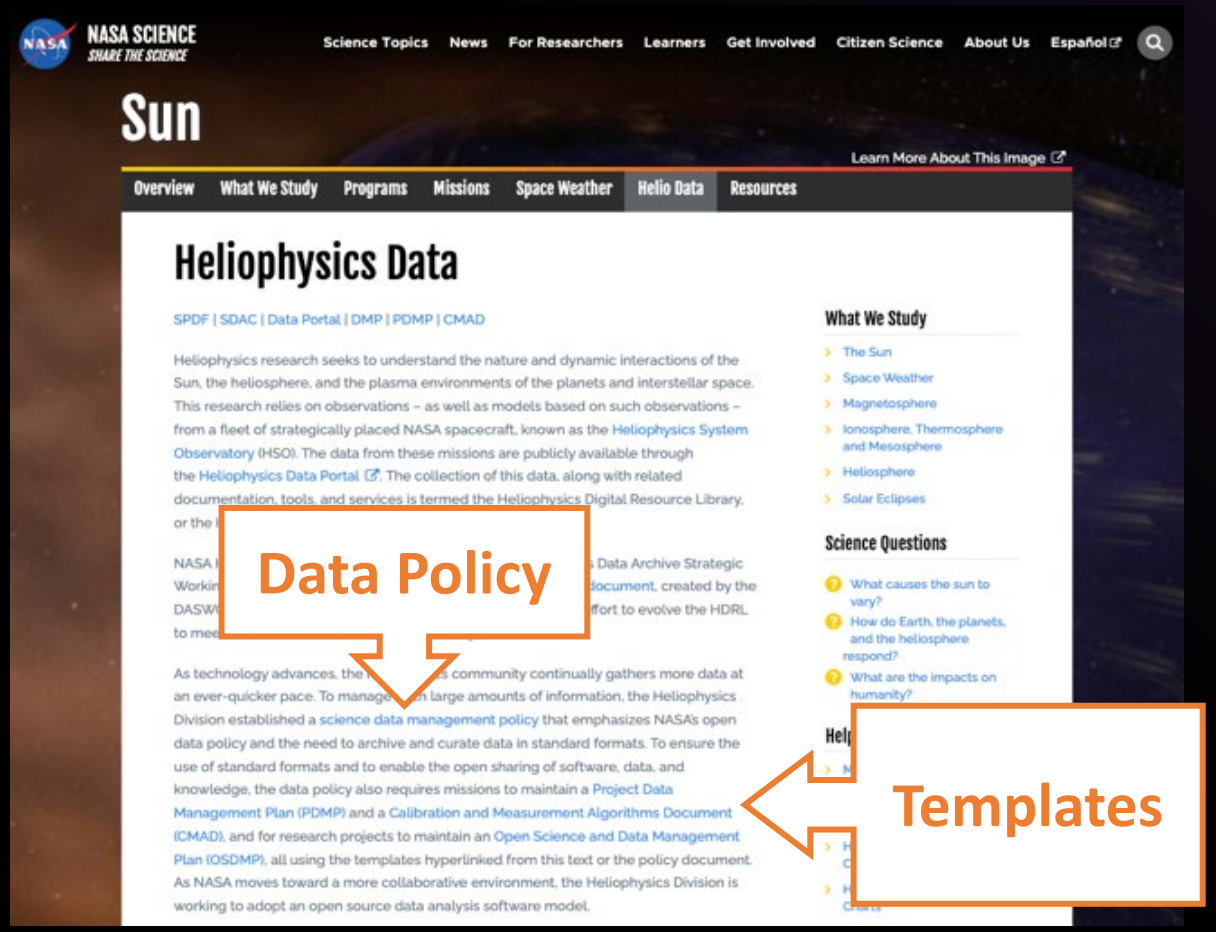
Cooperative Interaction	SW Centers	NASA
Transition	Make the Center space weather capabilities available to the NASA CCMC, and as appropriate to the operational entities NASA/SRAG, NOAA/SWPC, DoD/DAF.	Coordinate the transition of the Center capabilities between Center and CCMC, and as appropriate, the operational entities NASA/SRAG, NOAA/SWPC, DoD/DAF.
Legacy Output	Specific to each Center in statement.	Maintain links and information on legacy outputs from Centers on its program-level website for open science and accessibility purposes and to create a resource highlighting new knowledge and unanswered questions moving forward.

Open R2O2R includes:

- Data
- Models
- Publications
- Reports



Where to find resources, templates, & documents



Heliophysics Data Webpage

- Templates for key documents such as:
  - Open Science Data Management Plan (OSDMP)
  - Project Data Management Plans (PDMP)
- Links to policies
  - Heliophysics Data Policy (further definitions and clarifications)
  - SPD-41a
- Shortcuts to Heliophysics Digital Resource Library (HDRL) repositories
  - Space Physics Data Facility (SPDF)
  - Solar Data Analysis Center (SDAC)

https://science.nasa.gov/heliophysics/data

QUESTIONS

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