

# Space Weather Enterprise Forum

*Solar Maximum: Can We Weather the Storm?*

## Program

Sponsored by the National Space Weather Program Council

The National Press Club Ballroom  
Washington, DC

June 21, 2011



Space Weather  
Enterprise Forum 2011

The Office of the Federal Coordinator for Meteorological Services and Supporting Research

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OFFICE OF THE FEDERAL COORDINATOR  
FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

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June 21, 2011



Dear Colleagues,

Welcome to the Space Weather Enterprise Forum! The members of the National Space Weather Program Council and I are pleased to present an informative slate of speakers to address this year's theme: *Solar Maximum: Can We Weather the Storm?* We are very pleased you have joined us today to learn and discuss this important topic.

I extend my appreciation to the members of the OFCM-sponsored National Space Weather Program Council and all of their representatives who planned and organized the forum. The member agencies and sponsors of the forum are the Departments of Commerce, Defense, Energy, Homeland Security, the Interior, State, and Transportation as well as NASA, the National Science Foundation, and the Office of Science and Technology Policy and Office of Management and Budget in the Executive Office of the President. Under Council direction, the Office of the Federal Coordinator for Meteorology has organized the forum you are attending today.

Thank you for joining us in Washington, DC, to exchange ideas, share information, raise awareness of space weather and its effects, and to help build an informed and resilient society in the decade ahead. I encourage you join in the discussions and enjoy the forum!

Sincerely,

A handwritten signature in black ink, appearing to read "Samuel P. Williamson", with a long horizontal flourish extending to the right.

Samuel P. Williamson  
Federal Coordinator for Meteorology  
and Chairman, National Space Weather Program Council

## **Space Weather Enterprise Forum 2011**

*Solar Maximum: Can We Weather the Storm?*

National Press Club  
Washington DC  
June 21, 2011

### **Motivation**

As we approach the next peak of solar activity expected in 2013, our Nation faces multiplying uncertainties from increasing reliance on space weather-affected technologies for communications, navigation, security, and other activities, many of which underpin our national infrastructure and economy. We also face increasing exposure to space weather-driven human health risks as trans-polar flights and space activities, including space tourism and space commercialization, increase.

### **The Forum**

The Space Weather Enterprise Forum brings together the space weather community to share information and ideas among policymakers, senior government leaders, researchers, service-provider agencies, private-sector service providers, space weather information users, media, and legislators and staff from Capitol Hill to raise awareness of space weather and its effects on society. This year, we will continue this outreach but will sharpen the focus on critical infrastructure protection and human health and safety, with the necessary underpinnings of research, improved products and services, and applications to serve a broad and growing user community. Our ultimate goal is to improve the Nation's ability to prepare for, avoid, mitigate, respond to, and recover from potentially devastating impacts of space weather events on our health, economy, and national security.

### **Forum Objectives**

- Share information across the enterprise and raise awareness for new users, decision makers, and policymakers; areas of exchange include the following:
  - New research results
  - New transitions of research into operations
  - New products and services
  - Integrated, unified space weather operational capabilities
  - International activities and cooperation
  - Commercial space weather users and providers
  - Integration of social science into space weather services
- Identify effective approaches to build resilience across society, particularly in critical infrastructure protection and support.
- Identify effective approaches to raise awareness in the broader society.
- Improve communications within and external to the enterprise.
- Collect information to support a new National Space Weather Program Implementation Plan.

## **Sponsor**

The National Space Weather Program Council is part of the U.S. Federal meteorological coordinating infrastructure under the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM). The Council brings together the Federal agencies involved in providing space weather products and services, space weather research, users of space weather information, and other offices that set policy or funding for the Federal portion of the space weather enterprise. The purpose is to facilitate coordination, collaboration, and leveraging of activities, results, and capabilities across the Federal agencies. The participating agencies and their representatives are listed on the inside front cover of this book.

## **Program:**

This year's theme is, *Solar Maximum: Can We Weather the Storm?* We will again follow a panel session format, including brief presentations by the expert panelists followed by ample time for lively exchange across a diverse group of attendees. The complete agenda is provided separately.

## **Sessions:**

- **Critical Infrastructure Vulnerability to Space Weather:** We depend on critical systems and activities affected by space weather, such as the electric power grid, communications, positioning and navigation, and national security. Space weather effects must be understood, mitigation actions developed, and acceptable levels of risk assessed to build and support an informed and resilient society. This session covers the main areas in which space weather can have a significant impact on our modern technological society.
- **Human Safety and Response Preparedness:** Protection of human health and safety are of paramount concern among the space weather service providers. Threats to human health and safety include exposure to space radiation and to the effects of infrastructure degradation following severe space weather events. Appropriate mitigation, response, and recovery plans and actions are critical to minimizing the risk. In this session, the panel will discuss human safety and response preparedness for adverse space weather conditions.
- **Space Weather Warnings and Prediction Services:** This session will introduce the new interagency and international Unified Space Weather Operational Capability initiative to improve space weather products and services in advance of the coming solar maximum. Dr. Jack Hayes, the U.S. Permanent Representative to the World Meteorological Organization, will present the overarching concept and the international context. He will be followed by a number of agency leaders who will describe the components of their programs that comprise the overall capability.
- **Strategic Communications, Education, and Outreach:** This session focuses on education and outreach and examines the challenges and opportunities among the public and stakeholders in raising awareness and understanding of space weather impacts on daily life, security, the global economy, infrastructure, and business continuity.

## Keynote Address

### United States Representative Yvette D. Clarke



Rep. Clarke is a Brooklyn native whose roots are firmly planted in her Jamaican heritage. A product of the New York City Public School System, Rep. Clarke received a scholarship to Oberlin College and was a recipient of the prestigious APPAH/Sloan Fellowship in Public Policy and Policy Analysis.

Rep. Clarke was first elected to Congress in November 2006 and represents the 11th Congressional District which includes the communities of Brownsville, Crown Heights, East Flatbush, Flatbush, Windsor Terrace, Borough Park, Sunset Park, Carroll Gardens, Kensington, Park Slope, Prospect Heights, Prospect-Lefferts Gardens and Prospect Park.

As the Congressional Representative of the 11th district, she is committed to continuing the district's legacy of excellence as set forth by the late Honorable Shirley Chisholm, the first African American woman and Caribbean American elected to Congress. As an activist, a community organizer and now as a legislator, Rep. Clarke's boldness, compassion and love for humanity has allowed her to become an effective leader and an outspoken advocate on numerous issues of great importance to her constituents.

Currently in the 112th Congress, Rep. Clarke sits on the House Committee on Homeland Security and House Committee on Small Business. In the 111th Congress, Rep. Clarke sat on several committees including the House Education and Labor Committee, the House Homeland Security Committee and the House Small Business Committee.

Just two years in office, Rep. Clarke was appointed Chairwoman of the Homeland Security Subcommittee on Emerging Threats, Cybersecurity and Science and Technology for the 111th Congress. Under her leadership, this Committee exercised its oversight jurisdiction on a variety of issues, including cybersecurity, biodefense, pandemic influenza preparedness, nuclear detection, mitigating radiological attacks, agro-terrorism, and research and development within the Department of Homeland Security.

An unwavering champion for her native Brooklyn, she has worked with non-profit organizations, local community groups and appropriators to secure millions of dollars in essential federal support for the district. As a result, major institutions received funds, including the Brooklyn Academy of Music, the Brooklyn Botanic Garden, the Brooklyn Public Library, the Brooklyn Children's Museum, the Prospect Park Alliance and the New York State Department of Transportation (DOT).

As a testament to what Representative Clarke has accomplished in her first term, she received an "A" rating from the Drum Major Institute, TheMiddleClass.org, and 100% ratings by Peace Action, The Brady Campaign and the American Civil Liberties Union (ACLU). She was also named After-School Hero by The After-School Corporation for her work on the House Education and Labor Committee. In May 2009, Rep. Clarke was also presented with an honorary Doctorate Law Degree from St. Francis College.

Rep. Clarke currently resides in the neighborhood where she grew up, in the Flatbush section of Brooklyn.

## Invited Speaker

**Dr. Margaret (Marge) Cavanaugh**  
**Deputy Assistant Director, Geosciences Directorate**  
**National Science Foundation**

In her position as Deputy Assistant Director for Geosciences at NSF, which she has held since 2004, Marge is involved with the development of NSF programs on climate change, clean energy, and hazard reduction. She has a leadership role in NSF's investment area, *Science, Engineering and Education for Sustainability*, which is aimed at informing societal actions needed for environmental and economic sustainability and sustainable human well-being.

Previously, she served as Staff Associate for the Environment in the Office of the Director. During that time, Marge chaired a staff advisory committee on environmental research and education, which guided the NSF's *Biocomplexity in the Environment* investment. She also was Executive Secretary for the NSF Advisory Committee on Environmental Research and Education.



Prior to joining NSF in 1989, Marge was Professor of Chemistry and Chairman of the chemistry department at Saint Mary's College in Notre Dame, Indiana. She was at Saint Mary's for 14 years.

A native of Ohio, Marge received her undergraduate degree from the University of Pittsburgh and her Ph.D. degree from Catholic University of America. Her postdoctoral appointment was with Dr. Mary Good at Louisiana State University in New Orleans in inorganic chemistry. She is a current member of the Board of Trustees for the University of Dayton.

Marge is a past chair of several American Chemical Society committees, including the Committee on Ethics, the Committee on Science, and the Committee on Women Chemists. She is a founding member of COACH – the Committee on the Advancement of Women Chemists. In 1995, she was named the first recipient of the ACS Award for Encouraging Women into Careers in the Chemical Science; in 2010, she received the Society's Volunteer Service Award. NSF honored her with the Foundation's Distinguished Service Award in 2011.

## Luncheon Speaker

### **Dr. Kathryn Sullivan**

#### **Assistant Secretary of Commerce for Environmental Observation and Prediction**

National Oceanic and Atmospheric Administration (NOAA)



On May 2, 2011, Kathryn D. Sullivan was appointed by President Obama as Assistant Secretary of Commerce for Environmental Observation and Prediction and Deputy Administrator for the National Oceanic and Atmospheric Administration (NOAA). Sullivan, who previously served as NOAA's chief scientist, is a distinguished scientist, renowned astronaut and intrepid explorer.

As Assistant Secretary, Sullivan will play a central role in directing Administration and NOAA priority work in the areas of weather and water services, climate science and services, integrated mapping services and Earth-observing capabilities. She will provide agency-wide direction with regard to satellites, space weather, water, and ocean observations and forecasts to best serve American communities and businesses. Working closely with Assistant Secretary for Conservation and Management and Deputy Administrator Dr. Larry Robinson and NOAA's forthcoming chief scientist, Sullivan will help ensure the effective integration of activities, information, products and services across NOAA.

Sullivan's impressive expertise spans the frontiers of space and sea. An accomplished oceanographer, Sullivan was appointed NOAA chief scientist in 1993, where she oversaw a research and technology portfolio that included fisheries biology, climate change, satellite instrumentation and marine biodiversity.

Sullivan was the inaugural director of the Battelle Center for Mathematics and Science Education Policy in the John Glenn School of Public Affairs at Ohio State University. Prior to joining Ohio State, Sullivan served a decade as President and CEO of the Center of Science and Industry (COSI) in Columbus, Ohio, one of the nation's leading science museums. Dr. Sullivan joined COSI after three years' service as Chief Scientist at NOAA.

Sullivan was one of the first six women selected to join the NASA astronaut corps in 1978 and holds the distinction of being the first American woman to walk in space. She flew on three shuttle missions during her 15-year tenure, including the mission that deployed the Hubble Space Telescope. Sullivan has also served on the National Science Board (2004-2010) and as an oceanographer in the U.S. Navy Reserve (1988-2006).

Sullivan holds a bachelor's degree in earth sciences from the University of California at Santa Cruz and a doctorate in geology from Dalhousie University in Canada.

## Featured Speaker

### **Mr. David Jones** **President, StormCenter Communications, Inc.**

Dubbed an “Applications Futurist” by NASA, Dave Jones combines years of experience in meteorology, broadcasting and Earth observation with a vision to transform the existing television ‘weathercast’ into an expanded delivery of relevant environmental and earth science information called the ‘Envirocast®’. Dave has also developed weather workstations that are being used in the television industry today and is currently involved in developing future integrated weather and environmental workstations that address the Global Earth Observation System of Systems (GEOSS).



As a 25-year veteran of the weather industry Dave served as an on-air meteorologist for NBC4 WRC-TV, the NBC Owned and Operated TV station in Washington, DC for 10 years. He has also appeared as a meteorologist on the NBC Today Show, NBC Europe and CNBC Asia. While working for NBC, Mr. Jones proposed and was awarded a cooperative agreement from NASA which resulted in the first TV weather web site in 1995 and launched a new era in communicating NASA data to the public and positioned NBC4 in Washington, DC as the leading station using Internet technology, which now receives an average of 3 million visitors monthly.

Since forming StormCenter Communications in 2001, the company has worked with Federal, State and local governmental agencies, non-profit organizations, corporations and citizen based organizations to develop partnerships that “Increase the Environmental IQ of America™”. StormCenter has grown its market to more than 35 million television households representing nearly 60 million people that are exposed to environmental science information through its media partnerships. StormCenter is also looking to develop innovative training programs for TV meteorologists to communicate space weather developments and impacts across the nation. With solar max approaching in 2013 TV meteorologists need to understand the significance that solar storms have on our planet, technologies and economy.

Dave was also a Director for Foundation for Earth Science – a 501 c (3) non-profit corporation in Northern Virginia. Mr. Jones holds the Broadcast Television Seal of Approval from the American Meteorological Society for excellence in television weather broadcasting and is a member of the ESIP Federation Partnership Committee and a current member of the NOAA Executive Science Board’s Climate Services Task Force (2011). He graduated from the University of Maryland in 1986 with a B.S. in Physical Sciences with minors in Math and Computer Science.

He has addressed several National Academy of Science (NAS), National Research Council (NRC) and NASA boards convened to investigate the transition from research to operations and currently advises the Secretary of Interior on a Federal Advisory Committee to address the future of Land Remote Sensing. Dave currently serves on a NOAA advisory Task Force focusing on Climate Services.

# **Session Moderators and Panelists**

## **Abstracts and Biographies**

## **Moderator**

**Joseph H. McClelland**  
**Director, Office of Electric Reliability**  
**Federal Energy Regulatory Commission**

Joseph H. McClelland was appointed the first Director of the Office of Electric Reliability by Chairman Joseph T. Kelliher when he established the office on September 20, 2007. The Office of Electric Reliability (OER), which now includes four Divisions with over 121 employees, manages all aspects of the regulation of the reliability and security (including cyber) of the Nation's bulk power supply system through the development, implementation and enforcement of mandatory standards. Mr. McClelland often serves as expert witness for FERC on reliability and security matters for the bulk power system at Congressional hearings. He also serves as the U.S. Chairman for the Tri-lateral Reliability Organization, and is a Federal ex-officio member of the NERC Members Representative Committee and recognized Federal participant of the NERC Board of Trustees. He was appointed to the Senior Executive Service of the United States of America in 2004, recipient of the Chairman's Medal for outstanding commitment and exceptional leadership in 2007, and is a member of the FERC Performance Review Board.



Mr. McClelland joined the Commission in 2004 as Director of the Division of Reliability within the Office of Energy Markets and Reliability. The Division of Reliability provided engineering analysis and recommendations related to the Commission's authority to regulate interstate market issues and to address Reliability Standards matters. It also monitored and analyzed issues related to the reliable operation of the Nation's power supply needs.

Mr. McClelland came to the Commission with more than 20 years of experience in diverse and progressive positions in the electric utility industry. In addition to his experience at FERC, he has served at the executive level within cooperative and investor-owned electric utility entities. He began his career with Allegheny Energy Inc., holding a variety of positions in engineering, marketing, regulation and rates, and project development. Immediately prior to joining the Commission, Mr. McClelland was the General Manager of the Custer Public Power District in Broken Bow, Nebraska managing all aspects of the operation.

## **Session 2: Critical Infrastructure Vulnerability to Space Weather**

### **Mr. John G. Kappenman Storm Analysis Consultants**

Recent analysis carried out for the US FERC, Congressional EMP Commission, FEMA and the U.S. National Academy of Sciences has determined that severe geomagnetic storms (i.e., space weather caused by solar activity) has the potential to cause crippling and long-duration damage to the North American electric power grid or any exposed power grid throughout the world. The primary damage impact to the power grid is the risk of permanent damage to high voltage transformers, which are key, scarce, and difficult to replace assets for the high voltage power network. This could potentially be an event larger and more damaging than hurricanes with financial impacts exceeding \$1 trillion per year and with recovery times that could span 4 to 10 years, which would also place many lives at-risk. These storm events can have a continental and even planetary footprint causing widespread disruption, loss and damage to the electric power supply for the United States or other similarly developed countries around the world. It is also estimated to be plausible on a 1 in 30 to 1 in 100 year time frame. In short, this is potentially the largest and most plausible natural disaster that the U.S. could face. The loss of electricity for extended durations would mean the collapse of nearly all other critical infrastructures, causing wide-scale loss of potable water, loss of perishable foods and medications, and many other disruptions to vital services necessary to sustain a nation's population.

The severity of the threat from Geomagnetic Storm impacts to present day electric power grid infrastructures around the world have grown as the size of grids themselves have expanded by nearly a factor of 10 over the past 50 years. These aspects of current design practices of electric grids have unknowingly and greatly escalated the risks and potential impacts from these threat environments. There has been no power grid design code that has ever taken into consideration these threat concerns, yet it is possible to remedially apply relatively inexpensive solutions and protocols to harden both the current power grid and to add hardening to future additions to this critical infrastructure.

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#### BIOGRAPHY

John G. Kappenman is the Owner and Principal Consultant for Storm Analysis Consultants, prior to this he has worked for many years in the electric power industry and for the scientific/engineering firm Metatech Corp. He has been an active researcher in power delivery technologies and his primary engineering contribution has been his research work on lightning and geomagnetic storms and their disruptive effects on electric power systems.

He is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) and the Power Engineering Society, and is the Past Chairman of the Transmission and Distribution Committee. He is also a member of a number of working groups and standards committees. He is a member of the American Geophysics Union. Mr. Kappenman provided presentations to the US Presidents' Commission on Critical Infrastructure Protection on the Potential Impact of Geomagnetic Storms on Electric Power System Reliability. He has also served on the Science Advisors Panel for the NOAA Space Environment Center.

Mr. Kappenman was one of the principal investigators under contract with the Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP Commission) and FERC. Mr. Kappenman has presented testimony before the Congress several times on the importance of geomagnetic storm impacts on the electric power industry. He also was a principal investigator examining the Vulnerability of the Electric Power Grid for Severe Geomagnetic Storms for FEMA under Executive Order 13407. He was also one of the Principal Contributors to the 2008 US National Academy of Sciences Report on "Severe Space Weather Events—Understanding Societal and Economic Impacts".

## **Session 2: Critical Infrastructure Vulnerability to Space Weather**

### **Mr. Eric Rollison**

**Engineer of Reliability Assessments, North American Electric Reliability Corporation  
(NERC)**

The risk from geomagnetic disturbances (GMD) is gaining renewed attention across the industry as new predictions suggest that severe storms could occur and potentially reach lower geographic latitudes and exhibit higher intensity than formerly expected. The infrequency of occurrence of severe GMD and the changing character of the bulk power system has led to a lack of data to draw scientifically-backed conclusions about the impact to bulk power system assets and its resiliency to strong events.

From a power system perspective, the most well-known geomagnetic disturbance in North America was the March 13-14, 1989 solar storm. This storm proved that individual transformers may be damaged from overheating, which can result in long-term outages of key transformers in the network. After March 1989, many NERC stakeholders within the U.S. and Canada put operating procedures in place to pre-position the bulk power system in a conservative state when provided sufficient advanced notice of a geomagnetic disturbance. These plans have been largely effective at avoiding widespread blackouts to the system during the smaller and lower intensity geomagnetic disturbances which have occurred since 1989. However, these procedures may not be adequate to address the extreme levels of magnetic field fluctuations that are now being considered.

NERC's Technical Committee's are actively addressing a range of High-Impact, Low-Frequency event risks to bulk power system reliability, acting on their jointly developed Critical Infrastructure Strategic Initiatives Coordinated Action Plan. Hundreds of subject matter experts from industry are engaged to support this important plan. Specific to GMD, the NERC Geomagnetic Disturbance Task Force (GMDTF) is investigating bulk power system reliability implications of geomagnetic disturbances and developing solutions to mitigate these risks. In coordination with this effort, the Severe Impact Resilience Task Force (SIRTF) is assessing the existing and desired resiliency levels of the bulk power system and the Spare Equipment Database Task Force (SEDTF) is developing parameters to inventory long-lead time equipment, with initial focus on transformers.

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### **BIOGRAPHY**

Eric Rollison is the Engineer of Reliability Assessments at the North American Electric Reliability Corporation (NERC). Eric began working at NERC in April 2009 and joined the Reliability Assessments and Performance Analysis Group in July 2010. He previously was an Engineer in the Compliance Enforcement group within NERC. Prior to joining NERC, Eric worked for five years as both an Engineer and Project Manager in the Aerospace and Defense industry. He focused his efforts on improving Power Systems for the Pratt and Whitney PW4000 Turbofan engine, and improving sensor technology on the General Electric's GE90-115B and GENx high bypass Turbofan engines.

Eric is currently the day to day Project Manager of the NERC's Geomagnetic Disturbance and Smart Grid Task Forces. Additionally, Eric is the Project Manager for NERC's Seasonal (summer and winter) Assessments, which are released in May and November of each year.

Eric holds a Master's of Science in Finance from Temple University in January 2009, and holds a Bachelors of Science in Mechanical Engineering from Villanova University in 2001. Eric is currently a member of Institute of Electrical and Electronics Engineers (IEEE) and the American Society of Mechanical Engineers (ASME).

## Session 2: Critical Infrastructure Vulnerability to Space Weather

**Mr. Mitch Narins**  
**Chief Systems Engineer - Navigation Services**  
**Federal Aviation Administration**

Title: Robust Alternate Position Navigation and Time (APNT) systems and the Second GPS Civil Frequency

Position, Navigation, and Time (PNT) are key enablers of the Federal Aviation Administration's (FAA) provision of safe, secure, and efficient air navigation services for our National Airspace System. As we transform today's NAS to the Next Generation Air Transportation System (NextGen), the need to ensure robust PNT will be of utmost importance.

The FAA is looking at multiple ways of ensuring robust PNT as well as the means by which to achieve greater benefits from existing capabilities. The new second civil frequency (known as L5) and a worldwide increase of ground monitoring facilities and augmentation systems offer a means to achieve this goal.

The presentation examines the needs and challenges of providing robust PNT and how these challenges are being met. It recognizes the specific challenges presented to delivering high accuracy, high-integrity space-based PNT services by changing ionospheric conditions and the importance of knowledge and incorporation of space weather information.

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### BIOGRAPHY

Mr. Narins is currently the Federal Aviation Administration's Chief Systems Engineer for Navigation Services, but he has held a number of positions, including Program Manager for Terminal ATC Automation and Program Lead for Next Generation Air-to-Ground Communications. For many years he led the FAA, Coast Guard, Academic, and Industry Team that modernized the Loran radionavigation system to enhanced Loran (*eLoran*).

Prior to coming to FAA, Mr. Narins headed the US Marine Corps Special Project Office's Communications Terminal and Electronic Warfare branches at the Naval Electronic Systems Command, worked as a standards and facilities engineer at the Federal Communications Commission's Field Operations Bureau, and served as a US Peace Corps Volunteer.

Mr. Narins is a recipient of the US Institute of Navigation's Norman P. Hays Award and the International Loran Association's Medal of Merit. In 2008 he was recognized by GPS World Magazine as one of the "50+ Leaders to Watch."

Mr. Narins holds a Bachelor of Engineering (EE) degree from the City College of New York and a Master of Engineering Administration/Management degree from the George Washington University, is a Certified Information Systems Security Professional (CISSP) and an active member of both the US Institute of Navigation and the Royal Institute of Navigation.

## **Session 2: Critical Infrastructure Vulnerability to Space Weather**

### **Mr. Tim Deaver Vice President, Hosted Payload Development**

Space Weather information is critical to successful operations of Geo Communication Satellites. SES incorporates inputs from several public sources and employs its own hosted payloads to monitor the local weather environment. As public sources of this important information face increasing budget challenges, what does the future hold?

SES WORLD SKIES U.S. Government Solutions, a subsidiary of SES WORLD SKIES, is exclusively focused on meeting the satellite communications needs of the U.S. Government. Leveraging more than three decades of experience in the government SATCOM market, SES WORLD SKIES U.S. Government Solutions offers robust and secure satellite-based communications solutions. Supported by SES's fleet of 44 satellites offering comprehensive global coverage, SES WORLD SKIES U.S. Government Solutions offers highly reliable fixed and on-the-move capacity.

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#### **BIOGRAPHY**

Mr. Deaver joined SES World Skies U.S. Government Solutions in January 2008 and currently serves as Vice President, Hosted Payload Development. In this position, Mr. Deaver leads the management of all Air Force programs and provides direct support to the Corporate Development team in their quest to find innovative ways to use commercial communication satellites to meet the needs of our U.S. Government customers. Mr. Deaver also serves as the Program Executive for the Commercially Hosted Infra-red Payload (CHIRP) program.

Prior to joining SES, Mr. Deaver served 22 years in the U.S. Air Force, attaining the rank of Lt Colonel. His most recent military assignment was as Deputy Chief, Space Control Architecture Division, National Security Space Office where he directed the development of a long-term architecture for the Department of Defense's space control capabilities. Before this assignment, Mr. Deaver was the Chief of the Space Control and Force Application Branch for the Undersecretary of the Air Force, where he led the Air Force policy team on three National Security Policy Directives signed by President Bush.

Mr. Deaver was the commander and operations officer of an overseas space surveillance system responsible for tracking and maintaining orbits of thousands of satellites and orbiting debris. He served at U.S. Space Command developing contingency and operational plans for the employment of classified space control capabilities. In previous assignments, Mr. Deaver gained experience in simulation and modeling, space system intelligence and space system operations.

## Moderator

**Mr. Jonathan T. (Jon) Malay,**  
**Director, Civil Space and Environment Programs, Lockheed Martin Corporation;**  
**President, American Meteorological Society**



Jonathan (Jon) Malay is Director of Civil Space & Environment Programs at the Washington Operations office of Lockheed Martin Corporation in Arlington, Virginia and he is a Fellow and the current President of the 14,000 member American Meteorological Society (AMS). At Lockheed Martin, he serves as the company's senior business development specialist interacting on a day-to-day basis with NASA Headquarters and the Goddard Space Flight Center for Earth and Space Science missions and with NOAA Headquarters and its Satellite and Information Service and National Weather Service for environmental satellites, space-based and *in-situ* instruments, space weather, and phased array weather radar. He also supports business with the Air Force Weather Agency for weather satellite direct readout terminals and supports virtually any corporate business area which involves the Earth-Sun environment.

Upon graduation in 1973 from the U.S. Naval Academy (BS Oceanography) and the immediate graduate education program at the Naval Postgraduate School (MS Meteorology), Malay began his career as a Navy Surface Warfare Officer specializing in Antisubmarine Warfare and was subsequently selected for specialist duty in meteorology and oceanography. In the early 1980's while serving as a Research Officer in underwater acoustics and oceanography at the Naval Underwater Systems Center, he further specialized in space-based remote sensing and was a 1984 finalist for NASA Astronaut selection. He retired from active duty at the rank of Commander in 1993 after tours at sea and ashore, including the USS NIMITZ (CVN-68), Naval Space Command, the Office of the Oceanographer of the Navy, and the National Reconnaissance Office. As a civilian, after working briefly at Orbital Sciences Corp. and at the Satellite and Information Service of NOAA, he joined Ball Aerospace in 1995 and then Lockheed Martin in 2003. In addition to his leadership of the AMS, Mr. Malay is a Fellow and Past-President of the American Astronautical Society (AAS), an Associate Fellow and recent Region I (Northeast US) Director of the American Institute for Aeronautics & Astronautics (AIAA). He is the author of the 2003 novel *Seraphim Sky*, co-author of the 2004 *National Geographic Encyclopedia of Space*, and is currently writing a book about his experience as a junior officer on the last ship to leave Vietnamese waters after the fall of Saigon in the spring of 1975, documenting the historical significance of the last official U.S. military presence in that conflict. He and his wife reside in Fredericksburg, Virginia.

## **Session 3: Human Safety and Response Preparedness**

**Mr. Michael Stills**

**Manager – International Operations, United Flight Dispatch**

Abstract not available

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### **BIOGRAPHY**

Michael Stills is currently the Manager of International Operations for United Airlines Flight Dispatch.

He is licensed by the FAA and has 20 years of operational airline experience. Responsible for procedural oversight and initiatives within the airline to ensure safety as mandated by the U.S Code of Federal Regulations, he monitors global operations to and from six continents.

He holds a Bachelor's degree from Villanova University.

## Session 3: Human Safety and Response Preparedness

### Mr. Leviticus A. Lewis FEMA Representative-DHS Space Team

On June 28, 2010, the President announced the National Space Policy of the United States of America (“National Space Policy”) and specified that the United States must:

“Increase assurance and resilience of mission-essential functions enabled by commercial, civil, scientific and national security spacecraft and supporting infrastructure against disruption, degradation, and destruction, whether from environmental, mechanical, electronic or hostile causes.”

On February 3, 2011, the Secretary of Homeland Security signed the DHS Policy for Space memorandum. The Department’s Policy shall guide Component efforts internally and across the Homeland Security Enterprise and US Critical Infrastructure/Key Resources.

FEMA in coordination with the NOAA Space Weather Prediction Center has established a Space Weather Alert and Notification protocol and has conducted joint exercises with the European Union/Swedish Civil Contingencies Agency (MSB) concerning management of critical disasters in the Transatlantic Domain.

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### BIOGRAPHY

Leviticus A. “L.A.” Lewis is a member of the Department of Homeland Security Space team as the FEMA Representative. In July 2010 Mr. Lewis was assigned as co-chair on the National Space Policy, Presidential Policy Directive (PPD-4) Interagency Working Group on Space Infrastructure protection. The task of this group is to develop a DHS led, in coordination with other relevant departments and agencies an implementation plan to assure protection of the space infrastructure. Mr. Lewis is also assigned as the Senior Agency Liaison to Federal Bureau of Investigation (FBI) and the FBI National Joint Terrorism Task Force (NJTTF). The NJTTF mission is to enhance communications, coordination and cooperation between all levels of government in the intelligence, law enforcement, public safety and homeland security communities.

Mr. Leviticus A. Lewis joined the Federal Emergency Management Agency as Director of the National Response Coordination Center, (NRCC) in July 2007. The NRCC maintains a 24-hour; 365 day watch at FEMA Headquarters with a primary mission of maintaining national situational awareness of the Agency's operational status and monitoring emerging incidents or potential incidents with possible operational consequences which would require assistance of the federal government. The NRCC is also responsible for initiating emergency response operations to support ongoing Federal, State and local incident response efforts. Prior to joining FEMA, Mr. Lewis was employed by the Transportation Security Administration as a Supervisory Transportation Security Specialist (Command Duty Officer and Special Projects) at TSA’s Transportation Security Operations Center. Prior to joining TSA, Mr. Lewis was employed as a defense contractor working for large and small technology companies and spent 20 years as a Surface Warfare Officer in the US Navy. Mr. Lewis has over thirty years of military, diplomatic, defense industry and Federal government experience. He has served in several senior leadership positions in his military and civilian careers.

Mr. Lewis graduated from Savannah State College with a Bachelor of Science degree in Electronic Engineering Technology and has a Master of Arts in National Security and Strategic Studies from the US Naval War College. Mr. Lewis was awarded a certificate of completion for the National Preparedness Leadership Initiative, Harvard University, John F. Kennedy School of Government and Harvard School of Public Health, Executive Education.

## **Session 3: Human Safety and Response Preparedness**

**Dr. John R. Allen**

**NASA Program Executive for Crew Health and Safety**

Space weather, or more precisely, radiation associated with space weather is a significant concern to space exploration activities involving humans. Levels of radiation exposure routinely exceed terrestrial limits even in the absence of major solar events. Solar Particle Events introduce higher levels of exposure with potentially different radiation exposures. As a result, space faring nations have had to establish exposure limits, develop mitigation strategies, and work toward better abilities to forecast solar events that protect astronauts while still allowing them to live and work in this hostile environment. The potential health hazards of radiation associated with space travel will be reviewed in light of the factors mentioned above. Further, the implications of space weather, as the world moves closer to a greater commercial, if not recreational, use of space will be discussed. Finally, the need for a better understanding of the environment and how to protect against it as new space vehicles and platforms are designed will be outlined.

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### **BIOGRAPHY**

Dr. John R. Allen serves as the Program Executive for Crew Health and Safety at NASA Headquarters Space Operations Mission Directorate (SOMD), Washington DC, where he oversees the programmatic aspects of space medicine activities conducted at the Johnson Space Center, Houston, Texas. He has participated in addressing astronaut health risks associated with operating in and exposure to an environment that contains significantly greater exposure to radiation on a daily basis than radiation workers here on earth. He serves on the Committee On Space Weather under the National Space Weather Program Office of the Federal Coordinator for Meteorology. In addition, he is a member of Space Environmental Gap Analysis Work Group, reporting OSTP. He also participates on the Research to Operations/Operations to Research work group, responding to the Decadal Strategy for Solar and Space Physics (Heliophysics).

Dr. Allen received a B.A. in Speech Communication from the University of Maryland (1975), a M.A. in Audiology/Speech Pathology from The Catholic University of America (1977), and a Ph.D. in Audiology and Bioacoustics from Baylor College of Medicine (1996). Upon completion of his Master's degree, he worked for the Easter Seals Treatment Center in Rockville, Maryland as an audiologist and speech-language pathologist. He joined the US Air Force in 1980, serving as Chief, Audiology at Andrews AFB, Maryland, and at the Wiesbaden Medical Center, Germany, and as Chief, Otolaryngology Services at the Aeromedical Consultation Service, Brooks AFB, Texas, where he directed research and clinical services. Colonel Allen then served as the Commander of the Air Force DoD Medical Element at Andrews AFB. He was detailed by the Air Force to the Space Operations Mission Directorate (SOMD), NASA Headquarters from September 2001 to December 2005. He retired from the Air Force in February 2006 and was hired by NASA to continue on in his current capacity. He serves as a liaison between SOMD and the Office of Chief Health and Medical Officer and the Exploration Systems Mission Directorate. While on active duty he was a member of the DoD Hearing Conservation Working Group, and served for six years as Consultant to the Air Force Surgeon General in Audiology, Speech Pathology, and Hearing Conservation.

## Session 3: Human Safety and Response Preparedness

### Dr. Brenda Phillips

Professor, Center for the Study of Disasters and Extreme Events, Fire and Emergency Management Program, Department of Political Science Oklahoma State University

For most of the population, disaster preparedness of any kind ranks low among many competing priorities. Yet improving response to hazard information, particularly warnings and protective action, requires dedicated, sustained preparedness outreach, education and - most importantly - action. A number of barriers to each of these efforts exist, particularly for under-resourced households and historically disadvantaged populations. This presentation discusses preparedness issues and principles for those most likely to be at risk for space weather impacts and draws upon scientifically-supported best practices for increasing awareness across socially vulnerable populations. Points of intervention are presented within existing initiatives, across key partners and within the context of people's daily lives.

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#### BIOGRAPHY

Brenda Phillips is a Professor at Oklahoma State University. She is the lead editor of *Social Vulnerability to Disasters* (CRC Press) and the lead researcher for *Effective Emergency Management: Making Improvements for Communities and People with Disabilities*, (National Council on Disability). Her textbooks include *Introduction to Emergency Management* and *Disaster Recovery* and her published research can be found in a wide variety of scientific journals. Dr. Phillips teaches courses on high risk populations, community relations, disaster recovery and mitigation, research methods and international relief in the Fire and Emergency Management Program at Oklahoma State University.

## **Moderator**

**Ms. Maria A. Pirone**  
**Senior Account Manager**  
**Environmental Systems – Harris Corporation**



Ms. Pirone, Sr. Account Manager for Environmental Systems at Harris Corporation, has over thirty-five years experience in information technology with twenty-five in weather and climate information services. During her career she has held management positions in both the marketing and technical development of weather and climate products and services. She is currently leading business development in the area of climate and environmental systems opportunities within the federal government and internationally.

Currently serving on the Executive Committee for the Alliance, The Weather Coalition and the Maryland Space Business Roundtable (advocacy groups representing the aerospace and weather industry) and on the AMS Network of Networks Working Group, her involvement in NSF, NAS, FAA and AMS committees has spanned two decades. In addition, she was appointed the first Private Sector advisor to the US Permanent Representative to the WMO (UN) for executive council meetings in 2000 and again in 2003 for the 14th Congress and the 3rd WMO Women in Meteorology Conference. Her work has been published in technical journals, industry and government publications. She has presented on the Hill, at the United Nations at the World Meteorological Organization, in national symposia and conferences in the US, UK and most recently, in Russia. She has a BS in Chemistry and an MBA in Finance from Suffolk University in Boston.

## Session 4: Space Weather Warnings and Prediction Services

### Dr. Jack Hayes

#### NOAA Assistant Administrator for Weather Service

Together with the other agencies of the National Space Weather Program, NOAA is leading an effort to develop a unified space weather operational capability to provide the best possible services to the Nation for the next solar maximum and beyond. The NSWP will produce a capabilities plan, including the near-term actions and a long-term roadmap, details of which will be unveiled at the Space Weather Enterprise Forum. NOAA is the Nation's official source for space weather guidance, prediction and data archiving, and is designated a National Critical System by the Department of Homeland Security. The advanced technologies that underlie our homeland security and economic prosperity are vulnerable to solar and geomagnetic storms. NOAA's Space Weather Program delivers space weather alerts, watches, warnings and forecasts to satellite operators, precision GPS users, the aviation industry, federal exploration and commercial space development mission controllers, and power distribution grid managers. NOAA is taking significant steps to ensure that we are prepared to meet the challenges of our first advanced technology (GPS, satellites, NextGen, wireless) solar maximum.

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#### BIOGRAPHY

John L. "Jack" Hayes is the National Oceanic and Atmospheric Administration (NOAA) Assistant Administrator for Weather Services and National Weather Service (NWS) Director. In this role, Dr. Hayes is responsible for an integrated weather services program, supporting the delivery of a variety of weather, water, and climate services to government, industry, and the general public, including the preparation and delivery of weather warnings and predictions, and the exchange of data products and forecasts with international organizations.

Dr. Hayes returned to the NWS in 2007 after serving as the director of the World Weather Watch Department at the World Meteorological Organization (WMO), located in Geneva, Switzerland. In that position, he was responsible for global weather observing, weather data exchange telecommunications, and weather data processing and forecasting systems.

Before joining the WMO, Dr. Hayes served in several senior executive positions at NOAA including Deputy Assistant Administrator for NOAA Research, Deputy Assistant Administrator of the National Ocean Service (NOS), and Director of the Office of Science and Technology for the NWS.

Dr. Hayes was also an executive in the private sector and the military. He was general manager of the Automated Weather Interactive Processing System (AWIPS) program at Litton-PRC from 1998 through 2000. From 1970 through 1998, Dr. Hayes spent a career in the United States Air Force. He held a variety of positions, culminating his career as the Commander of the Air Force Weather Agency in the rank of Colonel.

Dr. Hayes received both his Ph.D. and Master of Science degrees in meteorology from the Naval Post Graduate School in Monterey, California. A Fellow in the American Meteorological Society, he also graduated from Bowling Green State University, with a bachelor's degree in mathematics.

## Session 4: Space Weather Warnings and Prediction Services

### Colonel John Egentowich Deputy Director of Air Force Weather

The National Space Policy discusses preservation and responsible use of the space environment, highlighting the need for space situational awareness, which includes the need to characterize and exploit the space environment for operational advantage.

In order to fulfill space policy requirements, the Air Force Director of Weather has established priorities for improving ground-based space environment sensing during the next five years. First is the implementation of the next increment of the Air Force's ground-based ionospheric sensing network, the Next Generation Ionosonde (NEXION). Second is the replacement of the Air Force's solar optical telescopes with the remotely operated Improved Solar Optical Observing Network (ISOON).

Air Force Weather Agency (AFWA) will also upgrade tools to improve characterization and exploitation of the space environment. In collaboration with partners in research and academia, AFWA will integrate, test, and deploy a full-physics version of the Global Assimilation of Ionospheric Measurements (GAIM) model. AFWA will also transfer space weather databases into joint net-centric standards, allowing discoverability and accessibility of data for its users.

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#### BIOGRAPHY

Colonel Egentowich is the Deputy Director of Weather, Directorate of Operations, Deputy Chief of Staff, Operations, Plans and Requirements, Headquarters, U.S. Air Force, Washington, D.C. He is responsible for assisting the director in developing and implementing weather doctrine, policies, plans, programs, and standards. He plans, programs, and budgets for Air Force Weather resources and manages the execution of the \$350 million per year weather program. He manages the 4,412-person weather career field and directs the 1,400-person Air Force Weather Agency Field Operating Agency. He interfaces with Air Force MAJCOMs and the U.S. Army regarding full exploitation of Air Force weather resources and technology. He also directs interagency activities with the Department of Commerce, the National Aeronautics and Space Administration, and the Federal Aviation Administration.

Colonel Egentowich's previous assignments include being the Executive Officer to the Commander, Air Force Materiel Command and numerous leadership positions. He was the Director of Staff, Information Directorate at Defense Logistics Agency where he was responsible for managing all staff operations for 3,056 civilians, 27 military, over 1,000 contractors, and he was responsible for a \$700M annual budget. He commanded the 88th Weather Squadron at Wright-Patterson AFB, Ohio. The squadron provided meteorological and space environmental consultation services to all acquisition and technology programs of Air Force Materiel Command. He was deployed to Kandahar, Afghanistan, where he was the Deputy Commander of the 451st Air Expeditionary Group, which was responsible for all airlift operations in southern Afghanistan. He led the Global Weather Center Division at Air Force Weather Agency providing a variety of weather services to worldwide DoD operations. He also commanded the 401st Expeditionary Weather Squadron supporting NATO Stabilization Forces, Tuzla Air Base, Bosnia-Herzegovina. Prior to his current position, Colonel Egentowich was the commander of the 2nd Weather Group, Air Force Weather Agency, Offutt AFB, Neb. He led more than 500 active duty, civil service and contractors at 7 operating locations around the world.

## **Session 4: Space Weather Warnings and Prediction Services**

**Dr. Michael Hesse**  
**Chief, Space Weather Laboratory, NASA GSFC**

### **Space Weather Forecasting in a Shifting Environment**

Space research, and, consequently, space weather forecasting are immature disciplines. Scientific knowledge is accumulated frequently, which changes our understanding of how solar eruptions occur, and of how they impact targets near or on the Earth, or targets throughout the heliosphere. Along with continuous progress in understanding, space research and forecasting models are advancing rapidly in capability, often providing substantial increases in space weather value over time scales of less than a year. An optimal forecasting environment needs to be flexible enough to benefit from this rapid development, and flexible enough to adapt to evolving data sources, many of which are from research data sources and/or from non-US entities. This presentation will analyze the experiences obtained by developing and operating both a forecasting service for NASA, and an experimental forecasting system for Geomagnetically Induced Currents. It will conclude with suggestions for avenues toward future progress.

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#### **BIOGRAPHY**

Dr. Michael Hesse holds the position of Chief, Space Weather Laboratory at NASA's Goddard Space Flight Center. In this role he is responsible for a staff of 65 civil servants, university scientists, and contractors engaged in space research, instrumentation development and deployment, and space environment forecasting for NASA and partners. Dr. Hesse is the founding Director of the Community Coordinated Modeling Center (CCMC), for which he received NASA's Outstanding Leadership Medal in 2007. The CCMC is a multi-agency activity with the objective to bring to bear modern space research model on the needs of space weather forecasters and the research community. Furthermore, Dr. Hesse's responsibilities include that of Lead Co-Investigator for Theory and Modeling for NASA's Magnetospheric MultiScale (MMS) mission. Dr. Hesse serves or has served on numerous steering and advisory committees, most recently on the steering committee of the 2013 Heliophysics Decadal Survey. Dr. Hesse remains a publishing research scientist, with more than 200 papers in the scientific literature. In addition to Space Weather-related topics, his research interests include the theory and modeling of kinetic space plasma processes throughout the Heliophysics domain. Dr. Hesse was elected Fellow of the American Geophysical Union in 2010.

## **Session 4: Space Weather Warnings and Prediction Services**

**Dr. Richard Behnke**  
**Head, Geospace Section, National Science Foundation**

Together with the other agencies of the National Space Weather Program, NSF is leading an effort to develop a unified space weather operational capability to provide the best possible services to the Nation for the next solar maximum and beyond. The NSWP will produce a capabilities plan, including the near-term actions and a long-term roadmap, details of which will be unveiled at the Space Weather Enterprise Forum. NSF is responsible for maintaining the health of basic research in all areas of the atmospheric sciences. The Foundation supports theoretical, observational, and numerical modeling research with the goals of increasing fundamental understanding of space environment processes and improving space weather predictive capability. Research areas of emphasis are: (1) solar region evolution and eruptive events; (2) interplanetary transport; (3) magnetospheric physics and dynamics; (4) ionospheric physics and dynamics; and (5) upper atmospheric physics and dynamics. Knowledge of the processes that are fundamental to each of these areas is enhanced by a multi-disciplinary approach to investigating the basic mechanisms through which these areas interact.

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### BIOGRAPHY

Dr. Behnke received his PhD in Space Physics and Astronomy from Rice University in 1970. His research interests center on studies of the dynamics of the Earth's ionosphere using incoherent scatter radar techniques.

Dr. Behnke joined the National Science Foundation in 1982. Presently, he is Head of the Geospace Section in the Division of Atmospheric and Geospace Sciences where he leads a Section that emphasizes forward-looking and transformative basic research in aeronomy, magnetospheric physics and solar physics.

Dr. Behnke is a co-chair of the Committee for Space Weather of the National Space Weather Program.

## Session 4: Space Weather Warnings and Prediction Services

**Dr. David Applegate**  
**Associate Director for Natural Hazards**  
**U.S. Geological Survey**

The U.S. Geological Survey (USGS) Geomagnetism Program delivers ground-based monitoring of the Earth's magnetic field as an integral component of the interagency National Space Weather Program (NSWP). The USGS is currently working with the other agencies of the NSWP to develop a unified space weather operational capability to provide the best possible services to the Nation for the next solar maximum and beyond. The USGS provides high-quality, ground-based magnetometer data continuously from 14 observatories distributed across the United States and its territories. The Program collects, transports, and can disseminate these data in near real time, and it also has significant data-processing and data-management capacities. Working through the INTERMAGNET organization, and with other national geomagnetism programs, the USGS assists in the coordinated, global-scale monitoring, modeling and mapping of the Earth's magnetic field. The USGS also supports research on magnetic field activity, magnetic storms, and magnetic climatology, and it has recently developed a real-time storm-time disturbance (Dst) intensity scale.

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### BIOGRAPHY

David Applegate is the associate director for natural hazards at the U.S. Geological Survey. In that role, he leads the Coastal & Marine Geology, Earthquake Hazards, Global Seismographic Network, Geomagnetism, Landslide Hazards, and Volcano Hazards Programs and coordinates USGS hazards planning and response activities. He also co-chairs the National Science and Technology Council's interagency Subcommittee on Disaster Reduction. Prior to joining USGS, he worked at the American Geological Institute as director of government affairs and editor of *Geotimes*, AGI's newsmagazine of the earth sciences (now renamed *Earth*). Before that, Applegate served with the U.S. Senate Committee on Energy and Natural Resources as the American Geophysical Union's Congressional Science Fellow and as a professional staff member. Born and raised in Chambersburg, Pennsylvania, Applegate holds a B.S. in geology from Yale University and a Ph.D., also in geology, from the Massachusetts Institute of Technology.

## **Moderator**

**Mr. David Jones**  
**President, StormCenter Communications, Inc.**

Dubbed an “Applications Futurist” by NASA, Dave Jones combines years of experience in meteorology, broadcasting and Earth observation with a vision to transform the existing television ‘weathercast’ into an expanded delivery of relevant environmental and earth science information called the ‘Envirocast®’. Dave has also developed weather workstations that are being used in the television industry today and is currently involved in developing future integrated weather and environmental workstations that address the Global Earth Observation System of Systems (GEOSS).



As a 25-year veteran of the weather industry Dave served as an on-air meteorologist for NBC4 WRC-TV, the NBC Owned and Operated TV station in Washington, DC for 10 years. He has also appeared as a meteorologist on the NBC Today Show, NBC Europe and CNBC Asia. While working for NBC, Mr. Jones proposed and was awarded a cooperative agreement from NASA which resulted in the first TV weather web site in 1995 and launched a new era in communicating NASA data to the public and positioned NBC4 in Washington, DC as the leading station using Internet technology, which now receives an average of 3 million visitors monthly.

Since forming StormCenter Communications in 2001, the company has worked with Federal, State and local governmental agencies, non-profit organizations, corporations and citizen based organizations to develop partnerships that “Increase the Environmental IQ of America™”. StormCenter has grown its market to more than 35 million television households representing nearly 60 million people that are exposed to environmental science information through its media partnerships. StormCenter is also looking to develop innovative training programs for TV meteorologists to communicate space weather developments and impacts across the nation. With solar Max approaching in 2013 TV meteorologists need to understand the significance that solar storms have on our planet, technologies and economy.

Dave was also a Director for Foundation for Earth Science – a 501 c (3) non-profit corporation in Northern Virginia. Mr. Jones holds the Broadcast Television Seal of Approval from the American Meteorological Society for excellence in television weather broadcasting and is a member of the ESIP Federation Partnership Committee and a current member of the NOAA Executive Science Board’s Climate Services Task Force (2011). He graduated from the University of Maryland in 1986 with a B.S. in Physical Sciences with minors in Math and Computer Science.

He has addressed several National Academy of Science (NAS), National Research Council (NRC) and NASA boards convened to investigate the transition from research to operations and currently advises the Secretary of Interior on a Federal Advisory Committee to address the future of Land Remote Sensing. Dave currently serves on a NOAA advisory Task Force focusing on Climate Services.

## Session 5: Strategic Communications, Education and Outreach

### Ms. Victoria Jaggard Space Editor, National Geographic News Online

The National Geographic Society's mission is to inspire people to care about the planet, and an important part of this goal has been to help readers understand the ways space phenomena can influence Earth. Space weather and solar physics in particular have traditionally been popular topics for online news readers, especially as solar activity has started to increase. Our roster of seasoned science writers, who work closely with talented researchers in the field, has helped us carefully report on the latest findings about how the sun works, how Earth's magnetic "shield" protects us, and how stronger solar storms might break through that shield to impact orbiting and ground-based electronics. As with coverage of any natural disaster, one challenge has been tempering the "worst case" risks of solar storms with practical realities and unknowns. Stories about the exact types of solar activity that can impact Earth, efforts in space-weather forecasting, and what actions people can take to mitigate damage will be crucial in the coming months. In addition, readers should see how space weather can be important and exciting even when there's no looming potential for disaster. For instance, an increase in solar activity can be a boon for aurora enthusiasts and can generate amazing satellite imagery, which may spur people to delve deeper into the complex workings of our stormy star. Increased attention to space weather around Earth can also be an opportunity to inform people about how the sun affects the entire solar system, including deep-space missions, as well as a chance to link what we learn about solar activity to our understanding of other stars and stellar phenomena across the universe.

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#### BIOGRAPHY

Victoria Jaggard is the space editor for National Geographic News, the daily online news service of the National Geographic Society. Reaching more than 3.5 million readers each month, Nat Geo News strives to cover science and world cultures with speed, accuracy, and balance via news articles, photo features, blogs, and other digital media. As a news editor, Jaggard works with dozens of freelance writers around the world to find and present stories about space that inform a global audience. For NGS, Jaggard is also founder and editor of the space blog *Breaking Orbit* and a contributor to *National Geographic* magazine's Departments section.

A graduate of Lehigh University's Science Journalism program with a minor in Earth and Environmental Science, Jaggard has covered environmental policy, materials science, chemistry, and science in pop culture for the U.S. EPA, *Chemical & Engineering News* magazine, and other print and digital outlets. Jaggard joined Nat Geo News in 2005, where she has taken a leadership role in writing about astronomy and astrophysics. She has reported on the touchdown of the Phoenix Mars lander and its watery discoveries, legal battles over ownership of the moon, newfound breaches in Earth's magnetosphere, and the painful reasons some astronauts lose their fingernails in space.

Jaggard is a member of the D.C. Science Writers Association and a graduate of the UNC Multimedia Boot Camp for Journalists. In 2010 Jaggard spent a week studying cosmology as a Knight Science Journalism Boot Camp Fellow and a week immersed in climate science and solar physics as an NCAR Journalism Fellow.

## Session 5: Strategic Communications, Education and Outreach

### Mr. Robert Irion

#### Science Journalist and Director, UC Santa Cruz Science Communication Program

Solar physics and space weather are dynamic, visual, compelling fields with clear impacts upon our lives. They are detective stories in every sense: unraveling complex events, searching for clues among signs both visible and hidden (to our eyes), stringing together cause and effect, preparing for possible calamity. In other words, they offer what every science editor loves in a good story for the public. Although many traditional markets have changed, both print and online media provide ways to reach mass audiences with accurate and lively tales about the basic science of space weather and its influences on our commerce. In particular, the vulnerability of our electronic communication enterprise to magnetic outbursts from the sun is a powerful hook to engage readers who might otherwise overlook a story that smells like "physics." Such efforts require cooperation from eloquent researchers and great visual elements, such as the data stream from the Solar Dynamics Observatory. Scientists themselves can play a role by writing directly for certain audiences and by using social media (with help from communications professionals). I will discuss an article in the April 2011 *Smithsonian* that reached about 7 million readers by following these themes, and I will describe the profusion of online publications that offer new ways to convey the challenges and importance of studying space weather.

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#### BIOGRAPHY

Robert Irion is director of the Science Communication Program and senior lecturer in science writing at the University of California, Santa Cruz. His one-year program provides intensive training in science journalism for graduate students who already have earned a bachelor's degree, master's degree, or Ph.D. in science or engineering. Students learn the foundations of journalism from professional practitioners in the San Francisco Bay Area, and they work at part-time internships at newspapers, radio stations, online news services, and university news offices. Graduates of the 30-year-old program work in science media, at universities, federal agencies, and museums, and as freelance writers throughout the U.S. and Europe.

Mr. Irion started working as a newspaper journalist after earning a bachelor's degree in Earth and Planetary Sciences from the Massachusetts Institute of Technology in 1985. He then completed the UC Santa Cruz Science Communication Program and worked for nearly a decade as the campus science writer there. Mr. Irion then became a freelance magazine journalist, working as the U.S. correspondent in astronomy and astrophysics for *Science* and as a contributor to *Discover*, *New Scientist*, *Astronomy*, *Sky & Telescope*, *Muse*, and other national magazines. He joined the UC Santa Cruz faculty in 2006. He now writes about space sciences for *Smithsonian*, *Scientific American*, and *National Geographic*.

Mr. Irion is a two-time winner of the David N. Schramm Award for High-Energy Astrophysics Science Journalism from the American Astronomical Society for articles in *Science* and *Smithsonian*. He also received the American Institute of Physics Science Writing Award for *One Universe: At Home in the Cosmos* (Joseph Henry Press, 2000), a book he coauthored with Neil deGrasse Tyson and Charles Liu of the American Museum of Natural History. Mr. Irion is co-chair of the Education Committee of the National Association of Science Writers and a board member of the Northern California Science Writers Association. He lives in Santa Cruz.

## **Session 5: Strategic Communications, Education and Outreach**

### **Lieutenant Lesley Lykins**

**Director, Emerging Media Integration, Department of the Navy, Office of Information**

A dynamically changing communication landscape has increasingly challenged organizations - especially so for those in government. Emerging and social media technologies have flattened and democratized issues and understanding in ways that can make historically hierarchical organizations more than uncomfortable. With more than half of Americans now participating on Facebook, and considering the flourishing expectation of speed and transparency, social media is powerful. It provides organizations the opportunity to more efficiently, directly and richly share its story than ever before. Mismanaged, it can create a resource drain with negative organizational outcomes. One thing is certain: Agencies can share and represent who they are in these forums, or cede their reputation to the masses. In 2010, the Navy went from essentially no social media presence to more than 400 Navy organizations operating in excess of 800 properties. The U.S. Navy has used social media in crisis communication and humanitarian response and leadership engagement. LT Lesley Lykins, Director of Emerging Media Integration for the Navy, will share Navy lessons learned and best practices, and discuss the potential costs, obligations, risks and rewards Federal Agencies might consider in meeting this clear and present reality.

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#### **BIOGRAPHY**

Lieutenant Lesley Lykins was raised on a farm in Minerva, Ohio and chose to follow her father's lead by serving in the United States Navy. She was commissioned as an officer in the Navy in 2001 through the Naval Reserve Officer Training Corps at Boston University. She started her career as a Surface Warfare Officer on Spruance Class destroyers based in San Diego, California. After three years she transferred to the Public Affairs Community and has served at commands including the Maritime Force Protection Command, now Naval Expeditionary Combat Command, as the strike group public affairs officer for the Nassau Expeditionary Strike Group and the Deputy Public Affairs Officer at the Navy Office of Information in New York City. Most recently she has been assigned as the Director of Emerging Media Integration at the Department of the Navy Office of Information and she now spends a great deal of time on Facebook, Twitter, YouTube and other sites analyzing coverage of the Navy in social media forums as well as advising commands on how best to utilize social media to connect with their Sailors, families and fans. She is a wife and mother of two young children.

## **Session 5: Strategic Communications, Education and Outreach**

**Dr. W. Jeffrey Hughes**

**Director, Center for Integrated Space Weather Modeling, Boston University**

The Center for Integrated Space Weather Modeling (CISM) is an NSF Science and Technology Center initially funded in 2002. CISM is a consortium of eight universities and three research institutes led by Boston University that focuses its activities around one of the core requirements of the National Space Weather Program, developing space weather modeling capabilities. CISM is developing a suite of continually improving, comprehensive, physics-based simulation models that describe the space environment from the Sun to the Earth. Using these models as education tools is at the core of CISM's education program whose mission is "to introduce into education, particularly undergraduate and graduate education, the notion the sun-earth science must be viewed as a single, unified field of research and study." One of the means by which CISM achieves this mission is through an annual two-week Space Weather Summer School. Each year 32 "students" spend two weeks together attending morning lectures, using model simulations to better understand the space environment in the afternoons, and getting to know each other better in the evenings. The school provides a broad, hands-on conceptual introduction to the field of space weather without delving too deeply into the underlying physics. After a one-day introduction the curriculum spends two days on the sun, the solar wind, the magnetosphere, and the ionosphere/thermosphere, ending with a capstone exercise on the final day. About two thirds of the "students" are graduate students in the early stage of their graduate programs while the other third are professionals from government, the military, and industry either beginning their careers or entering the space weather field. We find that this is a powerful mix; the graduate students learn that space physics and space weather are much more than a purely academic discipline, and get a better understanding of career paths, while the professionals obtain a sense of the fundamental science underlying their day-to-day concerns and a better appreciation for how research scientists approach problems. Both groups get a better concept of how their particular research or activity fits into the broader picture. Most of the approximately 350 alumni of the summer school remain active in the space weather field.

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### BIOGRAPHY

W. Jeffrey Hughes is professor of astronomy at Boston University and the director of the Center for Integrated Space Weather Modeling, a National Science Foundation Science and Technology Center led by Boston University. CISM was founded in 2002 with the goal of developing sun-to-earth, physics-based models of the space environment.

A native of Wales, Hughes received both his BSc and PhD in physics from Imperial College, London. He spent two years as a Hayes-Fulbright Scholar doing post-doctoral research in the US, spending a year at both the University of Colorado and UCLA. He joined the Boston University faculty in 1978. At Boston University he was the founding director of the Center for Space Physics and has served as Astronomy Department chairman. He currently serves as associate dean of the Graduate School of Arts and Sciences. Hughes has served as Chair of the Universities Space Research Association Council of Institutions, and on its Board of Trustees. He is a member of the American Geophysical Union and has served on its Budget and Finance Committee and on its Meetings Committee.

Hughes' research focuses on the dynamics of the Earth's magnetosphere and its interactions with the solar wind and the ionosphere. He has published over 150 refereed papers. He teaches graduate courses in space plasma physics and astrophysical fluid dynamics and undergraduate courses in space physics and planetary physics.

## Session 5: Strategic Communications, Education, and Outreach

### Mr. Clay Anderson PEPCO Holdings

Communicating the impact of weather on critical infrastructure to the public can be a daunting challenge. This is even more true when the impacts are caused by space weather which is usually not directly noticeable to the naked eye. To further complicate this communication, managers of critical infrastructure like the electric power grid have to work closely with the media to quickly and accurately get important, potential life-saving information to the people who need it. To accomplish this feat, the public must be made aware of potential impacts from space weather, how they would be informed of imminent danger, and know what actions they can take to mitigate the effects.

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#### BIOGRAPHY

Clay Anderson is an exceptional communicator with over 10 years of broadcast media experience, currently serving in a dual role as a senior media representative and energy meteorologist for PEPCO, the public electric utility in the Washington, DC metro area. Clay Anderson's career has also included exceptional tenures at NBC affiliates in Dayton, OH as Chief Meteorologist, and WRC/NBC-4 in Washington, DC as weekend meteorologist. Anderson has also provided expert weather broadcast services for NewsChannel 8, WJLA/News-7 and WTOP radio, the highest rated radio broadcast in the region.

This is Anderson's second round of work in Washington, DC. His first was as an Air Force meteorologist stationed at Andrews Air Force Base, where he provided detailed weather forecasts, briefings and weather support for presidential aircraft. He spent a good part of the Reagan years on the presidential support team briefing the crew of Air Force One on what to expect wherever they would be required to travel in the world with the president.

Following his work at Andrews, Anderson transferred to the United States Space Command Center. There he joined an elite group of meteorologists who forecast changing conditions in outer space.

In 1994, after 20 years with the Air Force with stints across the United States, and overseas in Korea, he brought his skills to television working with major network stations in Nebraska and Colorado Springs, CO.

He holds a Bachelor of Science degree from Bellevue University, and a Master of Health Administration from Chapman University in California. Clay Anderson is proud to be currently serve as a professor at Georgetown University in Washington, DC in the Journalism Department teaching such courses as "The Business of Journalism" and "Investigative Journalism".

Anderson is a member of several professional organizations including NABJ, and the Tuskegee Airmen, Inc. He holds a coveted meteorological seal from American Meteorological Society. Anderson, a native of Philadelphia is proud to have contributed to and featured in educational curriculum focused on weather used in the school systems of Pennsylvania.

Clay Anderson is committed to building the knowledge and self-esteem of young people across the Washington metro region having given more than 100 appearances at schools. His education, Air Force and broadcast experience provide a compelling example of what can be achieved with focus, perseverance and the willingness to follow dreams. He is currently establishing the Clay Anderson Foundation focused on the empowerment and education of children.

## Forum Summary and Wrap-up

### **Dr. Paul D. Try, Colonel, USAF (Ret.)**

#### **Senior Vice President and Program Manager, Science and Technology Corporation**

**Dr. Paul D. Try** is Senior Vice President and Program Manager at Science and Technology Corporation (STC), and recent past Director of the International Global Energy and Water Cycle Experiment (GEWEX) Project Office (IGPO) of the World Climate Research Programme (WCRP). He received his Ph.D. in atmospheric sciences from the University of Washington with specialization in radiative transfer/remote sensing. Dr. Try's over 35 years as a professional in environmental sciences encompasses the full range of experience from operational and research project support, through leadership of international projects, and includes many years of leadership in the policy direction of both US and international environmental science organizations. He has extensive expertise in high level multi-agency research management as well as atmospheric physics, modeling and simulation, remote sensors (satellite and radar), atmospheric propagation, and support to military satellite and precision guided munitions employment.



Prior to joining STC, he served as Chief of Staff of the U.S. Air Force Air Weather Service and, also, Director of Environmental and Life Sciences in the Office of the Secretary of Defense where he provided oversight management of all DOD research and development in the environmental sciences, chemical/biological defense, medical capabilities and multi-service training. He also provided command as well as advisory support to a broad array of DoD Satellite operations, including direct support to the National Reconnaissance Office (NRO) and special support for precision guided munitions employment.

Dr. Try's recent program management and direct support activities with STC include acting as Director of a NASA funded International Project Office, support to the Office of the Federal Coordinator For Meteorological Services and Supporting Research (OFCM), management of meteorological satellite processing and application support activities for NOAA's National Environmental Satellite Data and Information Service (NESDIS), management of three research support efforts at laboratories of NOAA's Office of Atmospheric and Oceanic Research -- Environmental Technology Laboratory, Air Resources Laboratory, and Forecast Systems Laboratory, and oversight of support to Naval Research Laboratory and Air Force Geophysical Laboratory research efforts.

As Chief of the VELA Nuclear Detection Satellite environmental readout site in the 1970 timeframe, he provided some of the first satellite space weather observations of solar wind and high energy particle measurements to manned and unmanned space systems for numerous space projects. Dr. Try retired from the US Air Force as a Colonel, is a fellow of the American Meteorological Society (AMS), and was President of the AMS in 1996-97. Dr. Try has recently served on four committees of the National Academy of Sciences.

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