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# The National Academies Space Weather Roundtable

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

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

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# Mission of 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.
- ❖ **What are the gaps & ‘blockers’ preventing improvements?**
- ❖ **Identify “orphan” issues — acknowledged need but no clear funding/responsibility path**
- ❖ **Brainstorming group – generate ideas for other committees**

Art Charo

Geoffrey Crowley  
Sarah Gibson

1 Hazel M. Bain

2 Anthea J. Coster

3 Janet C. Green

4 *Jen Gannon*

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)

# Roundtable in Relation to Other Space Weather Committees

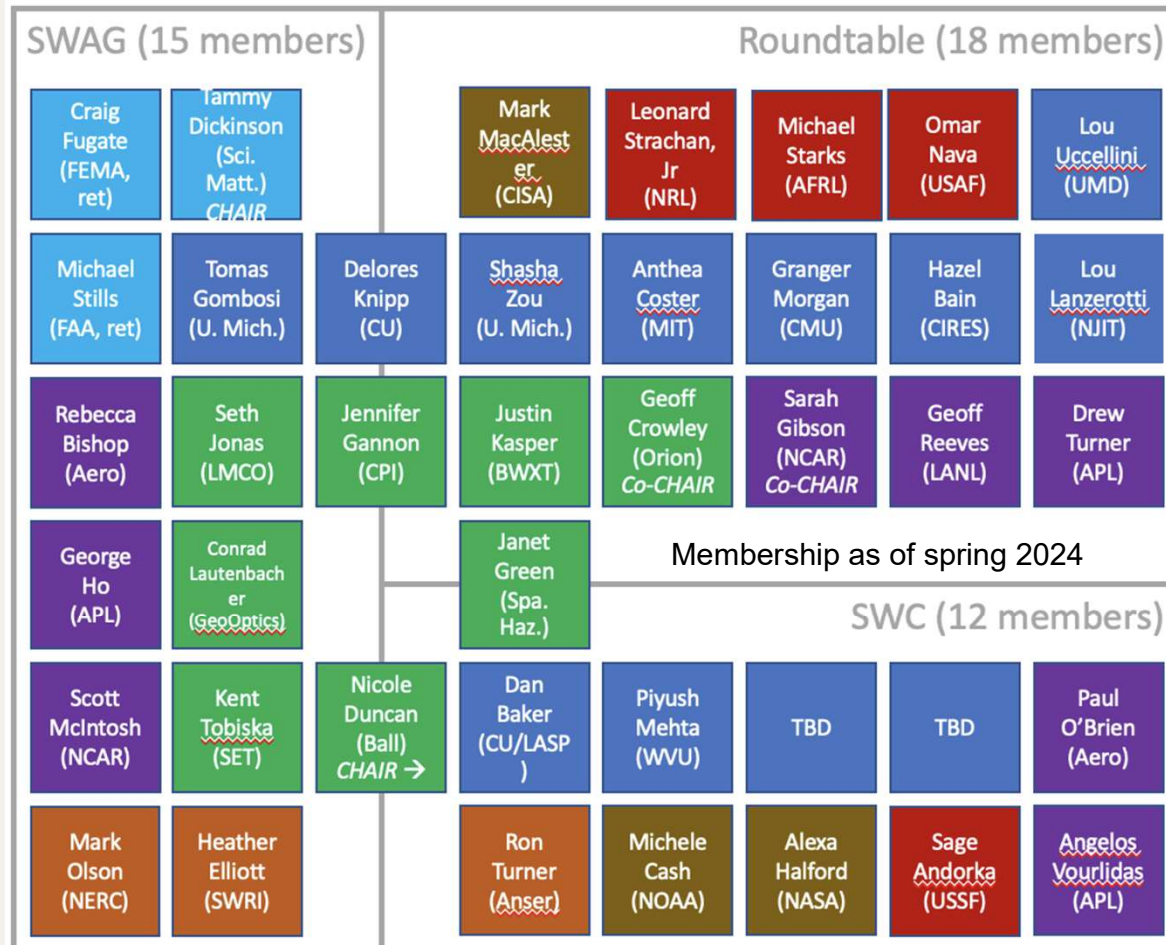
**Space Weather Advisory Group (SWAG):** Also created by PROSWIFT, formally advises SWORM.

**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



### 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

#### SWAG

Jennifer Meehan  
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#### Roundtable

Arthur Charo  
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#### SWC

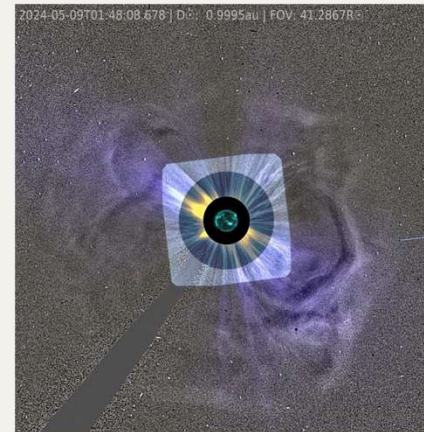
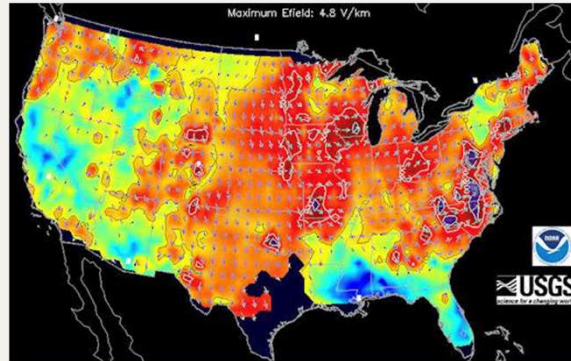
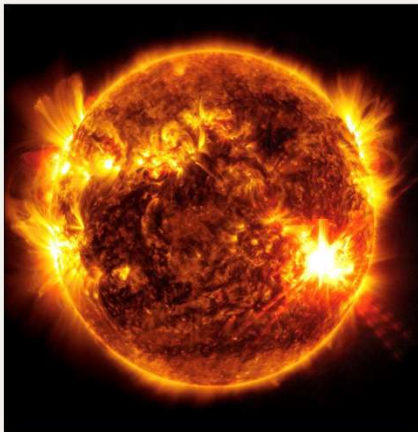
Kelly Korreck  
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## Recent topics of discussion

- **Space Weather Tabletop Exercise**

- May 8-9, 2024 @ APL and concurrent site in Colorado
- NOAA, NSF, NASA, FEMA, OSTP, USAF; Federal, state, local, tribal
- Scenario: Winter 2028, Artemis astronauts going to the Moon, solar active region goes wild



*Images from SWAG User Needs Survey*

- **Gannon Storms (May 2024):**

- The most intense space weather event on Earth in the last 20 years.
- Near-coincident with Tabletop Exercise!
- NOAA SWPC early warnings (May 10) → North America power grid operators implemented special operating procedures for resilience within 6 hours of onset of geomagnetic storm.

## Impacts of Gannon Storm (reports still coming in)

### Reported Impacts



Image: John Deere

#### BUSINESS INSIDER

John Deere dealership says a solar storm left GPS tracking on farmers' tractors 'extremely compromised'



#### GPS Systems

- Significant degradation of GPS systems
- Midwest farmers reported GPS tracking "extremely compromised" idled planting
- Airport equipment went "out of tolerance"

#### Satellite Operations

- Satellites experienced increased drag, necessitating more frequent station-keeping burns and collision avoidance maneuvers
- Degraded Starlink service
- Viasat struggled with maintaining satellite altitudes



Image: Ken Trombatore



Image: National Grid UK

#### Aviation

- Trans-oceanic flights rerouted to avoid radio disruptions
- Some loss of high frequency communication with aircraft
- WAAS real-time Extreme Storm Detector tripped

#### Energy Sector

- British Columbia activated their response plan due to irregularities in power grids
- US grid operators implemented measures to ensure reliability
- UK transformers over temperature alarms

## Recent topics of discussion

- **GDC & Space Weather: Practical Impacts**

- Global Dynamic Constellation: observing the Earth's ionosphere and thermosphere
- Solar and Space Physics 2013 Decadal Survey top flagship recommendation
- Currently “on pause” due to budget issues.
- Real-time space weather beacon
- OSSEs demonstrating data would significantly reduce errors on model predictions [Hsu et al 2024](#)

- **DoD-Civil SWx Collaboration and Cooperation: Panel Discussion**

- USAF, DAFC, US Space Force, US Navy, ONR participation
- Address duplication of effort -- leveraging efforts DOD-Civil
- Identified need for tactical as well as strategic discussions – e.g need for for common data repository/agreed upon format -- NASA, NSF, NOAA, DOD?

- **SWx Issues in Longterm Data Continuity and Archiving**

- NOAA NCEI, NSF, NASA discussion
- Need for strategic coordination -- Example of NCEI discontinuing ionosonde archiving

## Recent & Upcoming Roundtable Activities

**Summer In-Person Meeting July 8-9 2024**

**Telecons Aug 27, Oct 1, Oct 29**

**Next In-person Meeting: February 5-6, 2025**

Topics:

- Tabletop Exercise -- Lessons Learned (O2R)
- Gannon storms – evaluating effectiveness of mitigation efforts
- Decadal Survey/SWAG User Survey: reflections/synergies of report findings/recommendations
- Commercial space weather data products: current capabilities + issues