



# **Space Weather Advisory Group Inaugural Meeting**

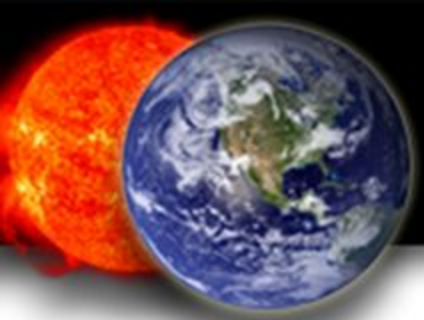
**December 1, 2021  
10:00 AM – 2:00 PM EST**

This webinar is a SWAG public meeting and will be recorded and transcribed. If you have a public comment, you acknowledge you may be recorded and are aware you can opt out of the meeting.



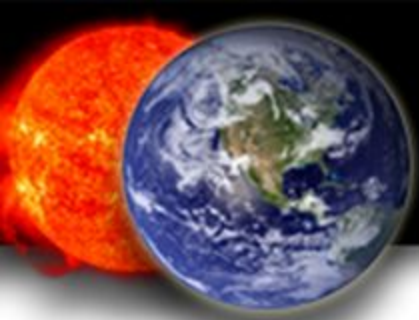
# Welcome!

- In accordance with section 60601 of the PROSWIFT Act - NOAA established the SWAG to advise the SWORM Interagency Working Group
- All 15 non-governmental representatives of the SWAG, were appointed by the SWORM Interagency Working Group with 3-year terms beginning on October 1
- Each SWAG member here today serves as a representative member to provide stakeholder advice reflecting the views of the entity or interest group they are representing. The PROSWIFT Act directs SWAG members to receive advice from the academic community, the commercial space weather sector, and space weather end users that will inform the interests and work of the SWORM



# Agenda

- |               |                                     |
|---------------|-------------------------------------|
| 10:00 - 10:25 | Welcome and Committee Introductions |
| 10:25 - 11:00 | SWORM Co-Chair Remarks              |
| 11:00 - 12:00 | PROSWIFT Act                        |
| 12:00 - 12:30 | BREAK                               |
| 12:30 - 1:40  | Committee Discussion                |
| 1:40 - 1:50   | Public Remarks                      |
| 1:50 - 2:00   | Closing Remarks                     |



# Welcoming Remarks

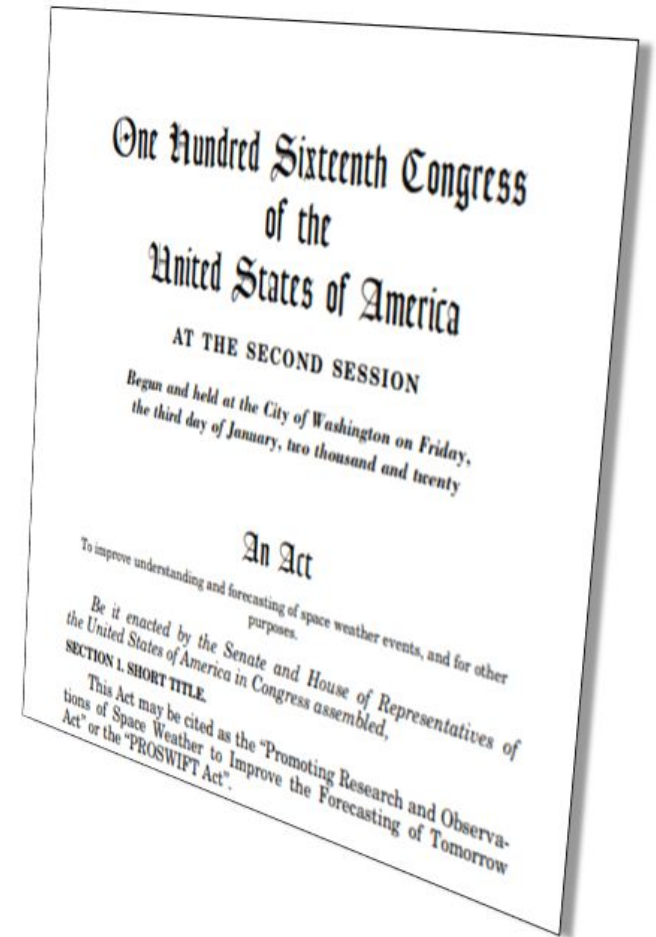


**Dr. Tamara Dickinson**

SWAG Chair

Nongovernmental End User Representative

President, Science Matters Consulting





# Committee Introductions

## SWAG Nongovernmental End-User Representatives

**Tamara Dickinson, SWAG Chair**  
Science Matters Consulting

**Mark Olson**  
North American Electric Reliability Corporation

**Michael Stills**  
United Airlines (retired)

**Craig Fugate**  
One Concern

**Rebecca Bishop**  
Aerospace Corp.

## SWAG Commercial Sector Representatives

**Jennifer Gannon**  
Computational Physics, Inc.

**Conrad Lautenbacher**  
GeoOptics, Inc.

**Seth Jonas**  
Lockheed Martin

**Kent Tobiska**  
Space Environment Technologies

**Nicole Duncan**  
Ball Aerospace

## SWAG Academic Community Representatives

**Tomas Gombosi**  
University of Michigan, Ann Arbor

**Delores Knipp**  
University of Colorado, Boulder

**Scott McIntosh**  
National Centers for Atmospheric Research

**Heather Elliott**  
Southwest Research Institute

**George Ho**  
Johns Hopkins University Applied Physics Laboratory



# SWORM Co-Chair Remarks

## **Ezinne Uzo-Okoro**

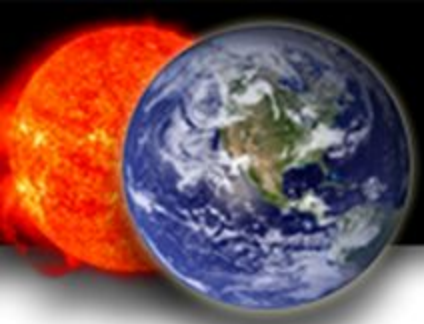
Assistant Director for Space Policy, Office of Science and Technology Policy

## **Robert Kolasky**

Assistant Director, Cybersecurity and Infrastructure Security Agency, DHS, and  
Director, National Risk Management Center

## **Louis Uccellini**

Assistant Administrator for Weather Services, NOAA, and Director, National Weather  
Service



# PROSWIFT Act - Overview

## Basic Elements

- 60601 Space weather
  - Role of Federal Agencies
  - Interagency Working Group (SWORM)
  - Interagency Agreements
  - **Space Weather Advisory Group (SWAG)**
- 60602 Integrated strategy
- 60603 Sustaining and advancing critical observations
- 60604 Research activities
- 60605 Space weather data
- 60606 Knowledge transfer and information exchange
- 60607 Pilot program commercial sector
- 60608 Benchmarks



# PROSWIFT Act - SWAG

## Space Weather Advisory Group (SWAG)

Members: 5 each - academia, commercial space, end user

- Advise SWORM on:
  - Facilitating advances in the space weather enterprise of the United States.
  - Improving the ability of the United States to prepare for, mitigate, respond to, and recover from space weather phenomena.
  - Enabling the coordination and facilitation of research to operations and operations to research.
  - Developing and implementing the integrated strategy including subsequent updates and reevaluations.
- Conduct user survey



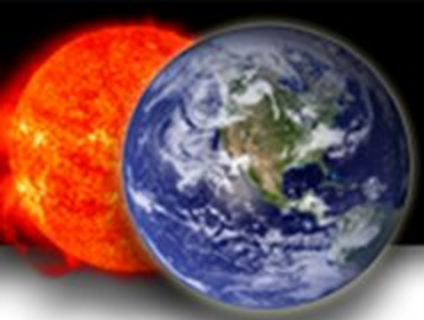


# PROSWIFT Act - User Survey

## In general:

The SWAG shall conduct a comprehensive survey of the needs of users of space weather products to identify:

- space weather research,
- observations,
- forecasting,
- prediction, and
- modeling advances required to improve space weather products.



# PROSWIFT Act - User Survey

## User Survey Requirements:

1. Assess the adequacy of Federal Government goals for lead time, accuracy, coverage, timeliness, data rate, and data quality for space weather observations and forecasting;
2. Identify options and methods, in consultation with the academic and commercial space weather sectors, to advance the above goals;
3. Identify opportunities for collection of data to address the needs of space weather users;
4. Identify methods to increase coordination of space weather R2O2R;
5. Identify opportunities for new technologies, research, and instrumentation to aid in understanding, monitoring, modeling, prediction, and warning of space weather; and
6. Identify methods and technologies to improve preparedness for space weather.



# 2019 Abt Associates User Survey

## Sectors addressed

- Electric Power Grid
- Satellite
- Global Navigation Satellite System
- Aviation
- Emergency Management

## Conversational guide was used for outreach with experts and customers

- Identify technological components affected by space weather
- Describe steps already undertaken to reduce vulnerabilities
- Determine actions that could be taken to further reduce these vulnerabilities
- Describe specific attributes of space weather information needed to further reduce these vulnerabilities
- Describe potential improvements in how space weather information is communicated to increase its usability
- Describe desired format of space weather information



# Lessons from Customer Needs and Requests for Space Weather Products and Services

Rob Steenburgh  
Acting Lead, Forecast Office  
NOAA/NWS/NCEP/Space Weather Prediction Center  
[robert.steenburgh@noaa.gov](mailto:robert.steenburgh@noaa.gov)

# Introduction: Study Goals and Methods



- Goal: Identify and describe current and potential users of SWPC products and services along with their requests
- Method: Interview experts in five sectors: electric power, satellites, Global Navigation Satellite Systems (GNSS), aviation, and emergency management (EM)
  - Most sectors, interview 4 – 5 stakeholders with expertise in engineering and/or operations
  - Exception is EM sector where interviews are with emergency managers

## Key Findings: Product Requests



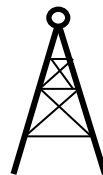
- Requests expressed from multiple sectors:
  - More spatially explicit information and forecasts
  - Improved (i.e., more) lead time for warnings and notifications
  - Improved access to historical data
  - Plain-language, impact-based products
  - “All Clear” notices



## Electric Power: SWPC Product Requests



- Improvements to the granularity of the G-scale and Kp-index
  - G5+ for greater operational relevance
  - Localized details vs global values
- Transition from G-scale to E-field forecasts
  - E-field seen as more relevant for GICs
- Improvements to product usability
  - Access to details for past extreme events
  - Improved data search options



## GNSS: SWPC Product Requests



- Improve precision and granularity of forecasts
- Develop scintillation forecasts
- Improve product accessibility and usability
  - Use non-expert language to translate space weather phenomena to potential impacts



## Satellites: SWPC Product Requests



- Provide products tailored to specific orbits
  - Tailored information for MEO and LEO in addition to GEO
- Increase forecast precision
  - Ideally would have 6-12 hours of lead time from forecast to impacts
- Improve access to historical data products (i.e., past events)
- Improve information presentation (e.g., visuals, color coding)
- Increase education and outreach to sector



## Aviation: SWPC Product Requests



- Improved forecast granularity and precision
- Changes to product language and presentation (non-technical language, impact-based)
- Post-event and historical data product development



## EM: SWPC Product Requests



- Localized, plain language forecast and alerts
- SWPC-facilitated education and communication
- Development of new tools (e.g., tools like NWS Chat, stoplight charts) and improvement of existing tools (e.g., headline over the NOAA scales banner)



## Discussion



Requests that are feasible versus infeasible:	Feasibility
▪ More spatially explicit information and forecasts	●
▪ Improved (i.e., more) lead time for warnings and notifications	●
▪ Improved access to historical data	●
▪ Plain-language, impact-based products	●
▪ "All Clear" notices	●

## Tips:

- Have someone like Jen Sprague in your corner - pick **good people**
- Cast a **wide net** - a list is a good start but consider other approaches
- Scrutinize **responses**
- Feasible versus **fantasy** - know the difference but don't exclude big ideas

Questions?





**BREAK**

**12:00 - 12:30pm ET**



# Committee Discussion



# PROSWIFT Act - User Survey

## Build on Abt User Survey

- Do we conduct an actual survey, and if so, who does it?
  - How to design questions so the responses are meaningful?
- Or can SWAG experts conduct internal review in their community?
- Sectors addressed in Abt survey
  - Electric Power Grid; Satellite; Global Navigation Satellite System; Aviation; Emergency Management
- Other sectors
  - Human space flight
  - Drilling and surveying
  - National security
  - SSA/STM - Upper Atm (space debris)
  - Split GNSS users - many applications - Ag users
  - Communications
- Other issues not addressed

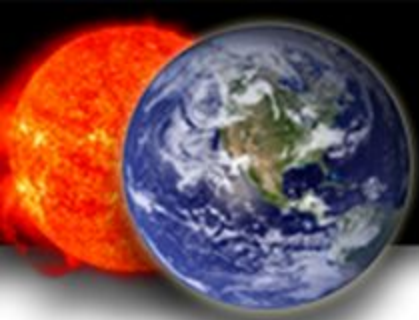


# Next Steps and Tasking



# Proposed Sector Leads

- **Electric Power Grid** – Olson, Gannon
- **Satellite** – Duncan, Elliott, Knipp, Lautenbacher
- **Global Navigation Satellite System** – Bishop, Gombosi, Knipp, Stills
- **SSA/STM** - Knipp, Bishop, Duncan, Tobiska
- **Radio Frequency Application** (comms and OTHR) - Bishop, Fugate, Stills (HF)
- **Aviation** – Stills, Tobiska
- **Emergency Management** – Fugate, Jonas
- **Human space flight** – Tobiska, Ho, Gannon
- **National Security** – Jonas, Ho
- **Research** – McIntosh, Knipp, Gombosi, Elliott



# Upcoming Meetings

## American Meteorological Society Annual Meeting

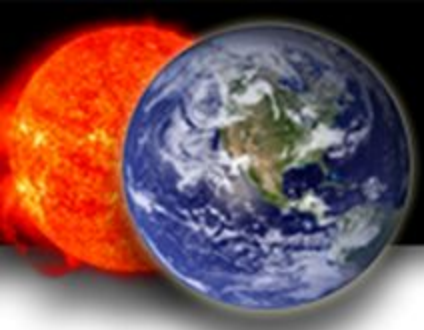
- January 23-27, 2022 - Houston, TX
- Hybrid meeting in conjunction with AMS to plan the speakers etc for Space Weather Workshop meeting (below)

## Space Weather Workshop

- April 25-29, 2022 - Boulder, CO
- Hybrid meeting
- Workshop on Monday focused on filling gaps in user survey
- Focus on filling the gaps in Abt user survey
  - Gaps in sectors; Gaps within sectors



# Public Remarks



# Closing Remarks





**Adjourned**

**[www.weather.gov/swag](http://www.weather.gov/swag)**

**Thank you!**