

Headquarters U.S. Air Force

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Space Weather Observing DoD Perspective



**Mr. Ralph Stoffler
HQ USAF/A3W
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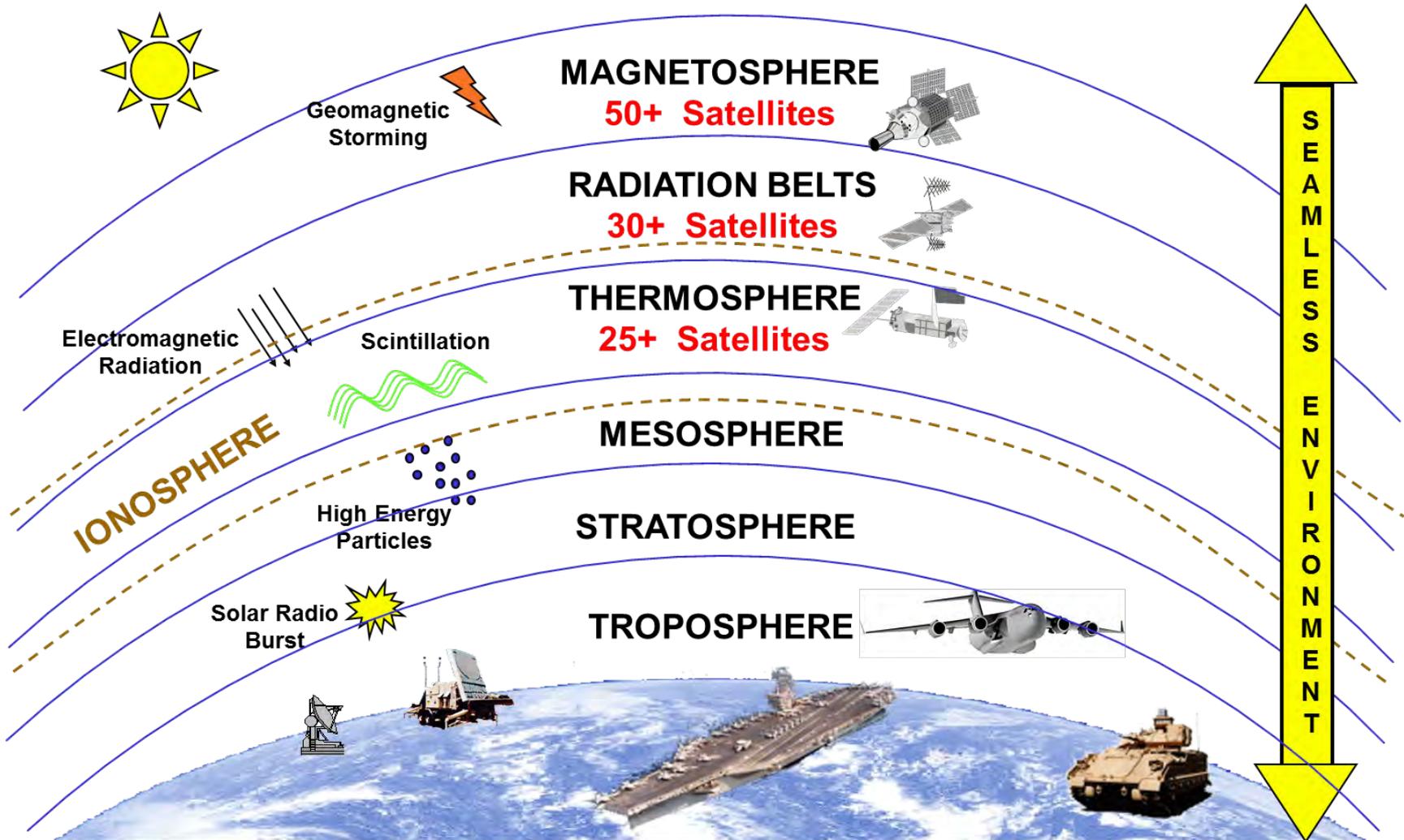
Overview

- **Space environment**
- **AF space weather observing systems – Current & Future**
 - **Ground & space-based**
 - **SECAF commitment**
- **Space weather application**
- **Space weather community**
- **DoD perspective**
- **Sensor-to-Operator chain**
- **Summary**



Space Environment

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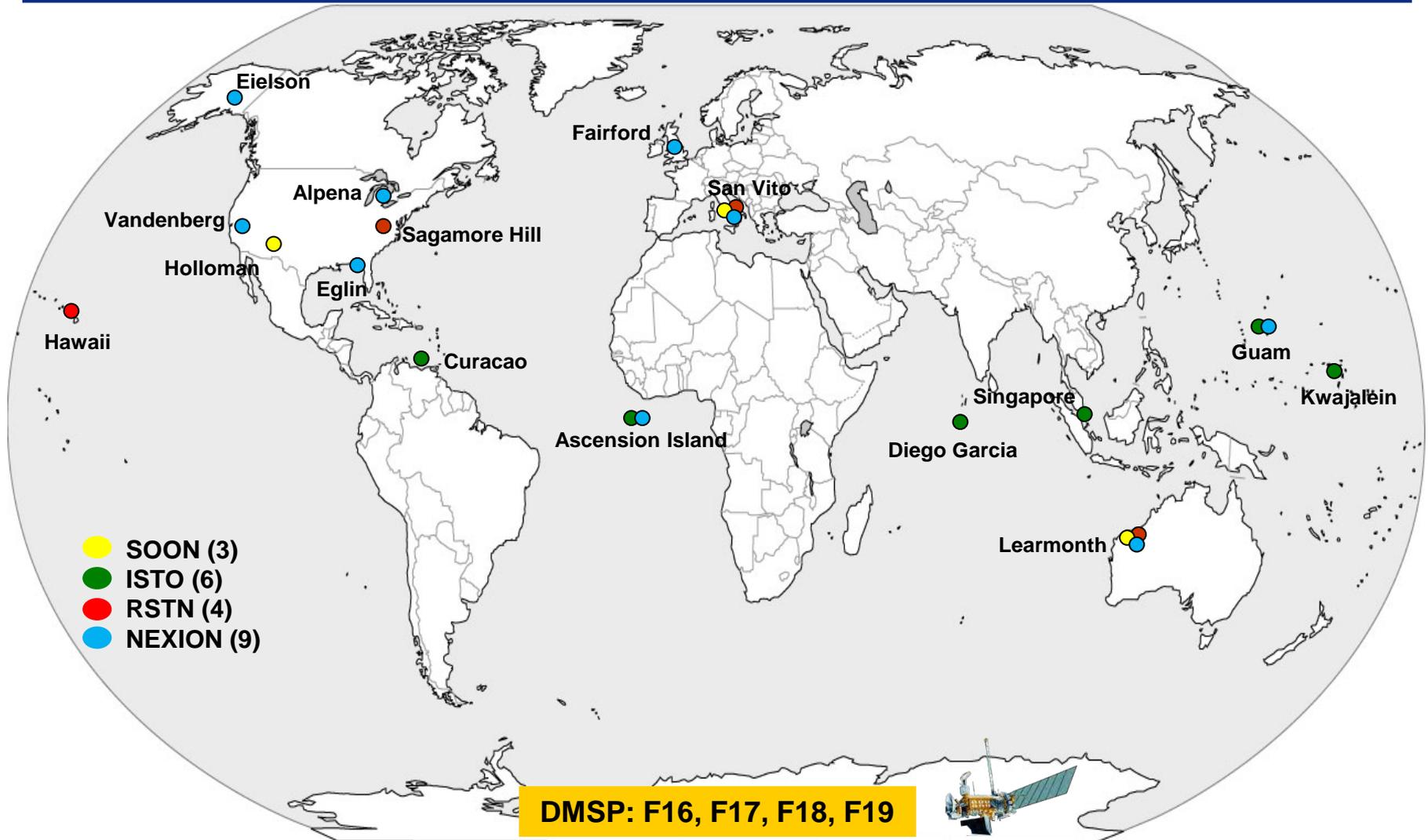


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AF Space Weather Observing Current

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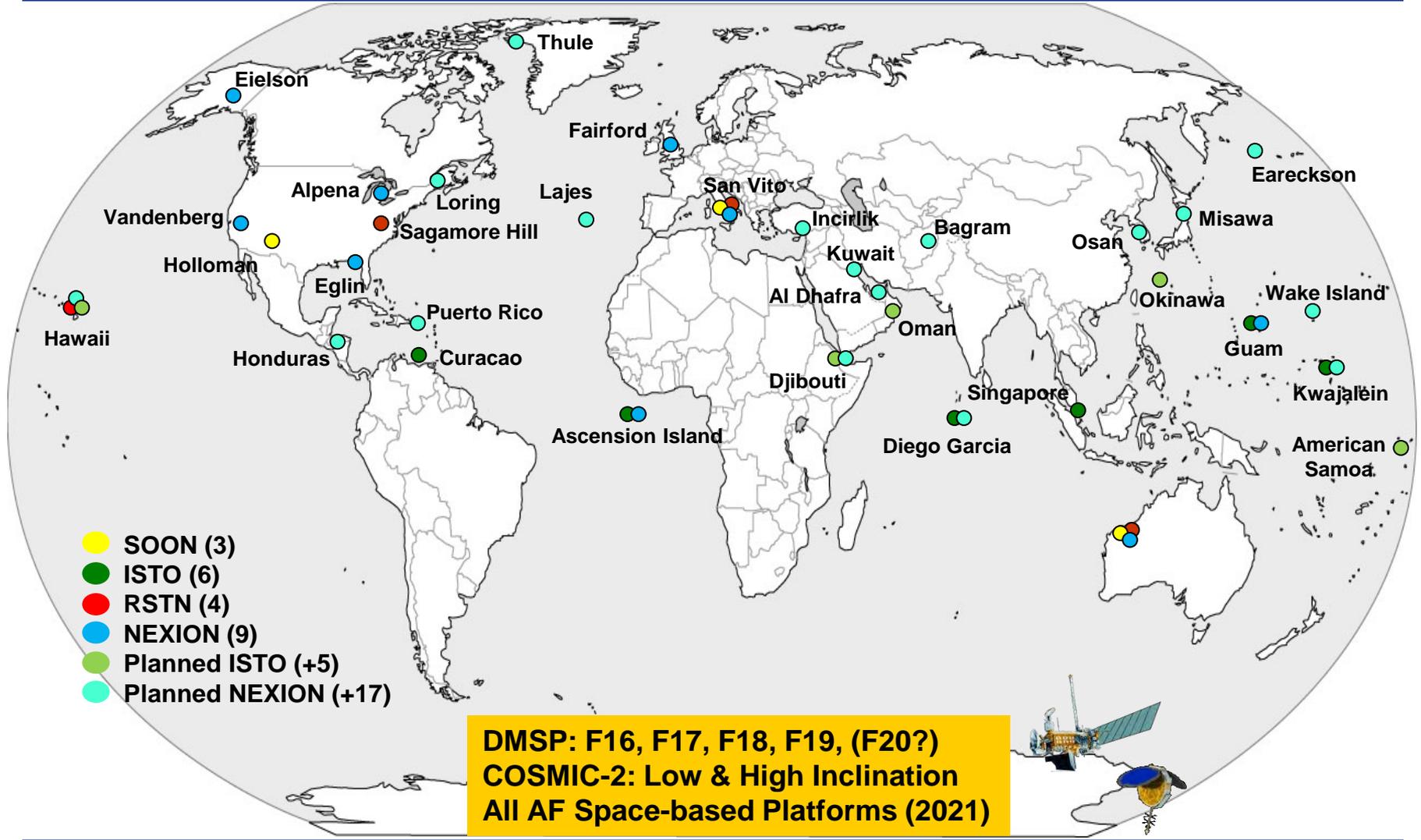


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AF Space Weather Observing Future

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Space-based ECP Observing

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- **Energetic Charged Particles (ECP)**
 - **DoD requires specification of natural environmental conditions at the satellite**
 - **March 2015, SECAF mandated all AF satellites fly ECP sensor**
 - **AF currently working through requirements & acquisition process to field sensor**
 - **Application**
 - **SpaceWOC – Space Situational Awareness (SSA), data assimilation & modeling**
 - **JSpOC – SSA and anomaly assessment**
 - **Timeline: IOC – 2021 / FOC – TBD**



Space Weather Application

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- **557th Weather Wing Space Weather Operations Center (SpaceWOC)**
 - Mission-tailored unclassified and classified analysis, forecasts, warnings
 - Disseminate system-impacting space weather
 - DoD operators and decision makers
 - National agencies
 - Anomaly assessment support
- **Joint Space Operations Center (JSpOC)**
 - C2 system executing USSTRATCOM space control mission
 - Focal point for space force integration & employment in military ops
 - Detect, track, and identify all artificial objects in Earth orbit



Mission Focused DoD & USG Operational Support



Space Weather Community

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- Space weather is a team sport!
- Actively engaged in global community
- Training
 - Space weather course (2 weeks) at 557 Weather Wing
 - Students from France, Italy, Netherlands, Germany – working to bring in Japan and South Korea
- Engaging with UK, South Korea on Ops Centers stand-up
- Data sharing via web services – national & international partners
- Cooperative efforts
 - NOAA SWPC – analysis and forecasting
 - AFRL, NRL, JHU/APL – modeling and data
 - Academic community

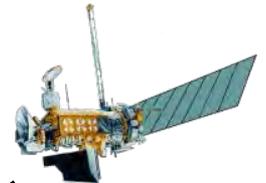




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Space Weather Observing for Military Operations

- What is the DoD perspective on space weather observing?
 - Operational requirement vs Research need
 - Sensor design, sustainability, lifespan
 - Assured availability
 - Sustained operational data sources
 - Dedicated communications
 - Access across all phases of military operations
 - Accredited systems
 - Usable on DoD/AF IT networks
 - Releasable to partners



Relevant, Reliable, Responsive Obs Feeding Sensor-to-Operator Chain



Sensor-to-Operator Examples

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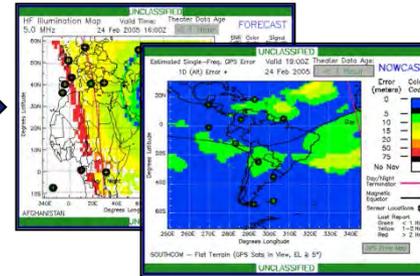
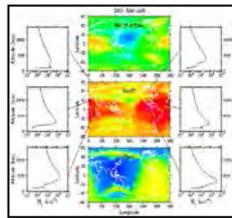
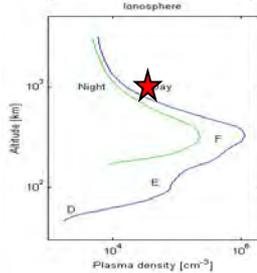
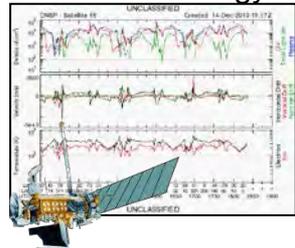
DMSP SSI/ES3
– counts/energy

Ionosphere Specification
(plasma density)

Model – GAIM

Impact products – GPS Error, HF illumination

Infantry navigates via hand-held GPS

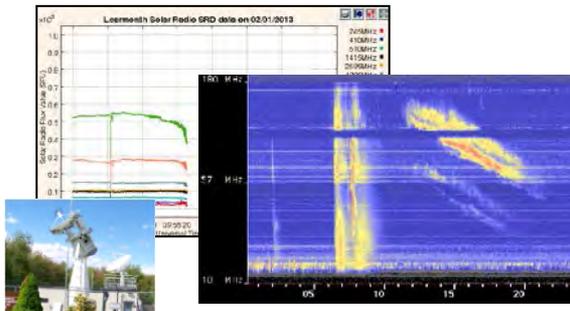


RSTN RIMS & SRS

SpaceWOC Forecaster SA

DoD Radar/SATCOM RFI determination

Buckley AFB space operators warned

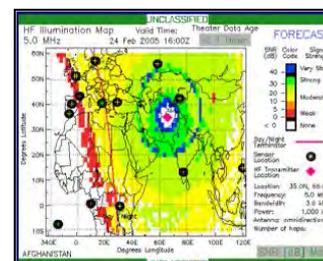
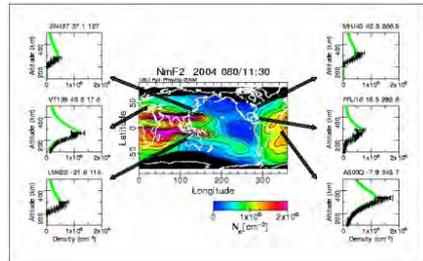
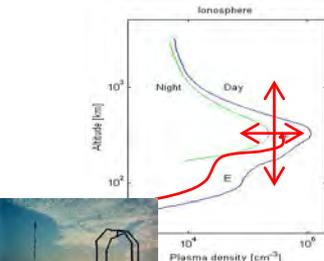


NEXION
– derived profiles

Models – GAIM assimilates obs

Impact products – HF illumination

Naval Special Warfare RHIB C2 via HF Comm



SENSOR

SPACE WEATHER DATA & PRODUCTS

OPERATOR



Summary

U.S. AIR FORCE

- Air Force committed to space weather observing...now & future
- Team with national & international community for DoD Support
- Sensor-to-Operator – accurate, timely, relevant impacts delivered

Global Power



Global Reach



Air Ops



Agile Combat Support



“Air Force weather enables Joint Warfighters to anticipate and exploit the weather...for air, ground, space, cyberspace and intel operations.”

– AFW Mission



Army Ops



Global Vigilance



Special Ops



Space Weather

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