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World's First Geodynamic AI Forecasting Capability

SPACE WEATHER NOWCASTING

Space Weather Services

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The importance of connecting to the actual and very dynamic space environment is
The Challenge of Space

The paradigm change to real-time, data-driven Space Weather Services is the defining opportunity

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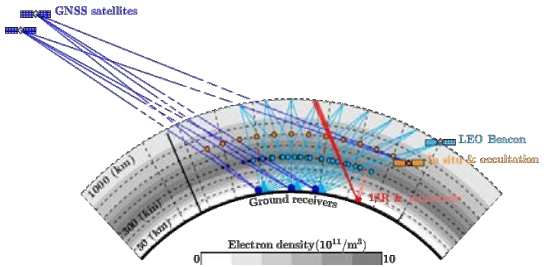
Future state of Space Weather with precursor SPC

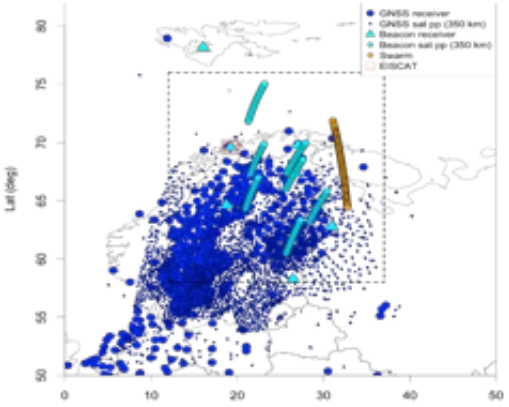
Real-time high-fidelity Space Weather Nowcasting

Streaming Real-time Data Capture



- GPS, GNSS, Occultation, LEO, ISR, Ionosondes, in-situ and from Partners

Real-time Data Assimilation



- Ionosphere based on ACTUAL DATA

Real-time Ionosphere Mapping

- Derive electron density within volume and continuously update individual voxels
- High fidelity / Definable Voxel
- Nowcasting - near real-time measurement of the state (energy) of the ionosphere.
- Foundation for dynamic Space Weather Forecasting

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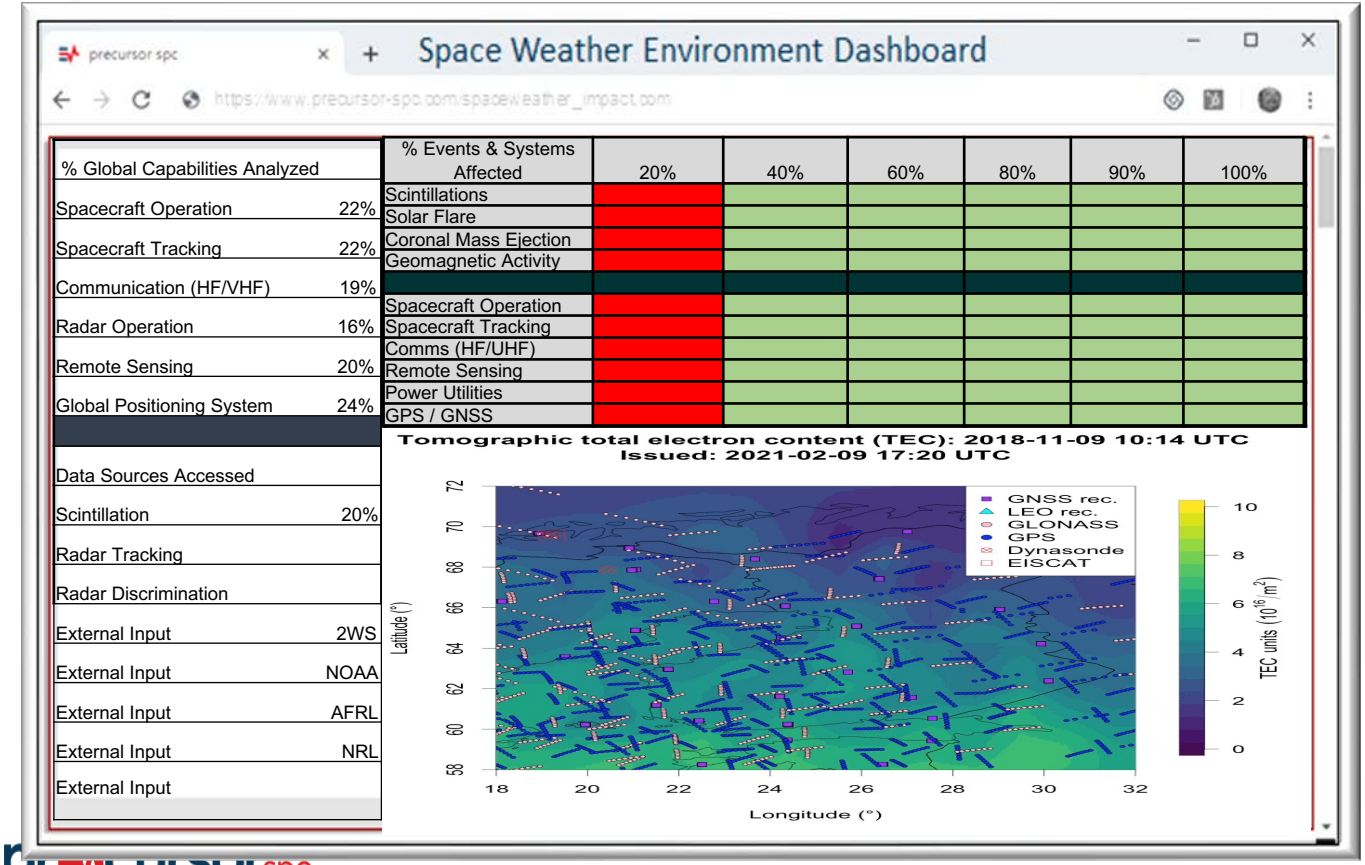
precursor Nowcasting program implemented for Air Force



- Real time Space Weather, updated in real-time
- Spatial Resolution less than 10 cubic km
- Temporal Resolution – minutes to seconds
- Leverages all currently available data and sources
- Real-time impact assessment of the Space Weather environment on assets, operations and missions

Summary of effects and importance of real-time high-fidelity ionosphere

Improving communication, tracking and discrimination, orbit performance

	Ion density	TEC	Freq	Effects without precursor	Effects with precursor
Communication (VHF, UHF, SATCOM)	YES	YES	YES	• Disruption for hours to days • Inability to support theater • Inability to support space assets	• Real time frequency mitigation • Updating CONOPS real time
Tracking (UHF, VHF)	YES	YES	YES	• Loss track • Frequent track reacquisition • Limit radar resources	• Real time frequency mitigation • Real time track association • Updating CONOPS in real time
Discrimination (UHF, VHF, S, X)	YES	YES	NO	• Limited to no discrimination • Affect target handover • Affect mission timeline	• Improved target handover • Improved mission timeline • Updating CONOPS real time
Satellite Orbit & Launch (GPS, LEO, etc.)	YES	NO	NO	• Affect ballistic coefficient estimate • Affect object velocity estimate • Affect drag estimate (10% error in density – 80% error in drag) • Affect orbit determination	• Better ballistic coefficient estimate • Better object velocity estimate • Improved drag estimate • Improved orbit determination • Real-time deployment adjustment