

NATIONAL  
ACADEMIES

Sciences  
Engineering  
Medicine



# The National Academies Space Weather Roundtable

Geoff Crowley, Ph.D. (Co-Chair)

Sarah Gibson, Ph.D. (Co-Chair)

Art Charo, Ph.D. Space Studies Board



# Roundtable in Relation to Other Space Weather Committees

**Space Weather Advisory Group (SWAG):** Also created by PROSWIFT, formally advises SWORM.

**Space Weather Council (SWC):** Advises NASA's Heliophysics Advisory Committee.

**Unlike SWAG and SWC, Roundtable is not FACA and does not make recommendations.** Allows for frank, deep dive discussions of orphan issues.

**Overlapping membership.** Frequent communication between leadership of SWAG, SWC, and Roundtable

## US Space Weather Committees and their Members

SWAG (15 members)				Roundtable (18 members)				
Craig Fugate (FEMA, ret)	Tammy Dickinson (Sci. Matt.) <i>CHAIR</i>			Mark MacAlester (CISA)	Leonard Strachan, Jr (NRL)	Michael Starks (AFRL)	Omar Nava (USAF)	Lou Uccellini (UMD)
Michael Stills (FAA, ret)	Tomas Gombosi (U. Mich.)	Delores Knipp (CU)		Shasha Zou (U. Mich.)	Anthea Coster (MIT)	Granger Morgan (CMU)	Hazel Bain (CIRES)	Lou Lanzerotti (NJIT)
Rebecca Bishop (Aero)	Seth Jonas (LMCO)	Jennifer Gannon (CPI)		Justin Kasper (BWXT)	Geoff Crowley (Orion) <i>Co-CHAIR</i>	Sarah Gibson (NCAR) <i>Co-CHAIR</i>	Geoff Reeves (LANL)	Drew Turner (APL)
George Ho (APL)	Conrad Lautenbacher (GeoOptics)			Janet Green (Spa. Haz.)				
Scott McIntosh (NCAR)	Kent Tobiska (SET)	Nicole Duncan (Ball) <i>CHAIR</i> →		Dan Baker (CU/LASP)	Piyush Mehta (WVU)	TBD	TBD	Paul O'Brien (Aero)
Mark Olson (NERC)	Heather Elliott (SWRI)			Ron Turner (Anser)	Michele Cash (NOAA)	Alexa Halford (NASA)	Sage Andorka (USSF)	Angelos Vourlidas (APL)

### INSTITUTION TYPES

11 Academia	8 For-Profit
8 FFRDC/UARC	4 Individual / Consultant
4 DoD Civil Servant	3 USG Civil Servant
3 Non-Profit	

### POCs

<b>SWAG</b> Jennifer Meehan <a href="mailto:jennifer.meehan@noaa.gov">jennifer.meehan@noaa.gov</a>
<b>Roundtable</b> Arthur Charo <a href="mailto:acharo@nas.edu">acharo@nas.edu</a>
<b>SWC</b> Kelly Korreck <a href="mailto:kelly.e.korreck@nasa.gov">kelly.e.korreck@nasa.gov</a>

# Space Weather Roundtable

Formed in response to the Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow Act (PROSWIFT Act → “Government-University-Commercial Roundtable on Space Weather”; 2020)

- Charged with facilitating communication and knowledge transfer among Government participants in the Space Weather Operations, Research, and Mitigation (SWORM) Interagency Working Group, the academic community, and the commercial space weather sector.
- Discuss activities to:
  - facilitate advances in space weather forecasting
  - increase coordination of space weather research-to-operations and operations-to-research
  - improve preparedness for space weather events.
- Meetings:
  - Monthly telecons
  - 3<sup>rd</sup> In-person Meeting January 17-18, 2024

Art Charo

Geoffrey Crowley  
Sarah Gibson

1 Hazel M. Bain

2 Anthea J. Coster

3 Jennifer L. Gannon

4 Janet C. Green

5 Justin C. Kasper

6 Delores Knipp

7 Louis J. Lanzerotti

8 Mark H. MacAlester

9 M. Granger Morgan

10 Omar A. Nava

11 Geoffrey D. Reeves

12 Michael Starks

13 Leonard Strachan Jr.

14 Drew L. Turner

15 Louis W. Uccellini

16 Shasha Zou

Mangala Sharma (NSF)

Genene Fisher (NASA)

James Spann (NOAA)

## ~Deep-Dive Topics (sub-groups)

- ❖ **Ground-based Observations for Space Weather – Jan, Feb, April 2023 monthly telecon discussions, “Closure Session” at in-person meeting in June and final presentation by Gannon in August 2023 telecon**

### FOCUS OF THE SENSOR “CENSUS”

- Existing near surface observations (ground-based, airborne, or buoys)
- US-owned and/or maintained sensors and networks
- Priority to sensors identified by the PROSWIFT Act
- Priority to sensors with potential for use in space weather operations

[National Academies Space Weather Roundtable, Past Events, August 22, 2023, Jenn Gannon](#)

- ❖ **Space Weather Benchmarks – July, August, September discussions with presentations by G. Reeves and M. MacAlester, and September guest C. Canizero and S. Jonas**

# June 1-2, 2023 In-person Meeting: Sessions

- **Reports from SWAG/SWC** (Seth Jonas, Jinni Meehan, Nicole Duncan)
- **Discussion of Space Weather Benchmarks** (Geoff Reeves, Mark Olson, Bill Murtagh)
  - Goal of establishing unified benchmarks for gov't + industry
- **Research to Operations/Operations to Research (R2O/O2R)** (Genene Fisher, Shea Hess Webber, Humberto Godinez, Janet Green)
  - Functional issues: need for new workforce, new ways of doing business
- **Lessons Learned from Terrestrial R2O/O2R** (Nikki Prive, Elsayed Talaat)
  - Observing System Simulation Experiments (OSSEs): where/how they are useful
  - Data Buys: progress, risk mitigation
- **Geospace Dynamics Constellation (GDC)** (Katherine Garcia-Sage, Paul O'Brien, Dan Baker, RT ex-officio)
  - Top recommendation of 2012 Heliophysics DS; explicit Space Weather impact; currently 'on pause'
  - 'A big bright light' on fundamental questions underlying Space Weather science.
- **Ground-based Observing Networks and Space Weather** (Jenn Gannon, Mike Farrar, Mark Engebretson, Asti Bhatt, Mike Hartinger, Anthea Koster, Dave Mencin, Glen Mattioli, Eric Donovan)
  - Orphan area – NSF does research, NASA and NOAA-NESDIS does space-based.
  - Networks are aging, nodes are disappearing, and plans for transition to operations generally unsupported.  
\*SWAG/SWORM recommendations\*\*
  - Lessons learned from terrestrial: multi-agency/commercial 'weird matrix of funding'.

# June 1-2, 2023 In-person Meeting: Discussion Themes

- **What does the new R2O-O2R workforce look like?**
  - Researchers trained in operational requirements, user needs
  - Software engineers experienced in transitioning to operational frameworks and with access to computational resources for the transition
  - Liaisons between research and operational communities (opportunity for small businesses?)
  - Operational communities with clear guidelines/procedures for Observing System Simulations Experiments (OSSE) implementation
- **We've tread this ground before...**
  - The SWAG recommendations are similar to those from the National Space Weather Program 20 years ago, with increasing interest in the operational side
  - Ground-based observing networks were the subject of the [NASEM Distributed Array of Small Instruments \(DASI\) workshop report \(2006\)](#); an NSF magnetometer facility was recommended in its Geospace Portfolio Review.
- **How can we be more intentional in prioritizing/planning/sustaining the space weather enterprise?**
  - Who owns ground-based space weather observations? Should such networks become facilities?
  - The 'pause' on Geospace Dynamics Constellation — with its real time data stream of thermospheric (neutral) densities at a time when satellites in LEO are steadily increasing (and with them the danger of space debris) — is an alarming development.



# January 17-18, 2024 In-person Meeting: Sessions

- **Reports on Related Efforts**
  - SWAG User Survey (Tammy Dickinson)
  - SWORM Implementation Plan (Jinni Meehan, Ken Graham)
  - SWC (Janet Green)
- **Discussion:**
  - Benchmarks & Scales; SWORM actions
    - long-term reanalysis, is it orphan?
  - Modeling Gap Analysis (Piyush Mehta, Angelos Vourlidas)
    - is there a need for a deep-dive by RT on this?
- **SWPC Testbed** (Jinni Meehan for Bill Murtagh, Tzu-Wei Fang, Eric Adamson)
  - Scales, New Products, R2O2R Readiness Levels
  - Proving Grounds vs Testbeds? How evaluated? Unfunded mandate?
- **Cislunar and Beyond -- Radiation Environment**
  - ARTEMIS (Yari Collado-Vega)
  - SRAG (Ricky Egeland, Katie Whitman)
  - SWPC (Kim Moreland for Hazel Bain)
  - Spacecraft charging (Linda Parker)
  - NASA Engineering/Safety (Joe Minow)
- **Strengthening the Partnership between DOD and Civil to Advance Space Wx Enterprise**

# January 17-18, 2024 In-person Meeting: Discussion Themes

- **How to improve communications between research and operations**
  - Is there a missing forum? How do researchers find out what operators want and vice versa?
- **R2O2R**
  - A recurring theme at Roundtable
  - Difficulties with transition R2O – different skills than research, and funding (where/who/how)
  - Role of commercial?
  - Effectiveness of readiness levels?
  - Tabletop exercise – outbrief and deep dive? Consequences of not filling gaps...
- **Engaging civil and DOD**
  - Deeper discussion of evaluation, mitigation and response
  - Identifying synergies
- **Still concerned about GDC**
- **Looking forward to Decadal Survey....**



# Roundtable can convene Workshops!

## Potential topics

- DOD-Civil Partnership Follow-On
- Tabletop Follow-up – research gap analysis
- ???

# Connection to other committees

## Communication is key, and has been good

- Deep-dive topics inspired by other groups
- RT discussions can shine light on topic and provide material for other groups

# Roundtable moving forward

## Roundtable funded for initial 5 year period

- Most likely scenario
  - 3 year term with option to extend for up to 2 years
  - Staggered terms
- Ex-officio members come/go at discretion of NASA/NOAA/NSF