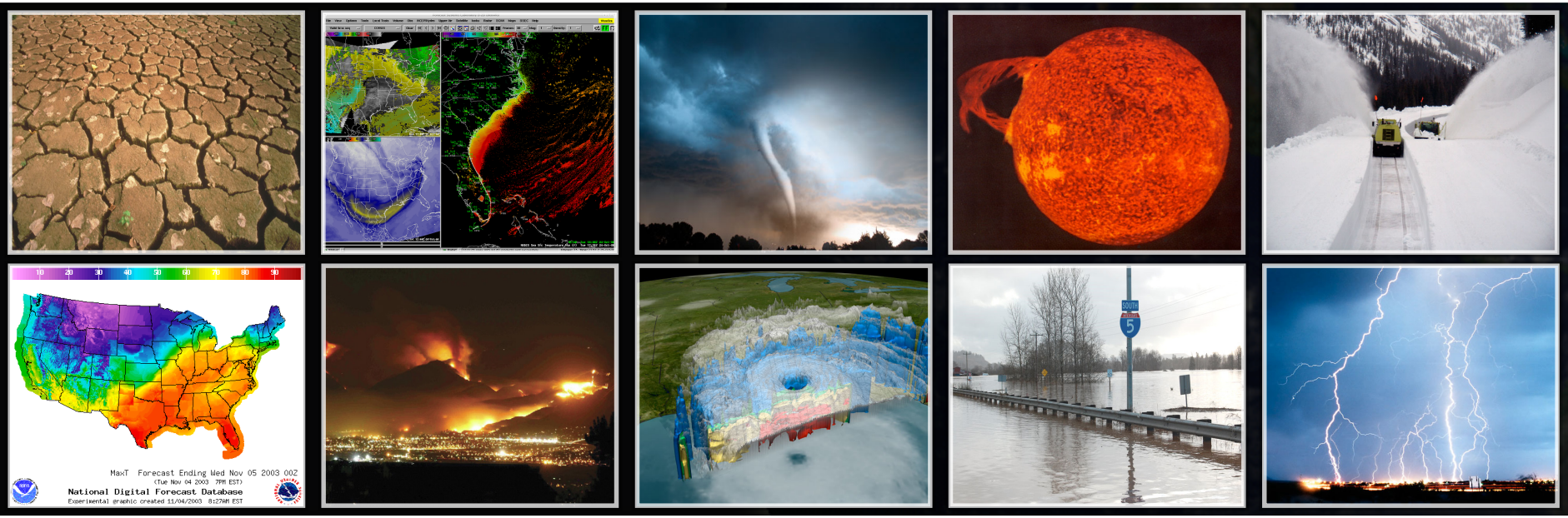
The 2019 National Space Weather Strategy and Action Plan



Dr. Louis W. Uccellini
Director, National Weather Service
Co-chair, Space Weather Operations, Research, and Mitigation (SWORM) Working Group
National Oceanic and Atmospheric Administration

Space Weather Enterprise Forum
26 June 2019

Impacts and preparedness drove the need for SWORM

(Space Weather Operations, Research, and Mitigation Working Group)

1. Establish **Benchmarks** for Space-Weather Events
2. Enhance **Response and Recovery** Capabilities
3. Improve **Protection and Mitigation** Efforts
4. Improve Assessment, Modeling, and Prediction of **Impacts on Critical Infrastructure**

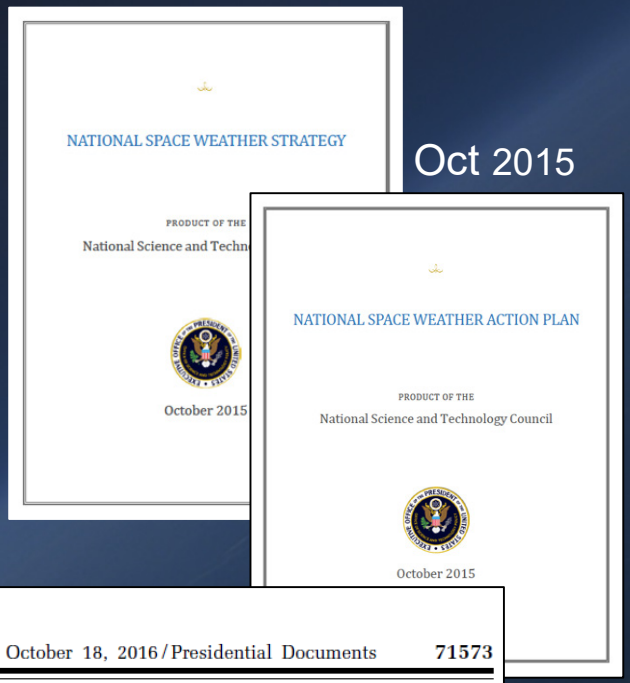
Understand and prepare

5. Improve Space-Weather Services through Advancing Understanding and Forecasting
6. Increase International Cooperation

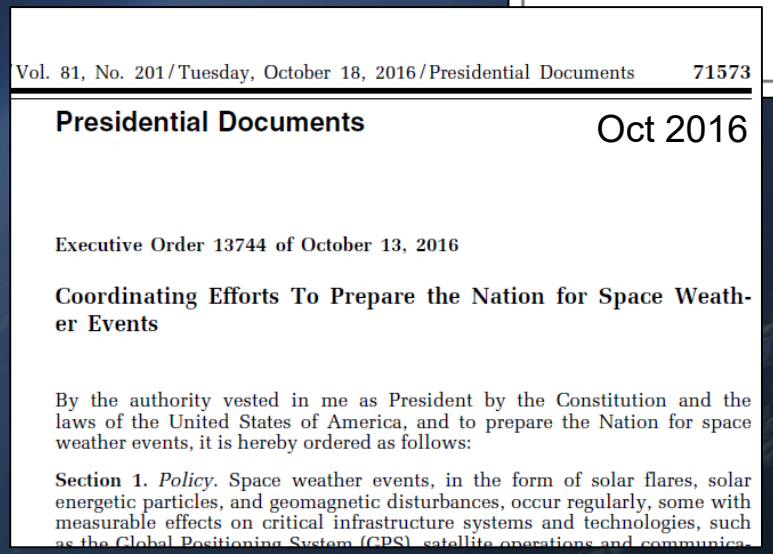
Facilitate operational readiness and improve decision making

Space Weather Operations, Research, and Mitigation (SWORM) progress:

- 99 National Space Weather Action Plan actions
- 6 actions in EO-13744: *Coordinating Efforts to Prepare the Nation for Space Weather Events*
  - Over 50 actions finished
  - A number of the resource-intensive activities have yet to be completed
  - Will require multiple years of sustained national commitment



Oct 2015



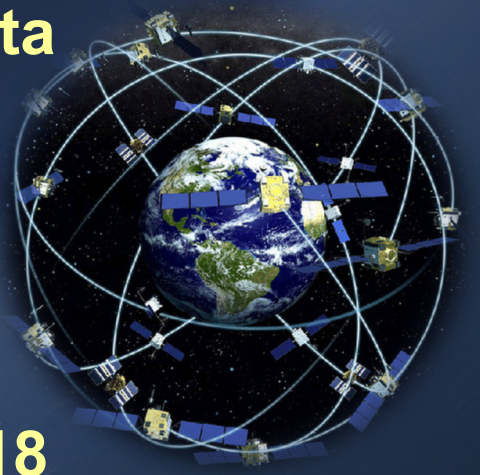
Oct 2016

Key to success - enhanced and dedicated cross-agency collaboration

Some accomplishments –

The DOD and DOC make historical particle data from the GPS constellation publicly available

- 23 satellites: 141 satellite-years of data now available at NOAA/NCEI



The Phase 1 Benchmarks released in June 2018

- The next steps are underway now and will capitalize on the worldwide space weather expertise across industry, academia, and governments

Space Weather as a Global Challenge

- International workshops to improve collaboration on space weather-related policies, research, forecasting, and risk management activities from a global perspective

Some accomplishments (cont) –

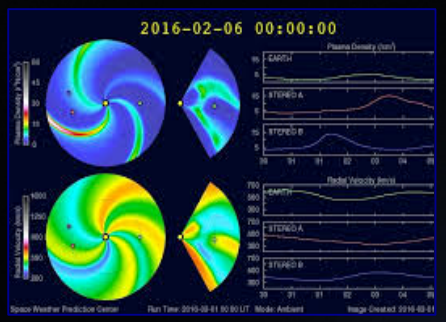
Federal Operating Concept for Forecasted Space Weather Events

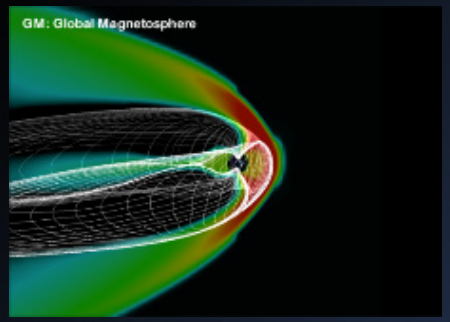
- Informs the coordination of Federal assets and activities to respond to notification of, and protection against, space weather events

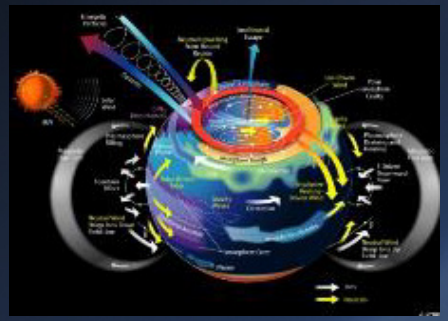
Recent Federal agency partnerships to improve research to operations

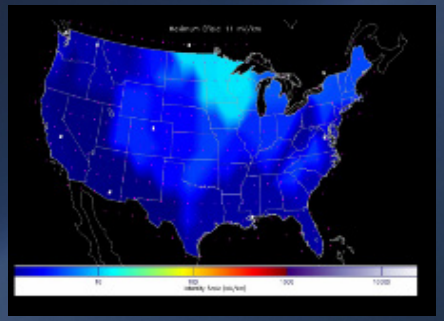
- NASA, NSF, NOAA Tri-Agency MOU signed in 2018
- Several interagency space weather applied research funding opportunities announced
- Joint NOAA-USGS Geoelectric Field model operational in 2019

Operational Space Weather Modeling
A Sun to Earth Continuum









GMU/AFRL WSA/Enlil	U. Michigan Geospace	NOAA/CIRES WAM-IPE	NOAA/USGS E-field
Predict and understand the structure of the solar wind as it propagates from the Sun to Earth	Predict and understand the geomagnetic response to changes in solar wind; provide regional predictions of geomagnetic storms	Predict and understand details in the mesosphere, exosphere, and ionosphere, to understand links between the lower and upper atmosphere	Characterize and predict the regional electric field and the associated currents that impact electric power grids
New Upgrade May 2019	Operational Sept 2016	Operational FY20	Operational FY19

Improve the R2O-O2R process that serves operational forecasting, research, and end-user needs

Enhance existing capabilities

- Prioritize space weather research on operational requirements
- Define and implement a prototype O2R framework

Expand Federal capabilities to establish the fundamental elements of R2O-O2R activities

- Establish community models
- Support research and development on operational models

2018 Review

- 2015 strategy called for an update to the strategy and action plan at the three-year point
- With over 50% of the action plan complete, it was an appropriate time to do a scrub of the remaining actions
- While there were many successes in implementing actions from the 2015 action plan, we recognized that we can better define some of the remaining actions
- Changes since 2015 provide opportunity to align with new policy and priorities (e.g., Space Policy Directives)

26 March 2019

- National Space Weather Strategy and Action Plan
- Executive Order on Coordinating National Resilience to Electromagnetic Pulses

NATIONAL SPACE WEATHER STRATEGY AND ACTION PLAN

Product of the
SPACE WEATHER OPERATIONS, RESEARCH, and MITIGATION WORKING GROUP
SPACE WEATHER, SECURITY, and HAZARDS SUBCOMMITTEE
COMMITTEE ON HOMELAND and NATIONAL SECURITY
of the
NATIONAL SCIENCE & TECHNOLOGY COUNCIL

March 2019

The White House

EXECUTIVE ORDERS

Executive Order on Coordinating National Resilience to Electromagnetic Pulses

INFRASTRUCTURE & TECHNOLOGY | Issued on: March 26, 2019

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ALL NEWS

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. Purpose. An electromagnetic pulse (EMP) has the potential to disrupt, degrade, and damage technology and critical infrastructure systems. Human-

The updated Strategy and Action Plan (2019) seeks to achieve three objectives to enhance the Nation's situational awareness and resilience to space weather events:

- Enhancing the protection of national security, homeland security, and commercial assets and operations against the effects of space weather
- Developing and disseminating accurate and timely space weather characterization and forecasts
- Establishing plans and procedures for responding to and recovering from space weather events

Conclusion

The 2019 Strategy and Action Plan provides a federally coordinated roadmap for strengthening our resilience to space weather events

The strategy builds on a new focus on American activities in space and in national security

Achieving the identified objectives will require coordination and collaboration within and across the Federal Government, as well as engagement with the commercial sector, academia, and allied countries