



## 2022 Space Weather Workshop (virtual meeting)

**THEME: Collaboration: Advancing the Space Weather Enterprise**

### Times in EDT

#### Monday Evening, April 25 (Session for Students)

**6:00 – 8:00 pm**      **Space Weather: Student Welcome and Citizen Science Discussion**  
Sophie Graf (Organizer, UT, Arlington); co-chair Elizabeth Vandegrif (UT, Arlington)

**6:00**                **Space Weather Workshop Student Welcome**  
Sophie Graf, UT Arlington

**6:05**                **Introduction to the Space Weather Workshop and Overview for Students**  
Bill Murtagh, NOAA/SWPC

**6:20 – 6:35**                **Q&A**

**6:35**                **Introduction to the Space Weather Student Career Development Resource**  
Sophie Graf, UT, Arlington

**6:50 – 7:00**                **Q&A**

**7:00**                **Heliophysics Citizen Science and Innovation in the Past, Present, and Future**  
Liz MacDonald, NASA Goddard Space Flight Center

**7:20**                **[HamSCI: Collaborating with Radio Amateurs to Better Understand Space Weather](#)**  
Nathaniel Frissell, University of Scranton

**7:40 – 8:00**                **Q&A**

#### Tuesday, April 26

**10:00**                **Opening Remarks and Welcome**  
Bill Murtagh, National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS), Space Weather Prediction Center (SWPC)

- 10:05 – 10:50**      **Space Weather Policy**  
Co-Chairs: Bill Murtagh, NOAA/SWPC  
                  Jinni Meehan, NOAA/NWS Headquarters
- 10:05**            **Space Weather and Critical Infrastructure Resilience: Senior Officials Exercise**  
Caitlin Durkovich, Resilience and Response, National Security Council (NSC), White House
- 10:15**            **Update from the Office of Science and Technology Policy (OSTP)**  
Ezinne Uzo-Okoro, Executive Office of the President (EOP) /Office of Science and Technology Policy (OSTP)
- 10:25**            **Implementation of U.S. Space Weather Policy**  
Mary Erickson, Space Weather Operations, Research and Mitigation Subcommittee (SWORM)/ National Weather Service
- 10:35**            **[UK Space Weather Strategy and US - UK Workshop](#)**  
Mark Prouse, Department for Business, Energy & Industrial Strategy, UK
- 10:45 - 10:50**      **Break**
- 10:50 – 11:19**      **Implementing the “Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow” Act - Part I**  
Co-Chairs: Jinni Meehan, NOAA/NWS  
                  Bill Murtagh, NOAA/NWS/SWPC
- 10:50**            **[NOAA National Weather Service \(NWS\)](#)**  
Clinton Wallace, NOAA/NWS/SWPC
- 10:58**            **Implementing the PROSWIFT ACT**  
Lt Col Justin Erwin, DOD/USAF
- 11:06**            **[Space Weather Advisory Group \(SWAG\)](#)**  
Tammy Dickinson, Science Matters Consulting
- 11:14 – 11:19**      **Break**
- 11:19 – 12:15**      **Implementing the “Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow” Act – Part II**  
Co-Chairs: Jinni Meehan, NOAA/NWS  
                  Bill Murtagh, NOAA/NWS/SWPC
- 11:19**            **NOAA National Environmental Satellite, Data, and Information Service (NESDIS)**  
Elsayed Talaat, NOAA/NESDIS/Office of Projects, Planning and Analysis (OPPA)
- 11:27**            **NASA**  
Jamie Favors, NASA Headquarters, Heliophysics Division
- 11:35**            **[NSF](#)**  
Mangala Sharma, NSF Geospace Section
- 11:43**            **American Commercial Space Weather Association (ACSWA)**  
Kent Tobiska, Space Environment Technologies
- 11:51 – 12:15**      **Community Discussion with Morning Session Speakers**
- 12:15 – 1:00**      **Lunch and  
National Academies of Sciences Space Weather Roundtable Discussion (12:20-12:55)**  
  
Co-Chairs: Bill Murtagh, NOAA SWPC

Jinni Meehan, NOAA/NWS

Art Charo, National Academy of Sciences

**1:00 – 2:30**

## **Space Traffic Coordination and Space Situational Awareness**

Co-Chairs: Janet Green, Space Hazards Applications

Mike Bonadonna, NOAA NESDIS

**1:00**

**Session Introduction – Janet Green**

**1:05**

### **[Still Muddling Through Space Traffic Management](#)**

Brian Weeden, Secure World Foundation

**1:15**

### **Office of Space Commerce – New Operational SSA System**

Brian Bates, NOAA Office of Space Commerce

**1:25**

### **Space Domain Awareness Environmental Toolkit for Defense: Software Transition Approach**

Sage Andorka, United States Space Force (USSF)

**1:35**

### **[LEO Space Environment Impacts on Satellite Orbits](#)**

Eric Sutton, Univ. of Colorado, Technology, Research and Education Center (TREC)

**1:45**

### **[Space Weather Environment during SpaceX Starlink Satellite Loss in February 2022](#)**

Tzu-Wei Fang, NOAA SWPC

**1:55**

### **[Space Weather Tools for Investigating Satellite Anomalies: Current Status and Future Needs](#)**

Alex Boyd, Aerospace Corporation

**2:05**

**Q&A**

**2:30 – 3:00**

**Break**

**3:00 – 4:30**

## **Space Weather Support for Human Exploration**

Co-Chairs: Azita Valinia, NASA Engineering & Safety Center (NESC)

Terry Onsager, NOAA SWPC

**3:00**

**Session Introduction – Azita Valinia**

**3:05**

### **[Space Weather and Crew Health Implementations](#)**

John Allen, NASA Headquarters, Human Exploration and Operations

**3:15**

### **[Space Radiation and Analysis Group](#)**

Janet Barzilla, NASA Johnson Space Center (JSC)

**3:25**

### **NASA Moon to Mars (M2M) Activities**

Yaireska Collado-Vega, NASA Goddard Space Flight Center

**3:35**

### **[Radiation Monitoring and Shielding Capability Gaps](#)**

Joe Minow, NASA Engineering & Safety Center

**3:45**

### **[Forecasting Solar Particle Events in Support of Human Space Exploration](#)**

Hazel Bain, University of Colorado Cooperative Institute for Research in Environmental Sciences (CIRES)/NOAA SWPC

**3:55**

### **[Solar Cycle Prediction Capabilities for Timing of Mars Missions](#)**

Ron Turner, Analytical Services, Inc. (ANSER)

4:05 – 4:30 Q&A  
4:30 – 5:00 Break  
5:00 – 6:30

**Lightning Talks (5:00-5:30) and Poster Session (5:30-6:30):  
Solar and Interplanetary Research and Applications**

Chair: Eric Adamson/NOAA SWPC

Lightning Talk Presenters (3 min each, from 5:00-5:30 EDT; poster viewing from 5:30-6:30 EDT)

**Predicting Solar Proton Events of Solar Cycles 22-24**

Aatiya Ali, Georgia State University

**Simplified CME Monitoring and Characterization by Summarizing Time Series of Coronagraph Images**

Manuel Flores-Soriano, University of Alcalá, Space Weather Group

**Coronal Hole Observer and Regional Tracker for Long-term Examination**

Chris Lowder, Southwest Research Institute

**Improving Operational Solar EUV Irradiance Modeling Using Physics-Based Differential Emission Measure Techniques**

Courtney Peck, CIRES/University of Colorado, NOAA NCEI

**Mapping the Sun with the Italian Radio Telescopes**

Simona Righini, Istituto Nazionale di Astrofisica

**What Machine Learning Algorithms Teach Us about Which Explanatory Variables Matter Most in Predicting Bz within Coronal Mass Ejections**

Pete Riley, Predictive Science Inc.

**Concept for Real-Time Solar Flare Predictions**

Juliana Vievering, Johns Hopkins University Applied Physics Laboratory

**Wednesday, April 27**

**10:00 – 11:30 Space Weather: Meeting the Needs of the Energy Sector**

Co-Chairs: Josh Rigler, US Geological Survey (USGS)

Jenn Gannon, Computational Physics, Inc.

10:00 **Session Introduction** – Josh Rigler, USGS

10:05 **Lessons learned from Historical Geomagnetic Storms**

Jeff Love, USGS

10:15 **Xcel Energy MagSTAR Magnetometer Project**

Matt Twardy, Xcel Energy

10:25 **Understanding the interconnections of the Sun-to-Power Grid System: Convergence and the NSF Workshop on simulating Space Weather Extremes**

Ryan McGranaghan, Orion Space Solutions

10:35 **Modelling and Validation of Geomagnetically Induced Currents and The Impact on the Swedish Power Grid**

Lisa Rosenqvist, Swedish Defence Research Agency, FOI, Sweden

10:45 **Use of NERC-collected Geomagnetically Induced Currents (GIC)-related data**

Mark Olson, North American Electric Reliability Corporation (NERC)

10:55 **Geomagnetically Induced Currents (GIC) Model Validation**

Bob Arritt, Electric Power Research Institute (EPRI)

11:05 – 11:30 Q&A

11:30 – 1:00 Lunch and following events:

- **Student Lunch: Student Government and Private Sector Career Path Panel (11:40-12:50)**

**Chair:** Sophie Graf, UT, Arlington; co-chair Elizabeth Vandegrif (UT, Arlington)

**Panelists:**

Janet Green, Space Hazards Applications  
 Jinni Meehan, NOAA/NWS Headquarters  
 Alex Boyd, Aerospace Corporation  
 Mangala Sharma, NSF Geospace Section

- **16th Annual NOAA - American Commercial Space Weather Association (ACSWA) Summit Meeting – by invitation (11:40-12:50)**

1:00 – 2:30

**Space Weather: Meeting the Needs for Global Aviation Services**

Co-Chairs: Brent Gordon, NOAA SWPC  
 Robyn Fiori, Natural Resources Canada (NRCan)

1:00

**Session Introduction** – Brent Gordon, NOAA SWPC

1:05

[Communication, Navigation, and Irradiation – ICAO Space Weather Services for Aviation](#)

Rob Steenburgh, SWPC

1:15

**Space Weather Considerations for Airlines**

Stephanie Klipfel, Manager Meteorology and A4A Meteorology Committee Chair Delta Air Lines

1:25

[UK User Feedback on Space Weather Products](#)

Krista Hammond, UK Met Office (UKMO)

1:35

[Operational Monitoring of Cosmic Radiation for Civil Aviation with the SiGLE-RT Model](#)

Philippe Yaya, CLS (France)

1:45

[Progress Towards Resolving Maximum Usable Frequency \(MUF\)](#)

Loredana Perrone, INGV (Italy)

1:55

**Space Weather and Aviation Testbed Experiment and Exercise**

Michele Cash, NOAA SWPC

2:05 – 2:30

**Q&A**

2:30 – 3:00

**Break**

3:00 – 4:30

**Observing and Modeling the Ionosphere: Supporting Communications and Navigation**

Co-Chairs: Tim Fuller-Rowell, CU CIRES/NOAA SWPC  
 Holly Gilbert, NCAR High Altitude Observatory (HAO)

3:00

**Session Introduction** – Tim Fuller-Rowell, CU CIRES/NOAA SWPC

3:02

**Observing and Modeling the Ionosphere: Supporting Communications and Navigation**

Sean Elvidge, University of Birmingham, UK

3:12

[Supporting Space Weather with the Geospace Dynamics Constellation](#)

Katherine Garcia-Sage, NASA Goddard Space Flight Center

3:22

[Forecasting Equatorial Ionospheric Stability Using a Regional Model and WAM-IPE](#)

David Hysell, Cornell University

3:32

**Q&A**

- 3:45 -4:30**      **Space Weather Workforce Development**  
Co-Chairs: Mangala Sharma, NSF Geospace Section  
Frank Centinello, NOAA Corps, SWPC
- 3:45**      **Session Introduction** – Mangala Sharma, NSF Geospace Section
- 3:47 – 3:52**      **[Commercial Sector Space Weather Job Opportunities and Qualifications](#)**  
Laura Stiles, Blue Origin
- 3:52 – 3:57**      **[My Future Career: How do I get there and what's next?](#)**  
M. Chantale Damas, Queensborough Community College
- 3:57 – 4:02**      **[Ways That Space Weather Can Open Doors and How to Make Sure Those Doors Don't Hit You in the Back](#)**  
Joe Mazur, Aerospace Corp
- 4:02 – 4:07**      **[Millersville University Space Weather Certificate Program](#)**  
Richard Clark, Millersville University
- 4:07 – 4:30**      **Q&A**
- 4:30 – 5:00**      **Break**
- 5:00 – 6:30**      **Lightning Talks (5:00-5:30) and Poster Session (5:30-6:30)**  
**[Ionosphere and Thermosphere Research and Applications](#)**  
**[Space Weather Policy and General Space Weather Contributions](#)**  
Chair: Delores Knipp, CU Smead Aerospace Engineering Sciences
- Lightning Talk Presenters (3 min each, from 5:00-5:30 EDT; poster viewing from 5:30-6:30 EDT)
- Detection of High-Latitude Ionospheric Plasma Conditions Leading to GPS Scintillations Using a Novel Poker Flat Incoherent Scatter Radar Mode**  
Jacob Willis, United States Military Academy
  - Innovative Global Ionospheric Total Electron Content (TEC) Map Reconstruction and Forecasting Using Machine Learning**  
Shasha Zou, University of Michigan
  - PlanetiQ GNSS RO Measurements of the Ionosphere**  
Rob Kursinski, PlanetiQ
  - Applications of FORMOSAT-7/COSMIC-2 to Space Weather at CWB/SWOO**  
I-Te Lee, Center Weather Bureau
  - Performance of a Locally Adapted NeQuick-2 Model During 2014 Solar Maximum over the Brazilian Equatorial Region**  
Osanyin Taiwo, National Institute for Space Research
  - A Machine-Learning Oriented Remote and In-Situ Dataset for Forecasting SEP Occurrence and Properties**  
Kimberly Moreland, University of San Antonio/Southwest Research Institute
  - A New Interactive 3-Dimensional Data Viewer for the Enlil Solar Wind Model**  
Christopher Pankratz, University of Colorado, Boulder
  - Osses and Other Numerical Studies in Support Of The Space Weather Next (SW Next) Program**  
Dimitrios Vassiliadis, NOAA/NESDIS

**Thursday, April 28**

- 10:00 – 12:00**      **Space Weather Research to Operations to Research (R2O2R) Applications**  
Co-Chairs: Barbara Giles, NASA Goddard Space Flight Center

Jim Spann, NASA Headquarters, Heliophysics Division

- 10:00**      **Session Introduction** – Barbara Giles, NASA Goddard Space Flight Center
- 10:05**      [Space-Weather CubeSat Array for 24/7 Prompt Global Coverage Experiment \(SWAP-E\)](#)  
Henry Voss, NearSpace Launch, Inc.
- 10:14**      [Operationalizing Data-driven Prediction Tools for Post-eruption Solar Energetic Particles](#)  
Sumanth Rotti - Petrus Martens, Georgia State University
- 10:23**      [Forecasting Solar Energetic Particle Events at the Cis-Lunar Environment using the Combined ASoM-iPATH Model](#)  
Gang Li, University of Alabama Huntsville
- 10:32**      [Predicting the Bookend Solar Flares](#)  
KD Leka, Northwest Research Associates (NWRA)
- 10:41**      **Commercial R2O Testbed**  
Alec Engell, NextGen Federal Systems
- 10:50**      [Forecasting Solar Flares Using the Time Evolution of Active Regions and Machine Learning Techniques](#)  
Talwinder Singh, University of Alabama, Huntsville
- 10:59**      **Transitioning from Deterministic to Probabilistic Space Weather Forecast using Ensembles of Neural Networks**  
Andrés Munoz-Jaramillo, Southwest Research Institute (SwRI)
- 11:08**      [Forecasting Solar Energetic Particle Radiation Using Data-Driven and Physics-Based Simulations](#)  
Lulu Zhao, University of Michigan
- 11:17**      [Miniaturized Nightglow Interferometer for Monitoring Emissions from a CubeSat](#)  
Wilbert Skinner, Michigan Aerospace Corporation
- 11:26**      **Kamodo Space Weather Models**  
Michael Contreras, Ensemble Government Services, LLC
- 11:35**      **Space Weather Forecasting Toolset to Support Operations**  
Robert Arslanbekov, CFD Research Corporation
- 11:44**      **Session Wrap-up and Inspiration for Future R2O2R**  
Janet Green, Space Hazards Applications
- 11:53**      **Q&A**
- 12:00 - 1:00**      **Lunch and Heliophysics Decadal Survey Plans-Interactive Discussion (12:10-12:50)**  
  
Co-Chairs: Howard Singer, NOAA SWPC  
Frank Centinello, NOAA Corps/SWPC  
  
[Art Charo, National Academy of Sciences](#)  
Jared Leisner, NASA, Heliophysics Division  
Elsayed Talaat, NOAA/NESDIS/Office of Projects, Planning and Analysis (OPPA)  
Carrie Black, NSF, Division of Astronomical Sciences and  
[Lisa Winter, NSF Atmospheric and Geospace Sciences Division](#)

1:00 - 2:30

## **Space Weather: New and Future Observations to Advance Understanding and Forecasting**

Co-Chairs: Irfan Azeem, NOAA NESDIS  
Simon Machin, UK Met Office

1:00

**Session Introduction** – Irfan Azeem, NOAA NESDIS

1:05

### **Strategies for Filling Critical Observational Gaps for Improved Space Weather Monitoring, Mitigation, and Predictive Capabilities**

Drew Turner, Johns Hopkins University Applied Physics Laboratory (JHUAPL)

1:15

### **NOAA's Space Weather Follow On Program: Ensuring Continuity of Data for Geomagnetic Storm Forecasts**

Doug Biesecker, NOAA NESDIS

1:25

### **Neutron Monitors and Space Weather—Back to the Future**

James Ryan, University of New Hampshire (UNH)

1:35

### **Solar X-rays: Early Flare Signatures and How to Measure Them**

Lindsay Glesener, University of Minnesota

1:45

### **Requirements for a Future Ground-based Solar Monitoring Network. Implications for ngGONG**

Valentin Pillet, National Solar Observatory

1:55

### **Access Diverse Space Weather Data with SWx TREC's Space Weather Data Portal**

Jenny Knuth, Univ. of Colorado, Technology, Research and Education Center (TREC)

2:05

**Q&A**

2:30 – 3:00

**Break**

3:00 – 4:30

## **Advances in Space Weather Modeling and Services**

Co-Chairs: Dan Welling, University of Texas, Arlington, Physics Department  
Howard Singer, NOAA/NWS/SWPC

3:00

**Session Introduction** – Dan Welling, University of Texas, Arlington, Physics Department

3:05

### **CCMC: Preparing Models to Enter the R2O Pipeline**

Leila M. Mays, NASA Community Coordinated Modeling Center (CCMC)

3:15

### **Advancing Space Weather Predictions with Data Driven Methods -- Stories from SOLSTICE**

Yang Chen, University of Michigan

3:25

### **PAGER: Probabilistic Sun to Earth Modeling Utilizing Data Assimilation and Machine Learning**

Yuri Shprits, University of Potsdam

3:35

### **Space Weather Science and Forecasting at University of Texas at Arlington**

Elizabeth Vandegrif, University of Texas Arlington

3:45

### **OSPREDI: A Coupled Approach to Modeling CME-Driven Space Weather with Automatically-Generated User-Friendly Outputs**

Christina Kay, Catholic University of America

3:55

**Aurora: Prediction, Imaging and Services**



Rodney Viereck, University of Colorado CIRES/NOAA SWPC

4:05

Q&A

4:20

[Workshop 'Penultimate' Remarks](#)

Howard Singer, NOAA/NWS/SWPC

4:30 – 5:00

Break

5:00 – 6:30

**[Lightning Talks \(5:00-5:30\) and Poster Session \(5:30-6:30\):  
Geospace/Magnetosphere and Aviation Radiation Research and  
Applications](#)**

Chair: Mary Hudson, Dartmouth College

Lightning Talk Presenters (3 min each, from 5:00-5:30 EDT; poster viewing from 5:30-6:30 EDT)

**Fine Structure of Geoeffective Solar Wind Transients Complicating Space Weather Predictions**

Matti Ala-Lahti, Department of Climate and Space Sciences and Engineering, University of Michigan

**Geomagnetically Induced Current Measurements and Space Weather Prediction in Austria**

Dennis Albert, Institute of Electrical Power Systems, Graz University of Technology

**Association between the Spatial Characteristics of Relativistic Electron Precipitation Observed at LEO and its Magnetospheric Drivers**

Luisa Capannolo, Boston University

**Effects of Upstream Small Scale Structure on Predictive Performance of the Space Weather Modeling Framework**

Sophie Graf, University of Texas at Arlington

**MAGICIAN Project: Machine Learning, Data Collection, Education and Outreach for Space Science Research**

Dogacan Ozturk, University of Alaska Fairbanks

**An ML Approach to Forecasting Space Weather Impacts on Critical Infrastructure from Ground-Based Arrays**

Adam Schultz, Oregon State University

**Multiscale Atmosphere Geospace Environment Model**

Michael Wiltberger, NCAR/HAO

**Atmospheric Ionizing Radiation Environment (AIRE) Institute**

Eric Benton, Oklahoma State University, Department of Physics