



9th NOAA TBPG Workshop
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Space Weather Prediction Testbed

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Status and Updates



SWPC/SWPT Models

Under Development

In Test and Transition

Operational

Sun:

- ADAPT (USAF)
- WSA (NASA)
- Flare Prediction (SBIR)
- Fareside Imaging (SBIR)
- EUV Irradiance (GOES)

Solar Wind:

- Enlil (George Mason U.)
- L1-Earth Transit (U. Colorado)
- Chen CME Model (NRL)

Magnetosphere:

- Space Weather Modeling Framework (U. Mich.)
- GOES Magnetopause Model (U. Colorado)

Ionosphere:

- IPE (U. Colorado)
- US-TEC
- NA-TEC
- Global TEC
- GPS/ROTI (SBIR)
- Equatorial Scintillation

Thermosphere

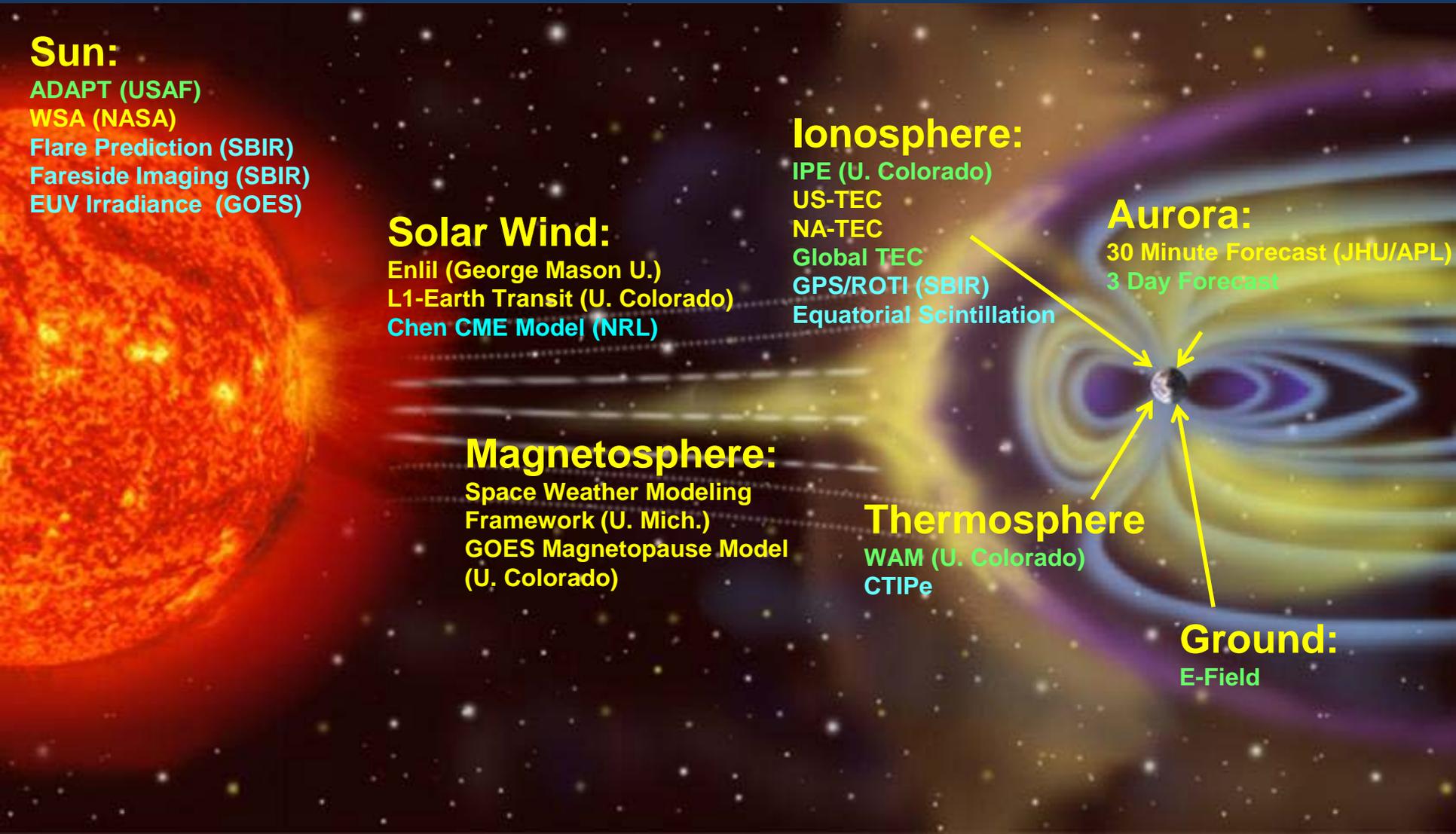
- WAM (U. Colorado)
- CTIPe

Aurora:

- 30 Minute Forecast (JHU/APL)
- 3 Day Forecast

Ground:

- E-Field





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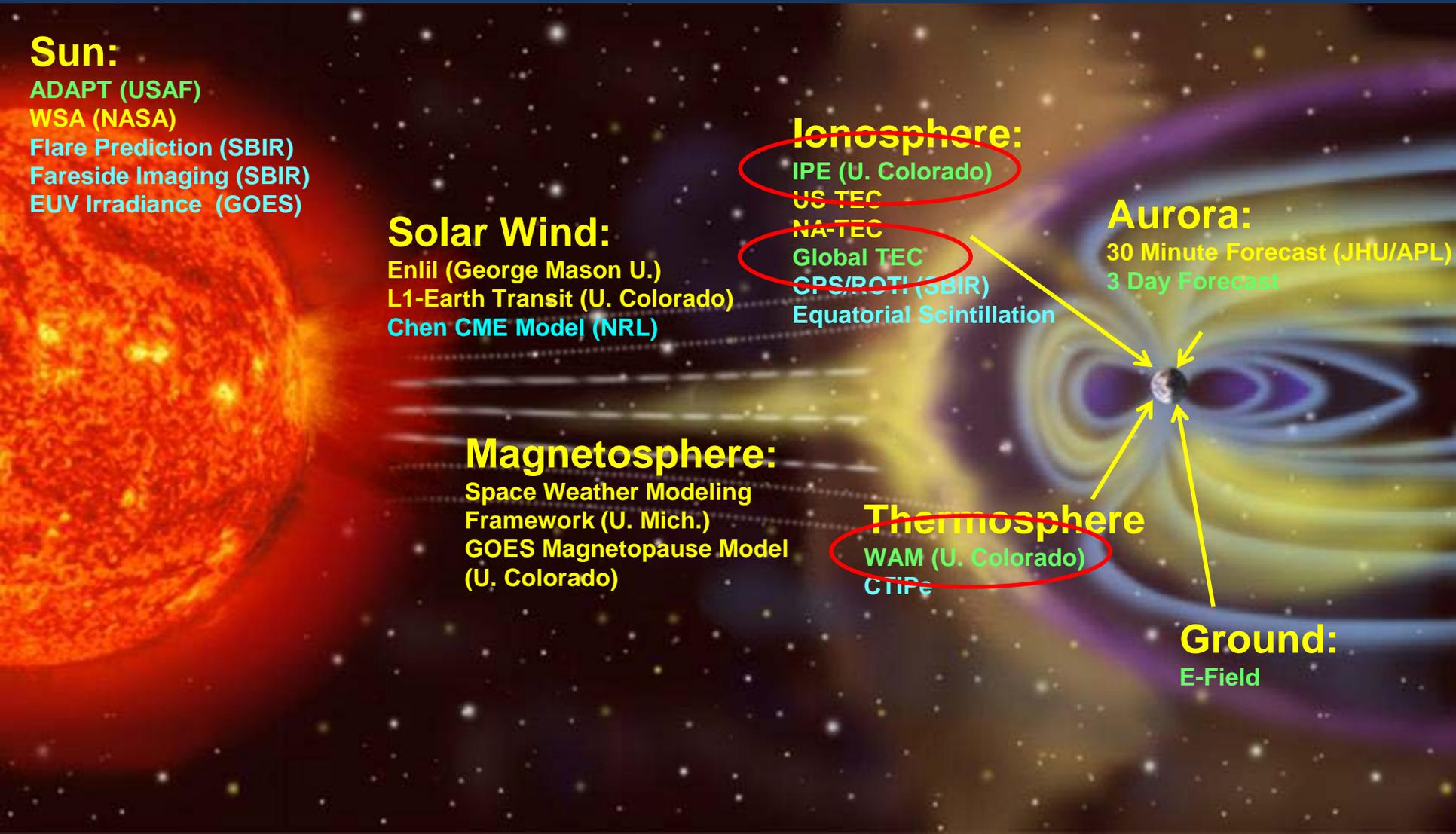
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FY17 Highlights: WAM-IPE Model Development

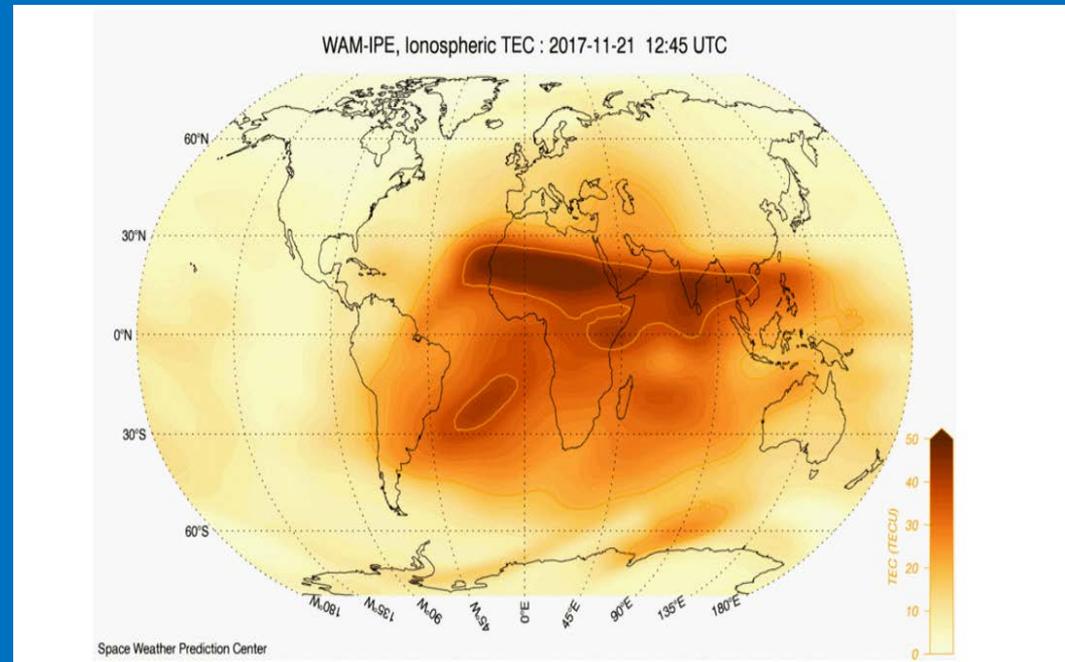
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FY17 Q4: Whole Atmosphere Model (WAM) coupled with the Ionosphere Plasmasphere Electrodynamics (IPE) model with WAM Data Assimilation System (WDAS) running on WCOSS-Dev

Whole Atmosphere Model:

- Extended GFS (up to 600 km)
- Drives ionosphere model (one way coupling)
- Imparts terrestrial weather structures onto the ionosphere.
 - planetary, tidal, gravity waves

Forecasts of Ionospheric/Thermosphere conditions support users of GPS/GNSS, HF Radio, Satellite Com. Satellite Drag,...



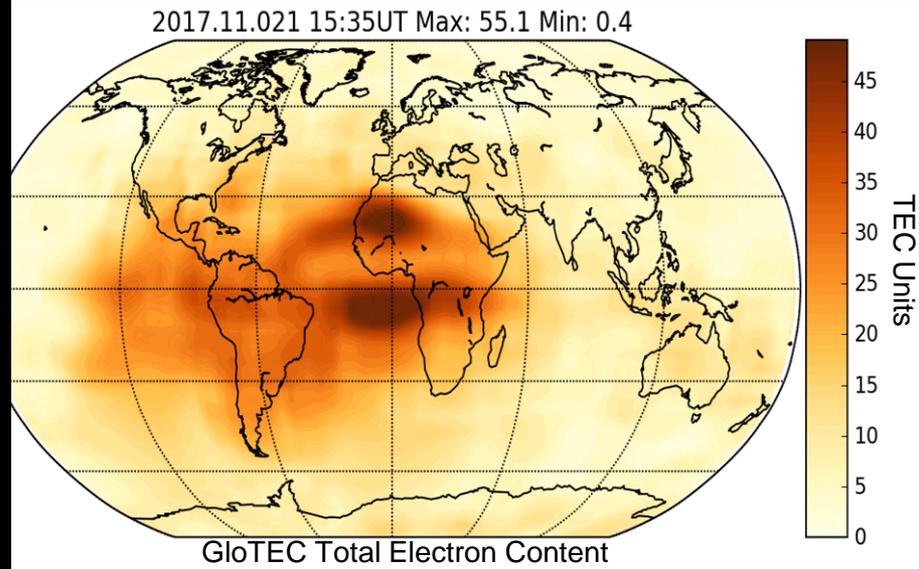
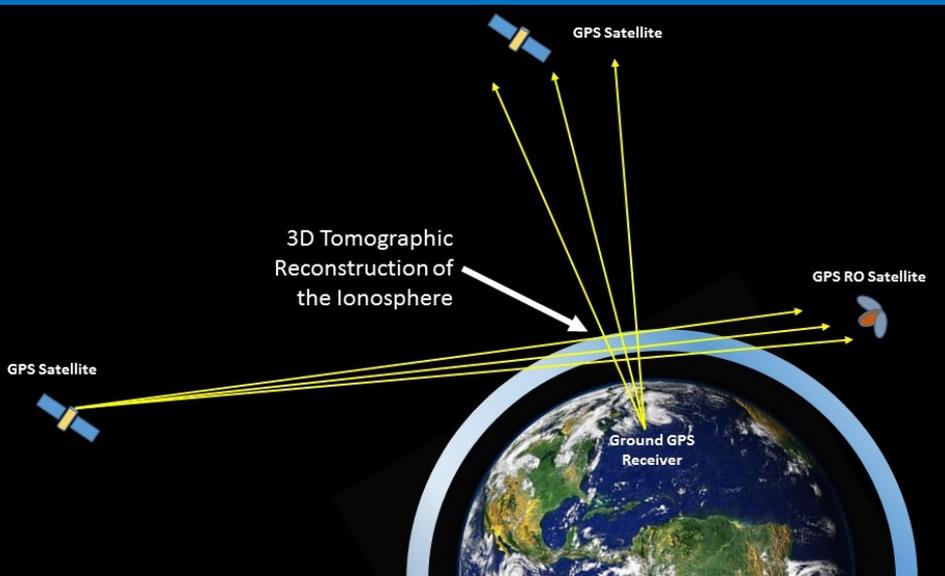


FY 17 Highlights:

GloTEC Model and COSMIC 2 Data

Assimilative model of the ionosphere

- **Global Total Electron Content (GloTEC):**
 - Combines ground-based and space-base (COSMIC) GPS/GNSS observations to create a 3D assimilative map of the ionosphere
 - Proves specification of parameters relevant to a number of users
 - GPS/GNSS, HF Communication, Satellite Communication

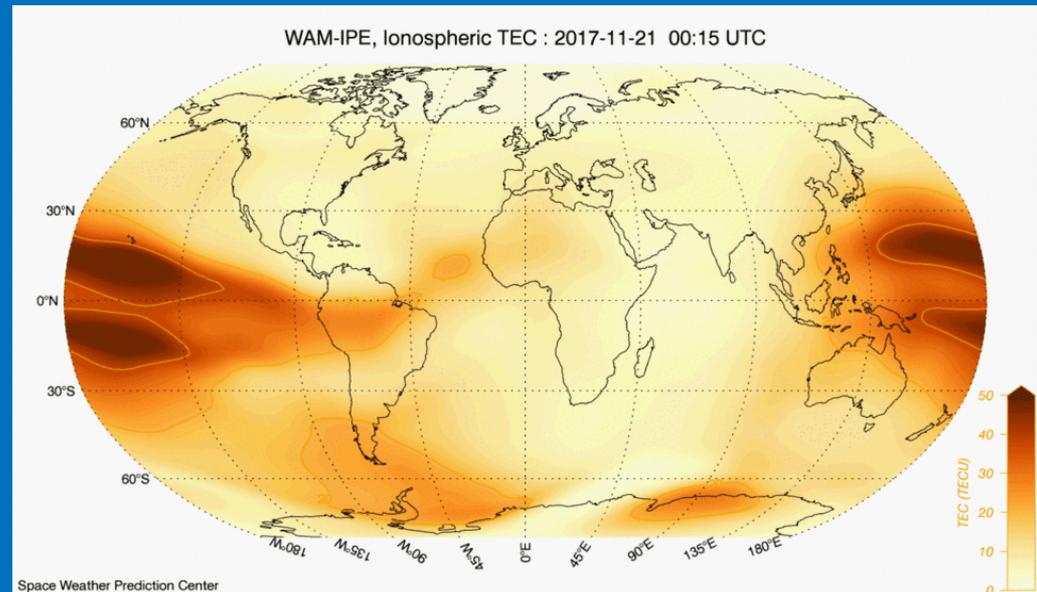
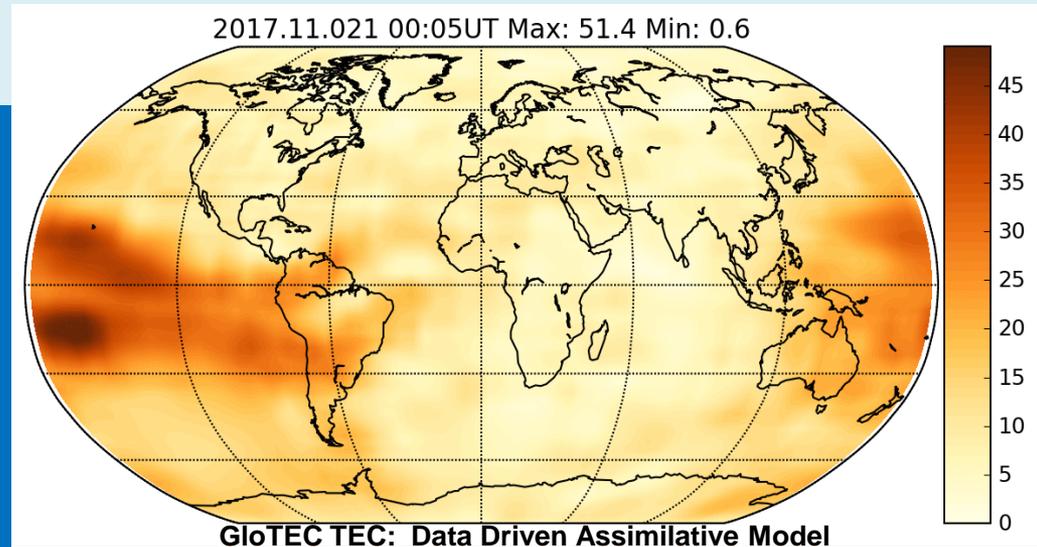




WAM-IPE Validation with COSMIC-2

GloTEC: Will use COSMIC-2 data to create a real-time 3D specification maps of the ionosphere and TEC

- WAM-IPE:** Will provide multi-day forecasts of ionosphere and TEC.
- Phase 1: COSMIC-2 and GloTEC will be used to validate WAM-IPE forecasts (FY19)
 - Phase 2: COSMIC-2 data will be assimilated into WAM-IPE to improve forecasts (FY20)





FY17(18) Transition Metrics

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Major Tests Conducted	Transitioned to Operations (RL9)	Recommended for Transition to Operations (RL9)	Advanced To Experimental Testing (RL8)	Further Demonstration / Development (RL 5-7)	Rejected For Further Testing
WAM-IPE: Real-time, One way coupled.		FY19 Q4	FY17 Q4		
GloTEC Assimilative Model with COSMIC 2 data		FY19 Q2	FY18 Q4		
WSA-Enlil Model Upgrade		FY18 Q3	FY18 Q1		
NSO GONG Data Processing on IDP		FY18 Q3	FY17 Q4		
Goespace Model Upgrade	(V2)FY17 Q4	(V3) FY19 Q3	(V3) FY18 Q3		
E-Field Product	FY19 Q2	FY 18 Q4	FY17 Q4		



FY18 Highlights:

Updates and Plans

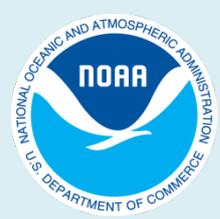
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- **WAM-IPE**

- 2-way coupling implemented on WCOSS-Dev (NESSI)
- Derived products developed (in conjunction with customers and user)
- FV3 Dynamical Core implementation and testing begins

- **GloTEC**

- Ready to receive COSMIC 2 data
- Ready to test GPS/GNSS RO data from the Commercial Data-Buy Pilot Product (high latitude GPS RO)



FY18 Highlights: Space Weather Action Plan

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- **Space Weather Action Plan:** Initiative to enhance National Readiness and Resilience against Space Weather



- Multi-Agency Announcement of Funding Opportunity: R2O2R
 - FY18 AO: Using existing funds a tri-agency announcement (NASA, NOAA, NSF) was released to support transition of model to operations and the upgrade and improvement to existing operational models.
 - FT19 AO: New money (~\$10M from OMB) has been allocated to enhance space weather R2O2R
- NASA-NOAA MOU Annex 2 developed for the next set of tasks
 - Aviation Radiation
 - Data assimilation
- Expansion of Space Weather Testbed Center
 - (multi-agency, academia, commercial partners).





Questions

Space Weather Prediction Testbed

- **Summary:**

- A number of models are in development
- Several models are being upgraded
- New resources are being used to address the R2O2R processes and applied research for space weather

- **Questions?**

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