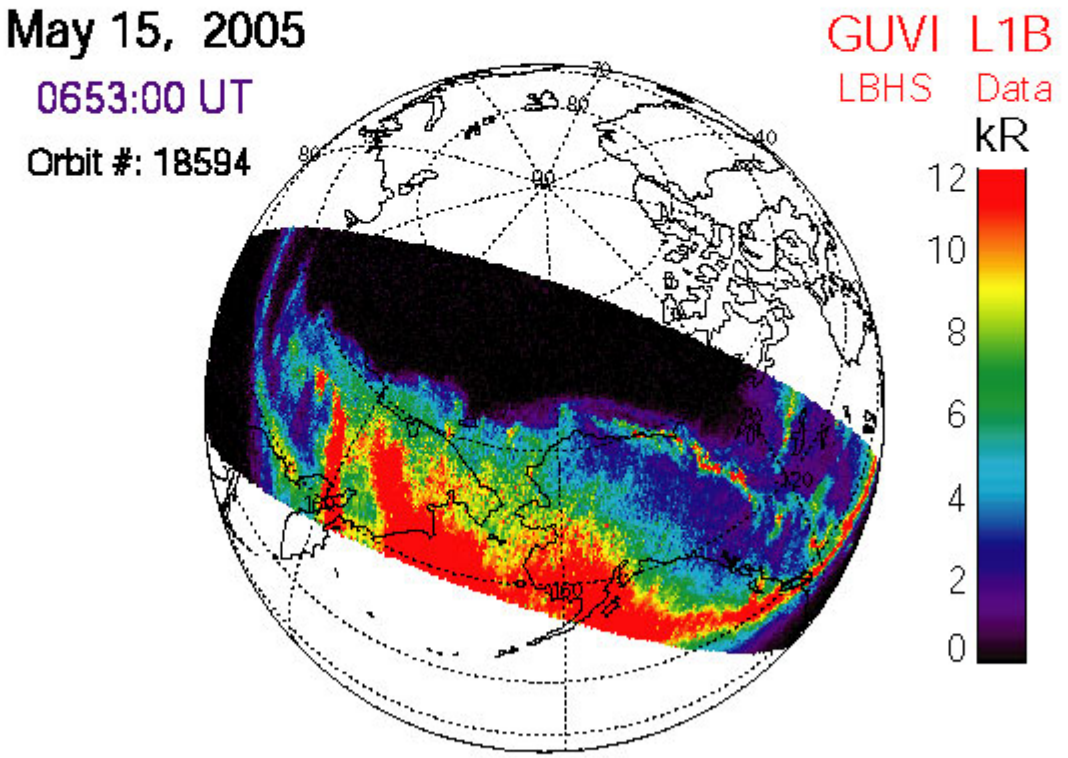
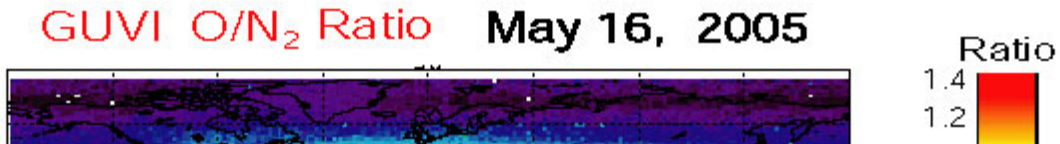
GUVI Global Ultraviolet Imager

OME
SCIENCE OBJECTIVES
FACT SHEET
WHAT'S NEW
VERVIEW
XTENDED MISSION
SING GUVI DATA
UVI DATA PRODUCTS
UMMARY IMAGES
UBLICATIONS
DUCATION





GUVI Global Ultraviolet Imager - Microsoft Internet Explorer provided by ITSD Department

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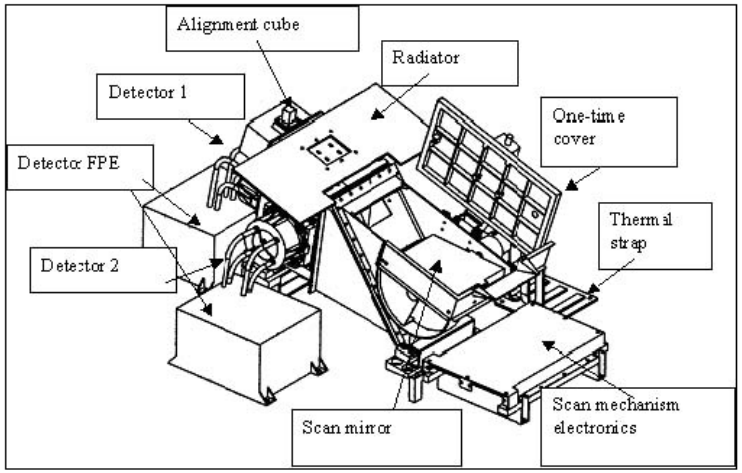
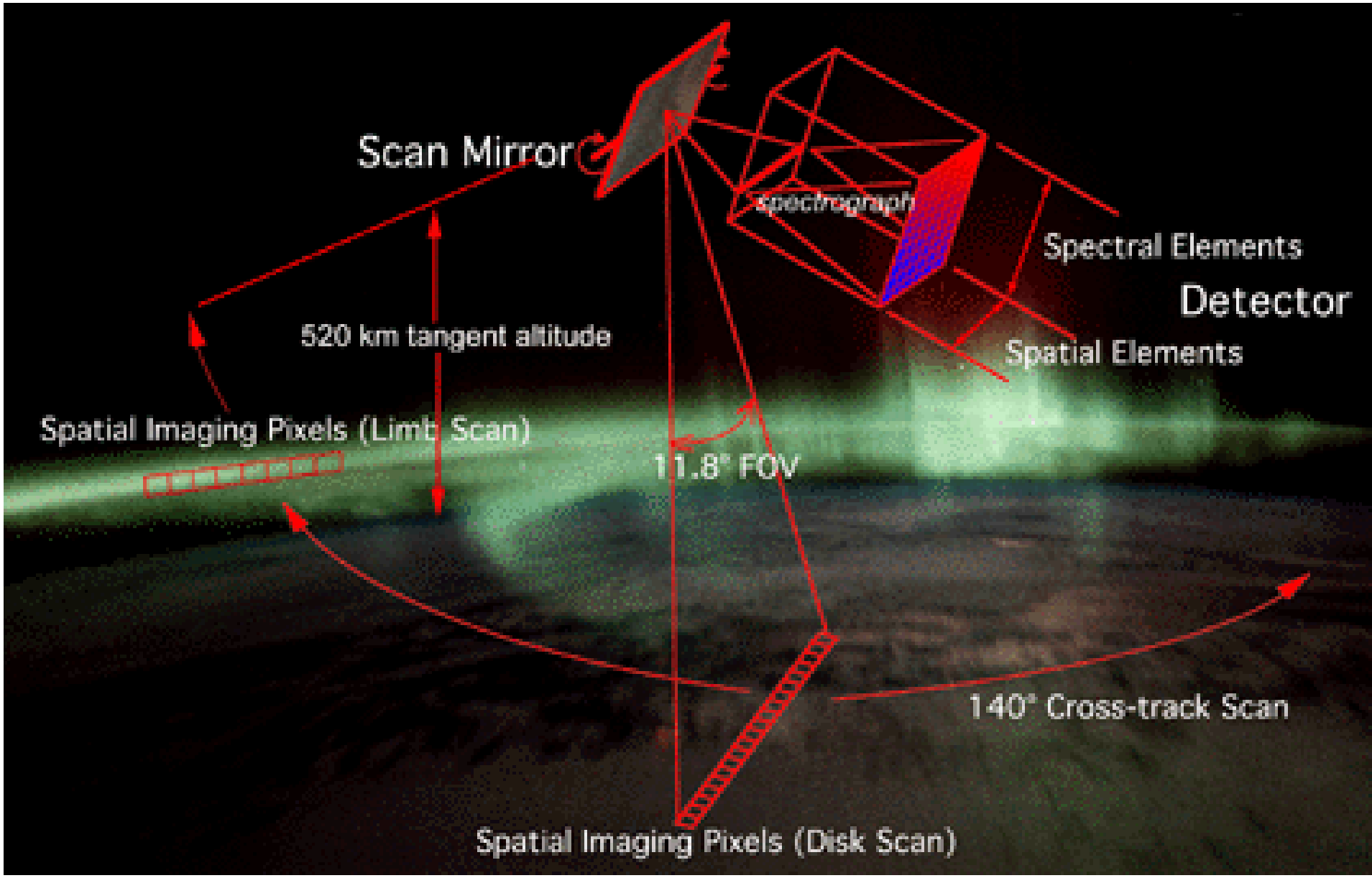
GUVI Global Ultraviolet Imager

Instrument

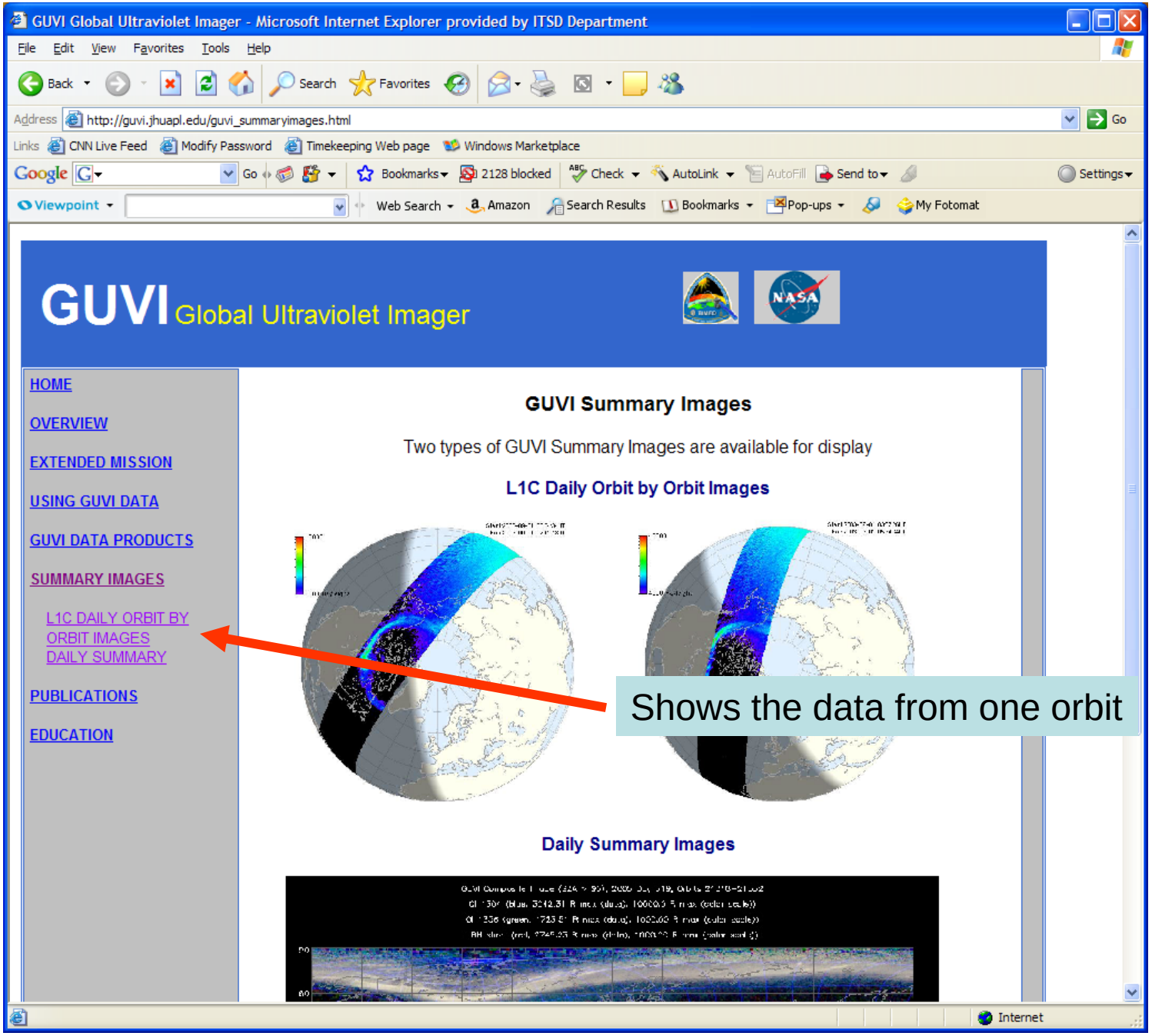
The GUVI instrument consists of three major functional elements: a scanning imaging spectrograph (SIS) that obtains the spectral data, a detector processor which converts information recorded at the detector into wavelength and spatial information as required, and an interface to the TIMED spacecraft. The SIS subassembly consists of a cross track scanning mirror at the input to the telescope and spectrograph optics. The spectrograph is a Rowland circle mount which gives reasonable spatial imaging quality along the entrance slit axis. Lifetime studies and experience with the SSUSI detectors indicated that it was prudent to have two detectors at the focal plane of the instrument. The actual detector to be used is determined by the location of a mirror which can be inserted into the instrument's optical path. The detectors are custom built micro-channel plate intensified wedge-and-strip anode sealed tube units.



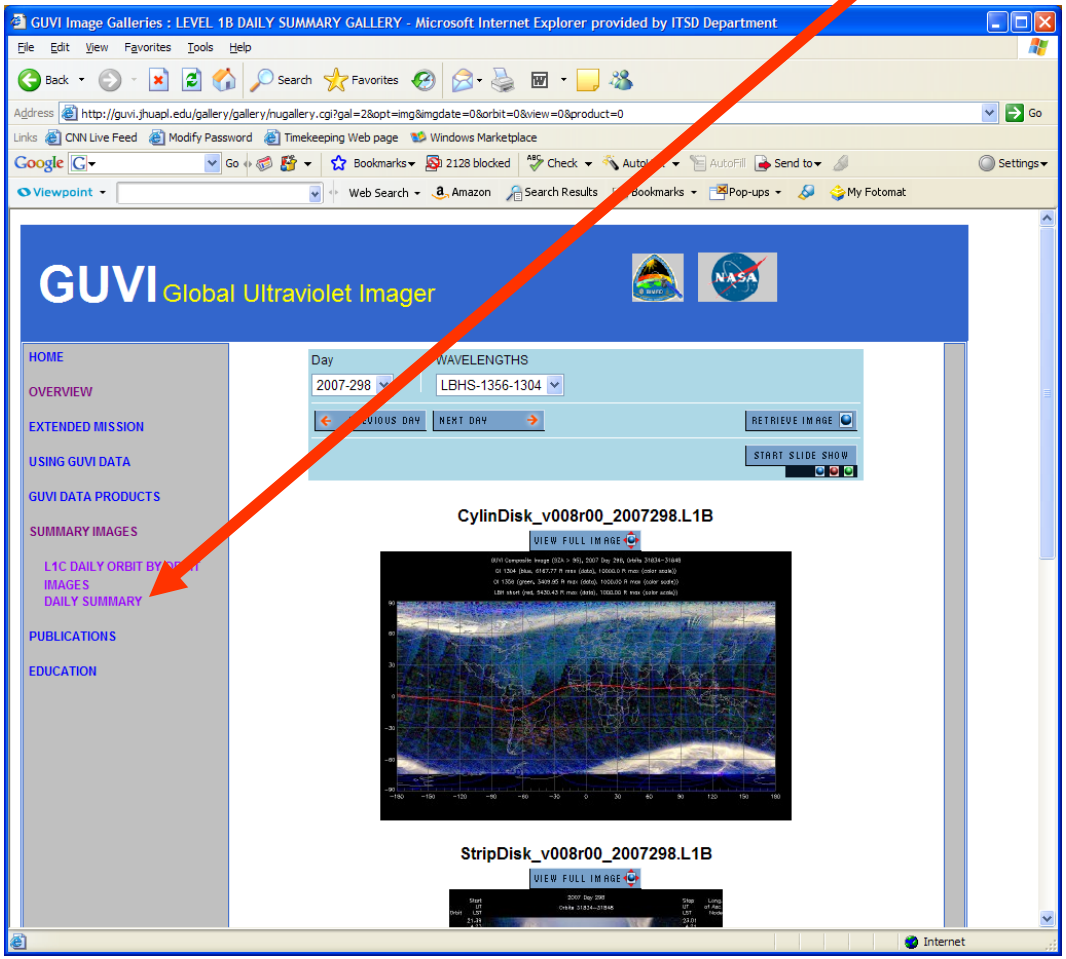
Internet


Scan Mirror
spectrograph
Spectral Elements
Detector
Spatial Elements
520 km tangent altitude
Spatial Imaging Pixels (Limb Scan)
11.8° FOV
140° Cross-track Scan
Spatial Imaging Pixels (Disk Scan)

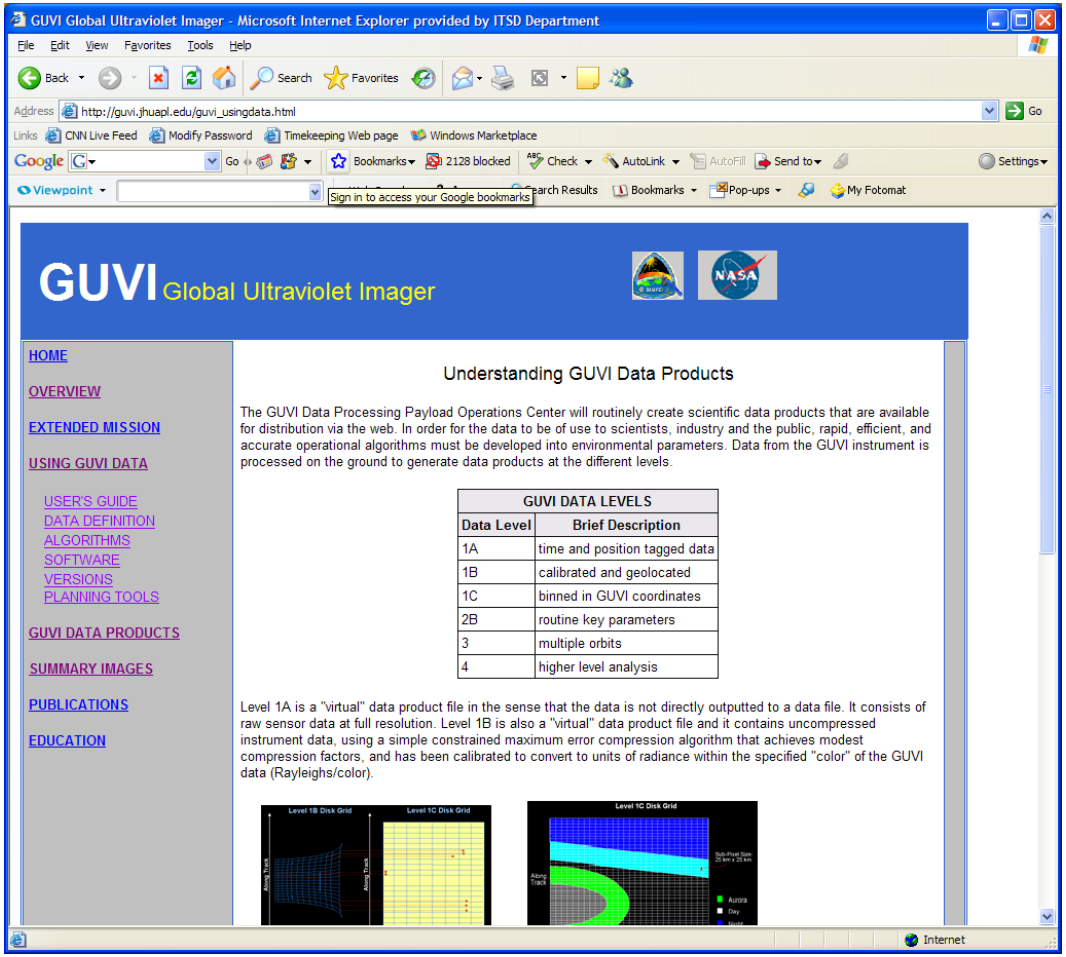
This is the page to go to to look at the GUVI data in the form of images



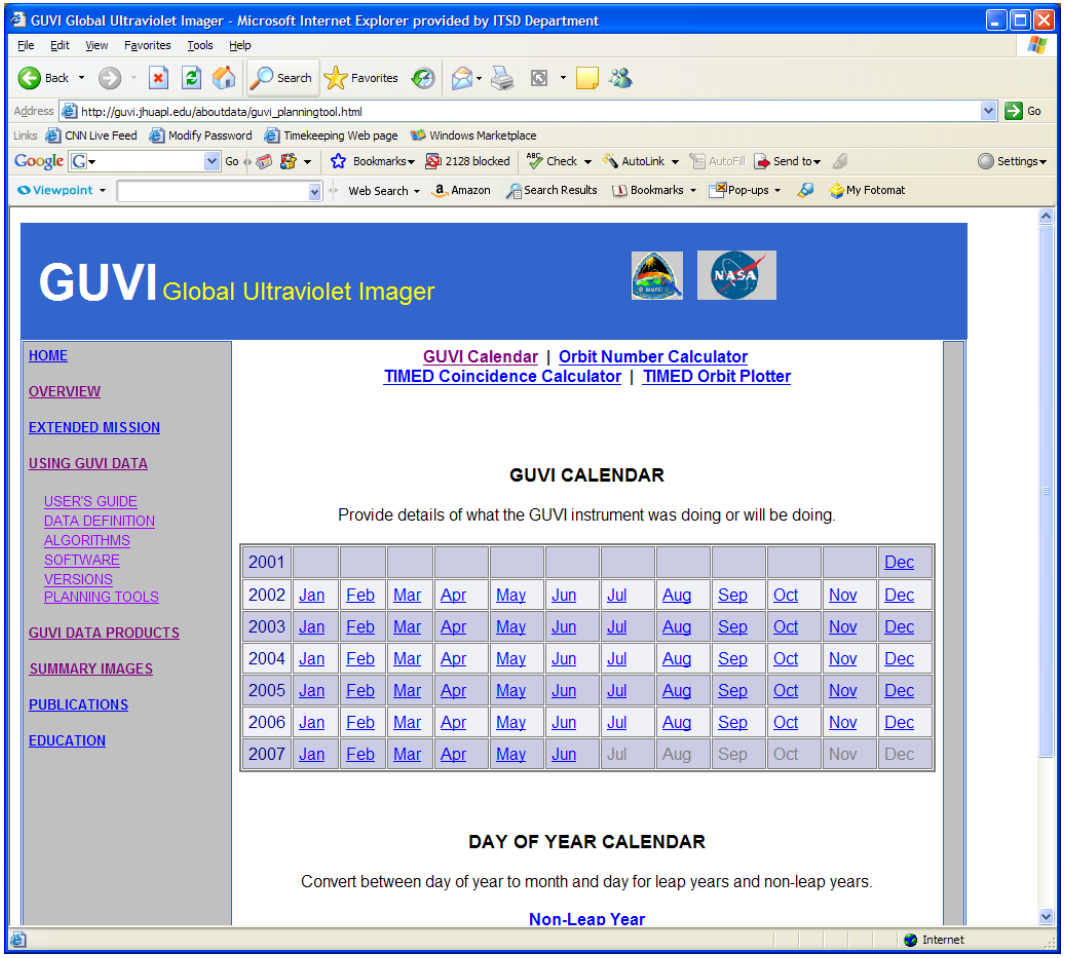
To look at a particular day click on daily summary you need the day of year



Tools are on this page – can use these to calculate orbit number, day of year, etc

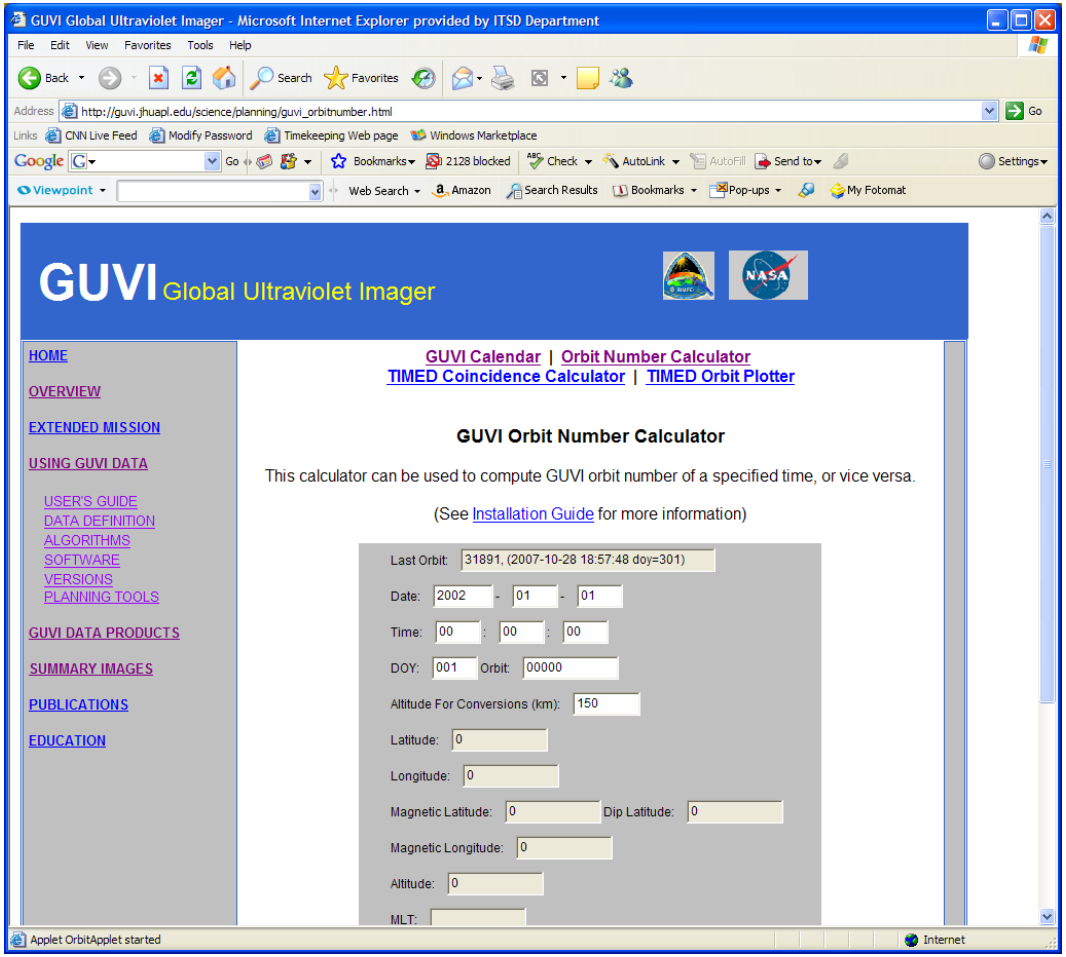


Click on the “planning tools” link to get here

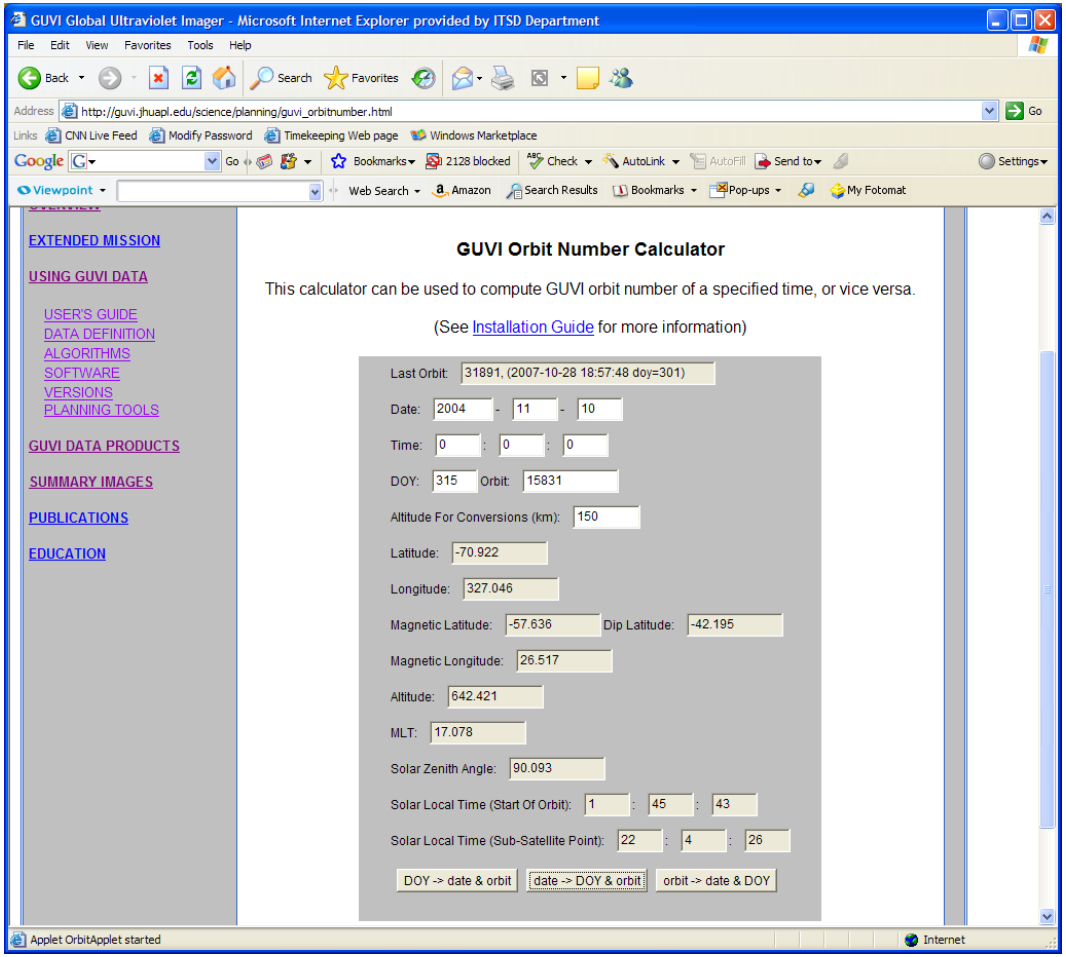


The GUVI calendar tells you if we were in a different mode on a particular day or if there was a spacecraft event.

Clicked on “orbit number calculator”

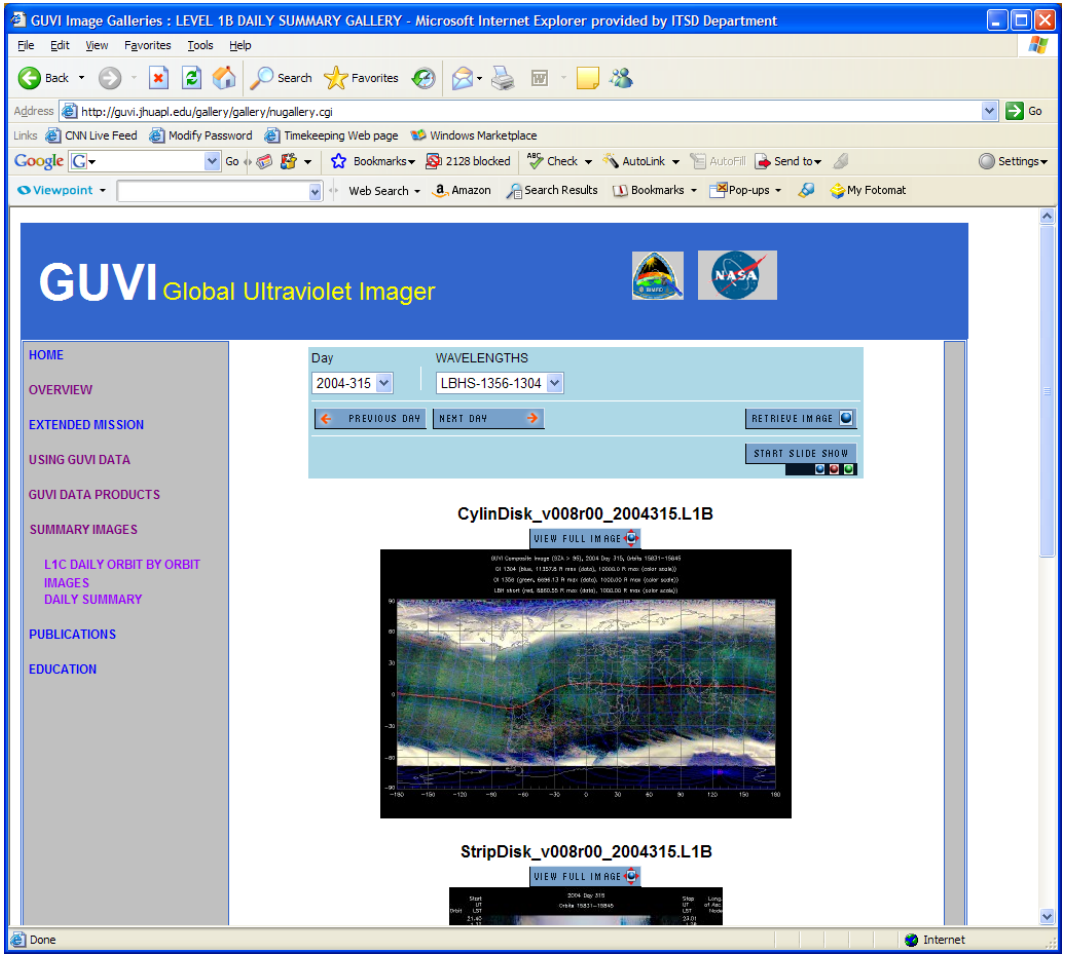


Entered the date and clicked at bottom of screen to convert to day of year “doy”

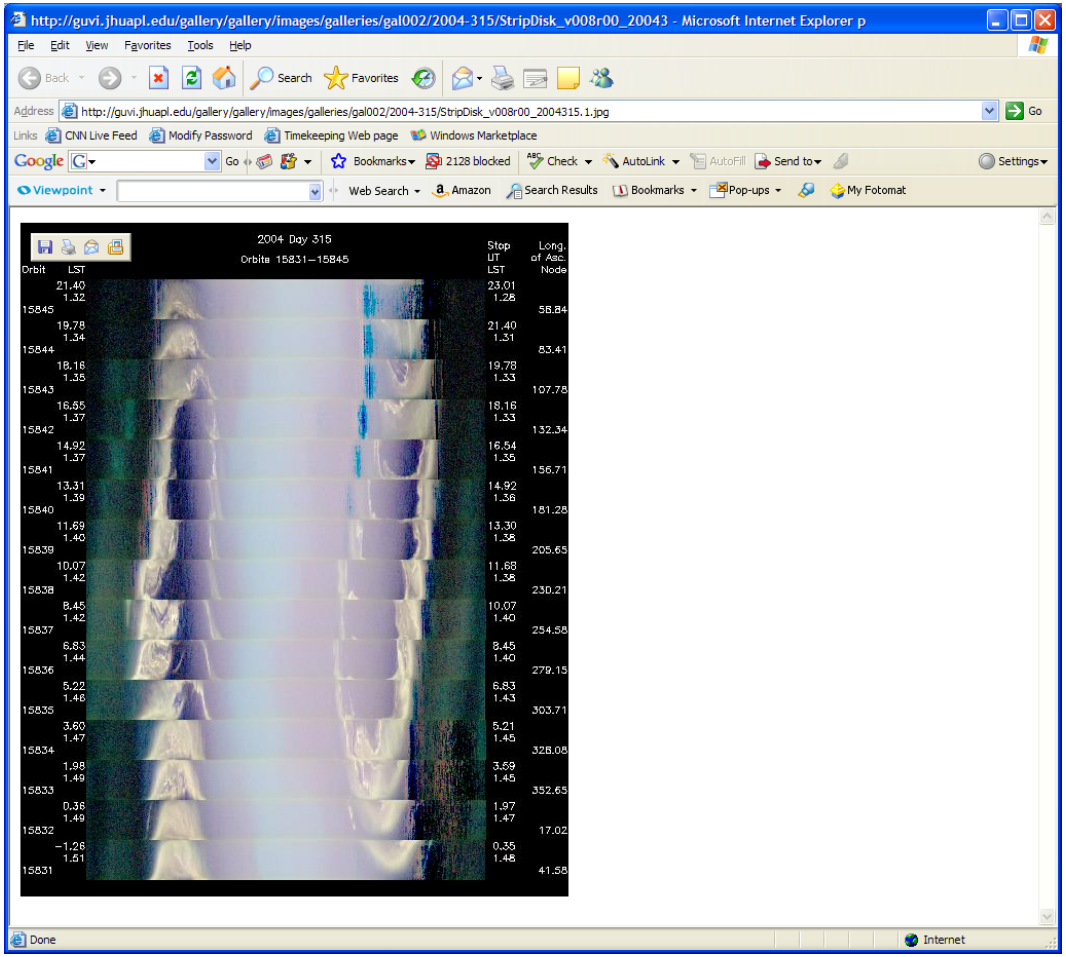


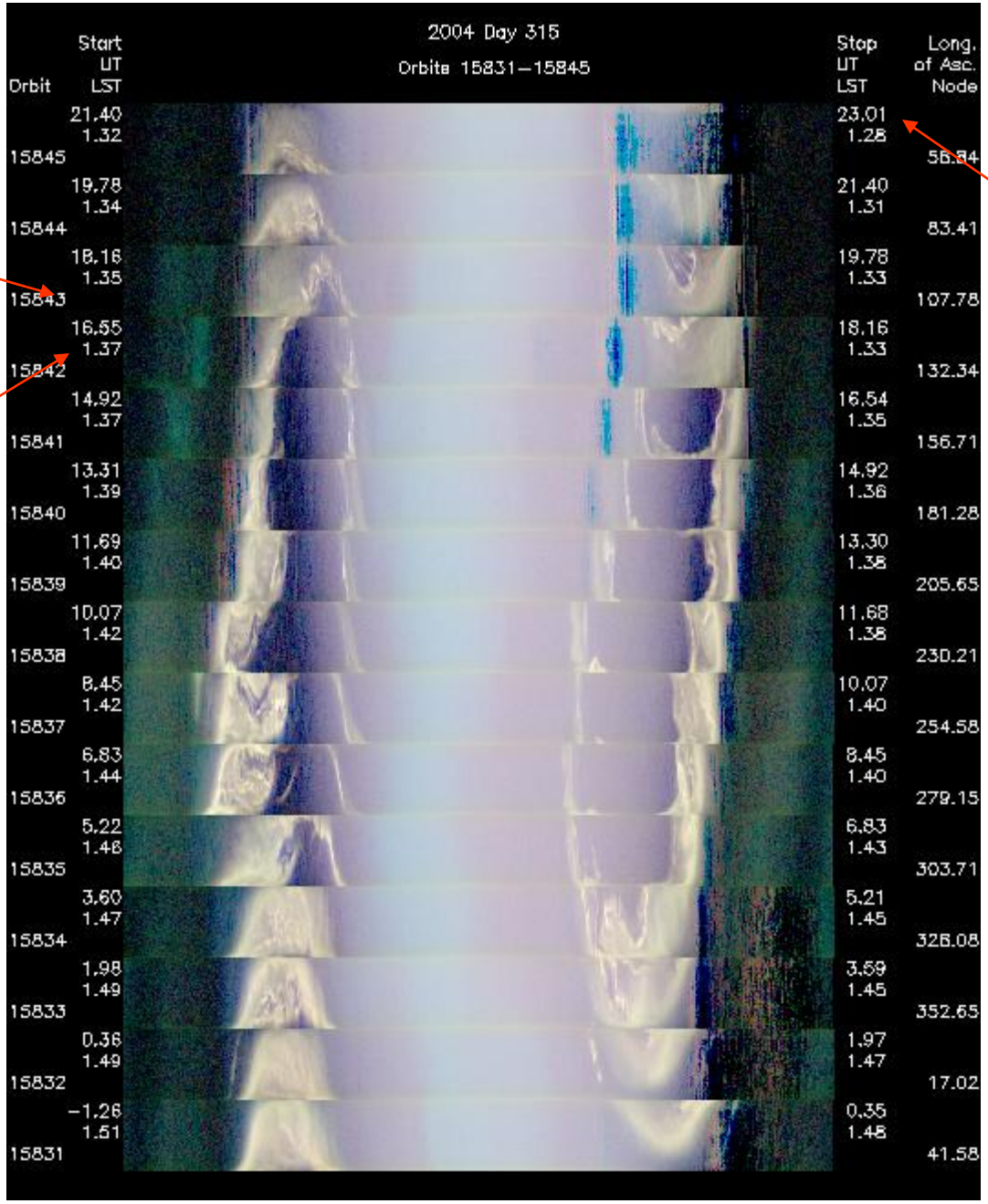
Now we know that it was day 315

Find the day of year and year on the scroll bar and click on “retrieve image” to see a summary



Scroll down to the disk summary and click to see the larger version of the image





Universal time at the ascending node
Or start of the orbit

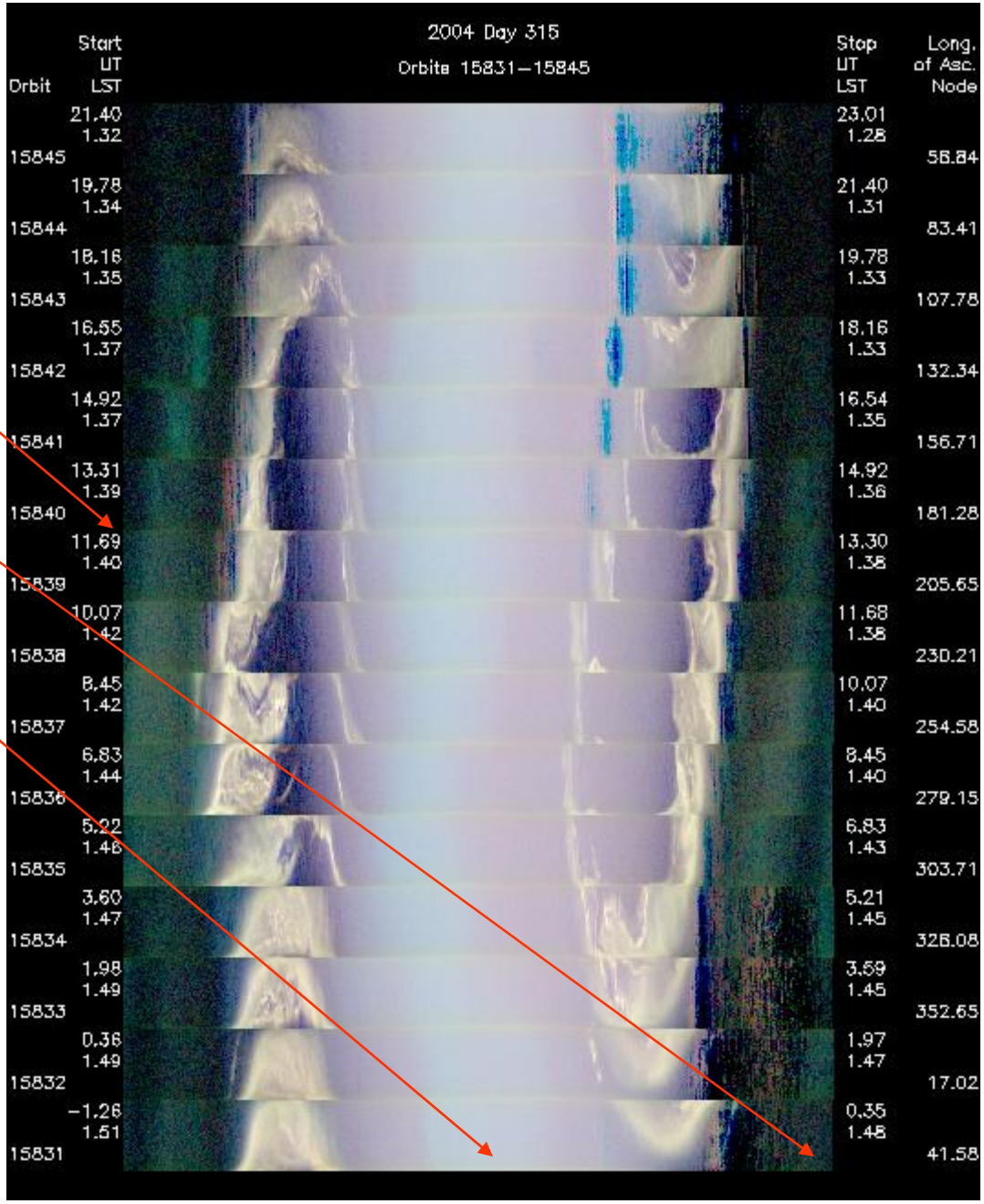
Local time at start of orbit

Orbit number

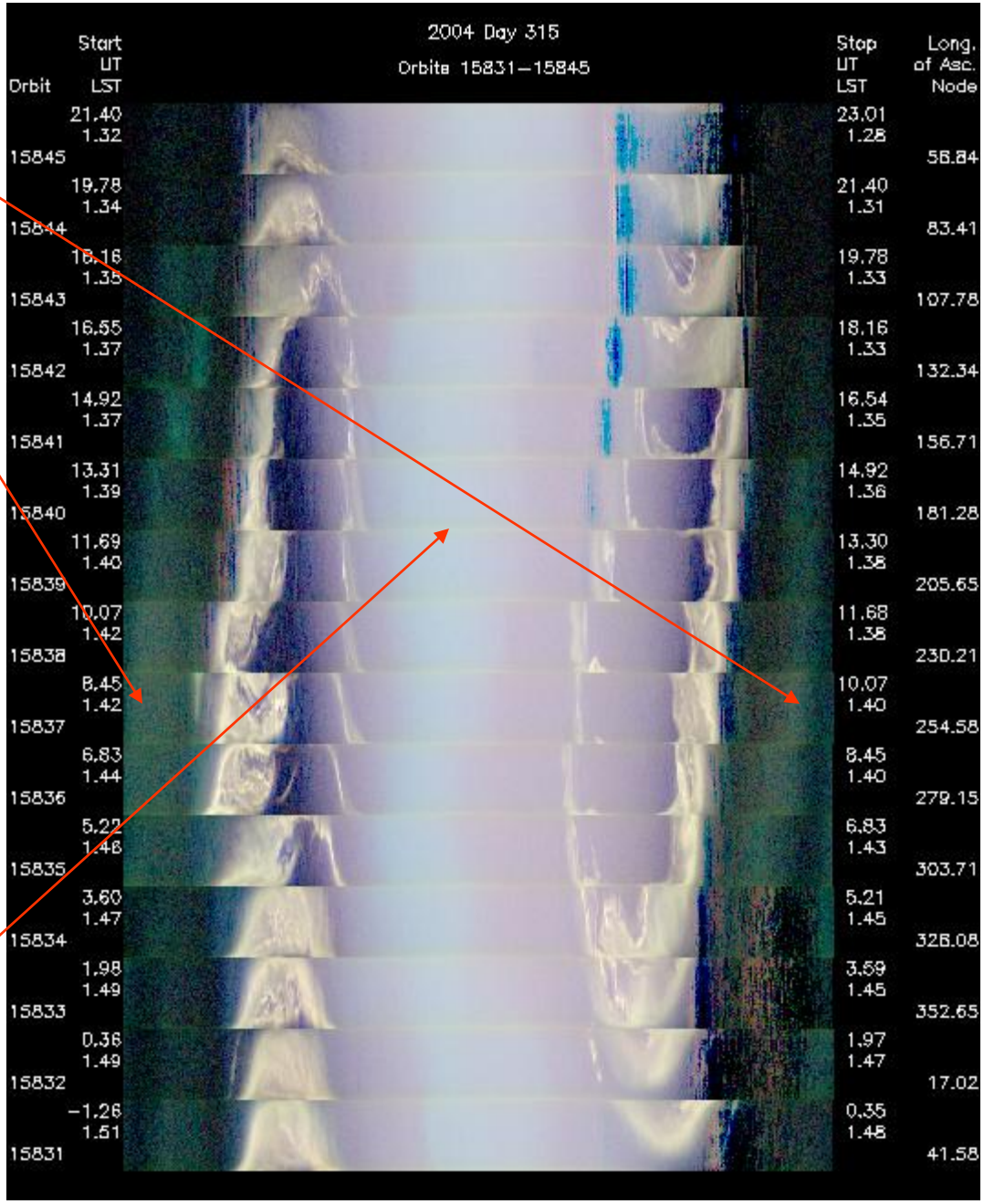
Universal time at the end of the orbit

Longitude of the ascending node

Geographic equator



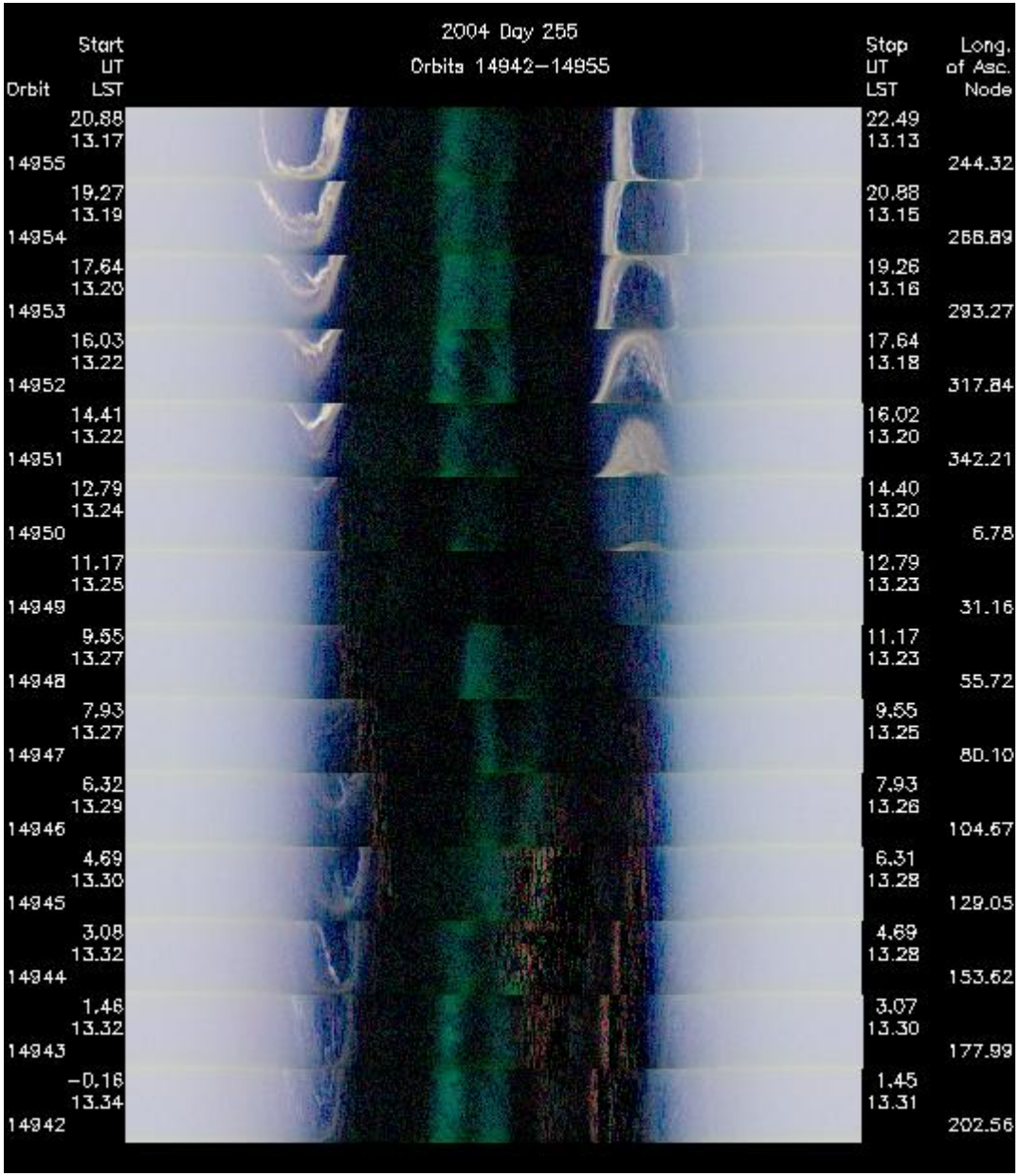
night

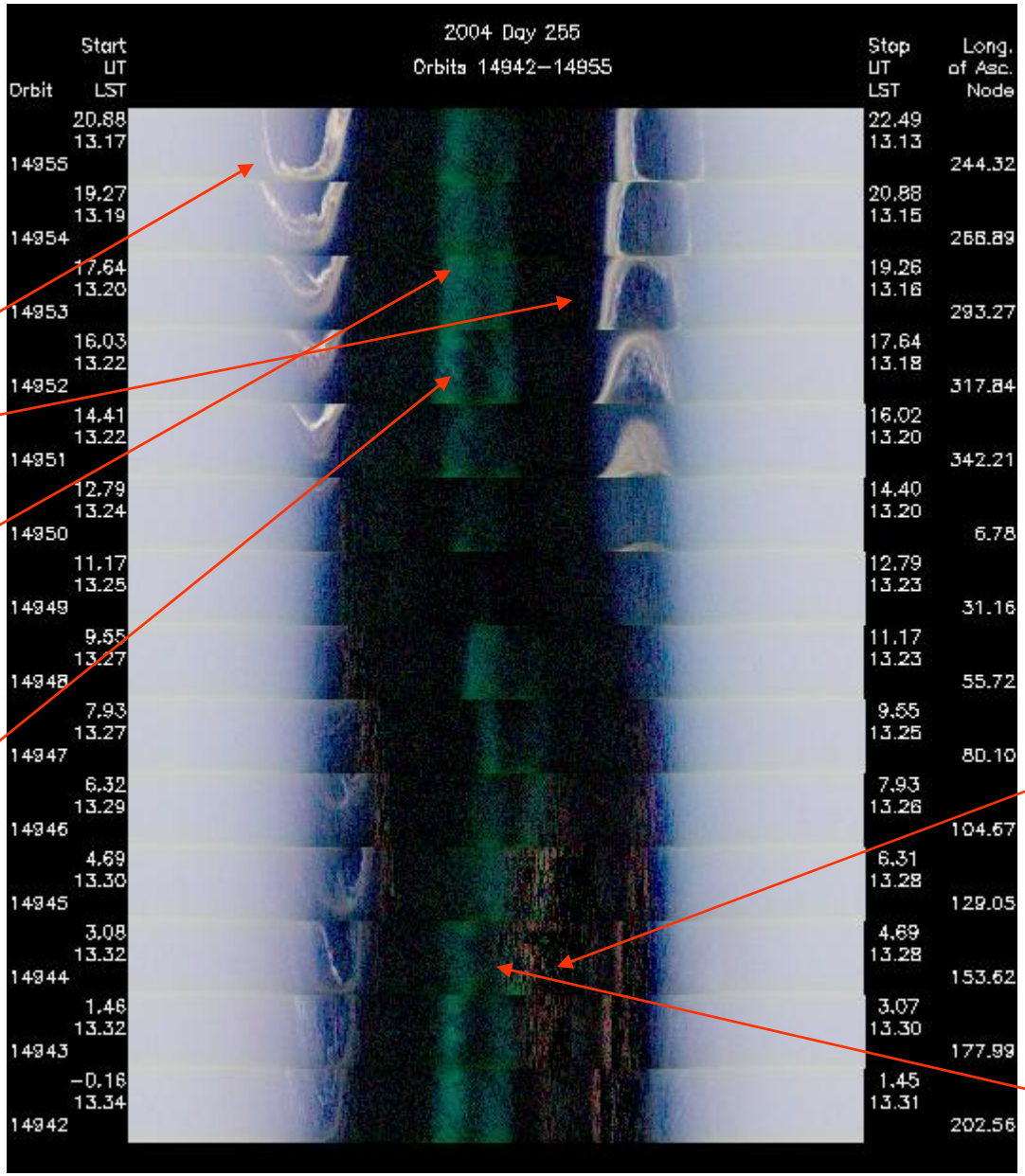


day

It just so happens that the ascending node was on the nightside on this orbit

Here’s an image 60 days earlier that is for the same local solar time – but the ascending node was on the dayside





aurora

arcs

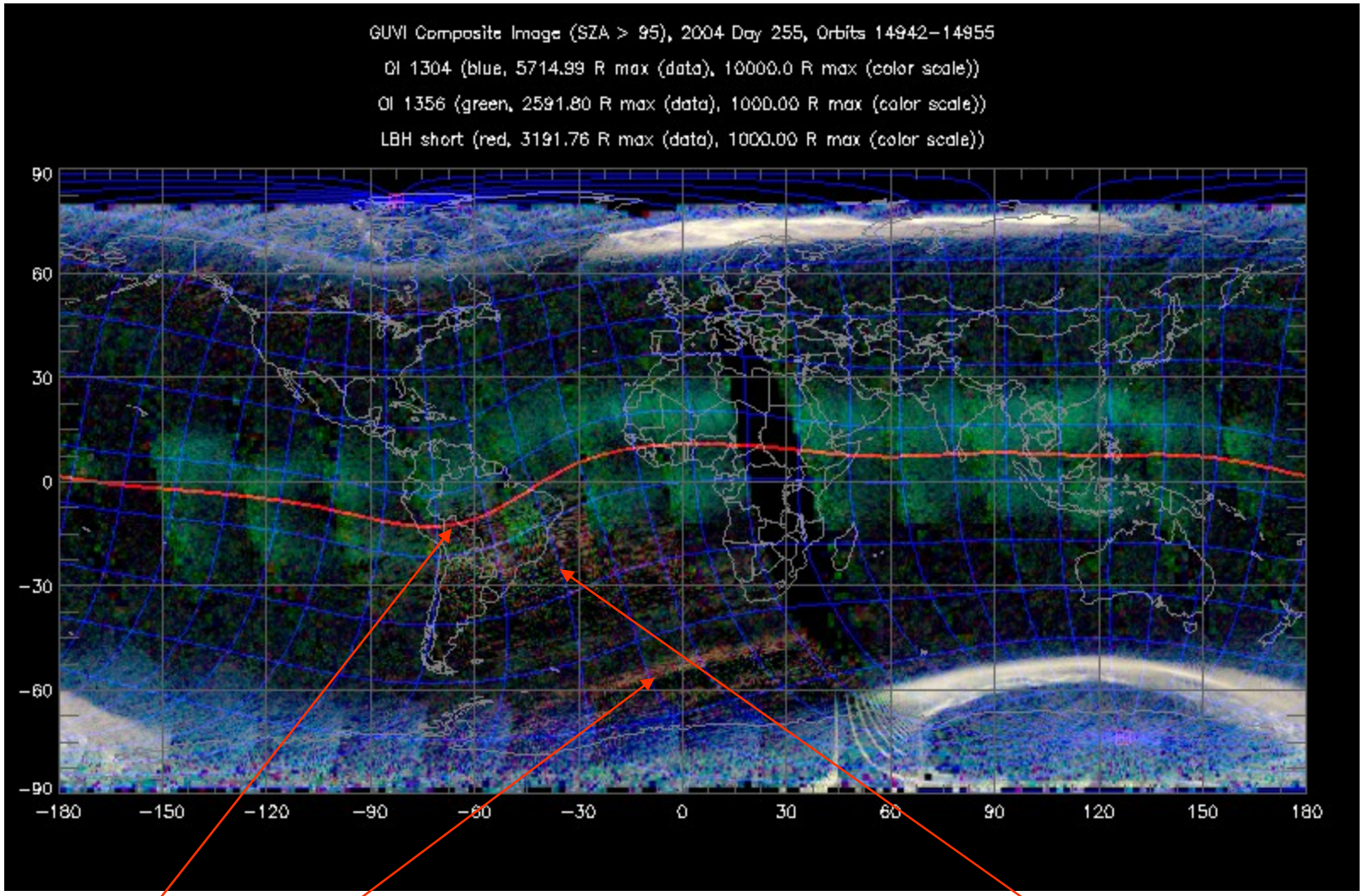
bubbles

Noise from the SAA

The nightside 135.6 nm intensity is proportional to the electron density squared…

North

South

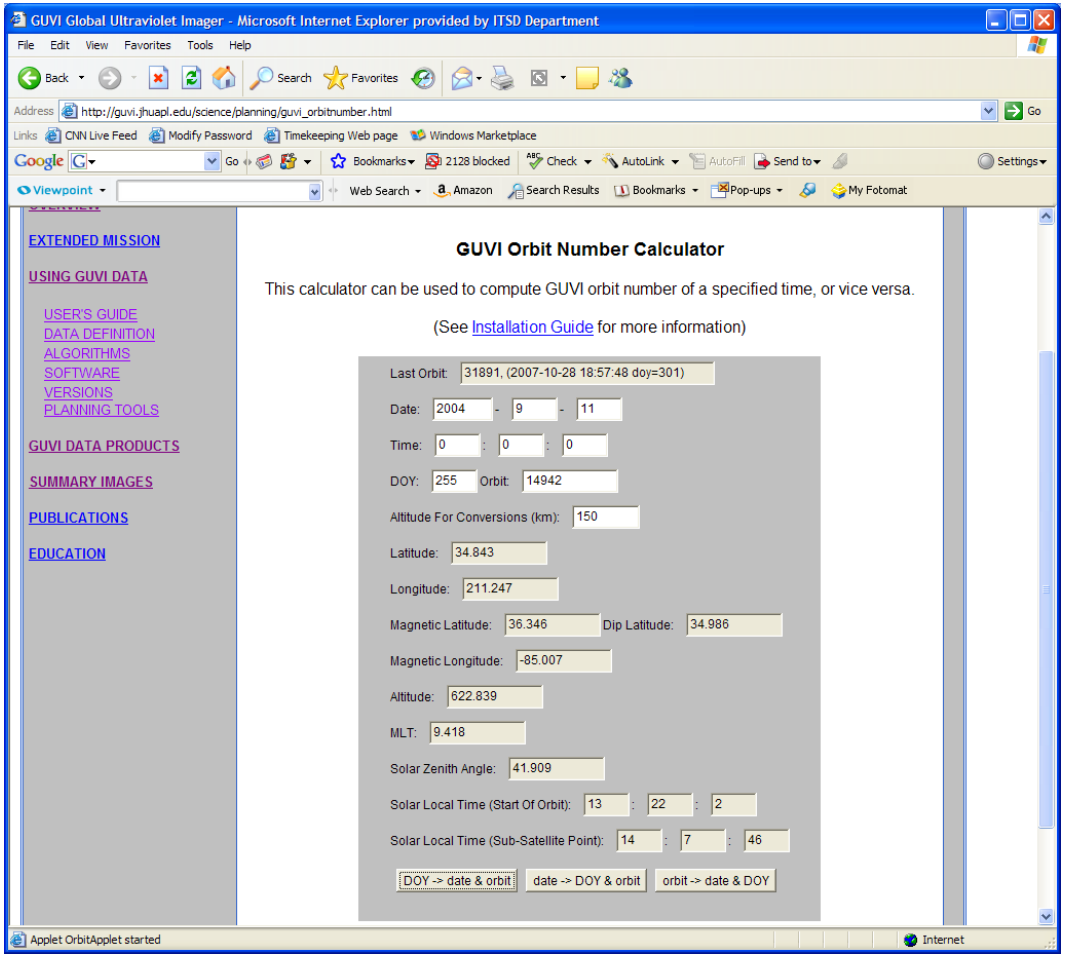


SAA

Radiation belt particles causing instrument noise

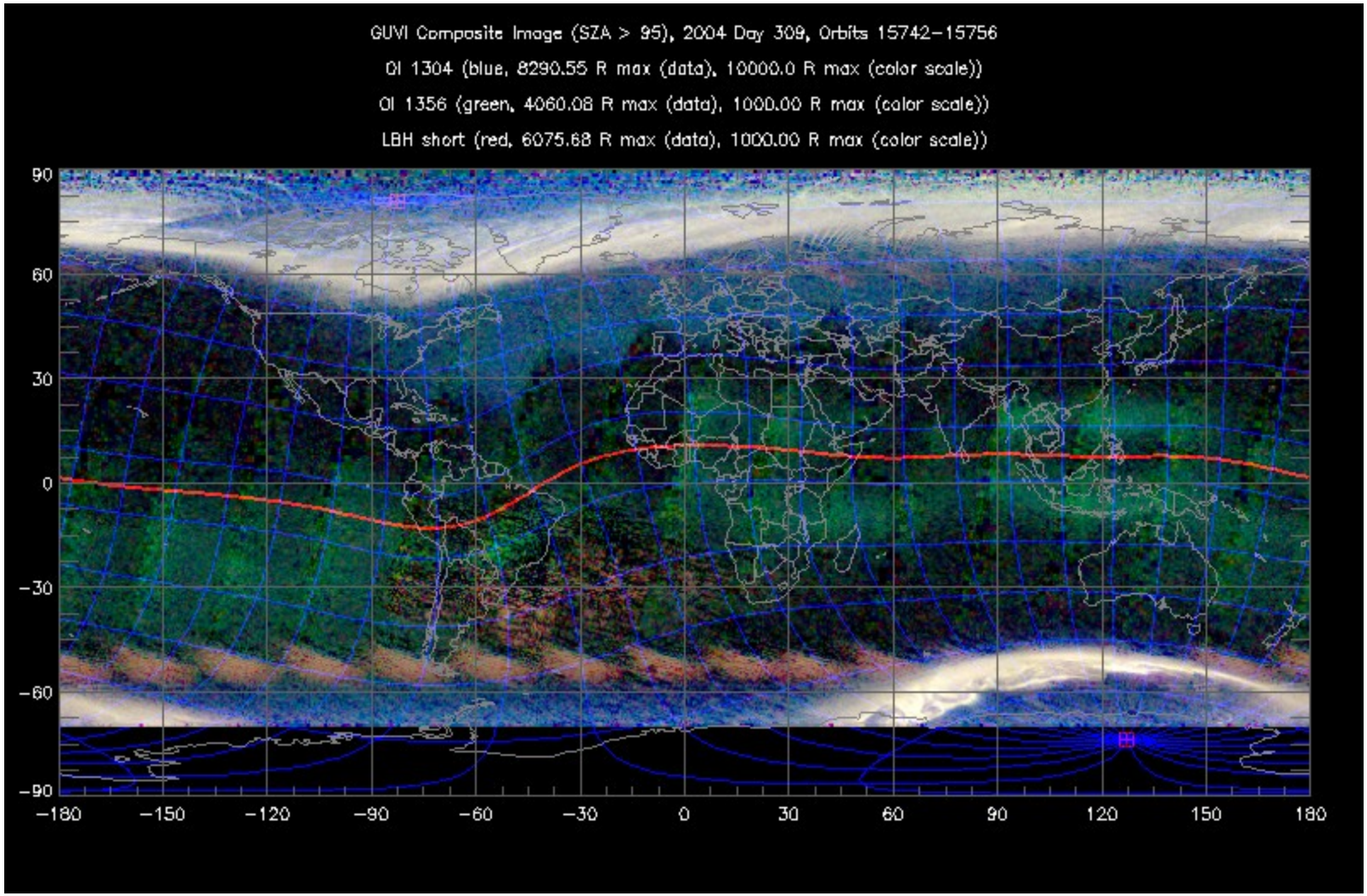
Bubbles visible?

We went back to the tool to see what day 255 was in terms of date – it was September 11



Use this to see the time history of data during the day

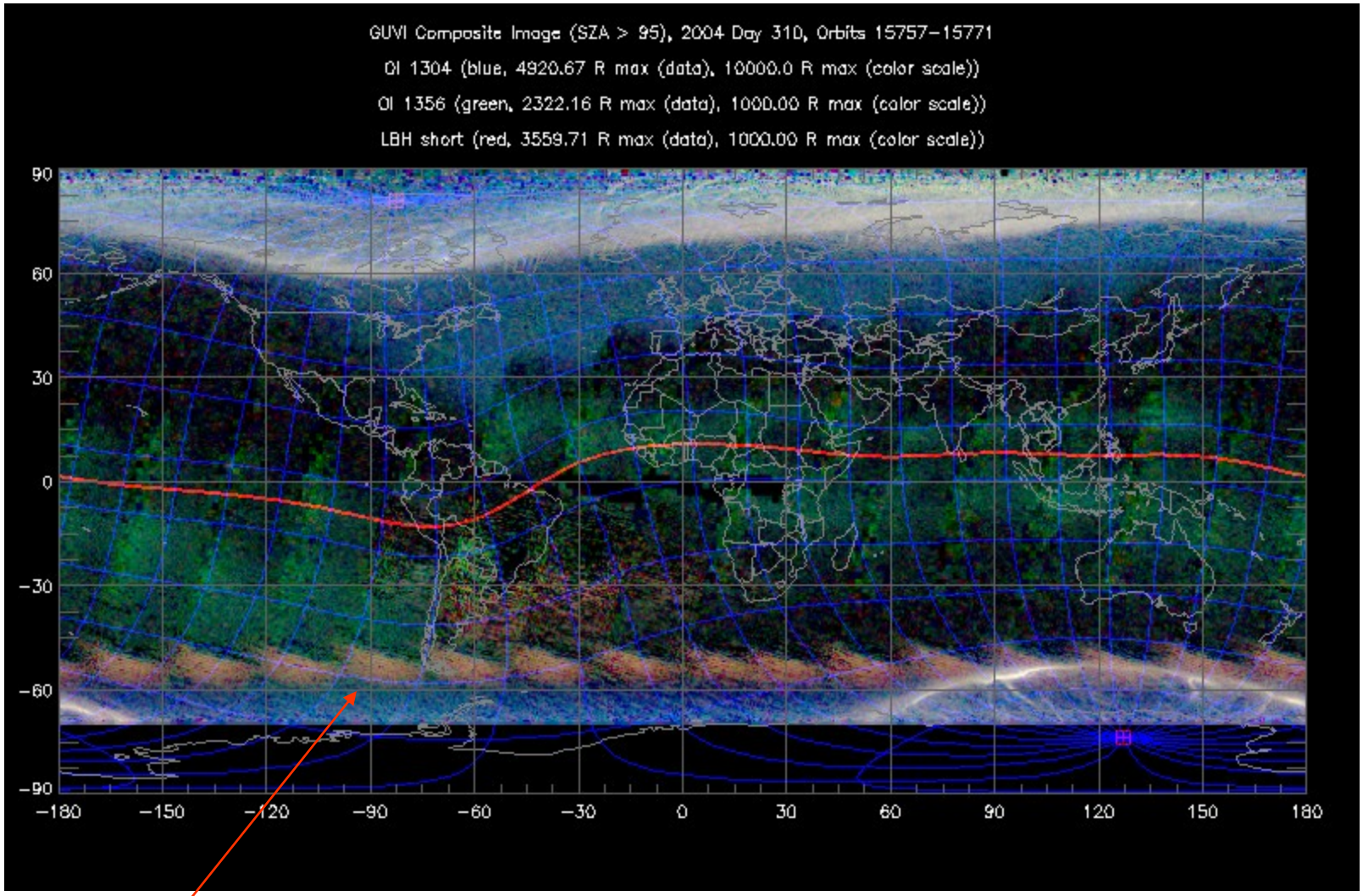
Glint is a reflection off a surface on the spacecraft and appears just at particular local times and solar zenith angles – because of this it appears as a straight line



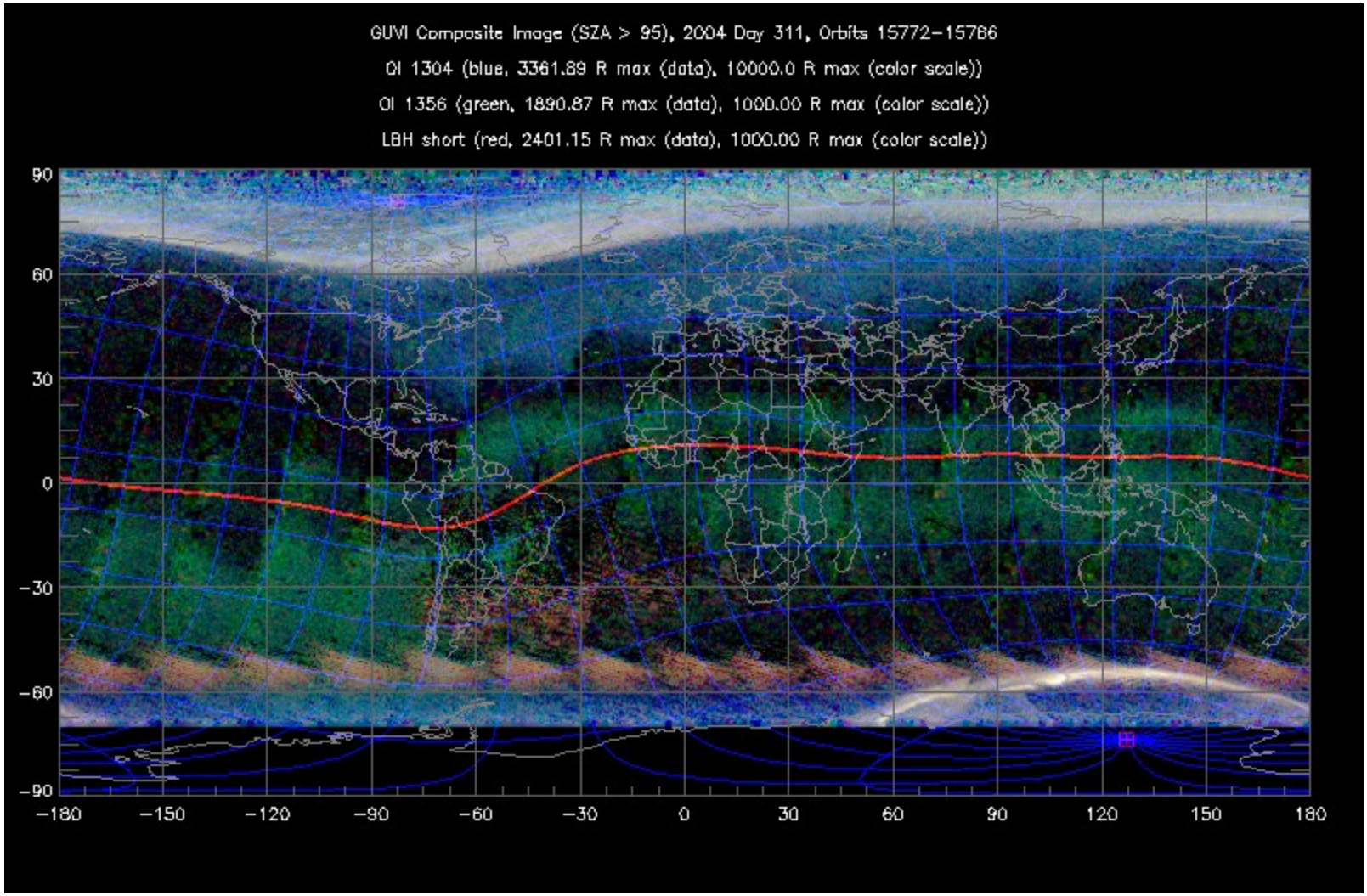
First half of the day

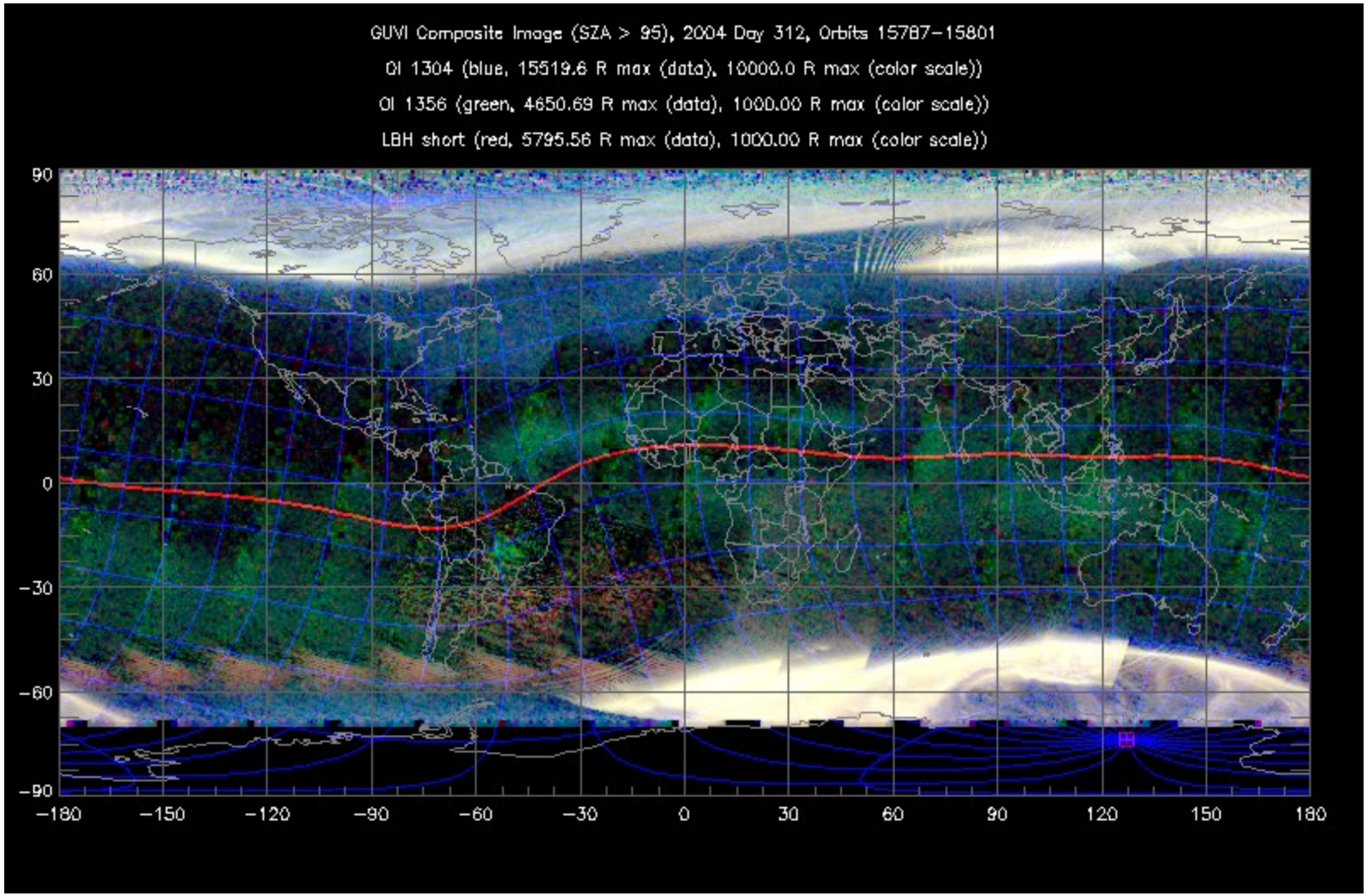
Second half of day

UT increases towards the left



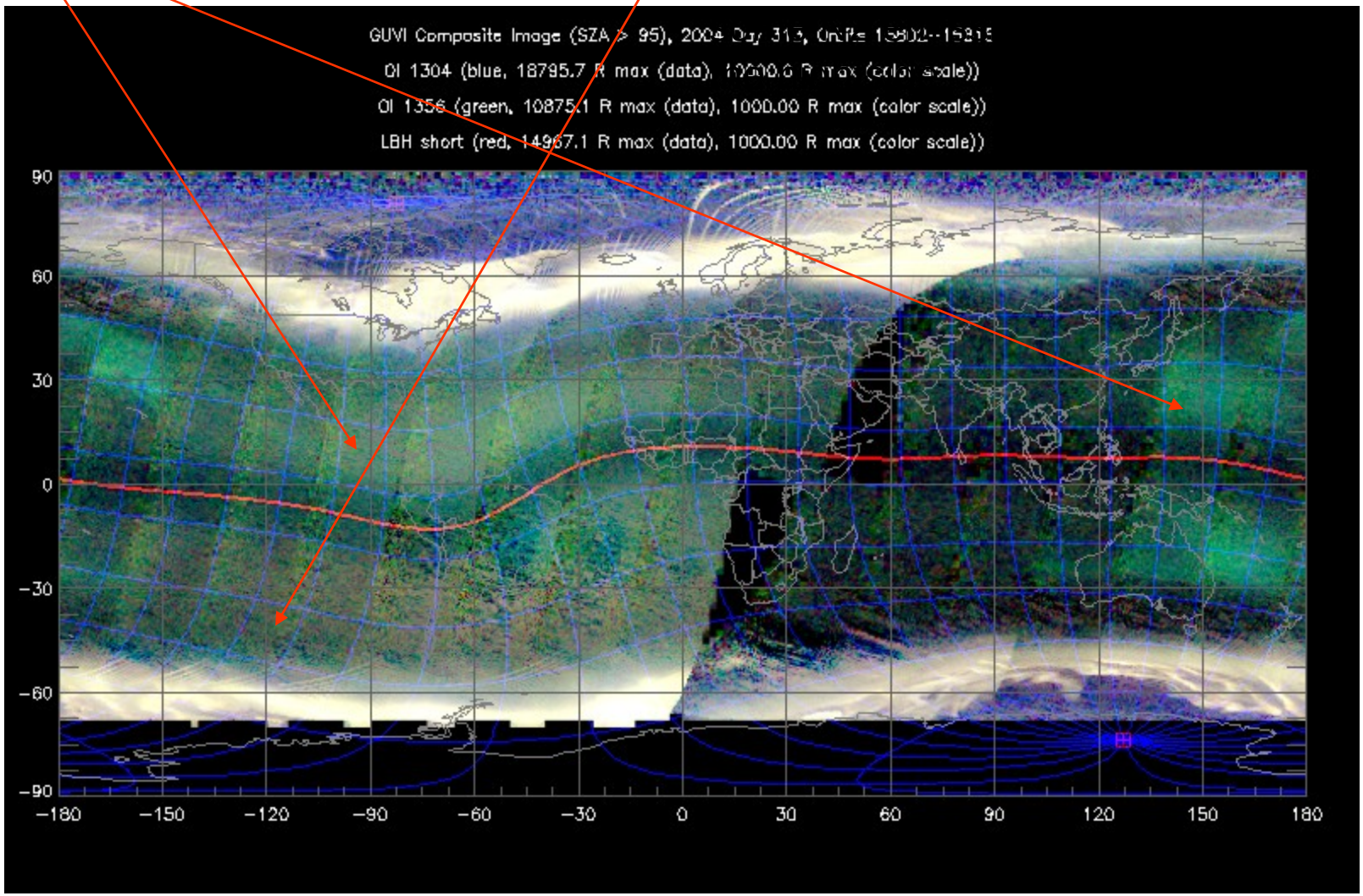
Glint doesn't follow the aurora


GUVI Composite Image (SZA > 95), 2004 Day 311, Orbits 15772-15786
OI 1304 (blue, 3361.89 R max (data), 10000.0 R max (color scale))
OI 1356 (green, 1890.87 R max (data), 1000.00 R max (color scale))
LBH short (red, 2401.15 R max (data), 1000.00 R max (color scale))
90
60
30
0
-30
-60
-90
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180

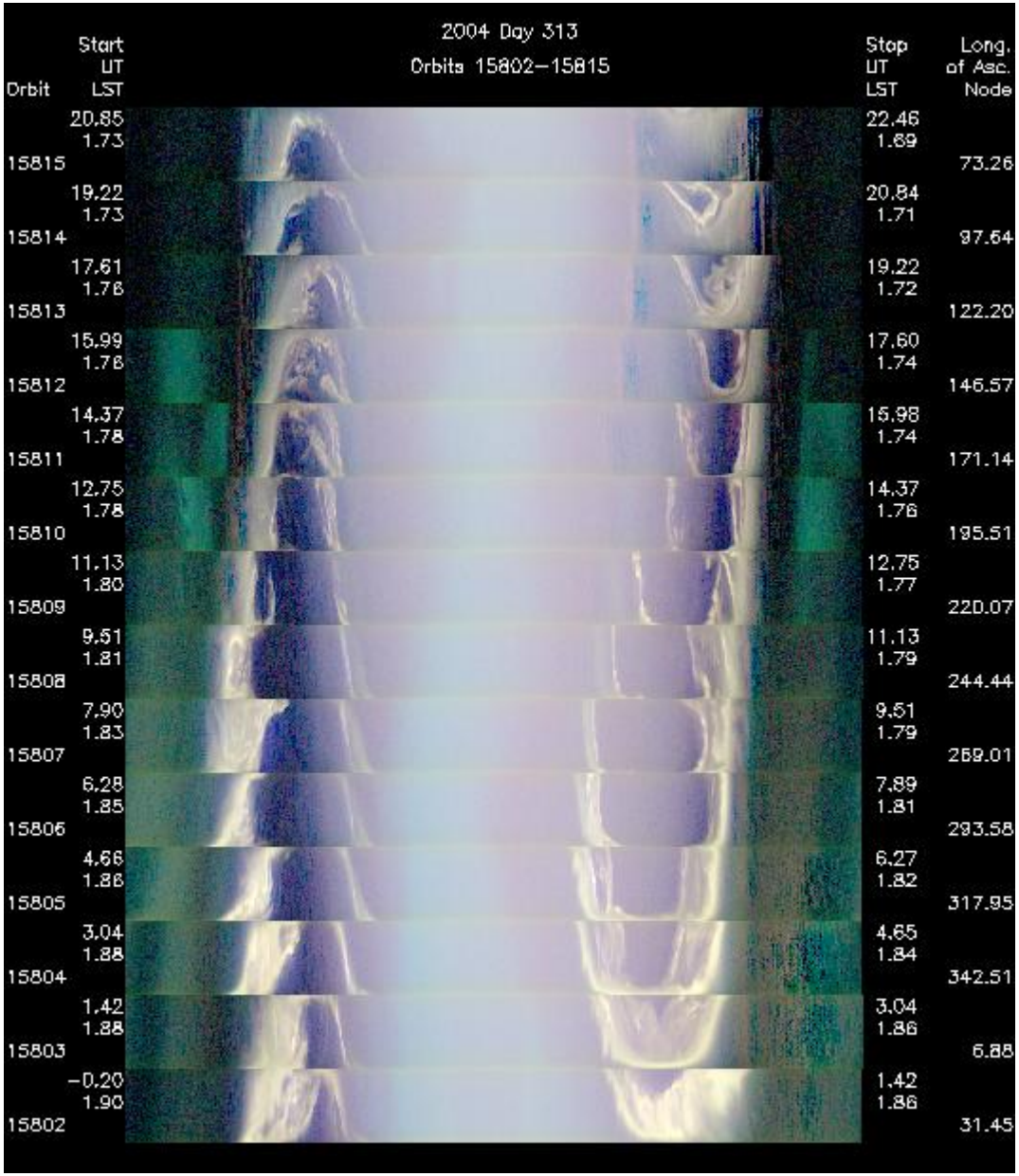

GUVI Composite Image (SZA > 95), 2004 Day 312, Orbits 15787-15801
OI 1304 (blue, 15519.6 R max (data), 10000.0 R max (color scale))
OI 1356 (green, 4650.69 R max (data), 1000.00 R max (color scale))
LBH short (red, 5795.56 R max (data), 1000.00 R max (color scale))
90
60
30
0
-30
-60
-90
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180

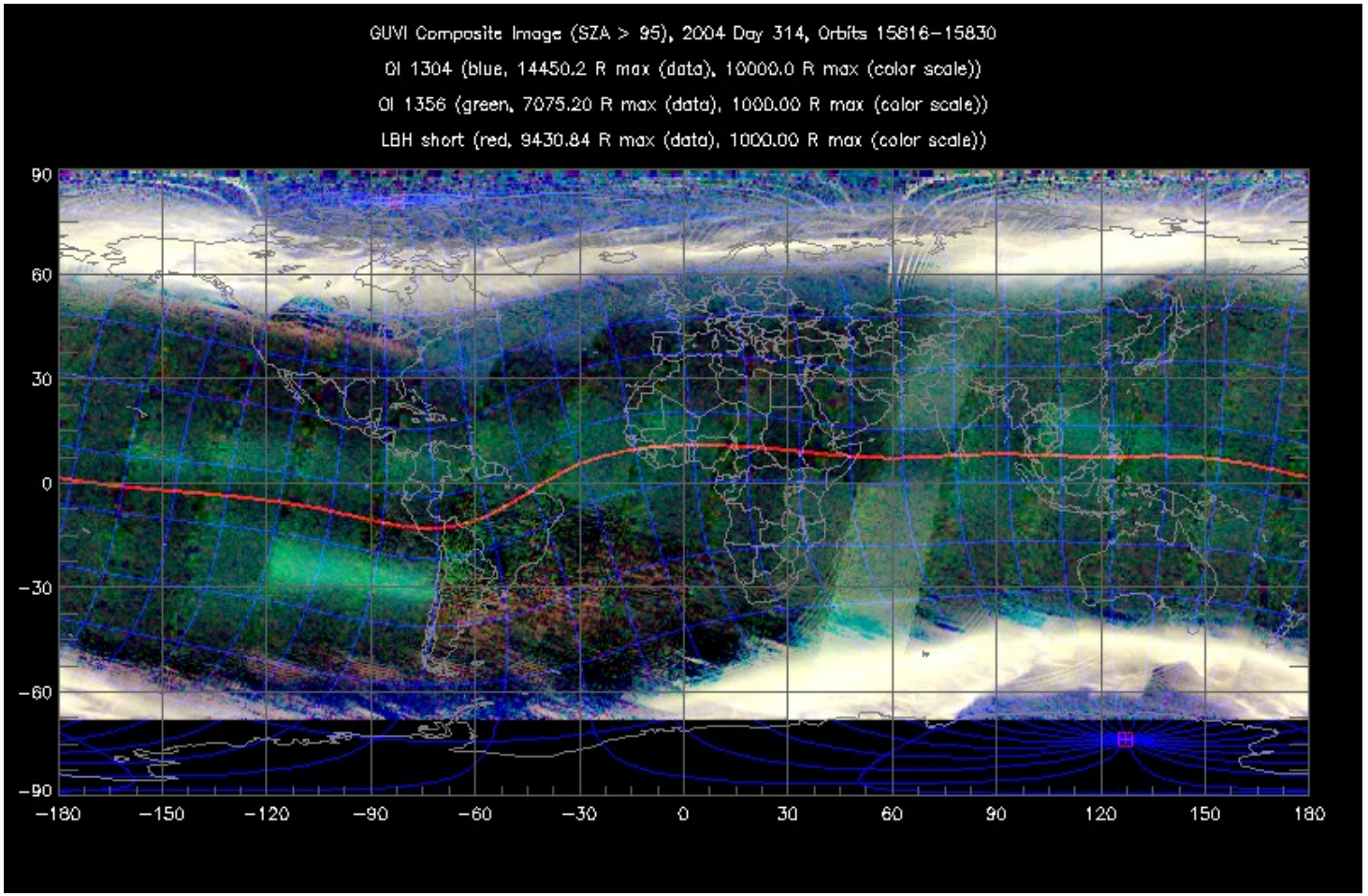
arcs

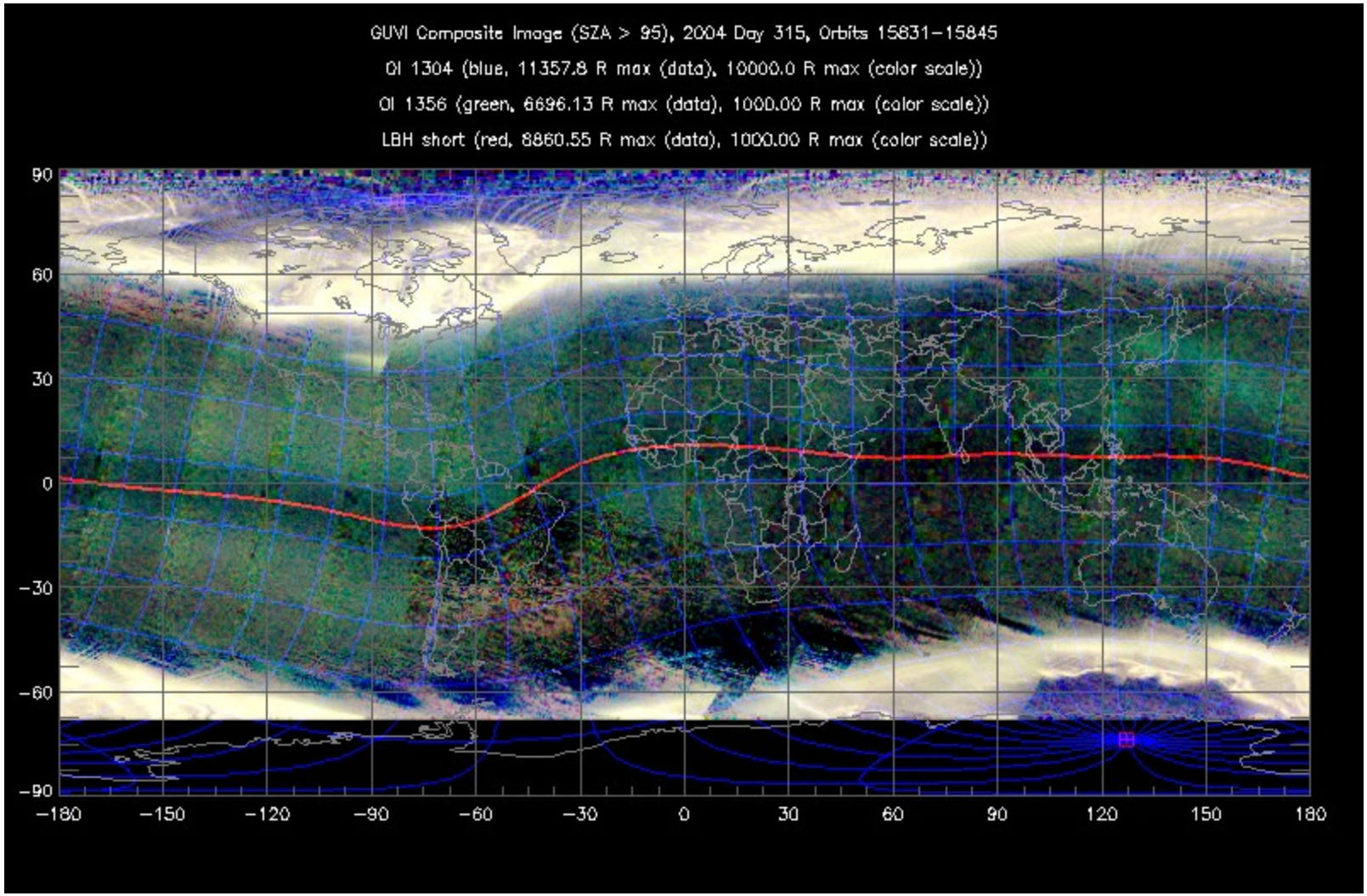
Additional emission from ring current precipitation – enough that it excited

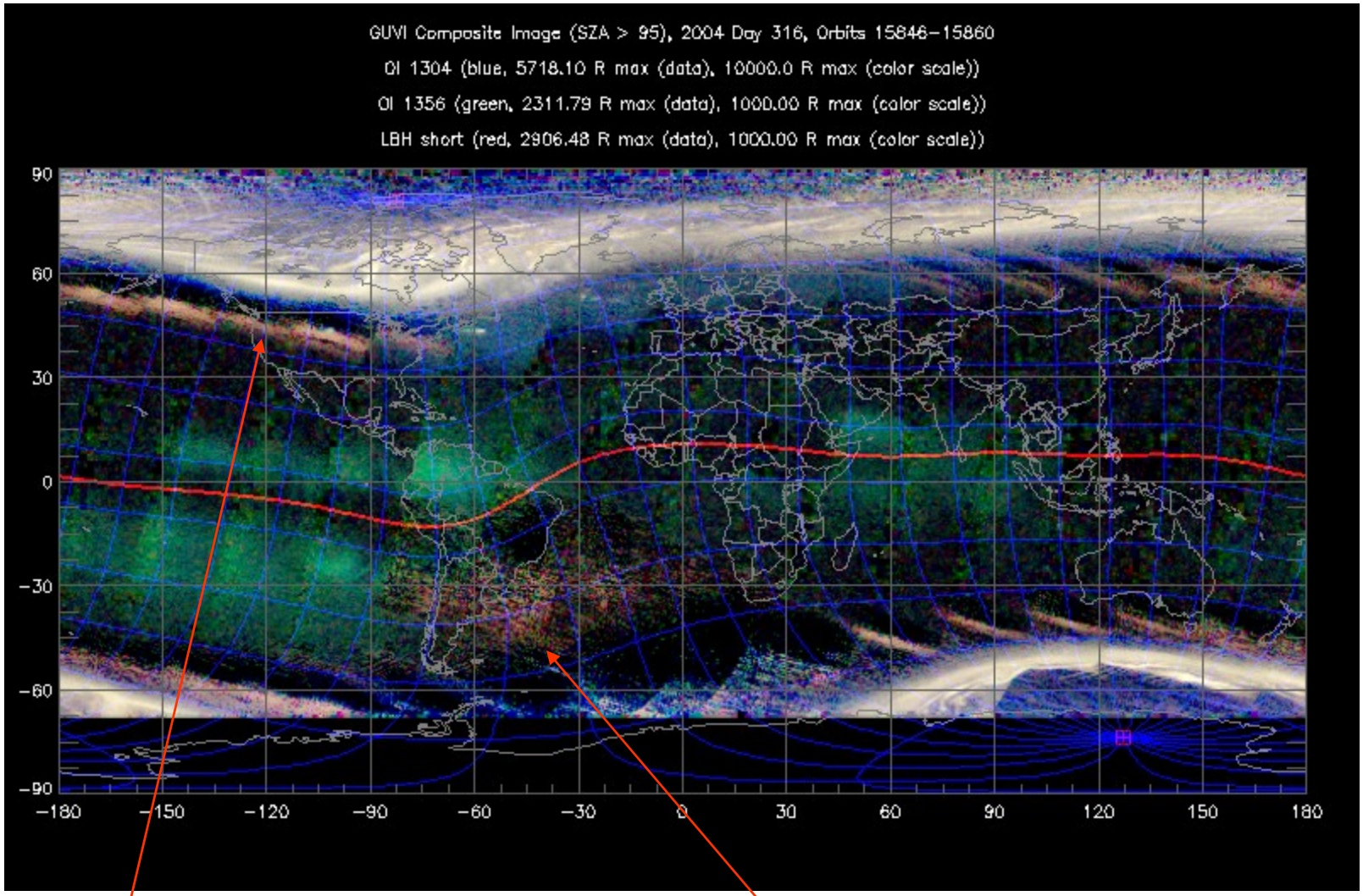


When you see red in these images it means there is emission in the N2 lyman birge hopfield or “LBH” bands


2004 Day 313
Orbits 15802–15815
Orbit
Start UT LST
Stop UT LST
Long. of Asc. Node
15815 20.85 1.73 22.46 1.69 73.26
15814 19.22 1.73 20.84 1.71 97.64
15813 17.61 1.76 19.22 1.72 122.20
15812 15.99 1.76 17.60 1.74 146.57
15811 14.37 1.78 15.98 1.74 171.14
15810 12.75 1.78 14.37 1.76 195.51
15809 11.13 1.80 12.75 1.77 220.07
15808 9.51 1.81 11.13 1.79 244.44
15807 7.90 1.83 9.51 1.79 269.01
15806 6.28 1.85 7.89 1.81 293.58
15805 4.66 1.86 6.27 1.82 317.95
15804 3.04 1.88 4.65 1.84 342.51
15803 1.42 1.88 3.04 1.86 6.88
15802 −0.20 1.90 1.42 1.86 31.45

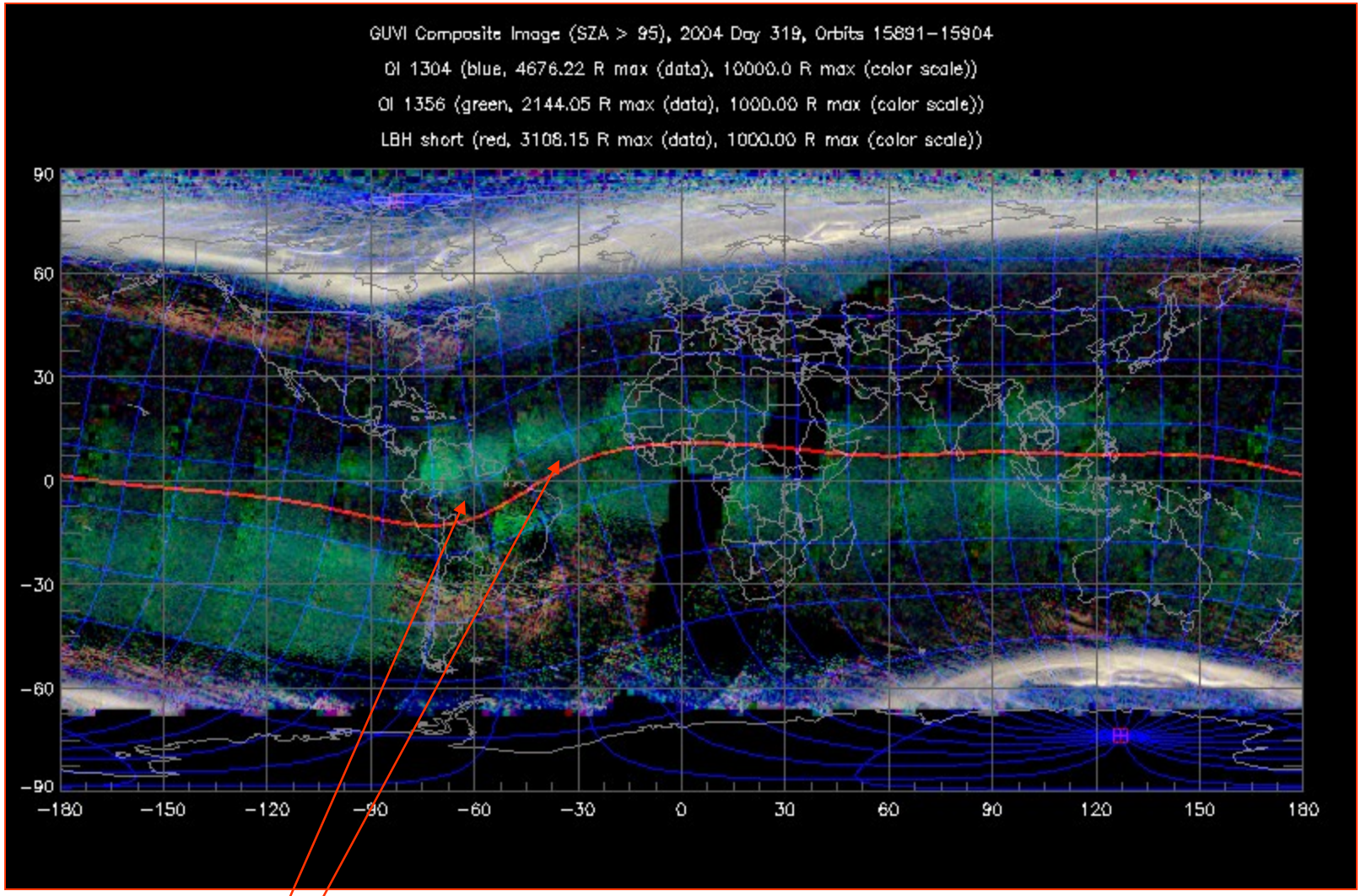

GUVI Composite Image (SZA > 95), 2004 Day 314, Orbits 15816-15830
OI 1304 (blue, 14450.2 R max (data), 10000.0 R max (color scale))
OI 1356 (green, 7075.20 R max (data), 1000.00 R max (color scale))
LBH short (red, 9430.84 R max (data), 1000.00 R max (color scale))
90
60
30
0
-30
-60
-90
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180


GUVI Composite Image (SZA > 95), 2004 Day 315, Orbits 15831-15845
OI 1304 (blue, 11357.8 R max (data), 10000.0 R max (color scale))
OI 1356 (green, 6696.13 R max (data), 1000.00 R max (color scale))
LBH short (red, 8860.55 R max (data), 1000.00 R max (color scale))
90
60
30
0
-30
-60
-90
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180



SAA

Noise in the instrument due to radiation belt particles


GUVI Composite Image (SZA > 95), 2004 Day 319, Orbits 15891-15904
OI 1304 (blue, 4676.22 R max (data), 10000.0 R max (color scale))
OI 1356 (green, 2144.05 R max (data), 1000.00 R max (color scale))
LBH short (red, 3108.15 R max (data), 1000.00 R max (color scale))
90
60
30
0
-30
-60
-90
-180
-150
-120
-90
-60
-30
0
30
60
90
120
150
180

bubbles

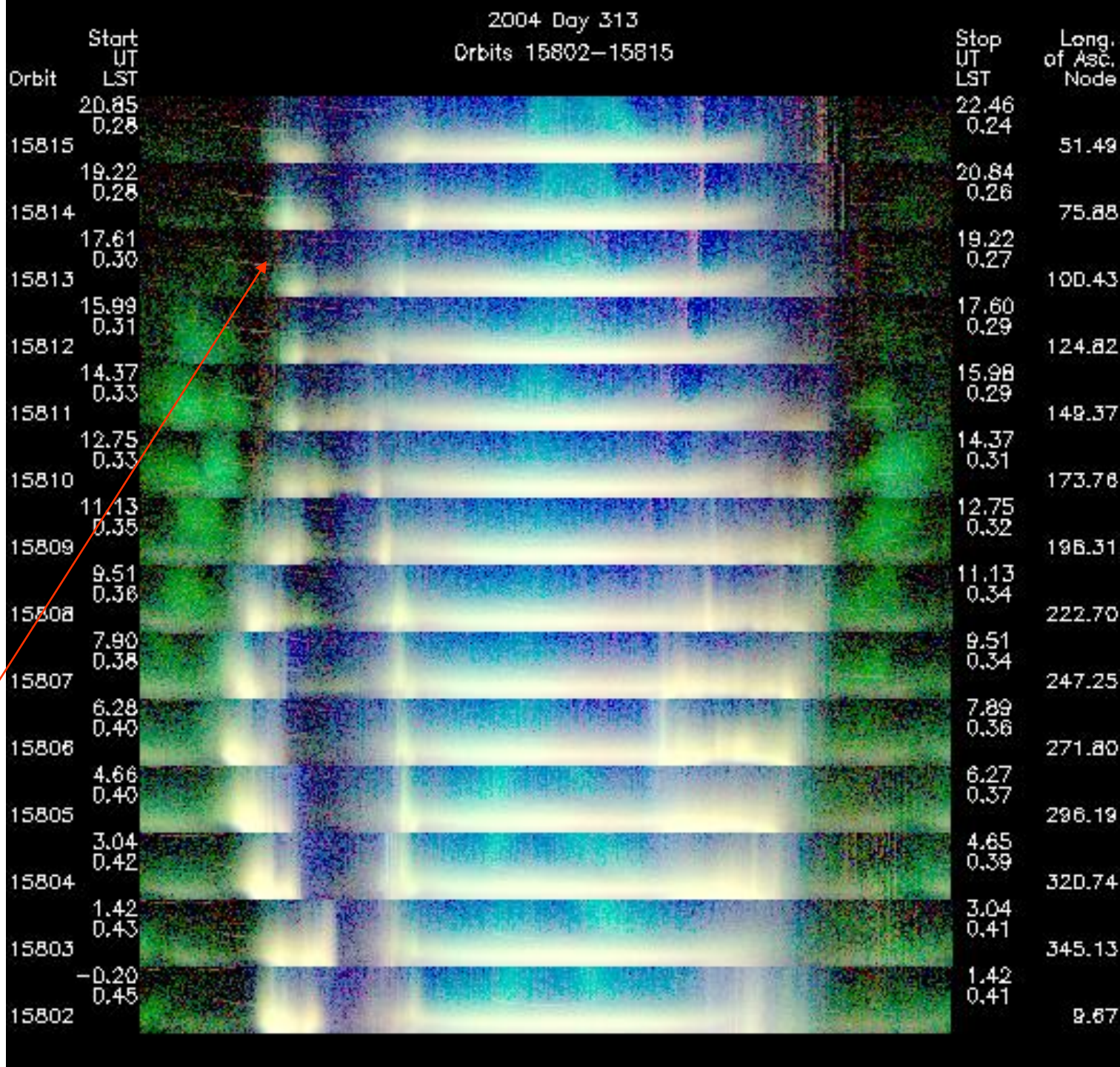
- Next two images compare the day 313 for 2004 – super storm day – and the 313 for 2003
- We see that there was indeed emission from the limb profile deep in the atmosphere at all wavelengths (seen as sort of a white color)
  - To make these summary images we just assigned colors to the 130.4, 135.6 and LBH (blue, green, red, respectively)
  - So the nightside arcs show up as green
  - The aurora shows up as white
  - Noise shows up as red (on the nightside) because the LBH color is summed up over a larger area of the detector and the noise is proportional to the area of the detector.
- If it was just 135.6 nm recombination we'd see just a high latitude "green" image… don't see this in 2004…

This is a summary of the limb data- so we are looking at the atmosphere edge on.

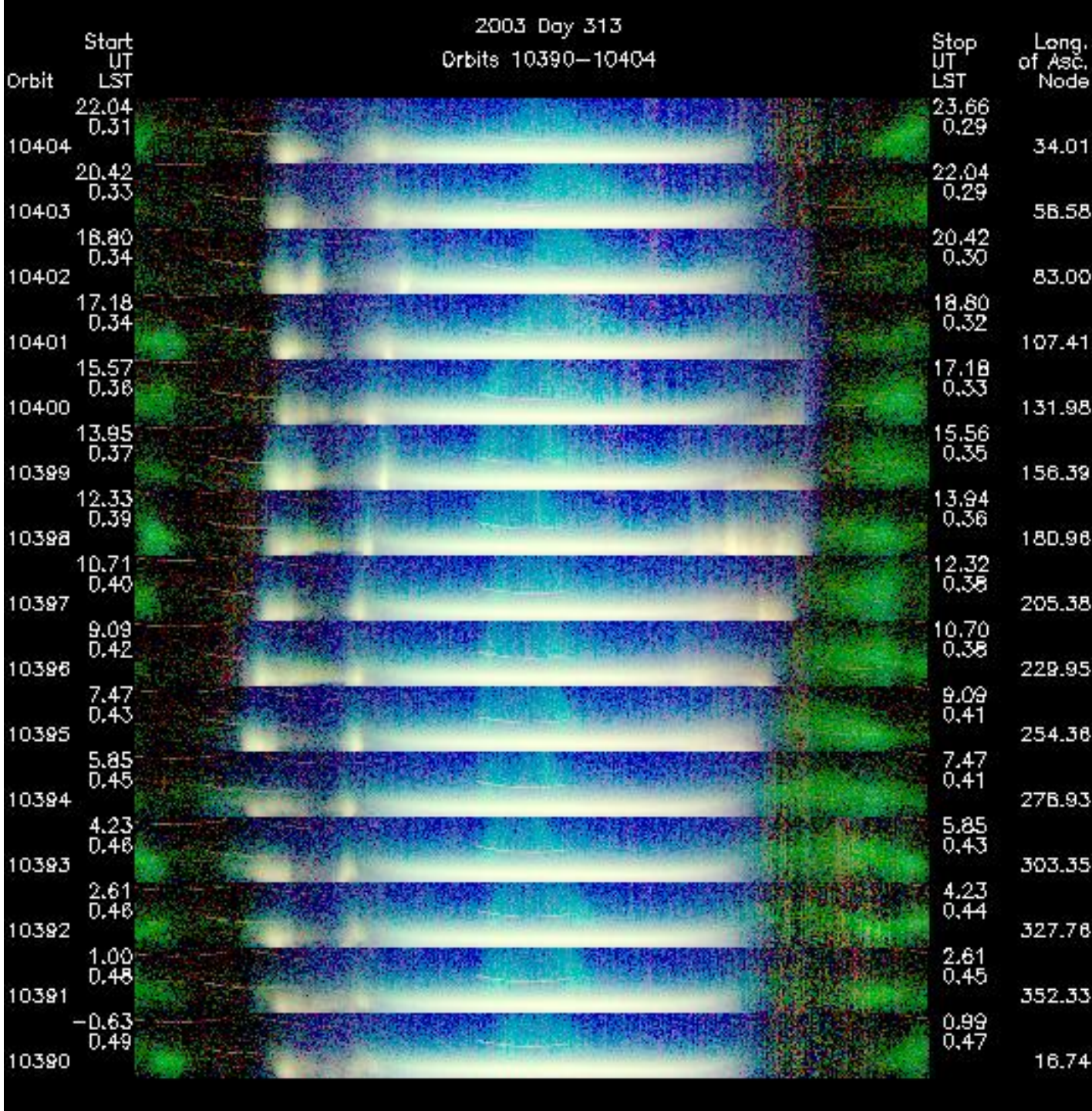
Altitude rusn vertically in each orbit.

Year 2004
Day 313

Star in the field of view (fov)



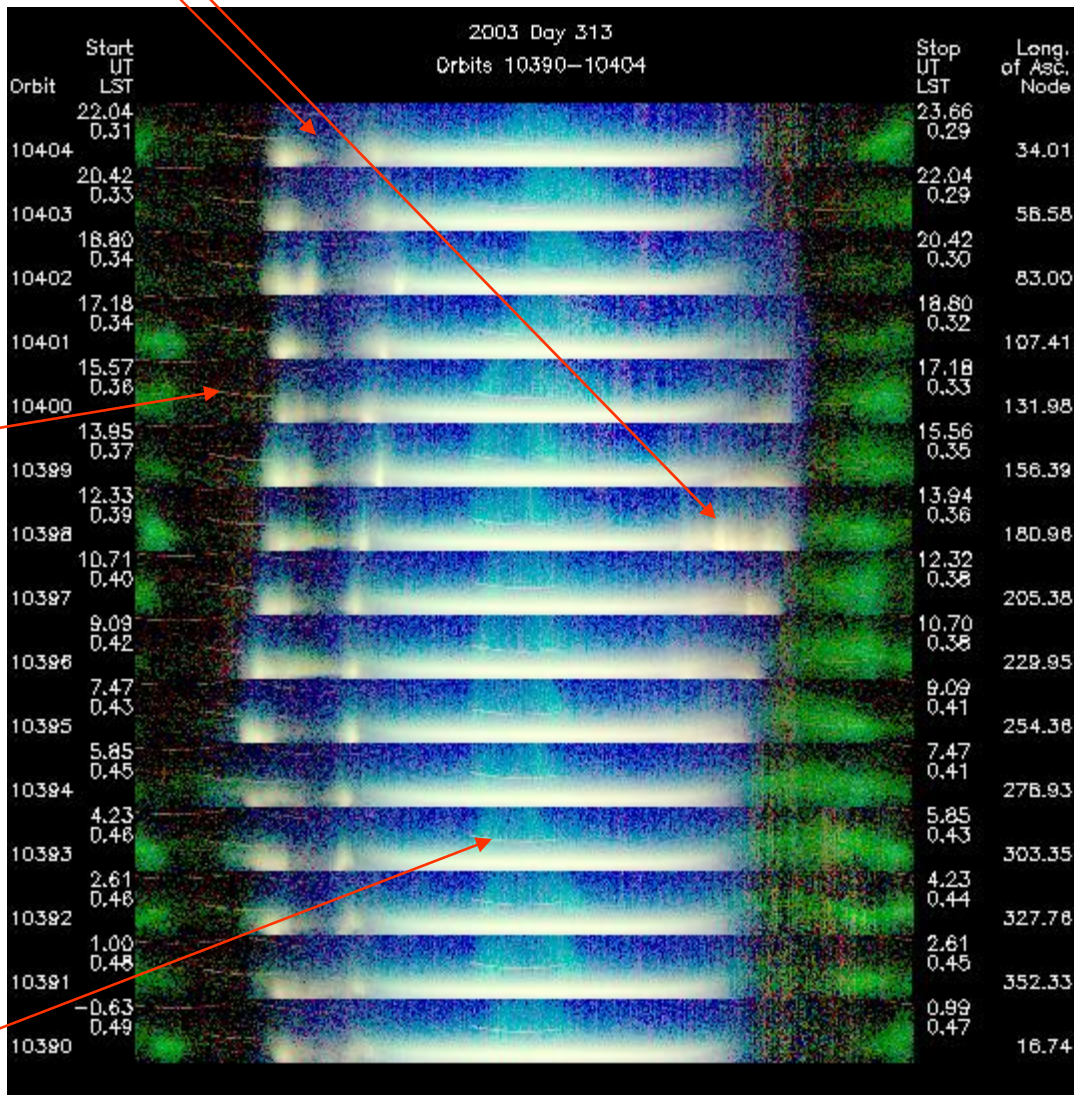
Year 2003
Day 314



- We can see the equatorial ionization anomaly (EIA) on the dayside
- The is due to radiative recombination to produce the emission in 130.4 and in 135.6
- The dayglow layer which is created by photoelectron impact excitation (for the oxygen lines at 130.4 nm and 135.6 nm and the N2 LBH bands) and resonant scattering of solar photons (for the oxygen line at 130.4 nm and the hydrogen line at 121.6 nm) is largely confined to altitudes below 300km for all the GUVI colors except the Lyman alpha emission at 121.6nm.

aurora

Limb view



star

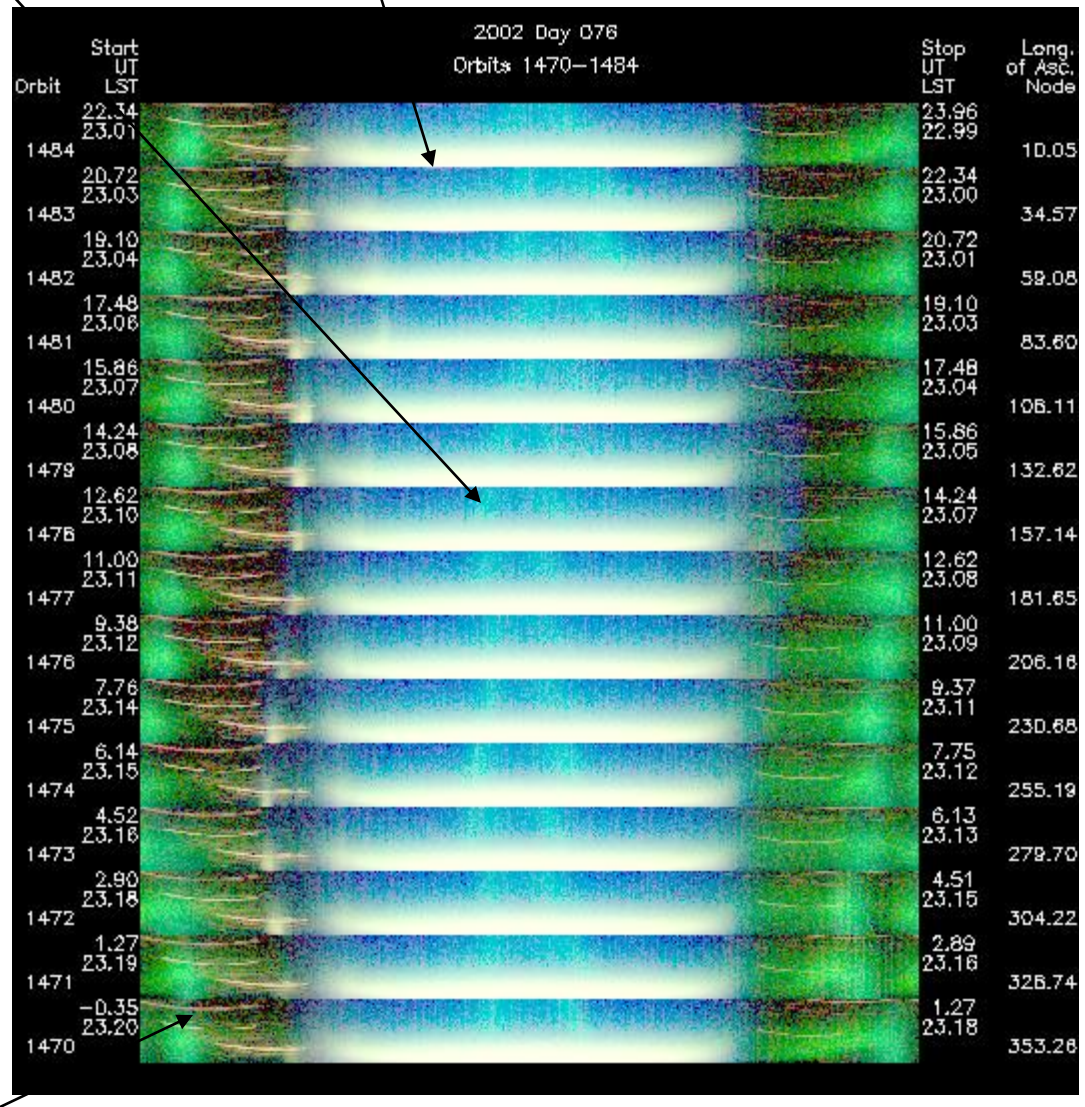
Arcs on the dayside

Dayside observations of the arcs

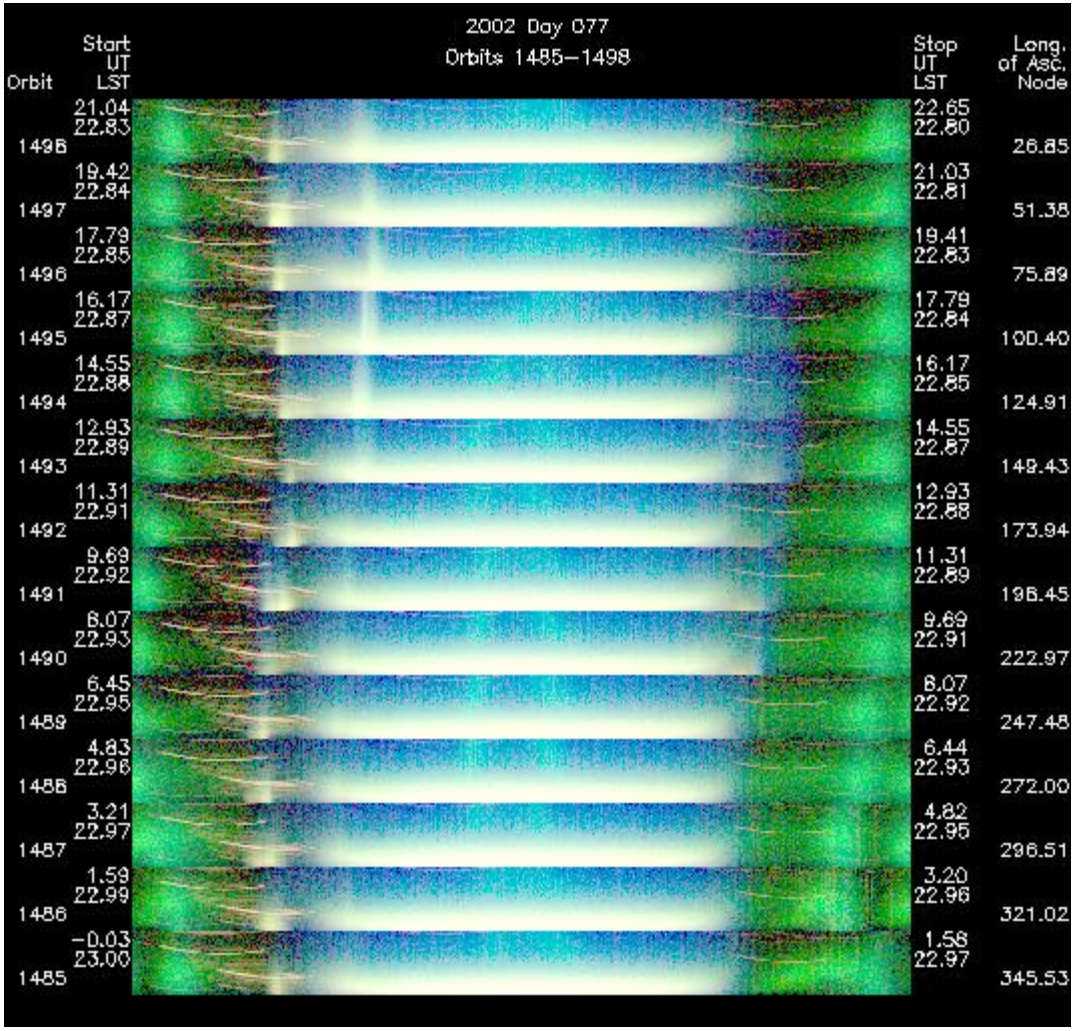
- We are going to look at the way the arcs change on the dayside
- We can’t readily see them looking down (in the summary images)
- We’ll use the limb profile summaries to see them

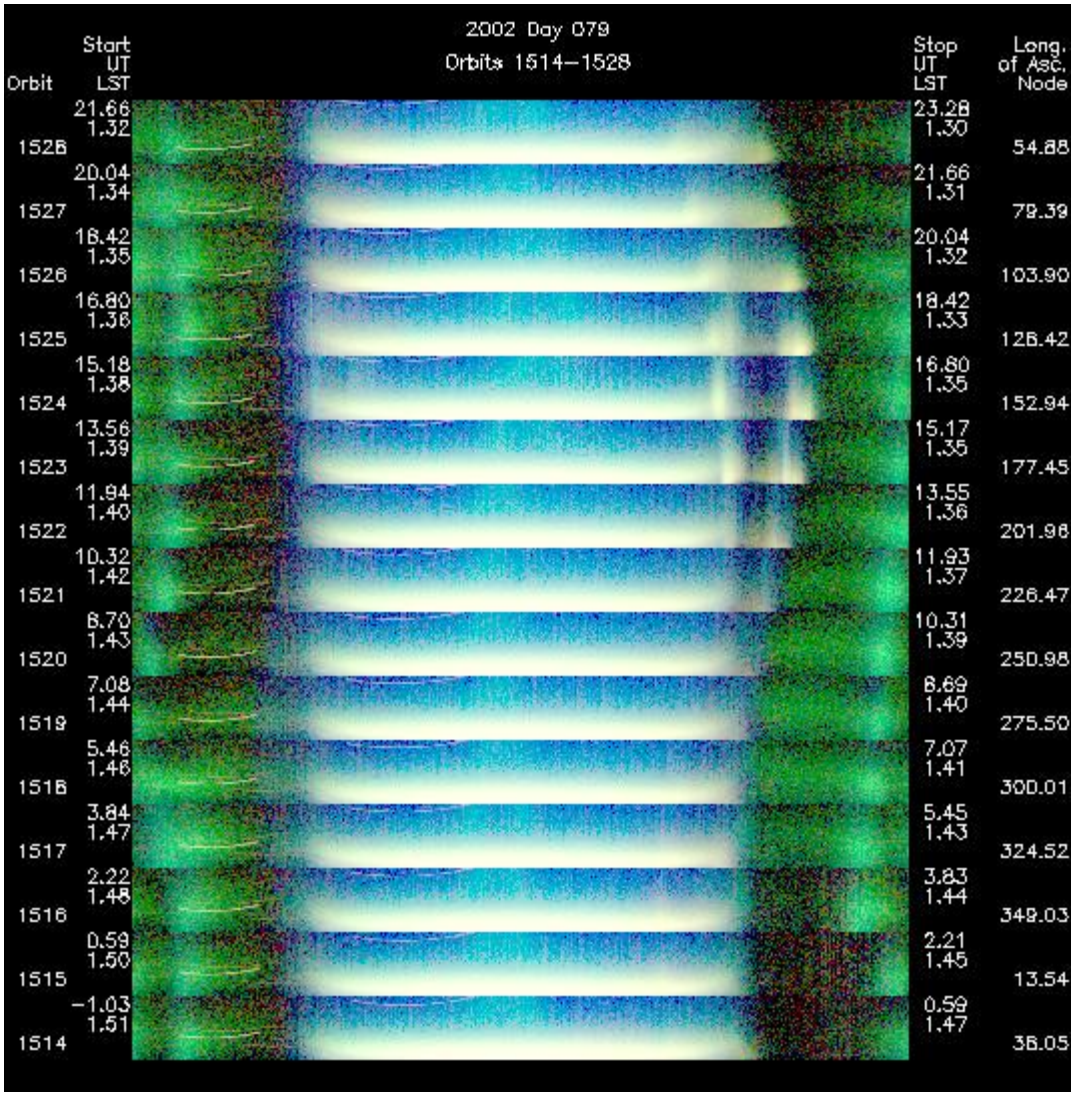
arcs

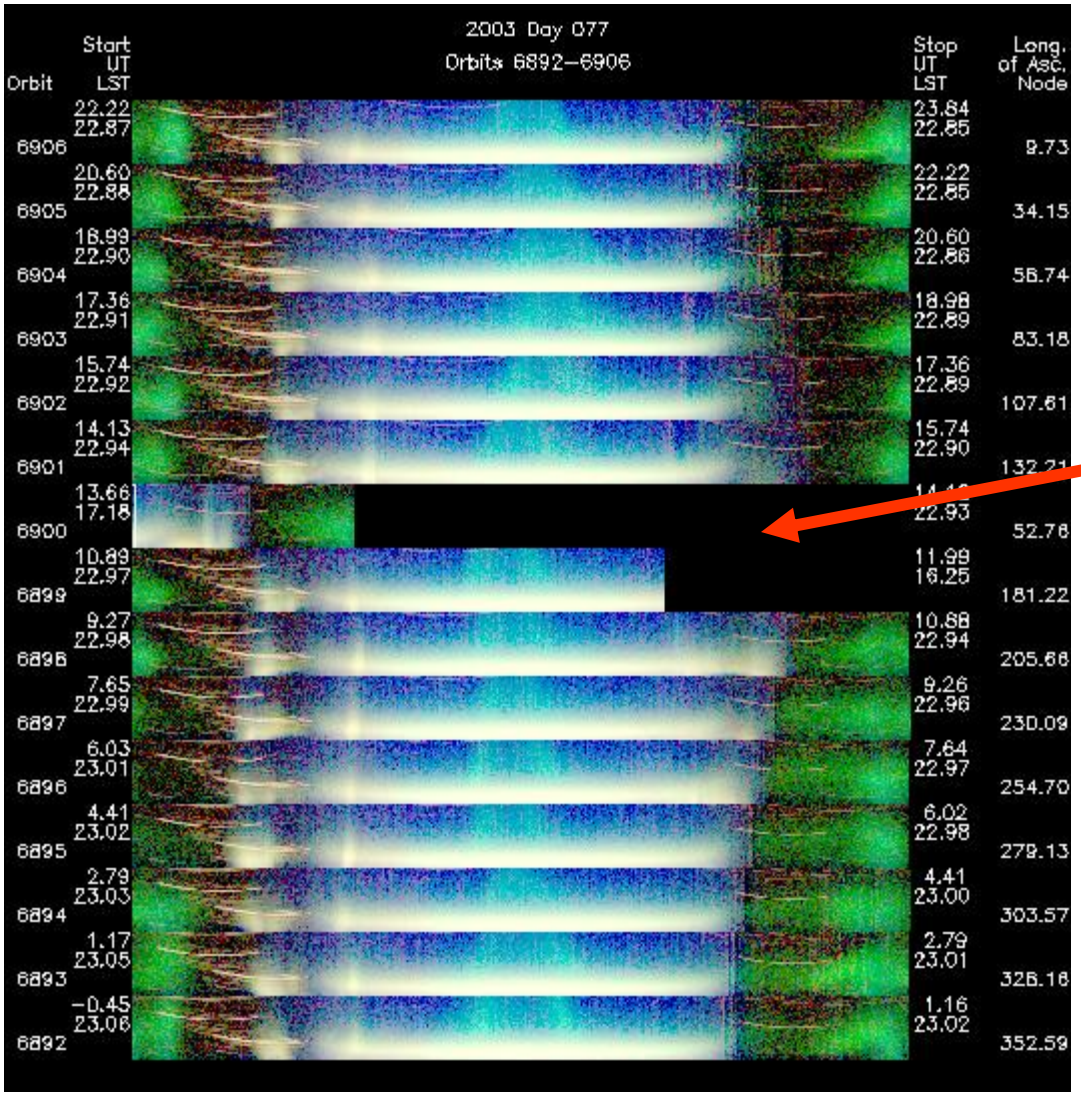
day



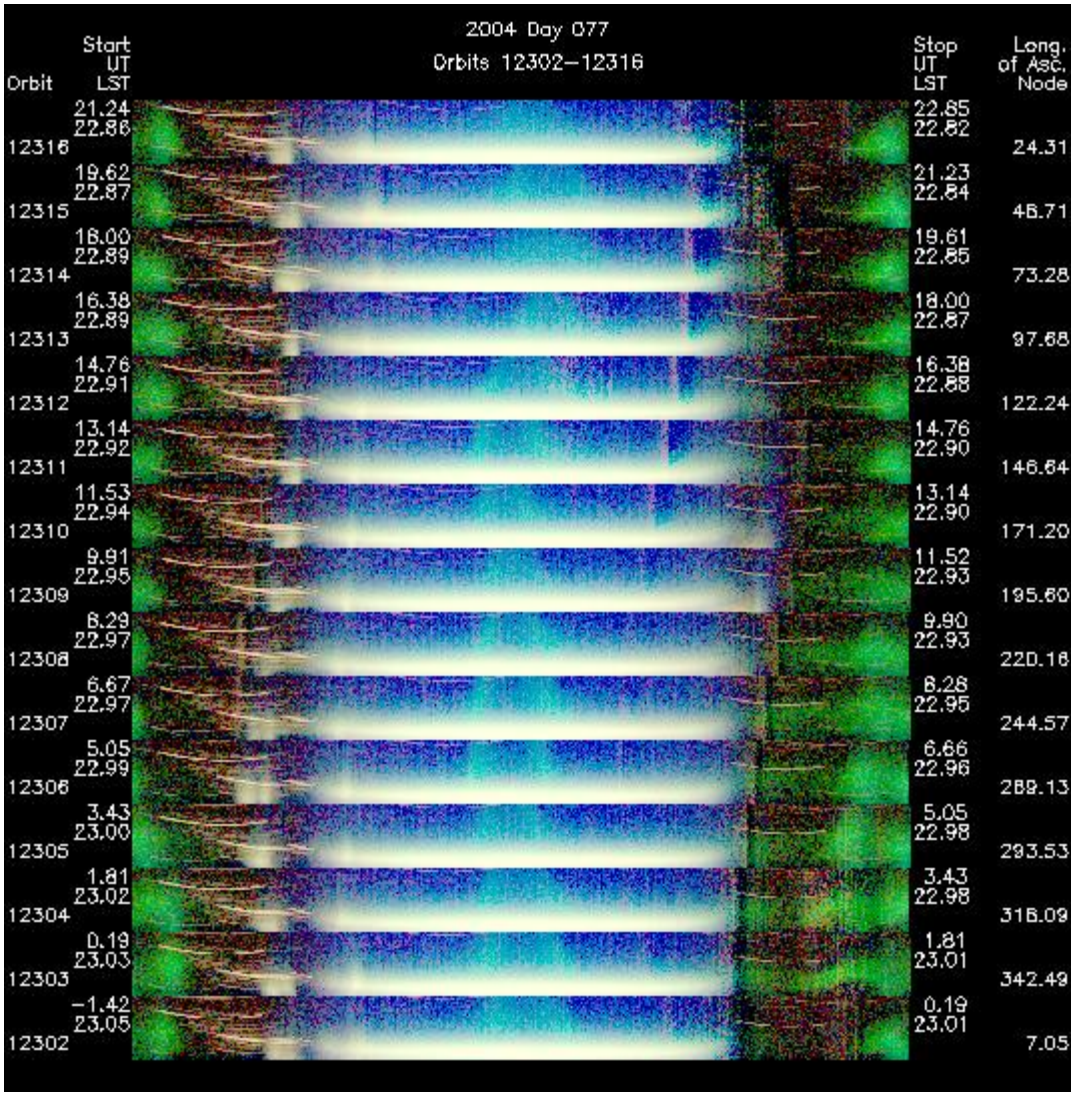
stars

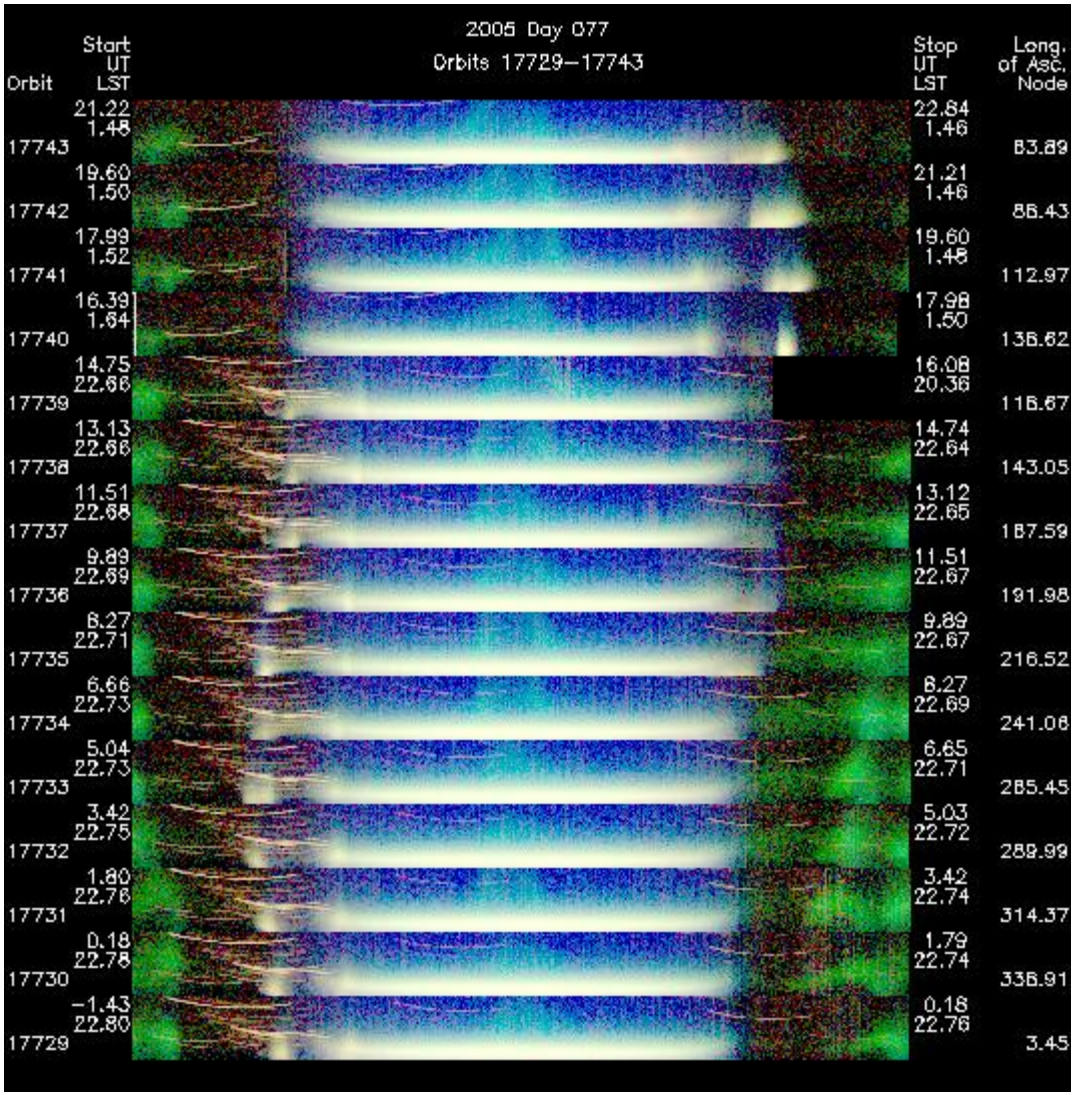

2002 Day 077
Orbits 1485–1498
Orbit
Start UT LST
Stop UT LST
Long. of Asc. Node
1498
21.04 22.83
22.65 22.80
26.85
1497
19.42 22.84
21.03 22.81
51.38
1496
17.79 22.85
19.41 22.83
75.89
1495
16.17 22.87
17.79 22.84
100.40
1494
14.55 22.88
16.17 22.85
124.91
1493
12.93 22.89
14.55 22.87
149.43
1492
11.31 22.91
12.93 22.88
173.94
1491
9.69 22.92
11.31 22.89
198.45
1490
8.07 22.93
9.69 22.91
222.97
1489
6.45 22.95
8.07 22.92
247.48
1488
4.83 22.96
6.44 22.93
272.00
1487
3.21 22.97
4.82 22.95
296.51
1486
1.59 22.99
3.20 22.96
321.02
1485
-0.03 23.00
1.56 22.97
345.53

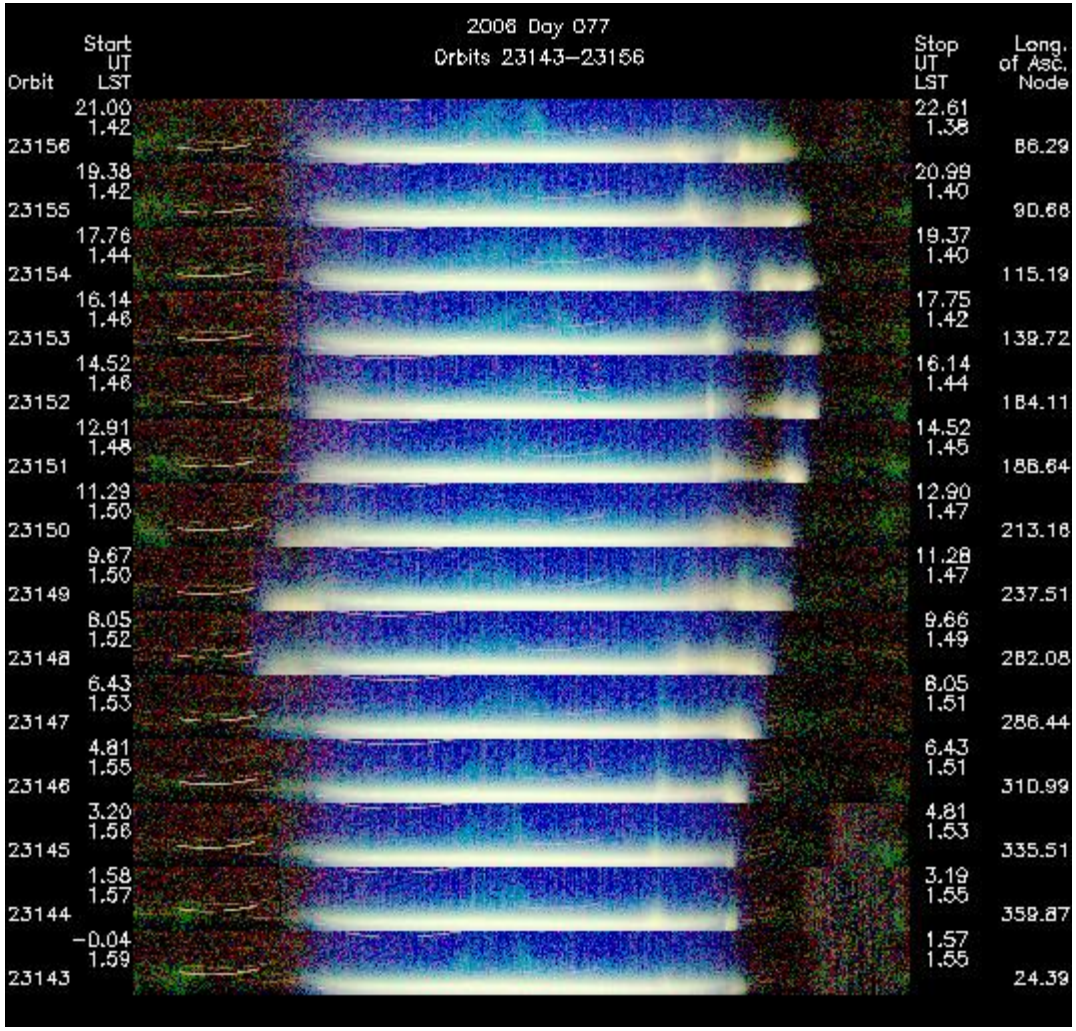

2002 Day 079
Orbits 1514–1528
Orbit
Start UT LST
Stop UT LST
Long. of Asc. Node
1528 21.66 1.32 23.28 1.30 54.88
1527 20.04 1.34 21.66 1.31 79.39
1526 18.42 1.35 20.04 1.32 103.90
1525 16.80 1.36 18.42 1.33 128.42
1524 15.18 1.38 16.80 1.35 152.94
1523 13.56 1.39 15.17 1.35 177.45
1522 11.94 1.40 13.55 1.36 201.96
1521 10.32 1.42 11.93 1.37 226.47
1520 8.70 1.43 10.31 1.39 250.98
1519 7.08 1.44 8.69 1.40 275.50
1518 5.46 1.46 7.07 1.41 300.01
1517 3.84 1.47 5.45 1.43 324.52
1516 2.22 1.48 3.83 1.44 349.03
1515 0.59 1.50 2.21 1.45 13.54
1514 −1.03 1.51 0.59 1.47 38.05

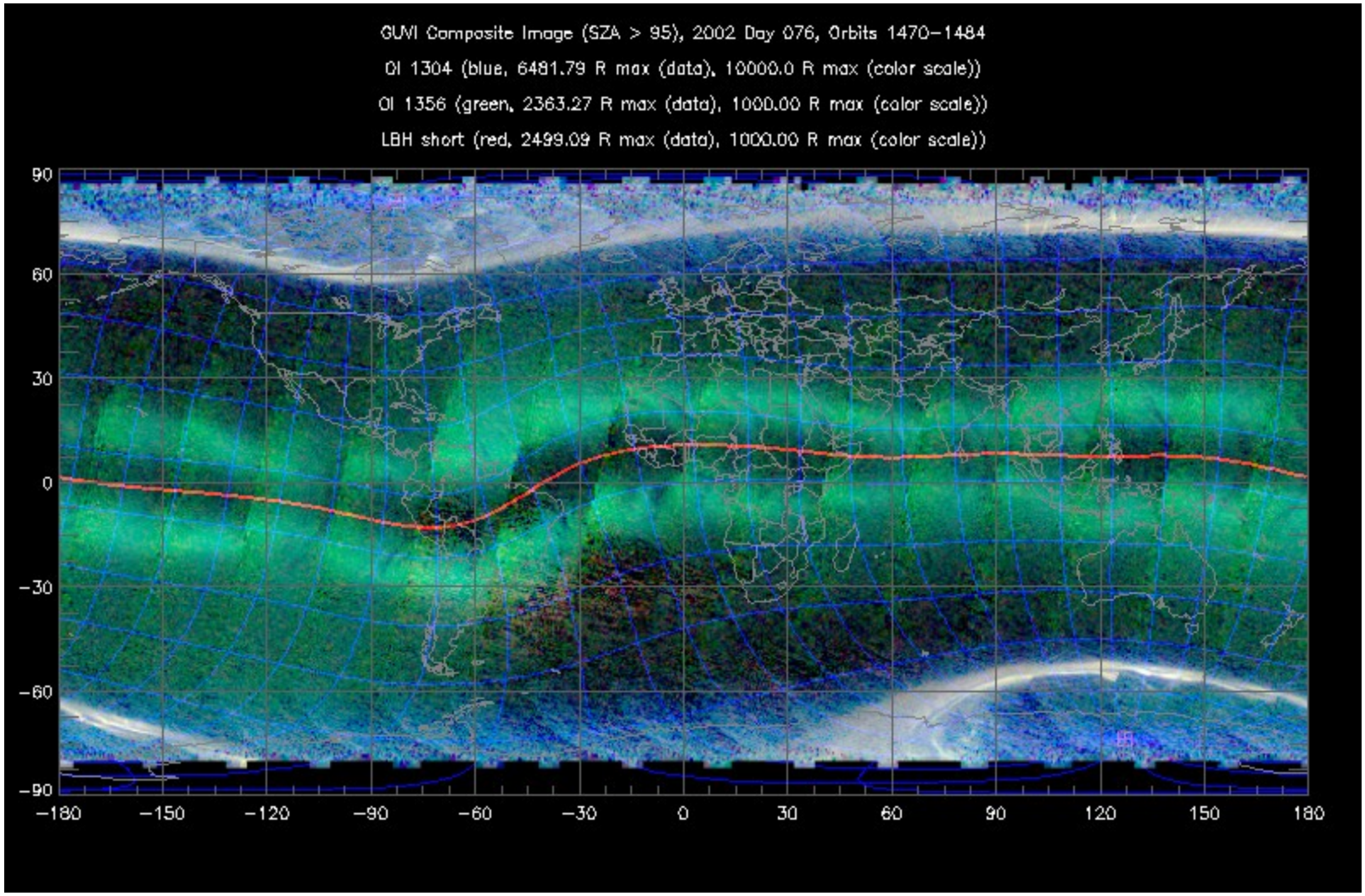


Some kind of problem here with the s/c


2004 Day 077
Orbits 12302–12316
Orbit
Start UT LST
Stop UT LST
Long. of Asc. Node
12316 21.24 22.86 22.85 22.82 24.31
12315 19.62 22.87 21.23 22.84 46.71
12314 18.00 22.89 19.61 22.86 73.28
12313 16.38 22.89 18.00 22.87 97.68
12312 14.76 22.91 16.38 22.88 122.24
12311 13.14 22.92 14.76 22.90 146.64
12310 11.53 22.94 13.14 22.90 171.20
12309 9.91 22.95 11.52 22.93 195.60
12308 8.29 22.97 9.90 22.93 220.16
12307 6.67 22.97 8.28 22.95 244.57
12306 5.05 22.99 6.66 22.96 269.13
12305 3.43 23.00 5.05 22.98 293.53
12304 1.81 23.02 3.43 22.98 318.09
12303 0.19 23.03 1.81 23.01 342.49
12302 −1.42 23.05 0.19 23.01 7.05


2005 Day 077
Orbits 17729–17743
Orbit
Start UT LST
Stop UT LST
Long. of Asc. Node
17743 21.22 1.48 22.84 1.46 83.89
17742 19.60 1.50 21.21 1.46 88.43
17741 17.99 1.52 19.60 1.48 112.97
17740 16.39 1.64 17.98 1.50 138.62
17739 14.75 22.66 16.08 20.36 116.67
17738 13.13 22.66 14.74 22.64 143.05
17737 11.51 22.68 13.12 22.65 167.59
17736 9.89 22.69 11.51 22.67 191.98
17735 8.27 22.71 9.89 22.67 216.52
17734 6.66 22.73 8.27 22.69 241.06
17733 5.04 22.73 6.65 22.71 265.45
17732 3.42 22.75 5.03 22.72 289.99
17731 1.80 22.76 3.42 22.74 314.37
17730 0.18 22.78 1.79 22.74 338.91
17729 −1.43 22.80 0.18 22.76 3.45


2006 Day 077
Orbits 23143–23156
Orbit
Start
UT
LST
Stop
UT
LST
Long.
of Asc.
Node
23156
21.00
1.42
22.61
1.38
86.29
23155
19.38
1.42
20.99
1.40
90.66
23154
17.76
1.44
19.37
1.40
115.19
23153
16.14
1.46
17.75
1.42
139.72
23152
14.52
1.46
16.14
1.44
164.11
23151
12.91
1.48
14.52
1.45
188.64
23150
11.29
1.50
12.90
1.47
213.16
23149
9.67
1.50
11.28
1.47
237.51
23148
8.05
1.52
9.66
1.49
262.08
23147
6.43
1.53
8.05
1.51
286.44
23146
4.81
1.55
6.43
1.51
310.99
23145
3.20
1.56
4.81
1.53
335.51
23144
1.58
1.57
3.19
1.55
359.87
23143
-0.04
1.59
1.57
1.55
24.39



Nightside for the same day – near solar max – not like now (hard to see in the summary plots)

New Horizons: NASA's Pluto-Kuiper Belt Mission

+ SCIENCE DATA SYSTEM (SDS) HOME
+ FEEDBACK
+ ABOUT SDS
+ FAQ

DATA PRODUCTS

- Data Product Downloads
  - Query for data
  - FTP access for data
  - TIMED Data Access Policy
- Data Product Descriptions
- Data Availability Plot
- Survey Products Plots
- Solar & Geomagnetic Indices
- S/C Beta angle (plot)
- Timelines

TOOLS

- Coincidence Locator Tool
  - Batch Coincidence Locator Tool
- Orbit Plotter Tool
- Planning Tools
- Date Converter Tool
- Data Reader / Shared Software
- Telemetry Archive Map Utility
- Telemetry Download Utility
- SDS User Registration

INFORMATION

- Documentation
- Data Product Descriptions
- Scientific Publications
- Acronyms
- Data Level & Version Conventions
- Rules of the Road
- MDC Tips

SCIENCE DATA SYSTEM

TIMED Coincidence Planning Tool

This is the page for the TIMED Coincidence Planning and visualization tool. It simulates the orbit of the TIMED spacecraft from either a set of two-line element files and spacecraft yaw files, or from a processed PVAT (**P**osition, **V**elocity, **A**ttitude and **T**ime) files and provides 2D visualization of the TIMED spacecraft's position, orientation and instrument views. For detail visualization description, please refer to the User Guide. The tool is written in Java, and it can be run in Netscape, Internet Explorer or others.

There is also a Date Converter program to enable you to convert from Julian Day to calendar date and vice-versa.

Go To Coincidence Calculator Home Page
Go To MDC Home Page

This is the tool to use if you want to compare to a location on the ground.

+ SCIENCE DATA SYSTEM (SDS) HOME
+ FEEDBACK
+ ABOUT SDS
+ FAQ

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SCIENCE DATA SYSTEM

TIMED Coincidence Planning Tool

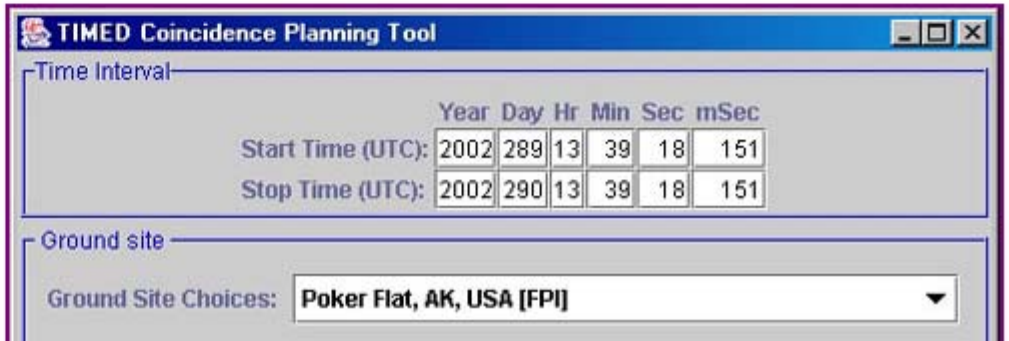
The TIMED Coincidence Planning Tool is a coincidence planning and visualization tool for TIMED. It simulates the orbit of the TIMED spacecraft from a pair of two-line element and spacecraft yaw files. The Tool can be started by clicking on the image below.

For the Coincidence Planning Tool, the accuracy of the predictions decrease the farther into the future you search for coincidences. A table detailing accuracy information is provided. If you are looking for coincidences far into the future, it is advisable that you re-use the planning tool a week before the original coincidence dates to get more accurate times. If possible, the tool should be used again a day or two prior to the coincidence for the best estimates of the coincidence times.

Please Note: This tool requires Java 1.2 or higher or, if you are using an Apple Macintosh, OS X. For more information, go to the Installation Guide.

For detail visualization description, please refer to the User Guide. Please refer to the Installation Guide for detailed System Requirements. A history of the software releases can be found in the Release notes.

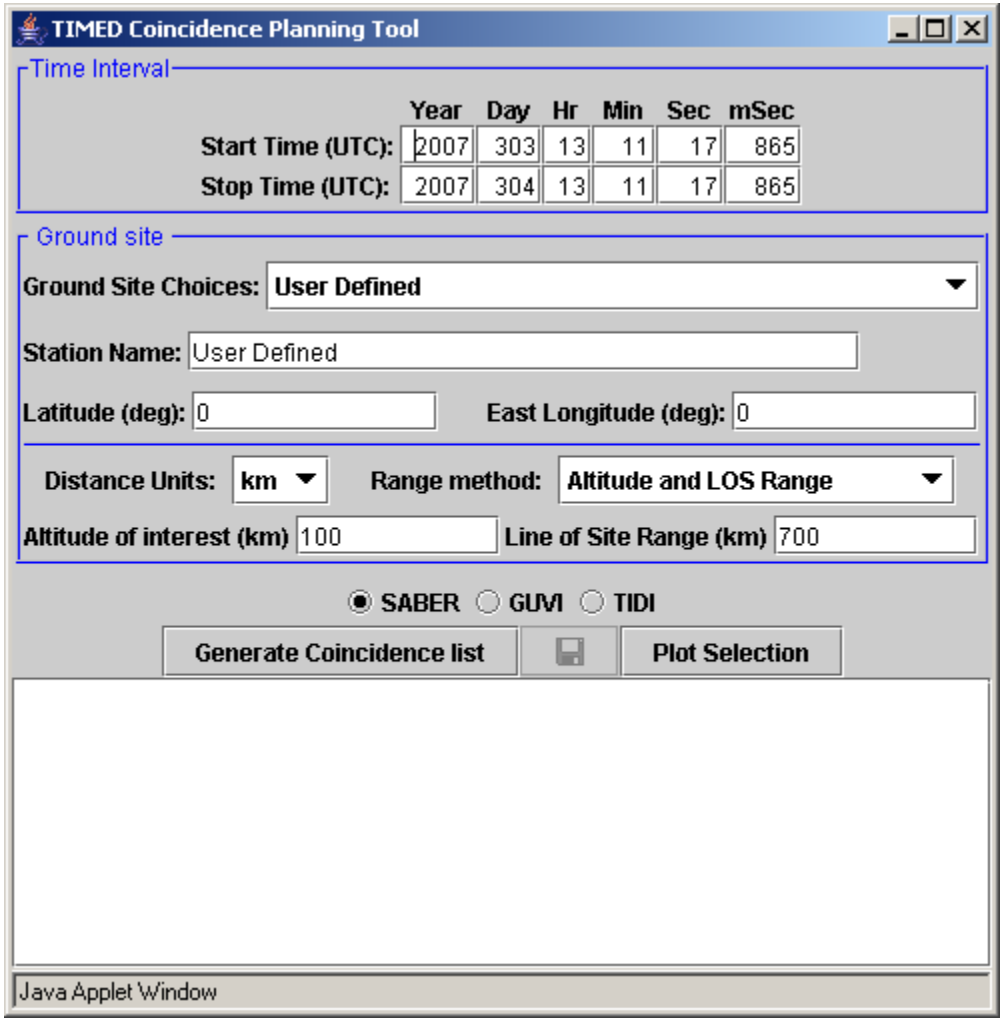
Start Coincidence Planning Tool.



Running the coincidence calculator

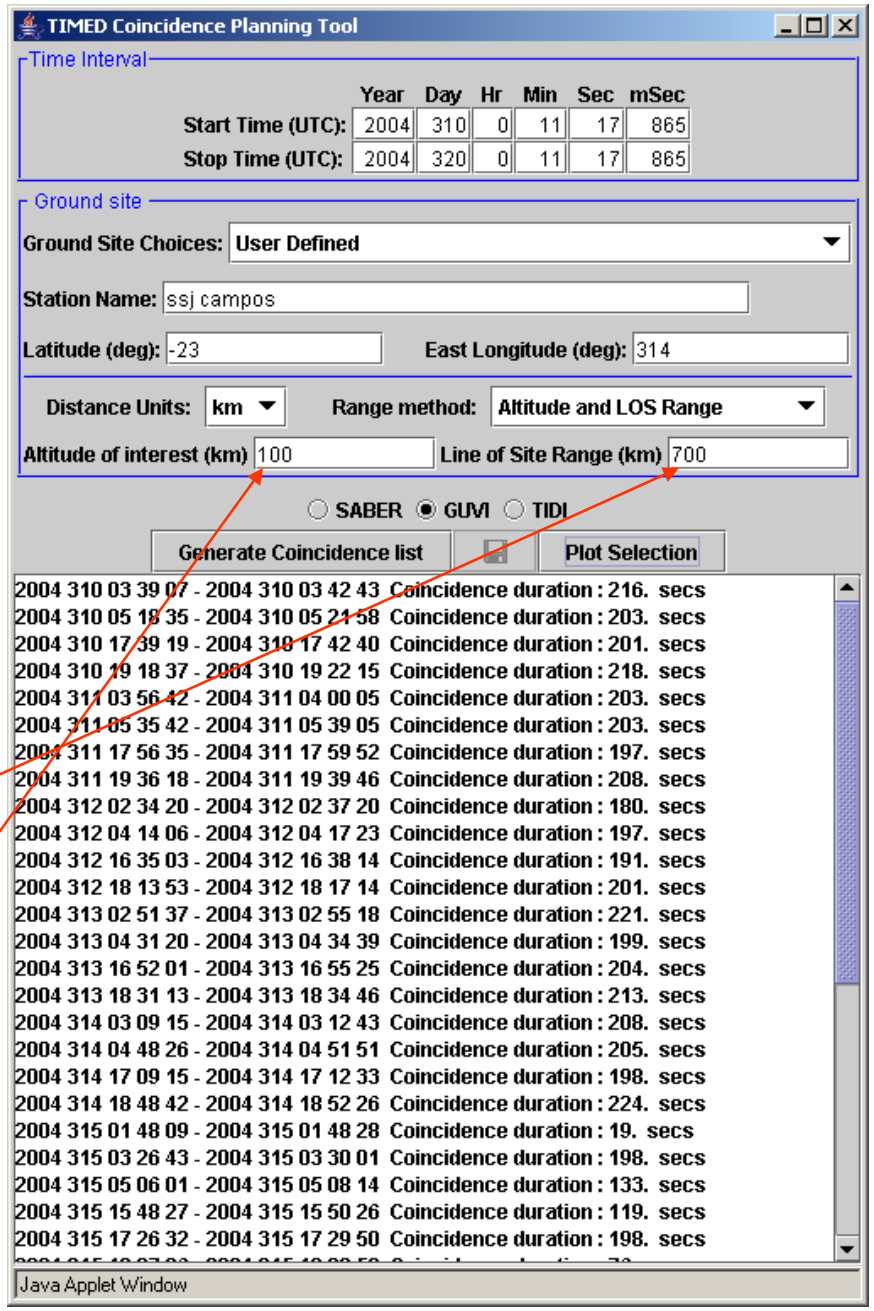
- On the page you just opened, click on the link “start coincidence planning tool”
- This runs a Java application
- You will get a window that looks like this ->

Note that you have to have Java installed on your machine!



This was generated for the november 2004 storm

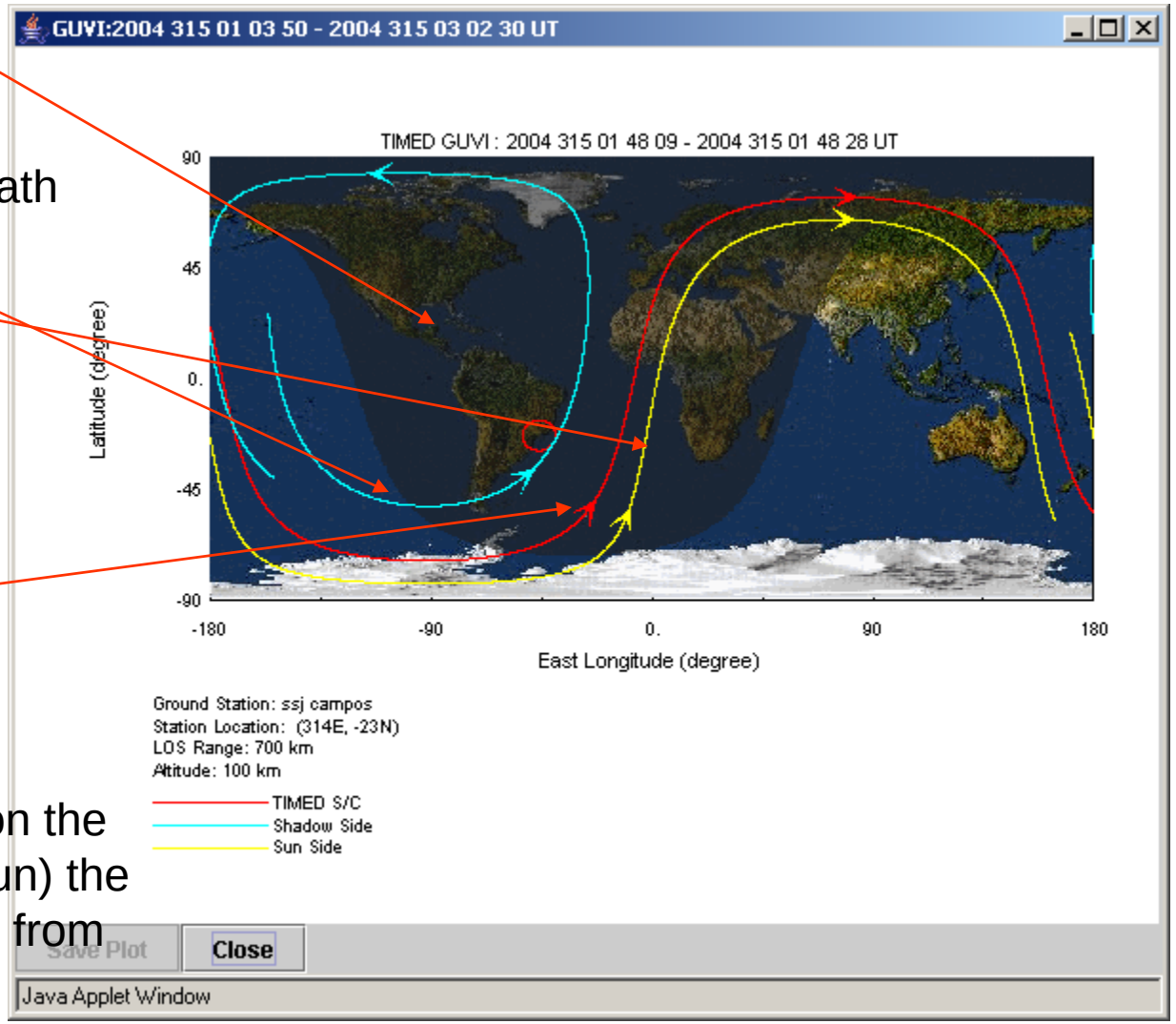
- We can look at each one of these and see what the viewing geometry looked like
- The coincidence occurred for times where the GUVI field of view was within 700 km of the site (this user specifed)
- This means that the GUVI field of view was within 700 km of the site
- The circle of the site field of view is mapped to the user specified altitude (100 km in this case)



nightside

Edge of the guvi swath

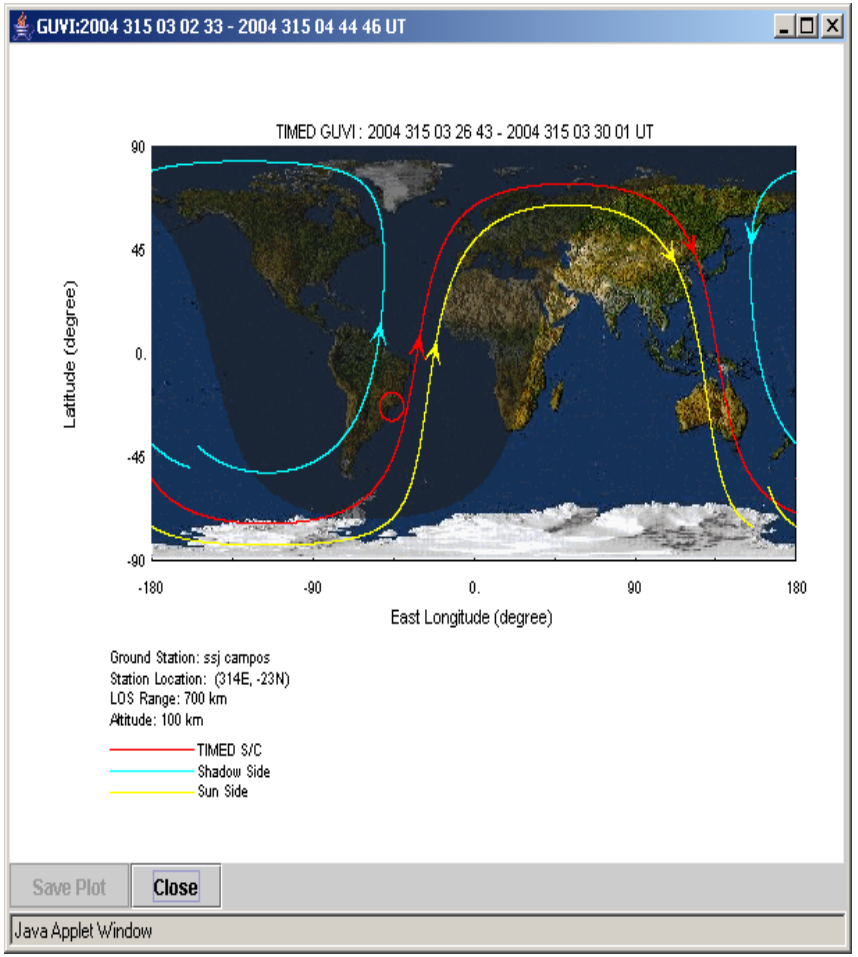
Spacecraft track



Because the GUVI limb is on the nightside (away from the Sun) the limb profiles can be located from these pictures

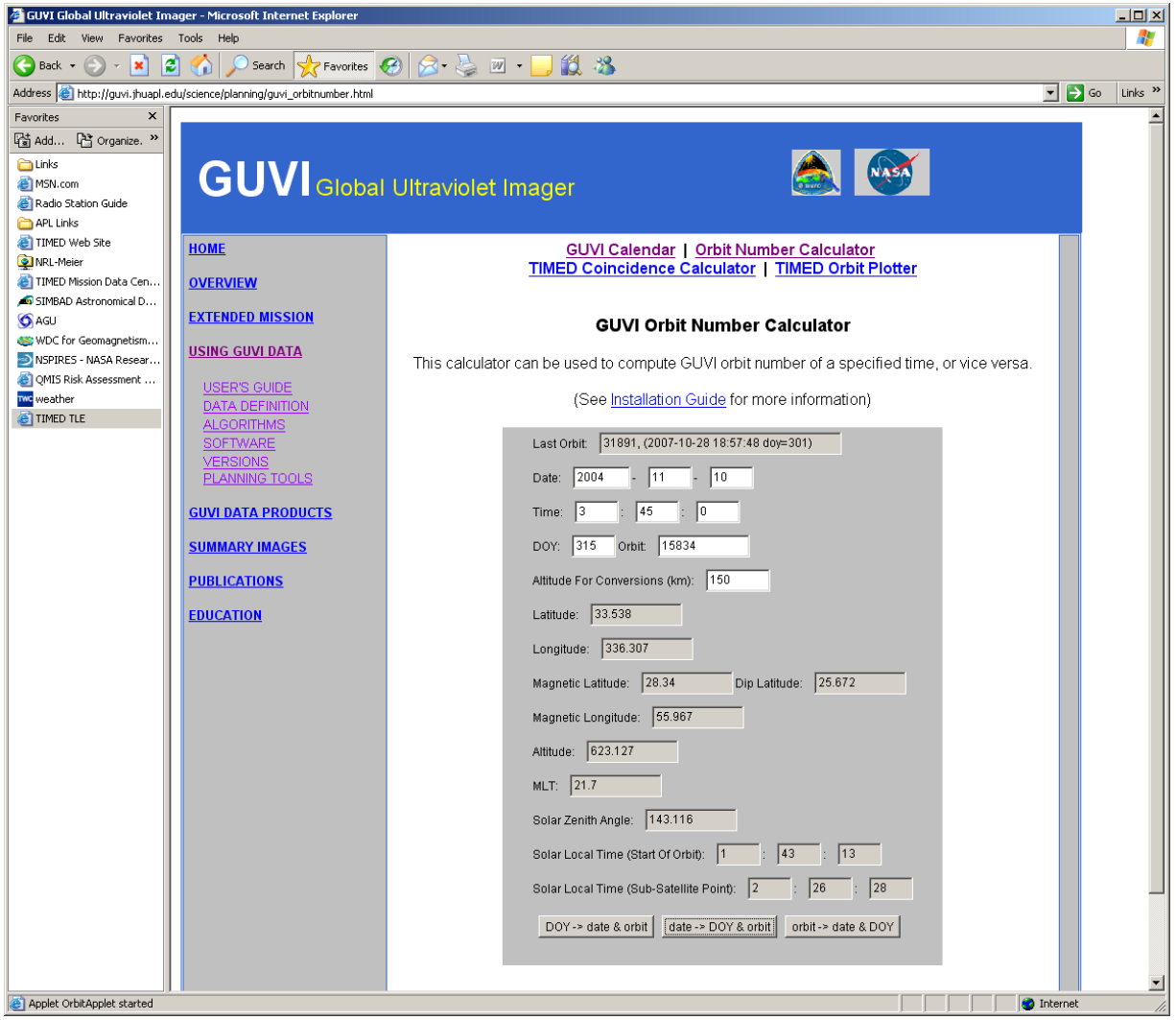
We can look at the next coincidence

- Note that the orbits moved to the west – this helps to get an idea of how the fov moves.



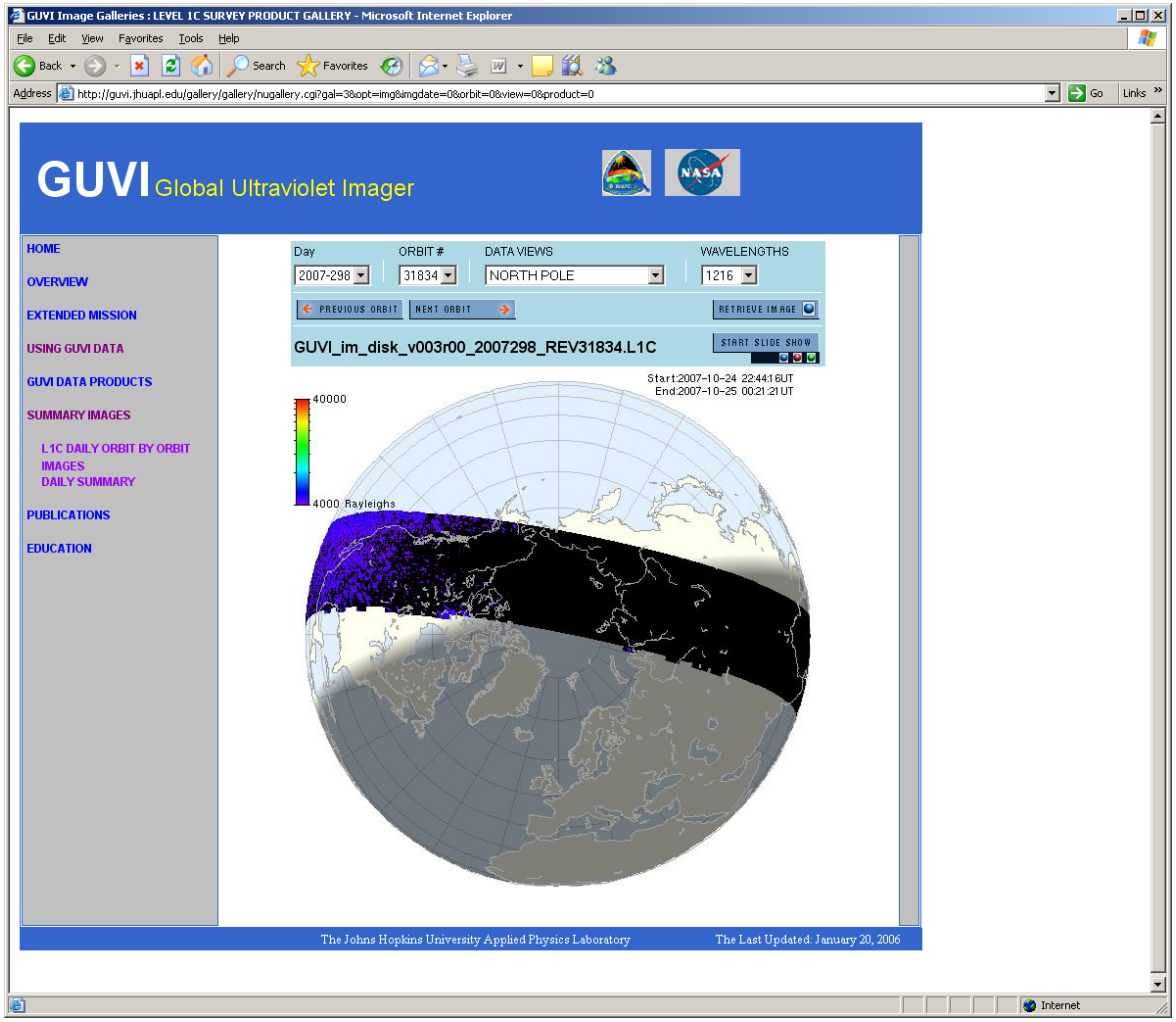
To determine which orbit of GUVI data to get

- Go to the GUVI web page that has the “planning tools”
- Enter the date and the UT from the coincidence planner
- Now you know the orbit number

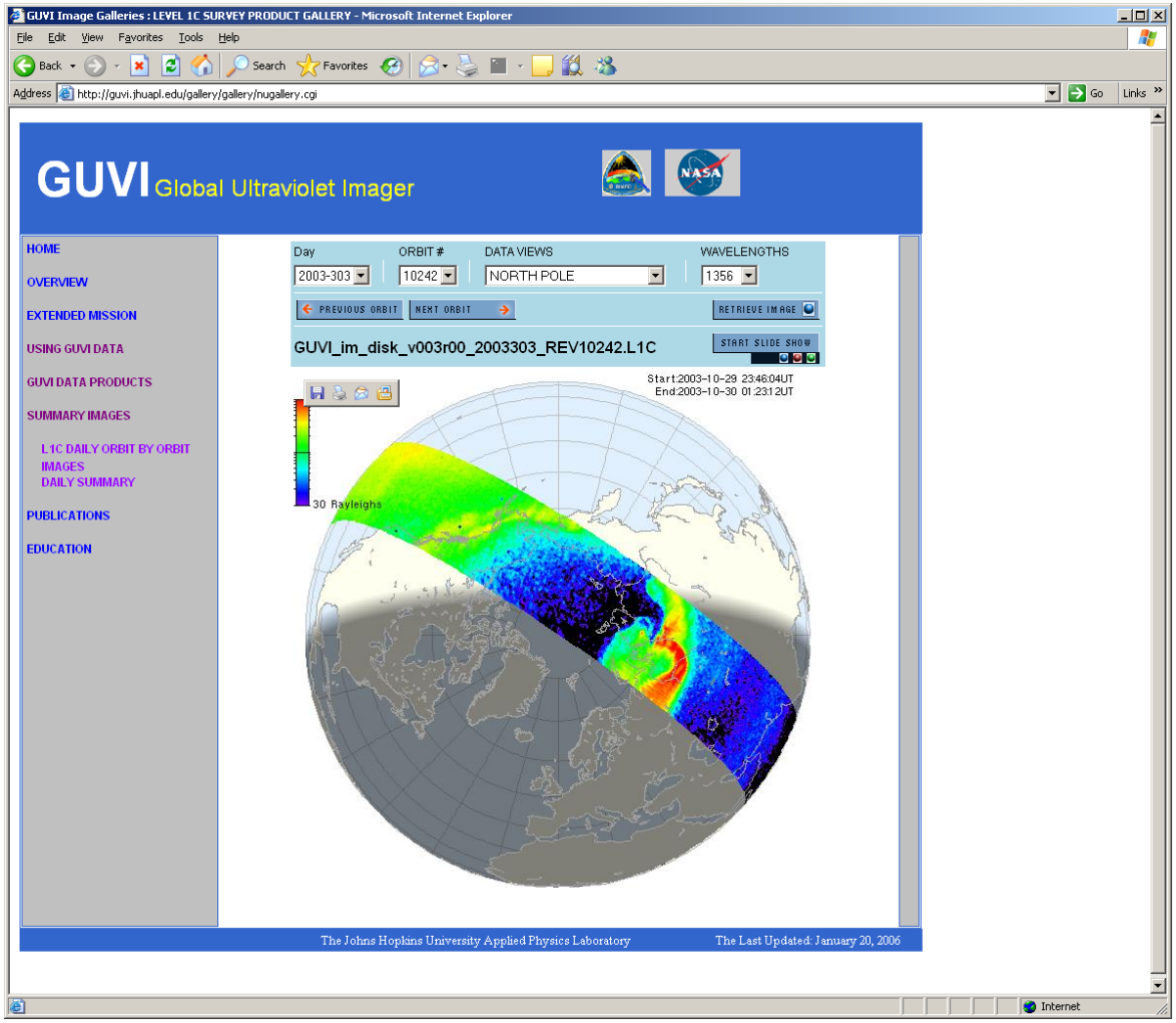


We can also look at a geolocated view of each orbit of GUVI data by color

- Go to the “summary images” page
- Click on “L1C orbit by orbit”

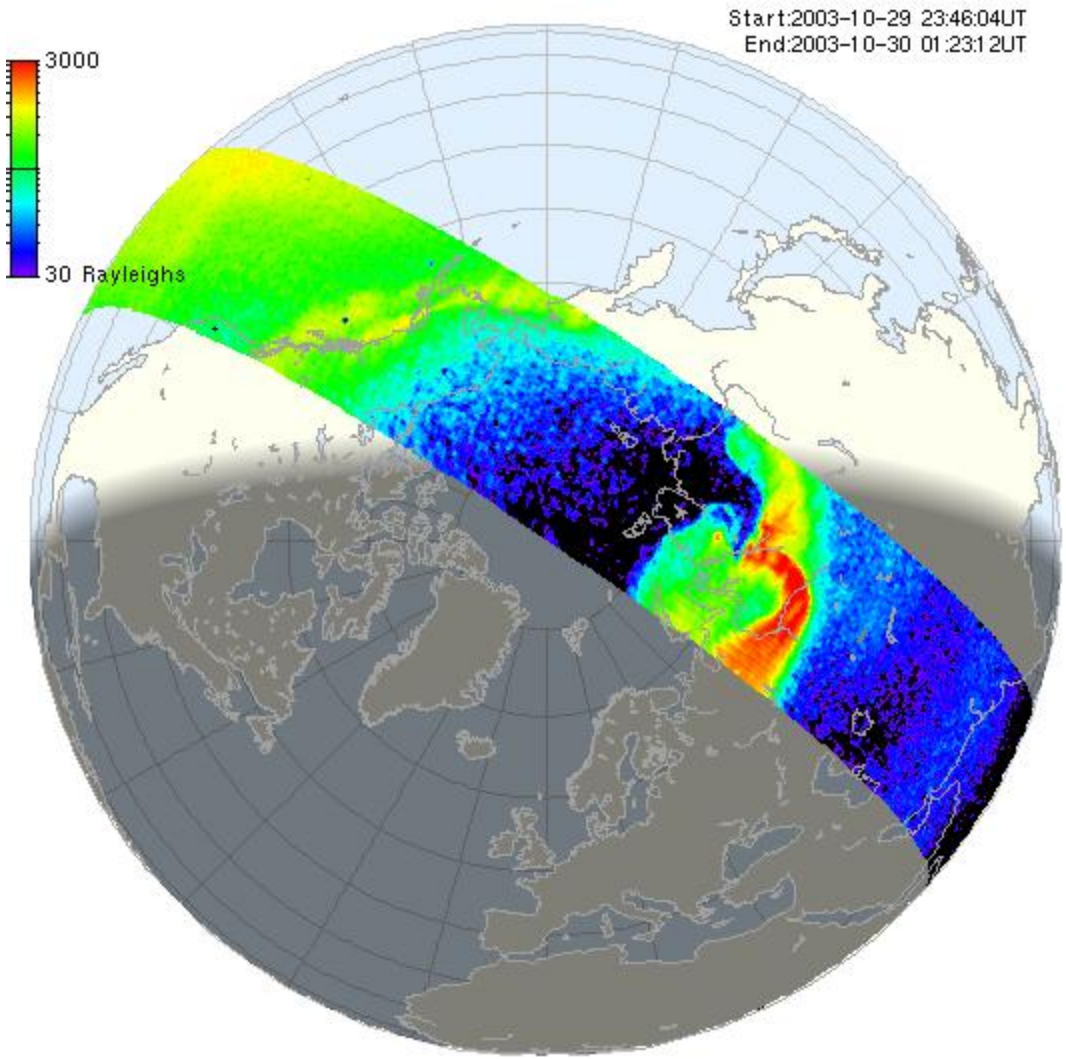


Just to demonstrate the use of the “L1C orbt by orbit” product



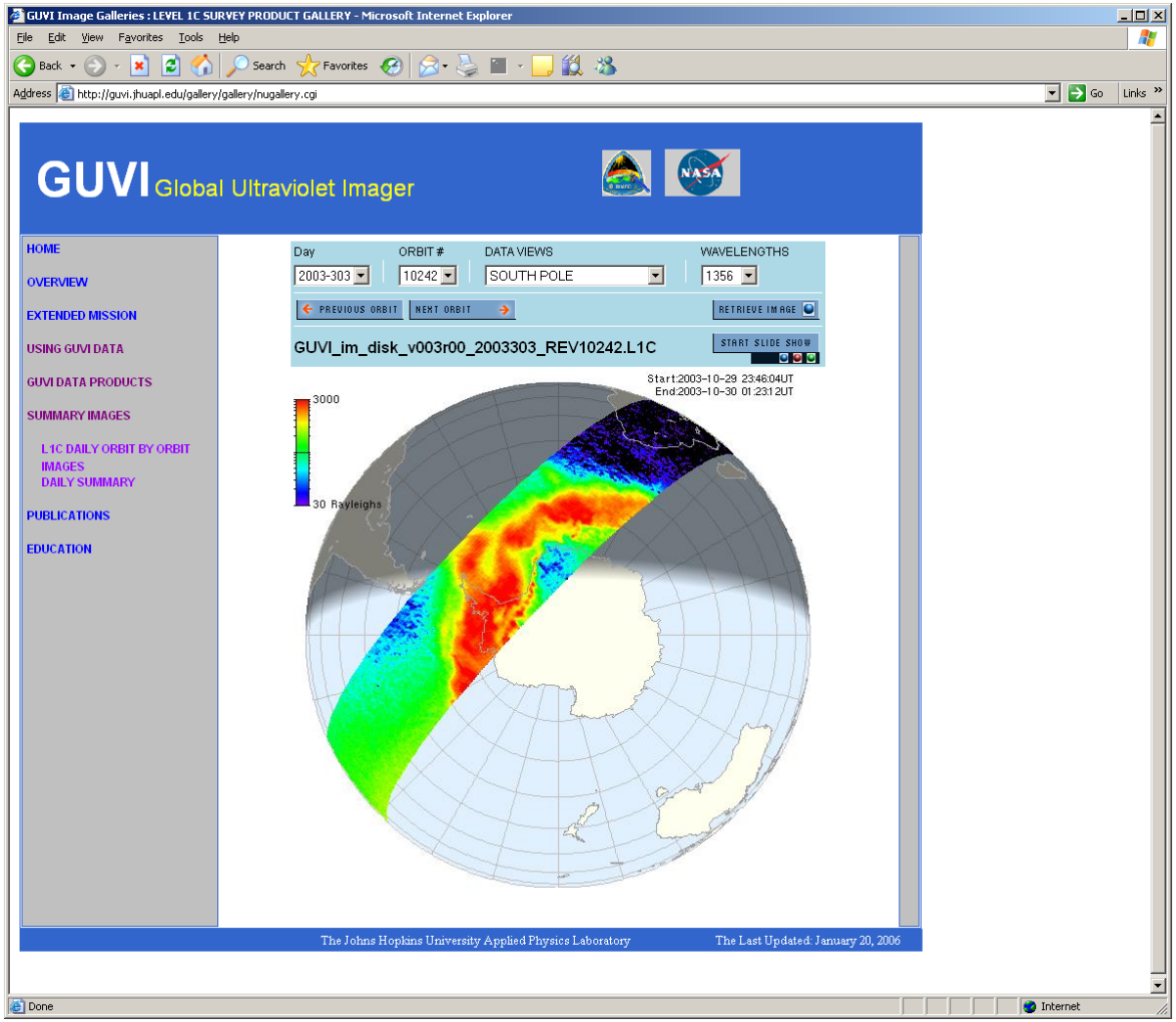
You can also just get the image

- This is for one of the five GUVI colors
- One of the orbits for the day
- North pole view

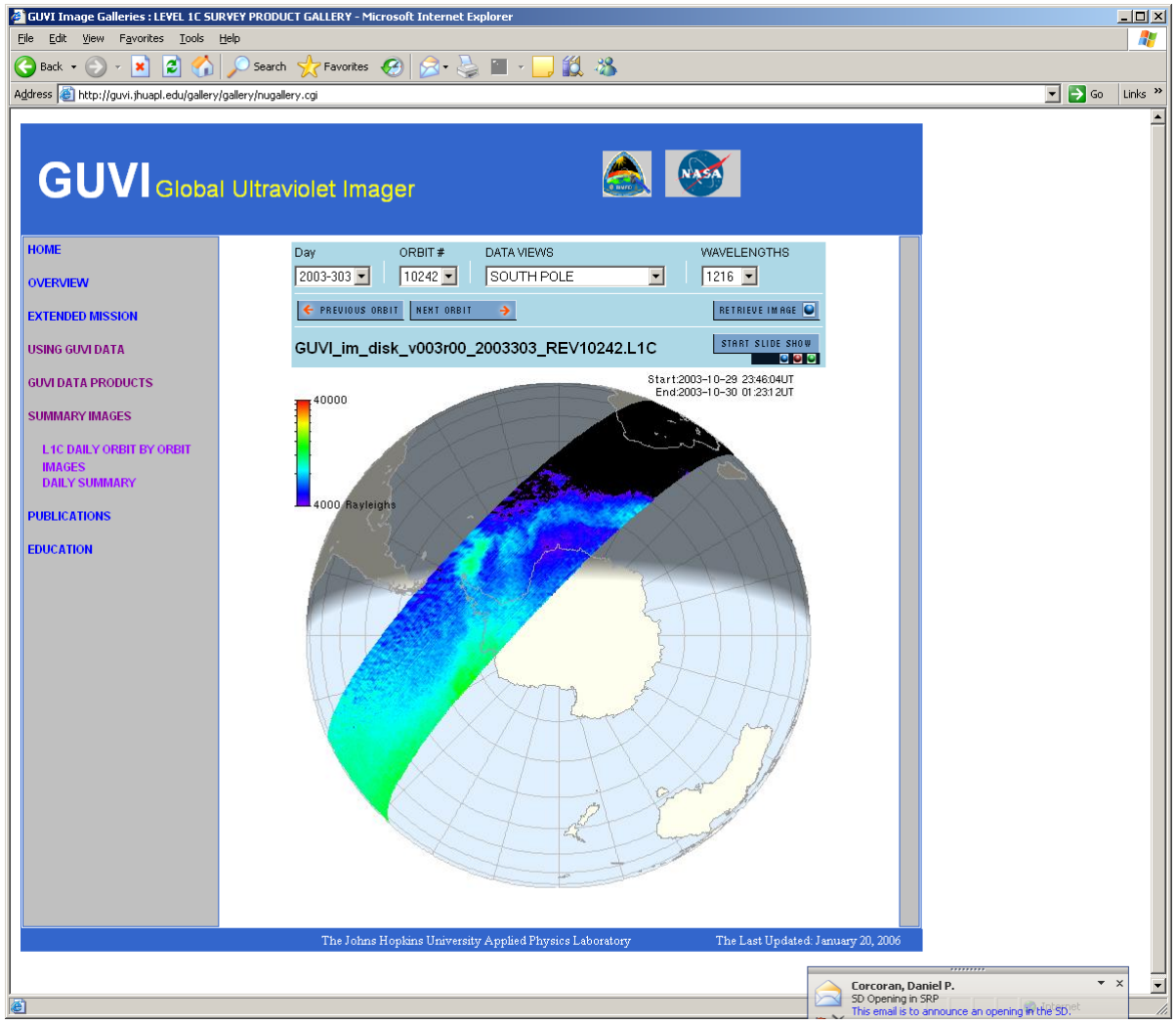


Pick south pole

- Gives you a better idea of where the data were taken and what they looked like



Choosing lyman alpha – 1216 lets you see where proton precipitation occurred



Choosing the “ascending equator” option lets you see the equatorial data

- For this day it happened that the ascending node was on the night side.