

ICON Overview

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June 27, 2018

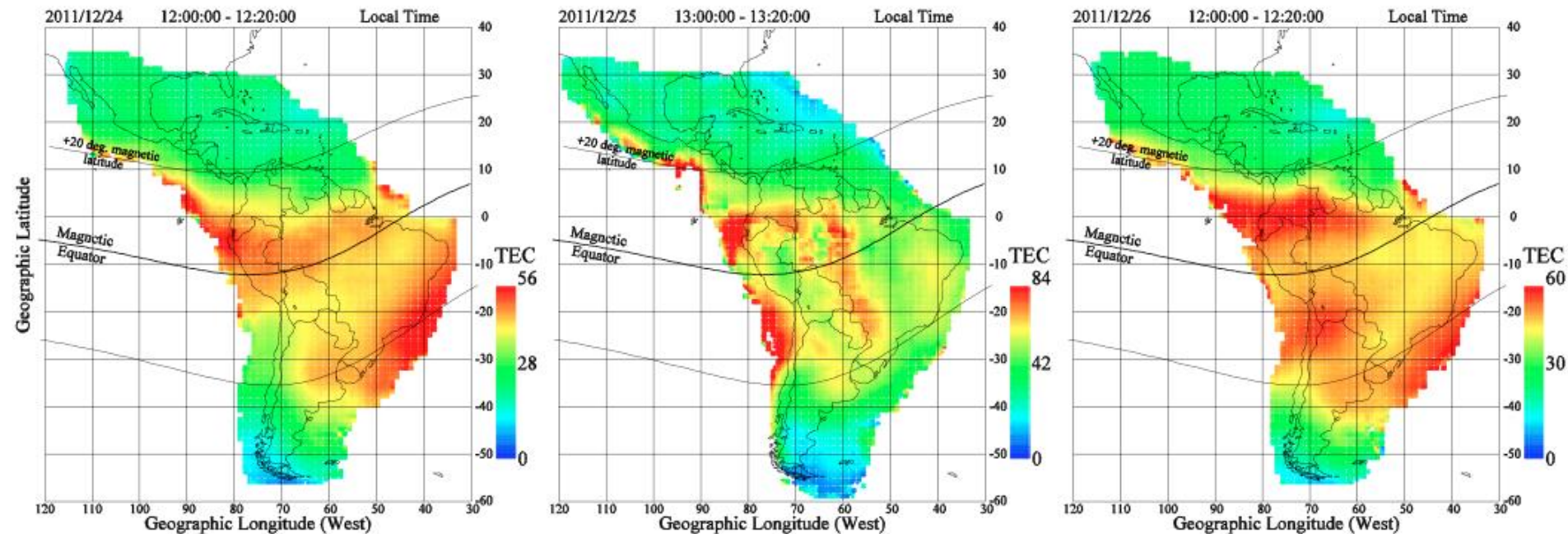


The Ionospheric Connection Explorer – Understanding the link between our Atmosphere and Space



ICON's overall goal is to understand **How our space environment is controlled by terrestrial weather**









Earth's ionosphere changes inexplicably from one day to the next



- ❑ LISN Network vTEC – PI Cesar Valladares, Boston College
- ❑ Outstanding day-to-day variability in equatorial ionosphere while $Dst = 0$ nT
- ❑ Cause unknown!

With tools like this, we see behavior of the ionosphere that is completely unexpected.

ICON team roles and responsibilities

 <p>UC Berkeley</p> <ul style="list-style-type: none"> • Project management • Systems engineering • S&MA • UV instruments • Payload electronics • Mission/Science Ops 	 <p>Naval Research Laboratory</p> <ul style="list-style-type: none"> • MIGHTI neutral wind interferometers • Ion velocity meters <p>UT-Dallas</p> 
 <p>OA - Space Systems Group</p> <ul style="list-style-type: none"> • LEOStar-2/750 spacecraft • Observatory I&T 	 <p>OA - Magna</p> <ul style="list-style-type: none"> • Payload structure • FUV Calibration <p>Centre Spatial de Liège</p> 
 <p>NASA</p> <ul style="list-style-type: none"> • HQ- SMD • GSFC – Explorers • KSC – LV Services 	 <p>Space Dynamics Lab</p> <ul style="list-style-type: none"> • Instrument support <ul style="list-style-type: none"> • Cameras/electronics • Payload I&T



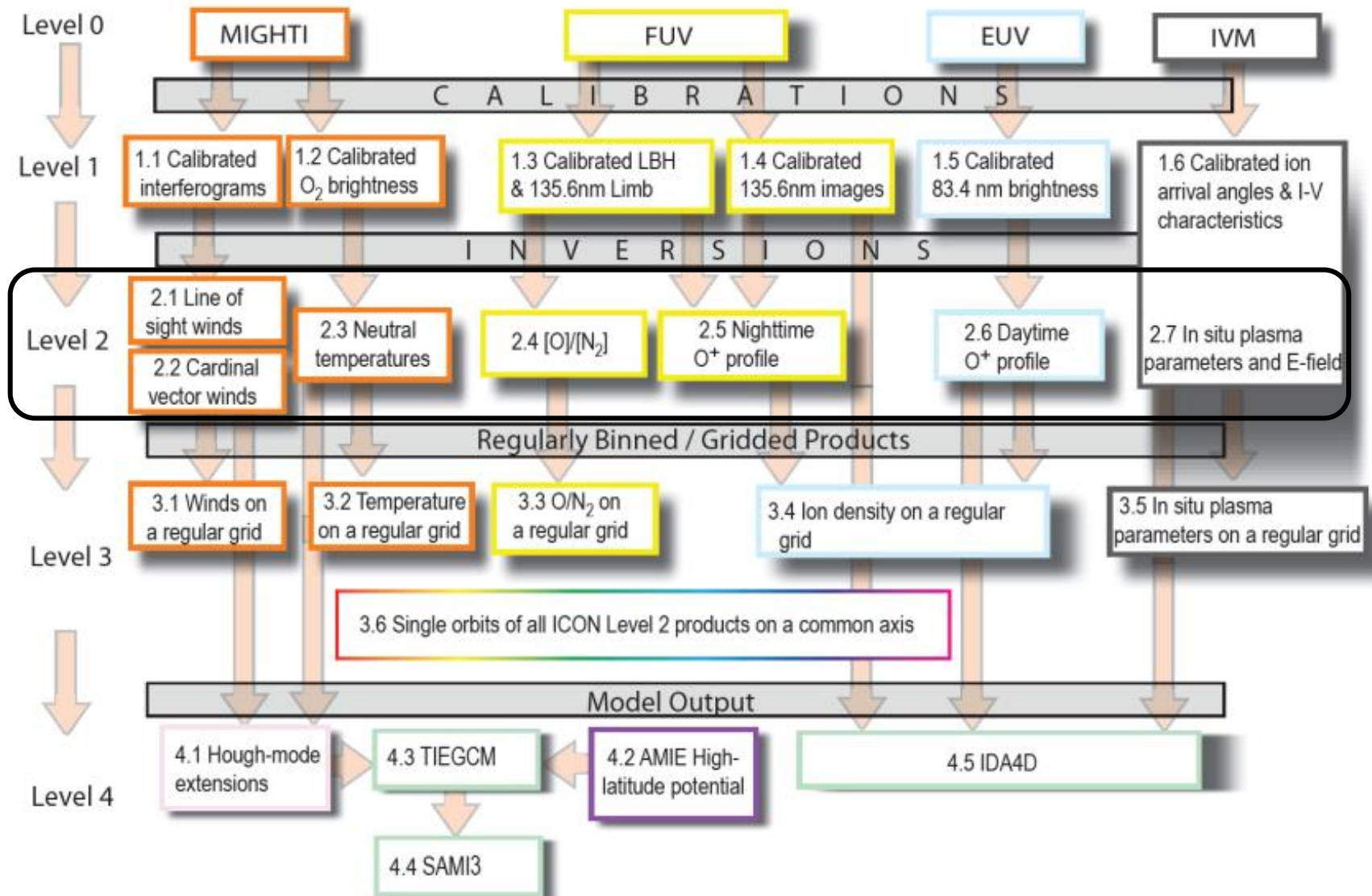




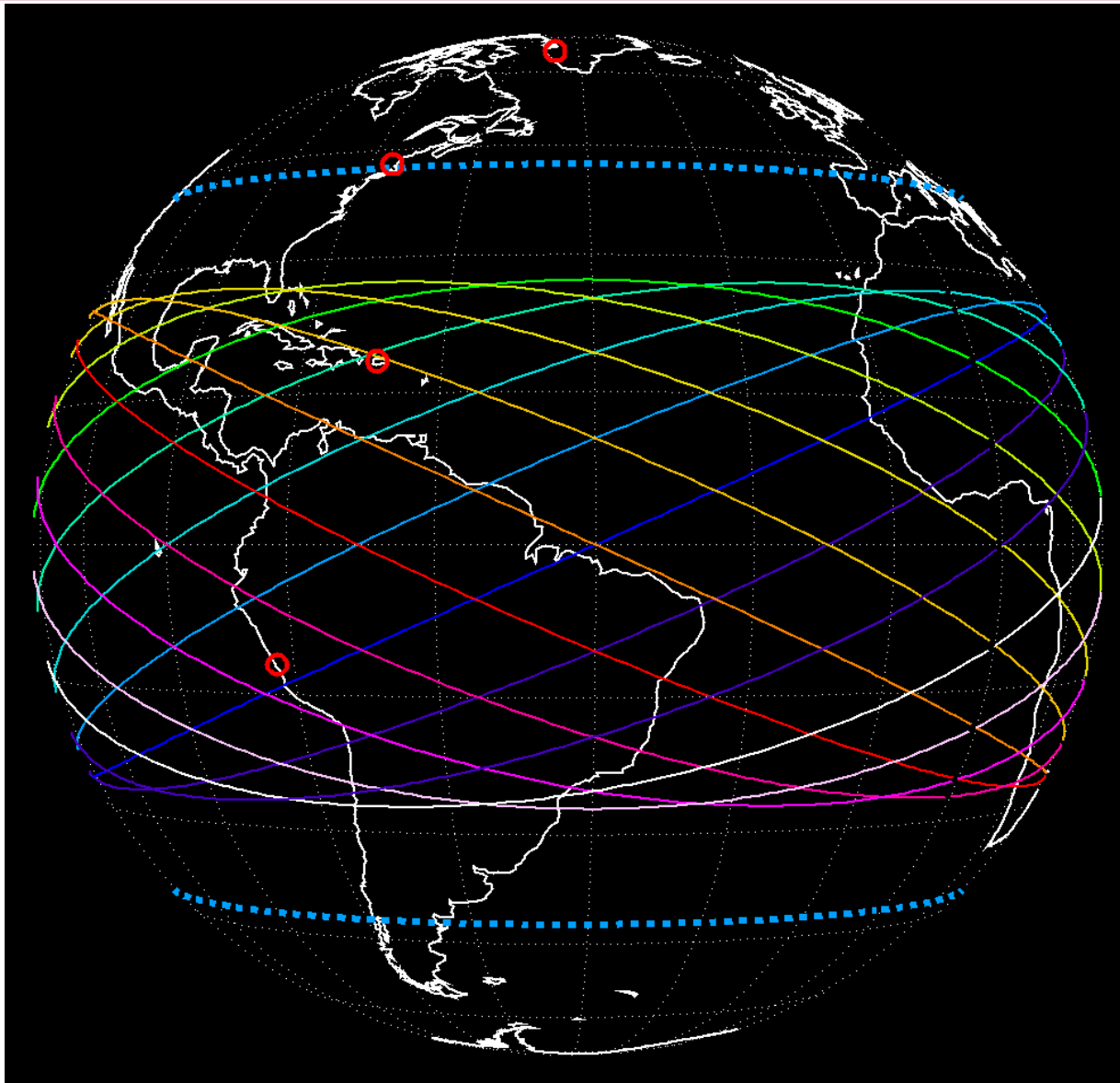
Science Requirements and Performance Predictions

Science Target	Range (altitude, local time)	Resolution Requirement	Precision Requirement	Performance
Horizontal Neutral Winds (Doppler shift of 557 and 630 nm emissions)	Day: 90-300 km alt. Night: 90-105 km alt. 200-300 km alt. 18 hours LT	Vertical: <i>5 km below</i> Horizontal: 250 km sampling day, 500 km night	90-105 km: 8.7 m/s 105-200 km: 10 m/s 200-300 km: 8.7 m/s per 500 km horiz. sample	Meeting requirements in each altitude range
Vertical Ion Drifts (Cross-track and in-track components)	<i>In situ</i> (575 km alt.), local sunrise to midnight	240 km horiz. sample 32 s	Cross-track: 4.5 m/s In-track: 21 m/s per 250 km horiz. sample	Cross-track: 4.0 m/s In-track: 19 m/s
Nighttime Ionospheric Density Profile (Intensity of 135 nm emissions)	Tangent alt. 0-450 km, local sunset to midnight	4 km vert., 20 km horiz. pixel size, 500 km horiz. sample; 1 min	NmF2 to 18% per 500 km horiz. sample	NmF2 to 3%
Daytime Ionospheric Density Profile (Intensity and ratio of 61.7 and 83.4 emissions)	Tangent alt. 100-450 km, local sunrise to sunset	20 km vert., 500 km horiz. 1 min	NmF2 to 18% per 500 km horiz. sample	NmF2 to 12%
Neutral Temperature (Band emission shape of 762 nm emission)	Tangent altitudes of 90-105 km., 18 hours LT	5 km vert., 500 km horiz. 1 min	12.2 K per 500 km horiz. sample	5 K @ 105 km
Thermospheric O/N₂ Ratio (Intensity and ratio of 135 and 157 nm emissions)	Tangent altitudes of 0 to 450 km, local sunrise to sunset	10 km vert., 500 km horiz. 1 min	Column ratio to 8.7% per 500 km horiz. sample	Column ratio to 6%

Validation has been performed for all Level 2 products



In GOLD's Field of View



Status



- ☐ ICON Science Validation effort is complete.
- ☐ All L2 retrievals to the ICON science data pipeline are ready.
- ☐ Pegasus XL vehicle undergoing inspection and parts in 1st stage being replaced.
- ☐ NASA Launch Services now planning for late September launch from Kennedy Spaceflight Center

This schedule provides ~ 6 months of validated data in May 2019