



Promoting Cooperative Solutions for Space Sustainability

Space Weather Policy for Preparedness & Recovery

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Secure World Foundation

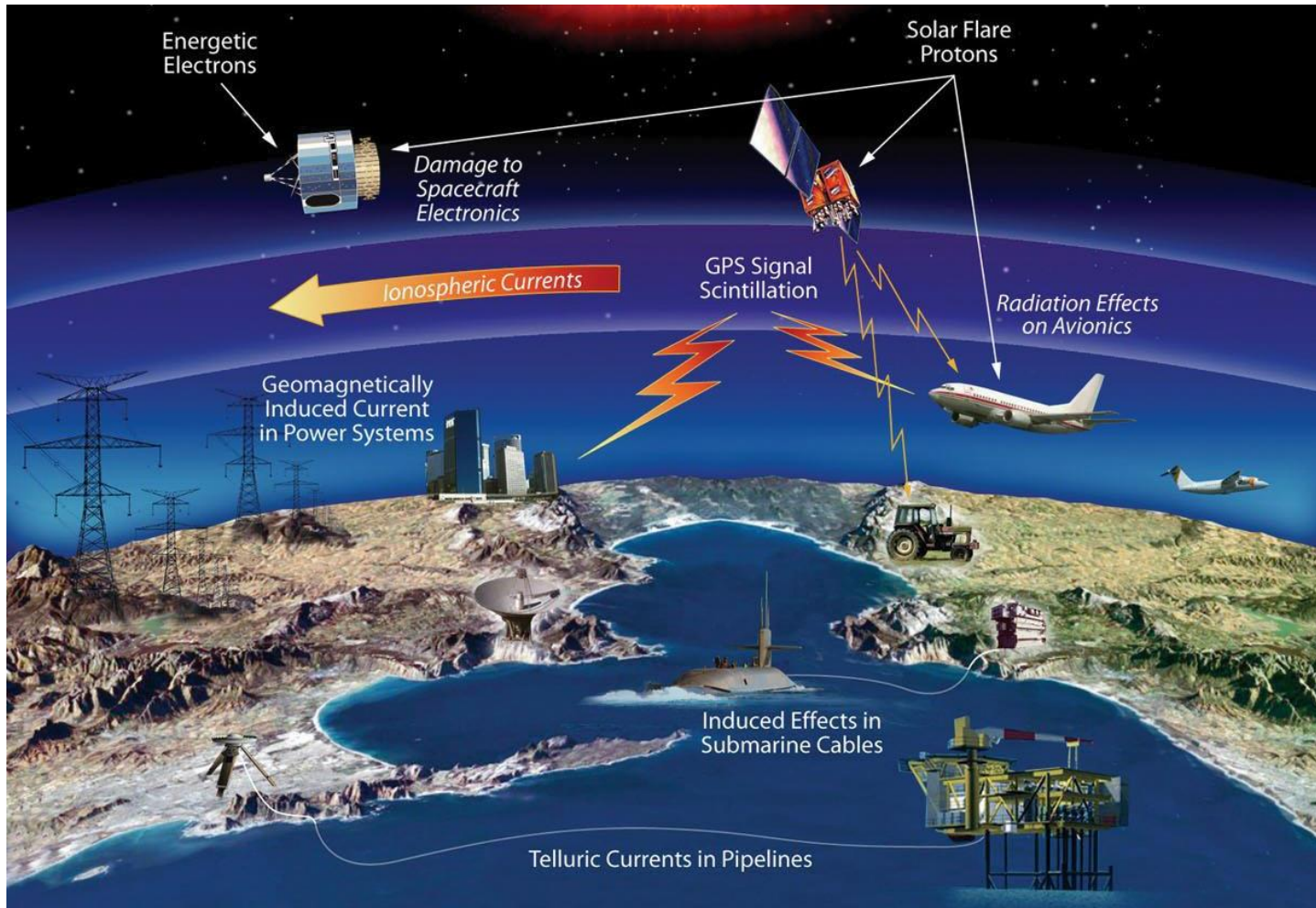
February 19, 2020



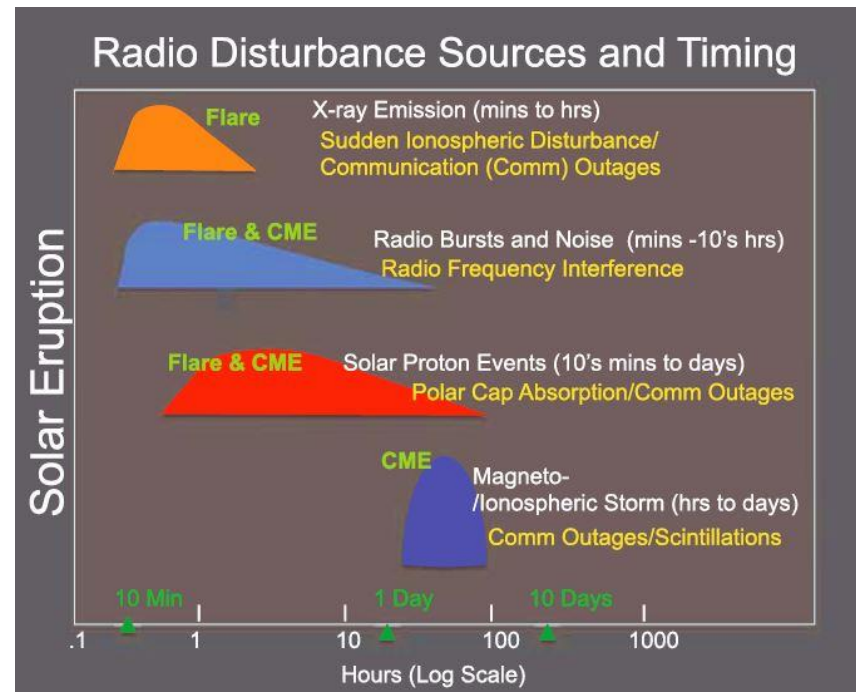
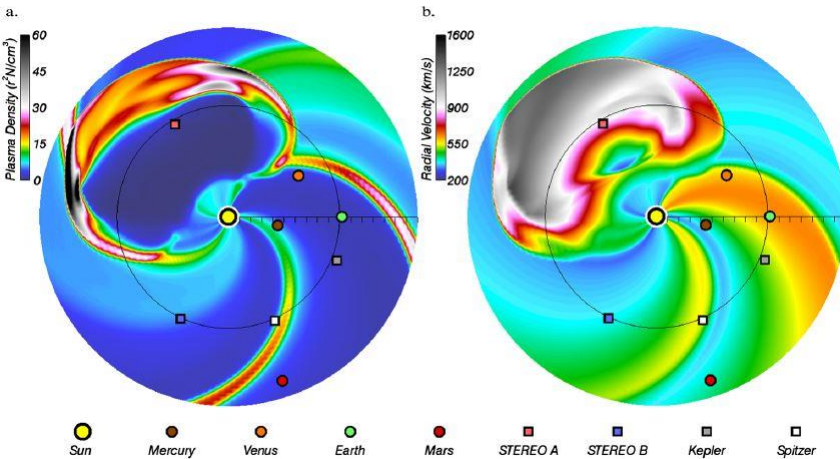
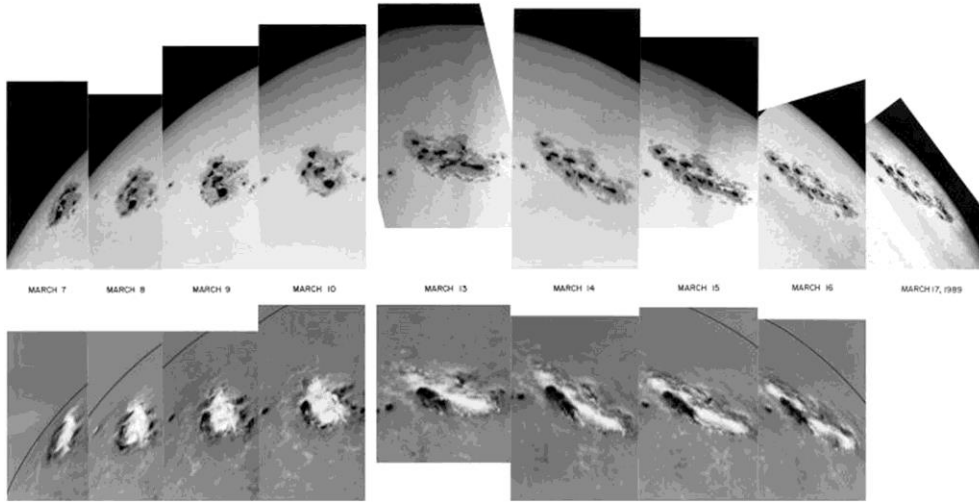
Promoting Cooperative Solutions for Space Sustainability

Secure World Foundation (SWF)

- Secure World Foundation *is a private operating foundation* that promotes cooperative solutions for space sustainability
- **Our vision:** The secure, sustainable, and peaceful uses of outer space contributing to global stability and benefits on Earth
- **Our mission:** SWF works with governments, industry, and international organizations and civil society to develop and promote ideas and actions for international collaboration that achieve the secure, sustainable, and peaceful uses of outer space for the socioeconomic and environmental benefits to Earth



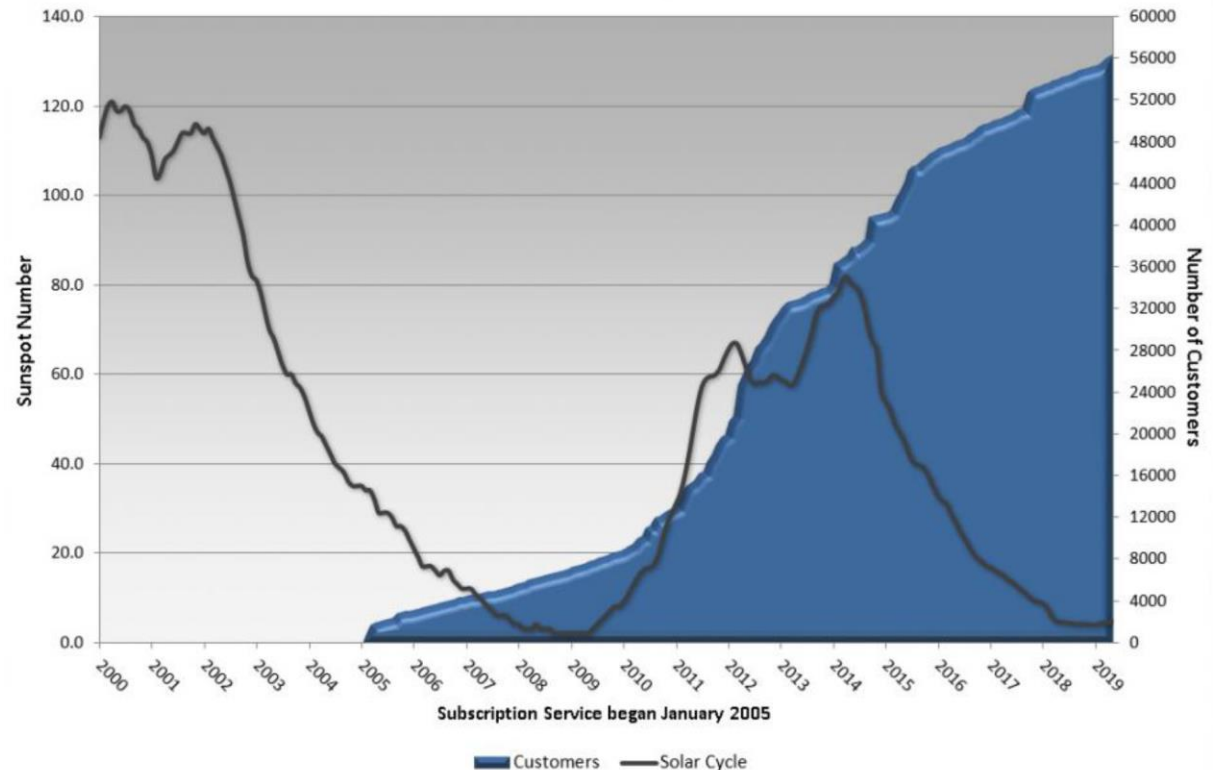
Observation / Modeling / Forecasting



Space Weather Prediction Center

- Space weather monitoring in the U.S. grew out of military radio interference during WWII
- Noted impacts where 1967 solar flare seemed to mimic USSR radar jamming, almost causing a U.S. nuclear response
- NOAA's Space Weather Prediction Center (SWPC) is the world's leading monitoring and forecasting center

Customer Growth
SWPC Product Subscription Service

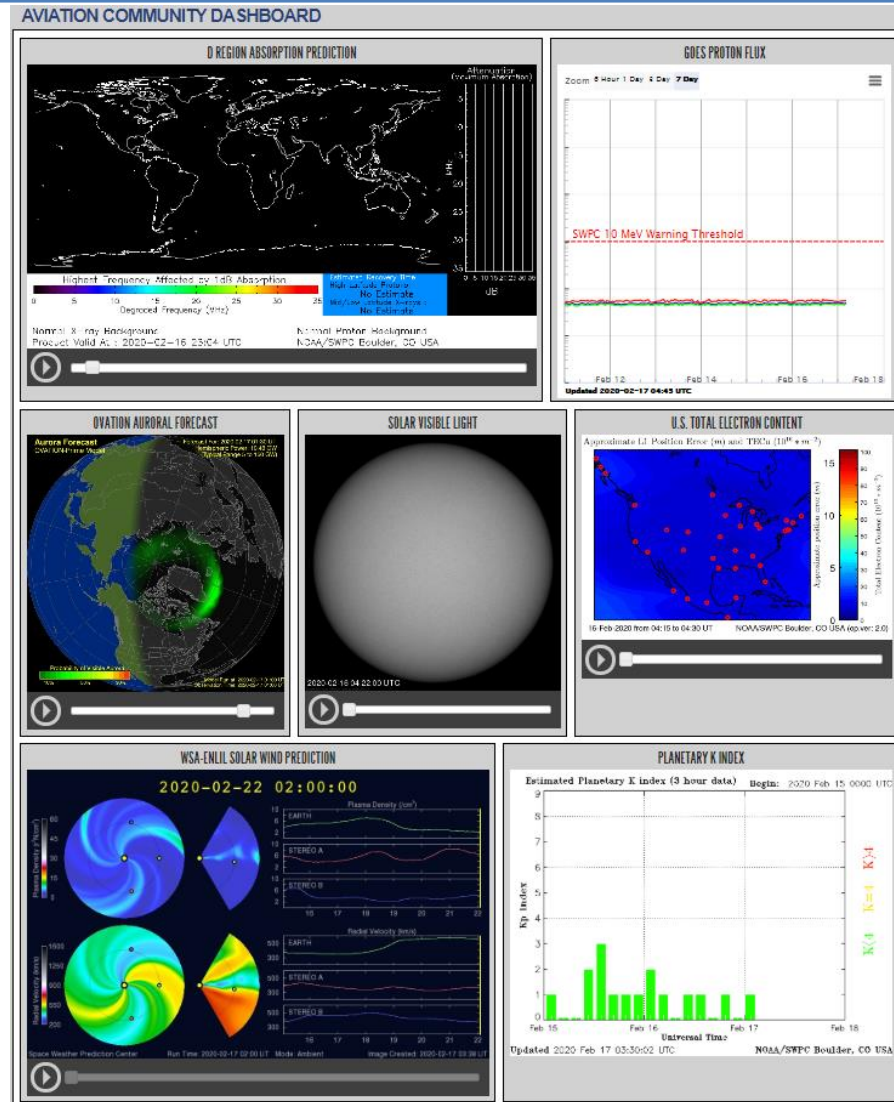
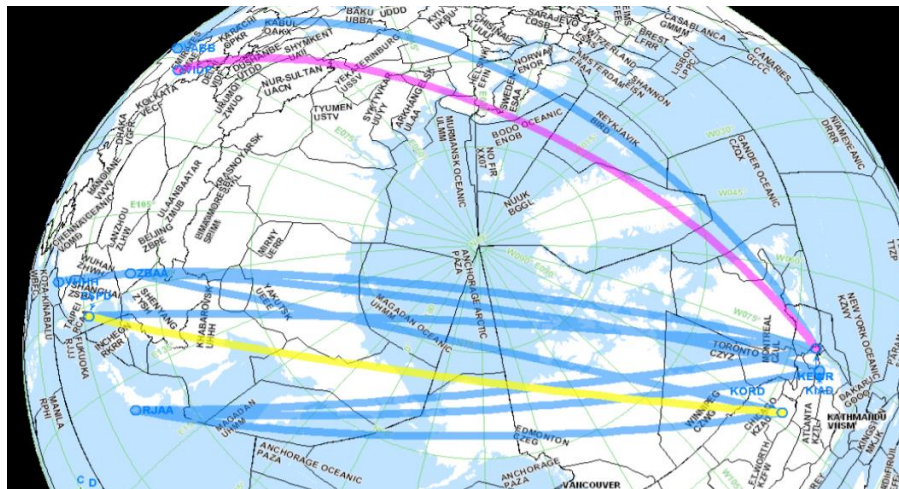


Customers include electric power industry, all major airlines, drilling & oil exploration, satellite companies, transportation sector, emergency responders, and more.

End-User Perspectives – Airlines

Air crew and passenger safety

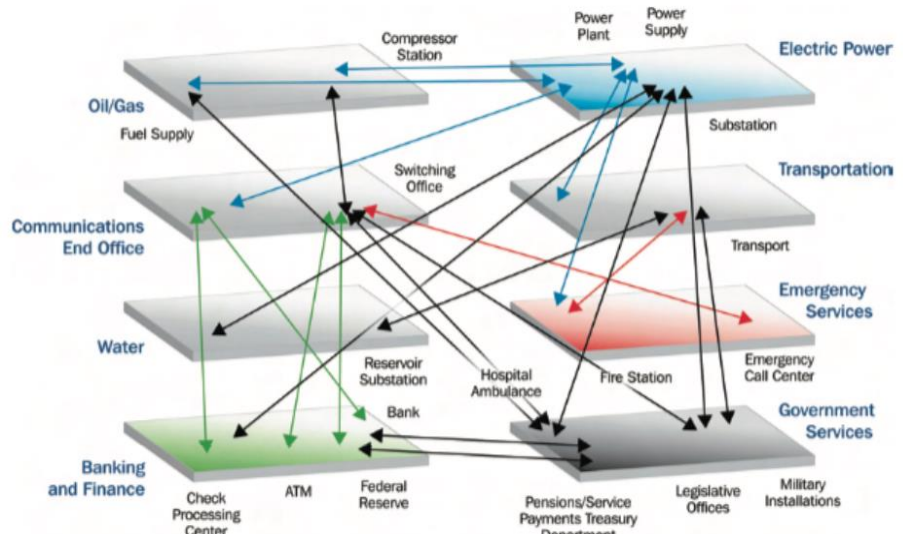
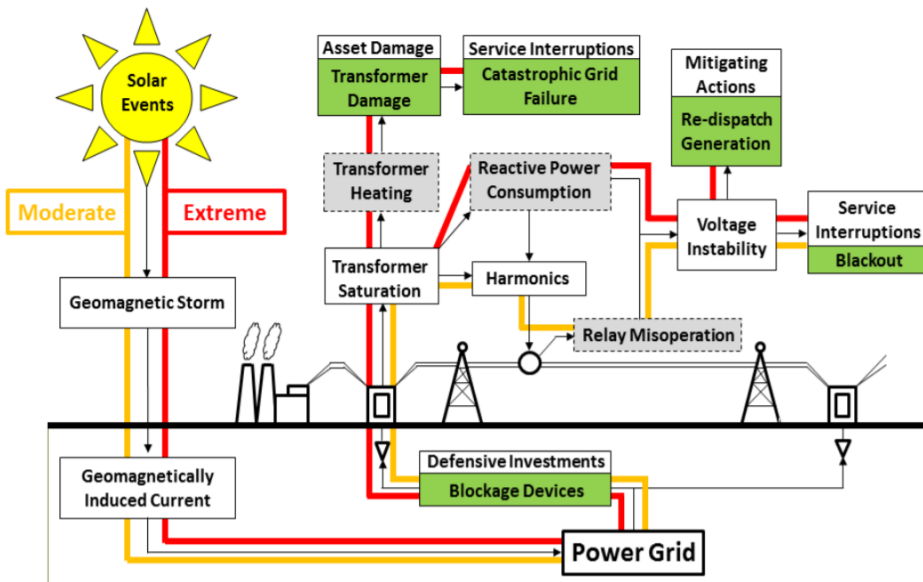
- High altitude – greater radiation risk
- Higher latitude – greater radiation risk
- Navigation (GPS) and communication (HF comms) interference
- Flight crew and passenger radiation dose concerns
- United’s first polar route in 1999
- 1999-2019 over 35,000 flights



End-User Perspectives – Utilities

Power generators, grid operators, & emergency responders

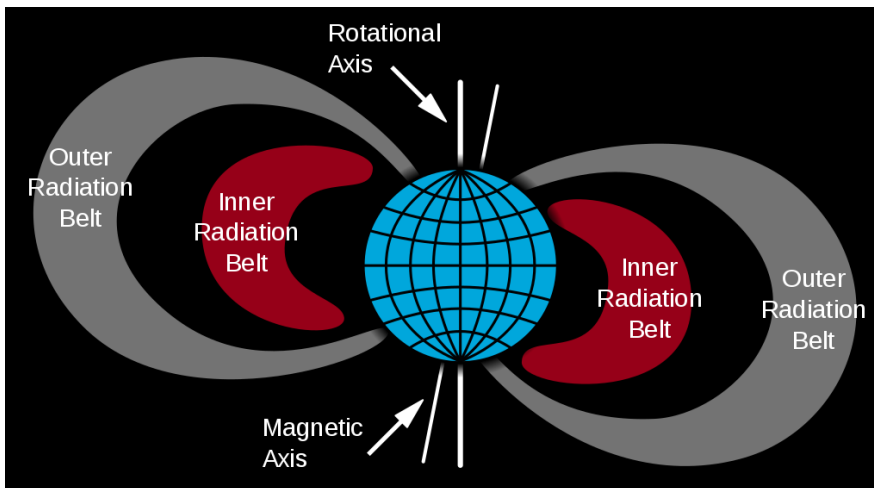
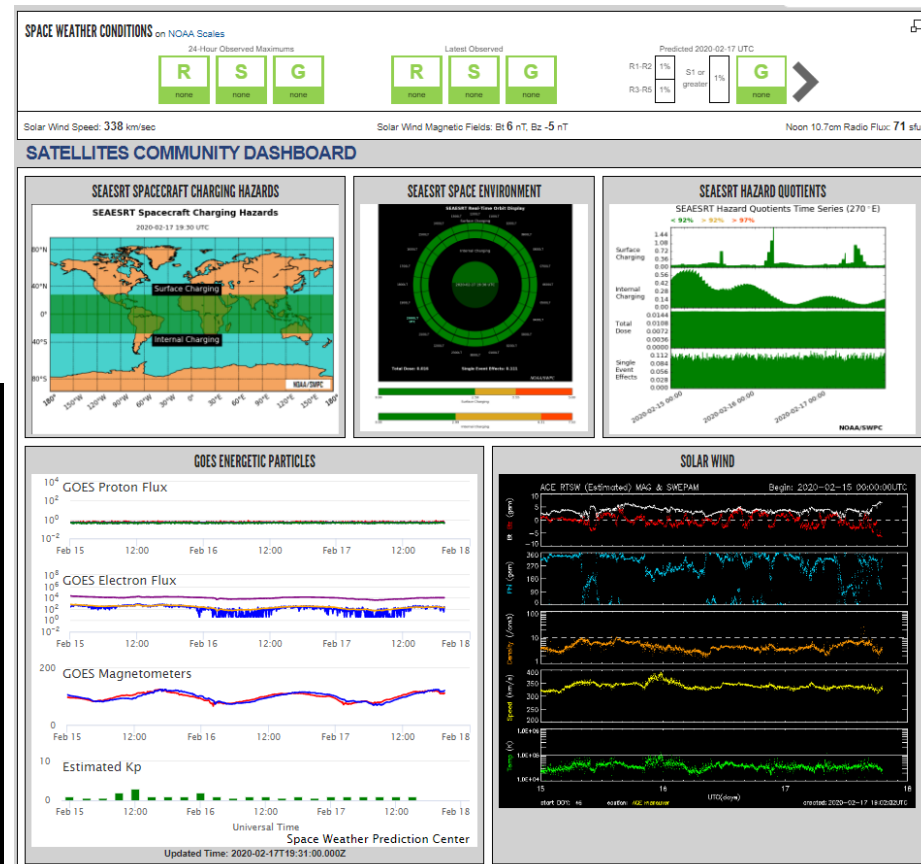
- Long conductive structures experience increased voltage from large solar storms leading to:
 - Transformer overheating and damage
 - Additional power consumption
 - Short-term blackouts
 - Even larger grid collapse with possible months-long large transformer replacement times
- Utilities are studying, training, and preparing for their regional situations



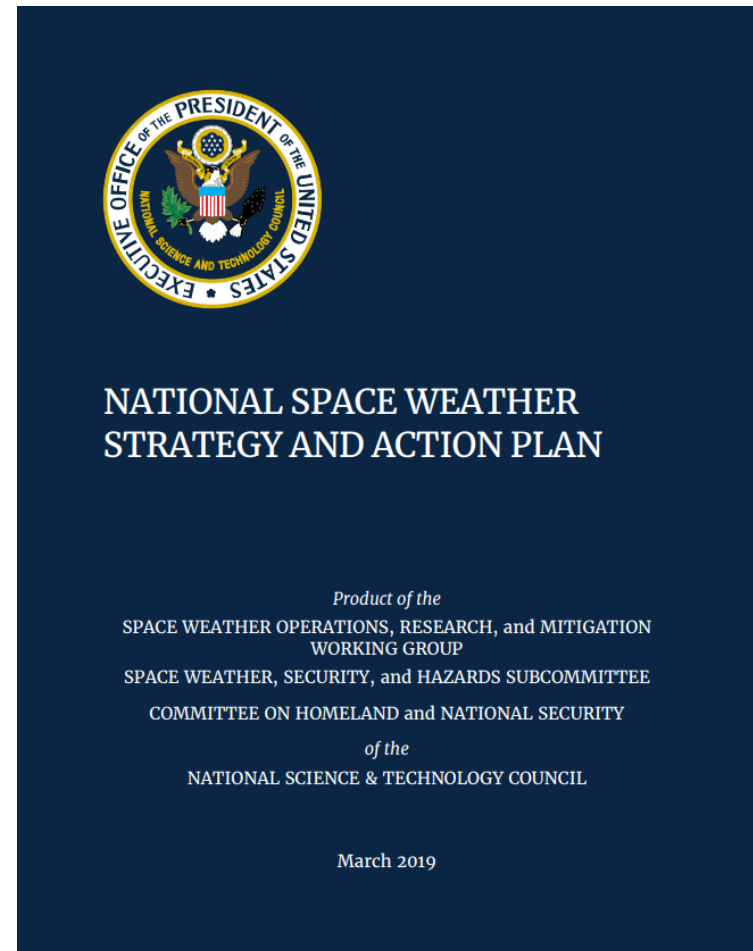
End-User Perspectives – Satellites

Satellite manufacturers, operators, and satellite data users (all of us)

- The Earth's magnetic field traps solar radiation
- Satellites orbit within those regions
- More radiation can cause satellites to malfunction and fail
- Increase solar energy also expands the outer layers of the atmosphere, increasing drag on LEO satellites



- Space Weather Operations, Research, and Mitigation Working Group (SWORM)
 - Interagency coordinating group organized in 2015
 - Recent work includes benchmarking for six space weather phenomena
 - Induced geo-electric fields
 - Ionizing radiation
 - Ionospheric disturbances
 - Solar radio bursts
 - Upper atmospheric expansion



- Space Weather Research and Forecasting Act (S.881)
 - Sen. Peters (D-MI) & Sen. Gardner (R-CO)
 - Introduced and passed in 115th Congress
 - Reintroduced in 116th Congress
- Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow Act (PROSWIFT) (H.R. 5260)
 - Rep. Perlmutter (D CO-7), Rep. Brooks (R AL-5), & Rep. Johnson (D TX-30)
 - Different version introduced in 115th Congress
 - New version, very similar to Senate draft, introduced and passed out of Committee in 116th Congress
- Both would codify and direct the interagency actions of the Executive branch and define further Congressional priorities

116TH CONGRESS
1ST SESSION

S. 881

[Report No. 116-171]

To improve understanding and forecasting of space weather events, and for other purposes.

116TH CONGRESS
1ST SESSION

H. R. 5260

To improve understanding and forecasting of space weather, and for other purposes.





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Thank you. Questions?

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