(A) = Acting

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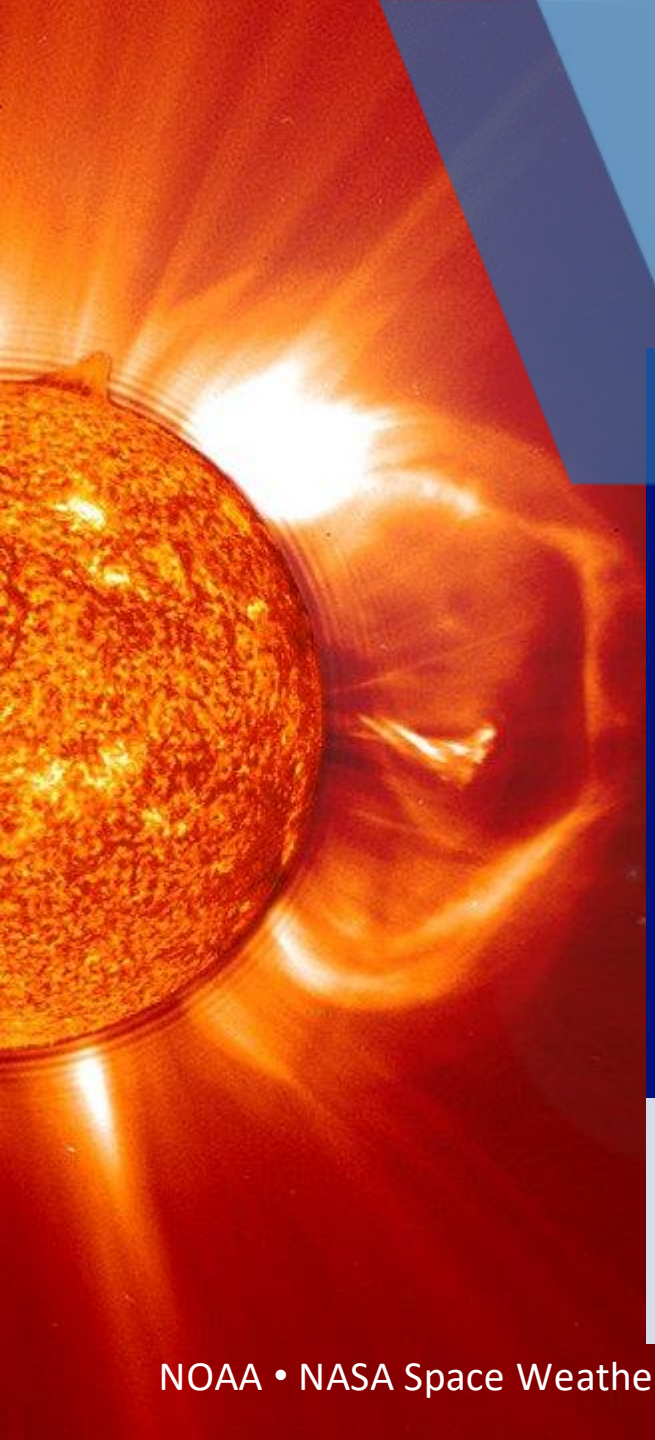
RADM Nancy Hann

Deputy Director
RDML Chad Cary

Deputy Assistant Administrator for Programs and Administration, Office of Marine and Aviation Operations
Randy TeBeest

Updated 6/6/24



NOAA Satellite-based Space Weather Observations

Elsayed Talaat and Irfan Azeem

Office of Space Weather Observations (SWO)

Office of Space Weather Observations (SWO)

- SWO is responsible for formulating and implementing NOAA's space-based missions for space weather observations.
- Includes projects to deploy and sustain NESDIS' flight and ground-based equipment for space-based space weather measurements.
- Implemented through a **joint NOAA-NASA SWO Programs Division.**

Space Weather Observations (SWO) Portfolio

Space Weather Follow On (SWFO)

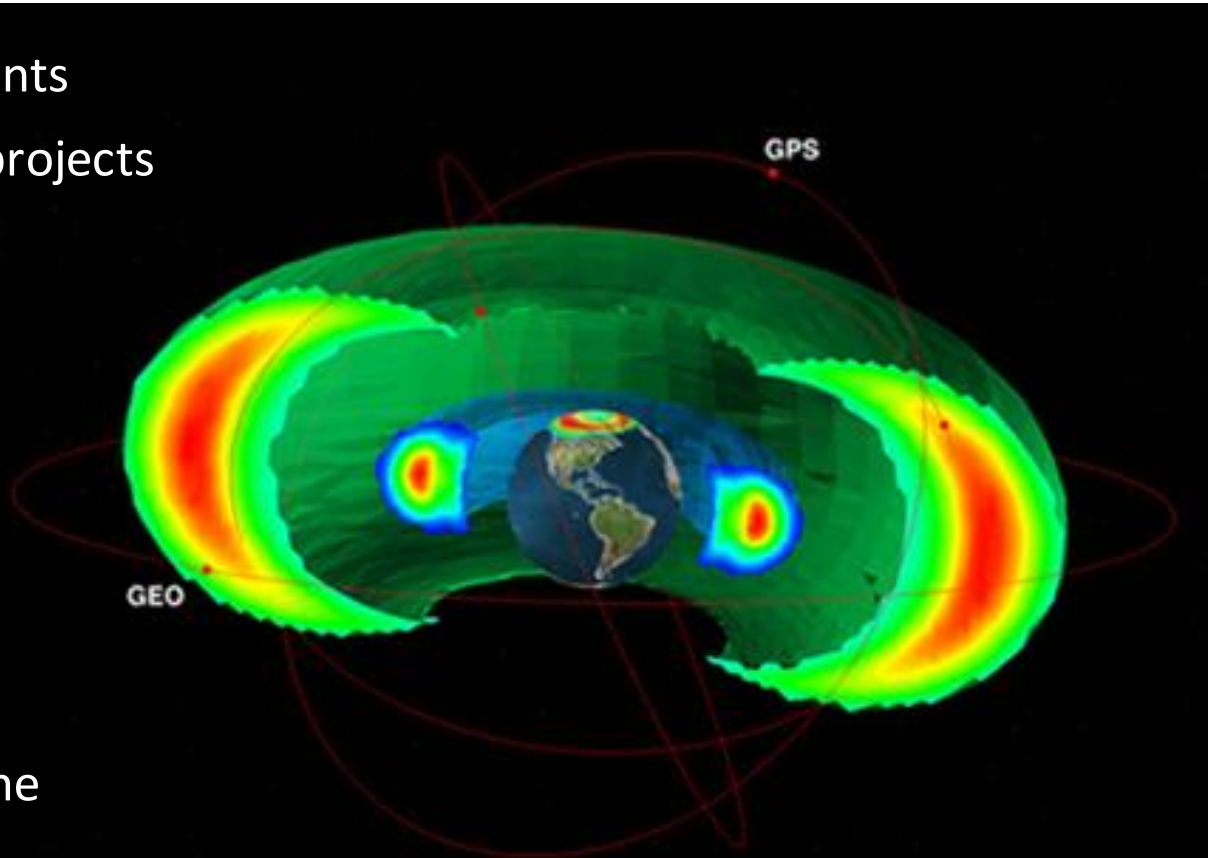
- Two program elements
  - SWFO-L1 mission and GOES-U coronagraph
- GOES-U launch planned for June 25, 2024
- SWFO Flight Project Pre-Environmental Review (PER) completed May 15-16, 2024
- All instruments delivered and integrated on the SWFO-L1 spacecraft
- SWFO coordination with NASA IMAP

Space Weather Next (SW Next)

- Expands NOAA's space weather data products by developing capabilities for L1, L5, GEO, HEO, and LEO
- SW Next L1 Mission Concept Review successfully completed March 27-28, 2023
- The L1 Series consists of two independently launched spacecraft (L1-A and L1-B) targeting launch of L1-A in 2028 and L1-B in 2032
- Instrument procurements are in black-out

Pre-formulation of SW Next GEO

- Developing SW Next GEO Project Level 1 Requirements
- Measurements being considered for SW Next GEO projects include:
  - Energetic particle sensor
  - Magnetometer
  - Photospheric magnetograph
  - Extreme Ultra Violet (EUV) imager
  - EUV Irradiance sensor
  - Thermospheric imager
- Preliminary studies commenced to identify and refine measurement requirements
- SWO is also exploring hosting opportunities for auroral imagers on HEO missions



NOAA/NESDIS Joint Venture Program

Leveraging capabilities being developed by other federal partners & industry **to provide high return on funds**

Recent and Current Space Weather Projects ➡ **Contact Dr. Nai-Yu Wang (nai-yu.wang@noaa.gov) for more information**

- Improving Thermospheric Density Forecast Capabilities through Utilization of SpaceX/Starlink Satellite Data, PI: Dr. Eric Sutton, University of Colorado, Boulder
- Solar Sail Fabrication, NeXolve0
- Tiny Remote-sensing Instrument for Thermospheric Oxygen and Nitrogen, PI: Bruce Fritz, NRL
- Three new space weather projects awarded in FY24

NOAA SBIR Program ➡ Email noaa.sbir@noaa.gov for more information

Six critical challenges that highlight important NOAA mission and research priorities

- 9.1 Extreme Events and Cascading Hazards
- 9.2 Coastal Resilience
- 9.3 The Changing Ocean
- 9.4 Water Availability, Quality, and Risk
- **9.5 Effects of Space Weather**
- 9.6 Monitoring and Modeling for Climate Change Mitigation

AMERICA'S SEED FUND SBIR | POWERED BY NOAA

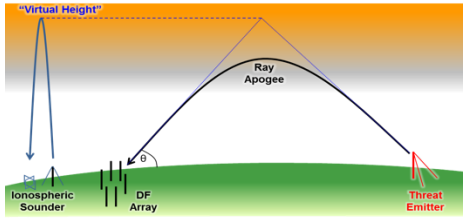
Space Weather Prediction Center

Tzu-Wei Fang and T-I Team

Safeguarding Society with Actionable Space Weather Information

HF Communication

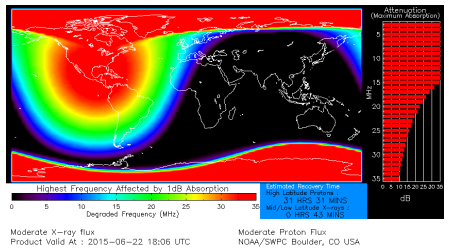
- **Customers: FEMA, Collins Aerospace, Commercial Airlines, and others**



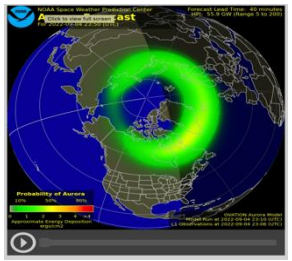
SWPC is also one of the centers that are responsible for issuing space weather advisories identified by the **International Civil Aviation Organization** (ICAO).

Impacted System	Effect	Parameter used	Moderate	Severe
HF COM	Post-Storm Depression	MUF	30%	50%
HF COM	Auroral Absorption (AA)	Kp	8	9
HF COM	Polar Cap Absorption (PCA)	dB from 30MHz riometer data	2	5
HF COM	Shortwave Fadeout (SWF)	Solar X-rays (0.1-0.8 nm) ($W\text{-}m^{-2}$)	$1x10^{-4}$ (X1)	$1x10^{-3}$ (X10)

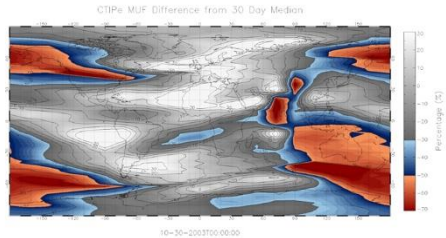
D-Rap



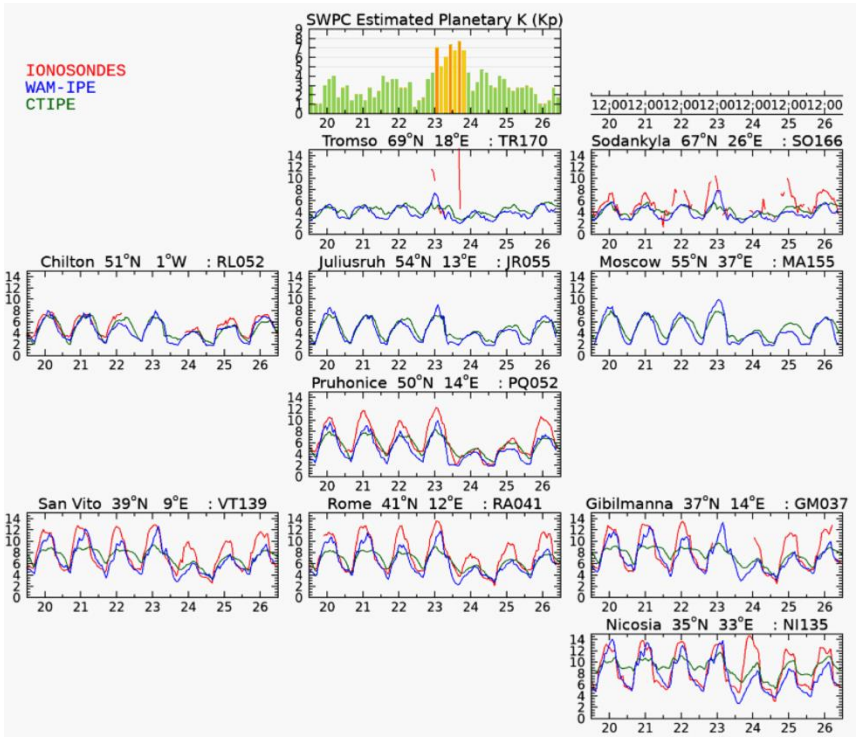
Ovation



Physics-based Models



Real-time Usage of Ionosonde Data to Support Operation

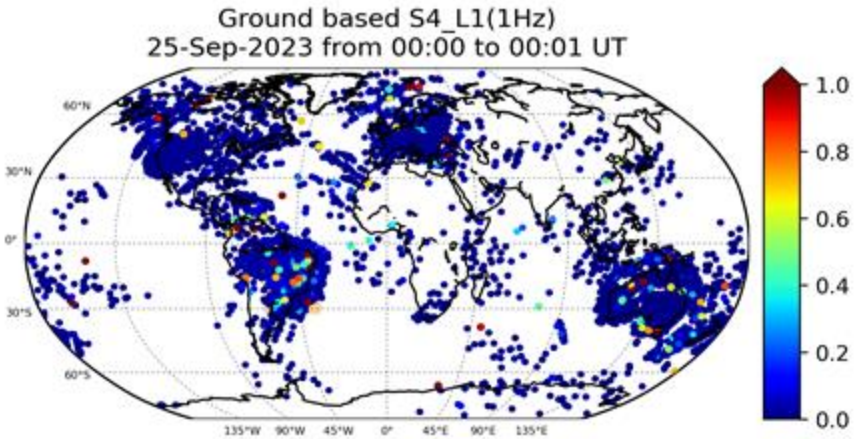


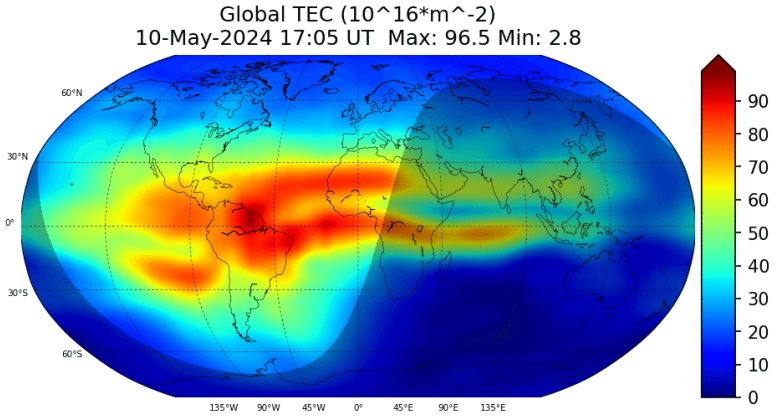
Satellite PNT and Communications

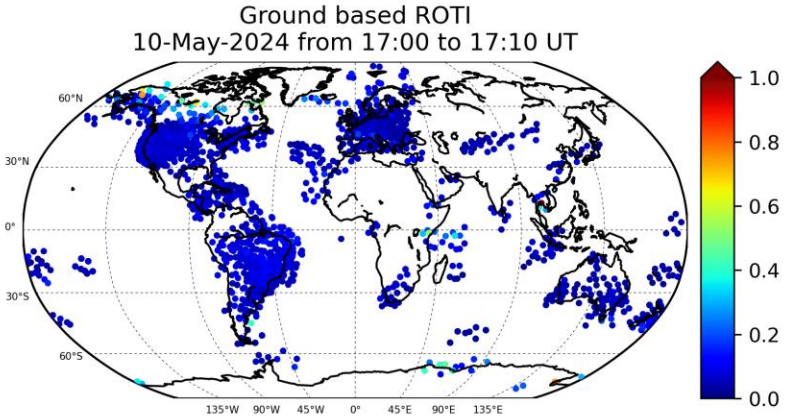
- **Customers: GNSS Receiver Manufacturers, PNT services, FAA, Aviation, and Space industries**

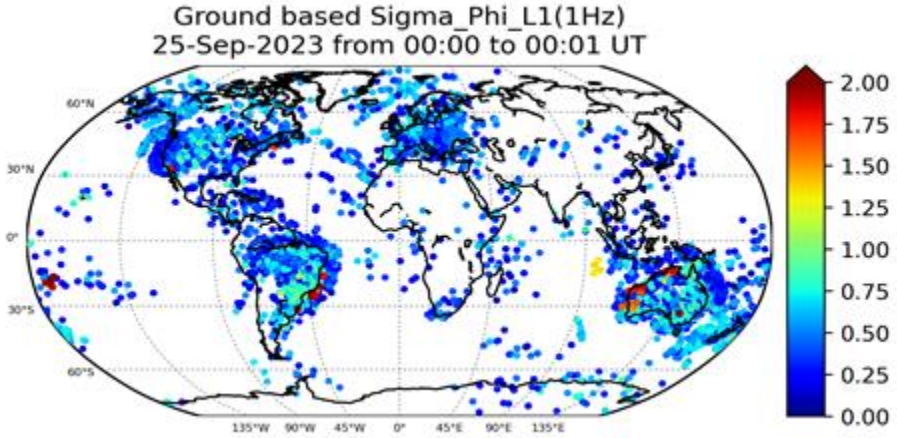
ICAO Space Weather Advisories on GNSS

Impacted System	Effect	Parameter used	Moderate	Severe
GNSS	Amplitude Scintillation	S4 (dimensionless)	0.5	0.8
GNSS	Phase Scintillation	Sigma-phi (radians)	0.4	0.7
GNSS	Vertical Total Electron Content (TEC)	TEC units	125	175









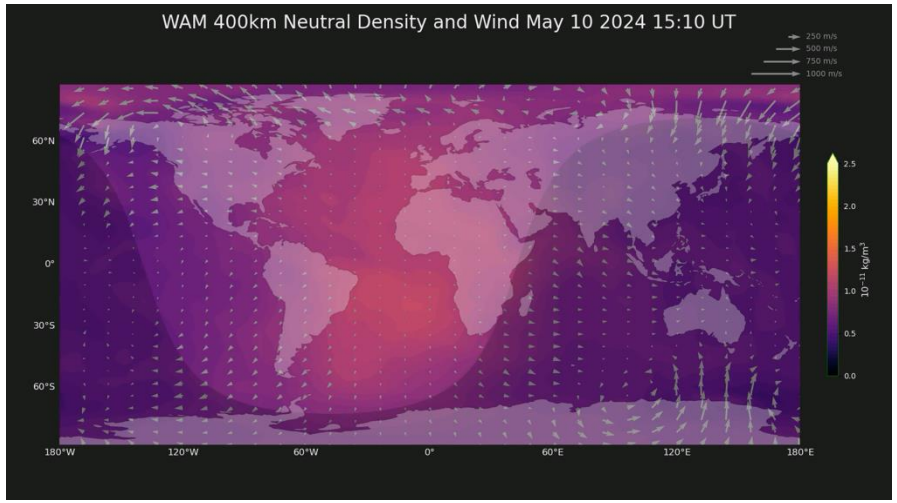
Satellite Industry Testbed Exercise (25-27 October, 2023)

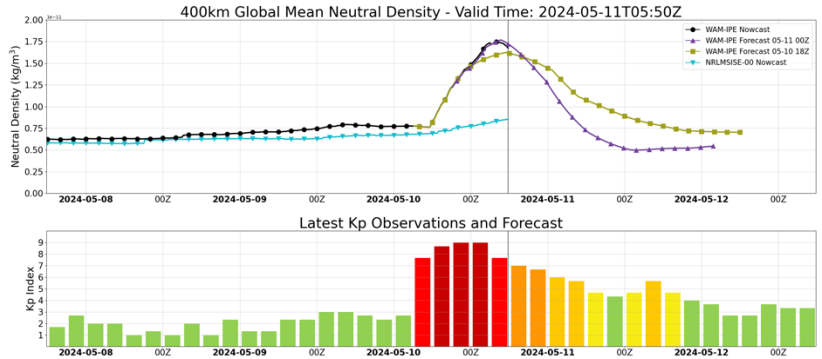
Satellite Owners/Operators – Tracking/Maneuver Services – Government – Academia/Research – Space Weather Commercial Services

Satellite Drag at LEO

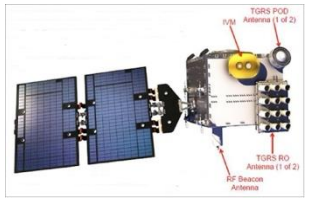
- **Customers: LEO satellite operators, tracking and maneuver services, collision avoidance**

WAM-IPE





COSMIC-2

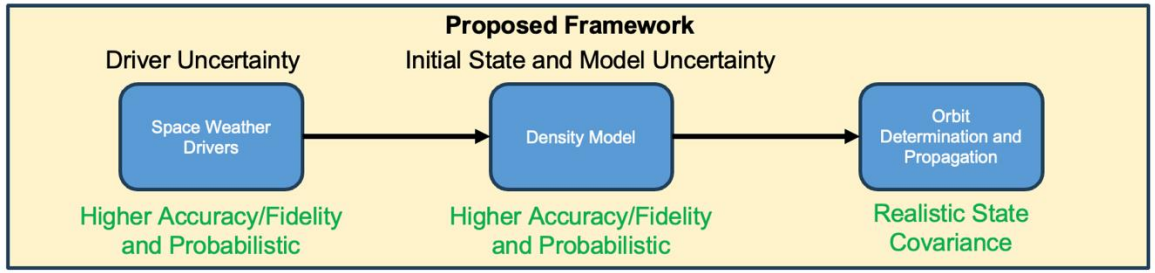


Jian Yao and COSMIC Team

SpaceX Starlink

Eric Sutton (CU Boulder)

Probabilistic Satellite Drag Forecasting for Operations



Piyush Mehta (WVU) and Industrial Partners