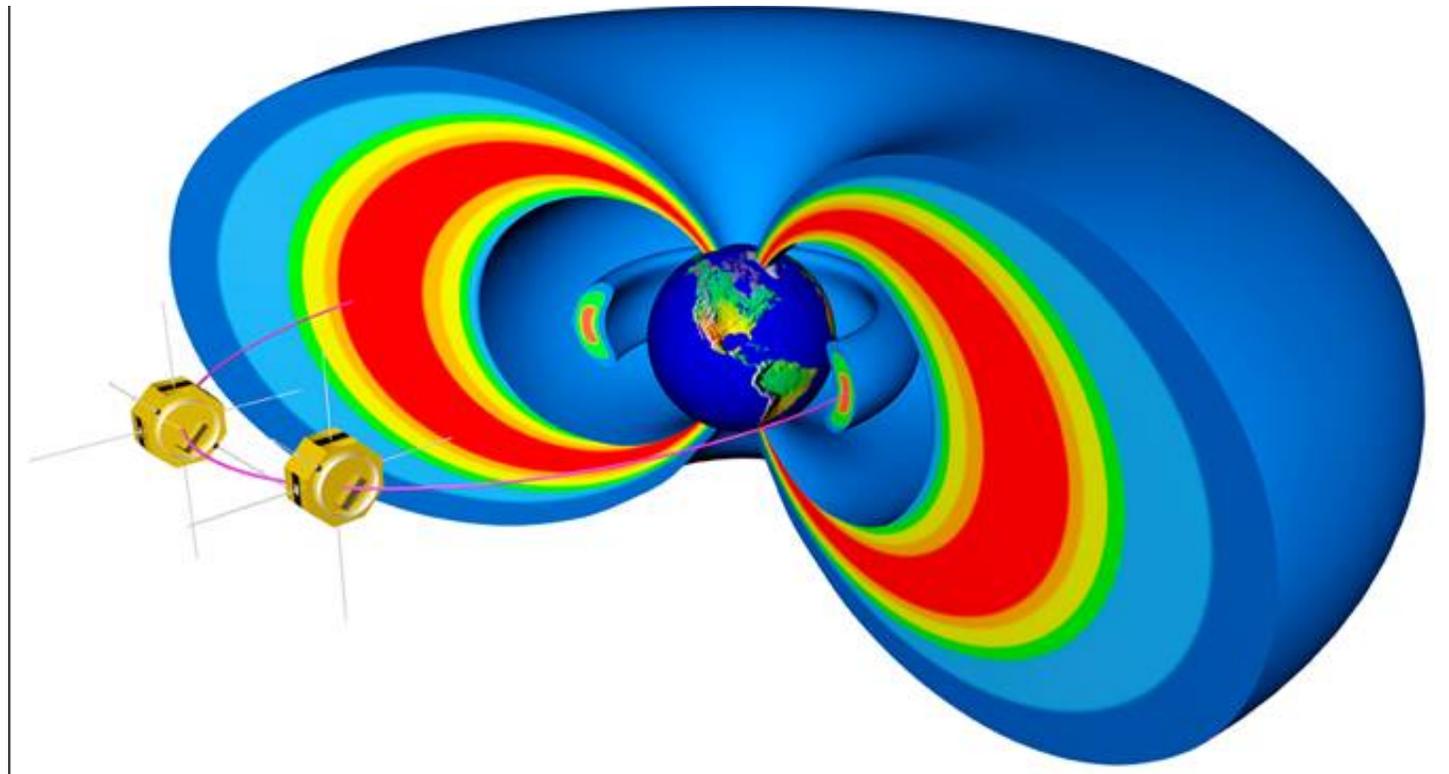


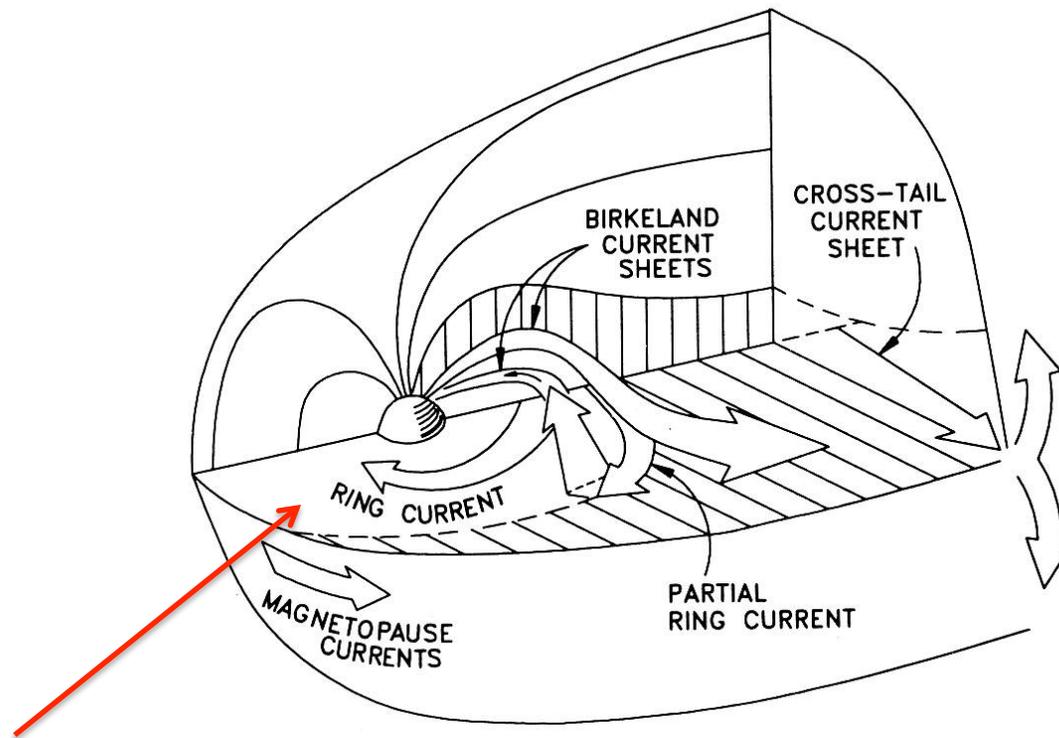
On-Line Visualization

Ring Current / Radiation Belt

Radiation Belts

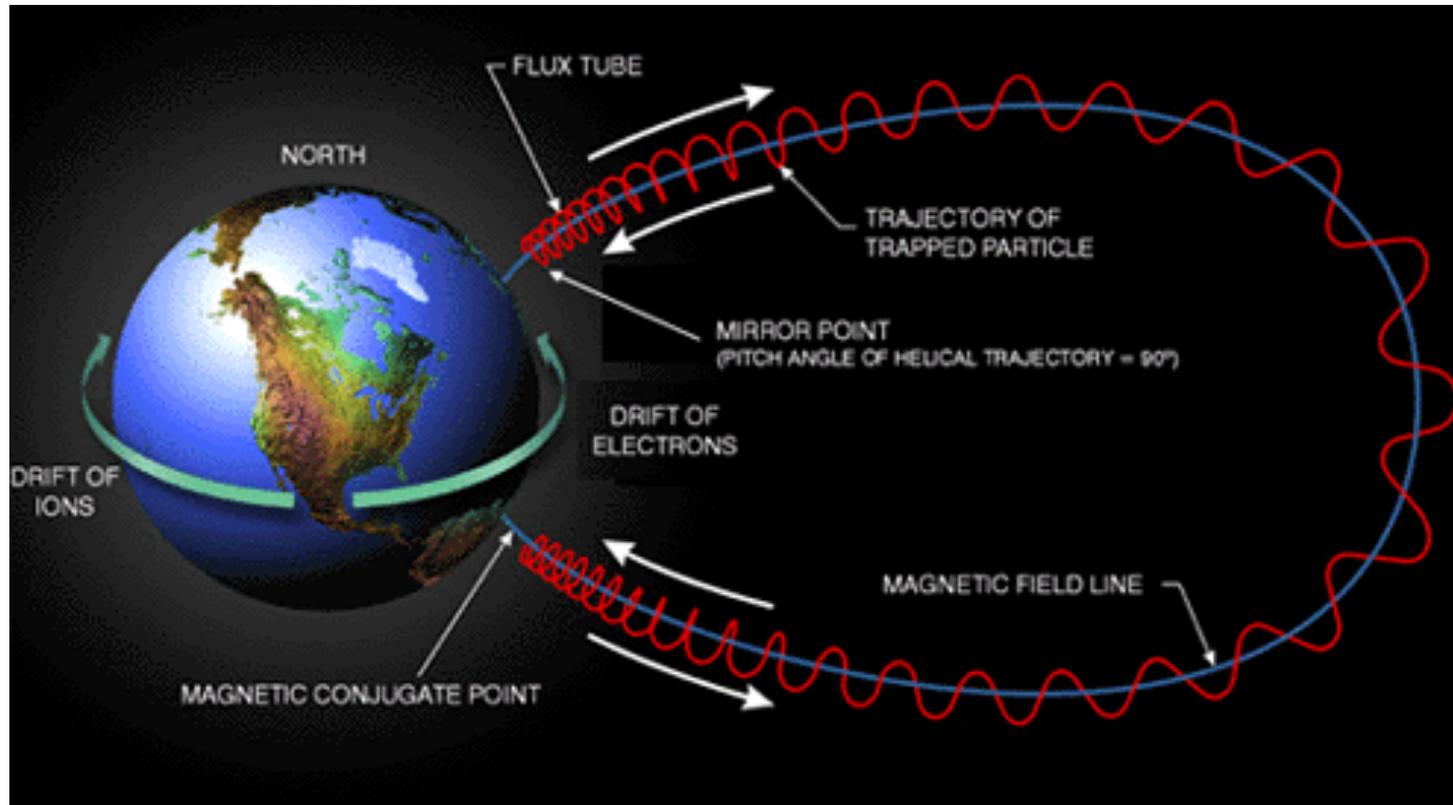


Magnetosphere Current Systems



The **ring current** is one of the major current systems in the Earth's magnetosphere. It circles the Earth in the equatorial plane and is generated by the longitudinal drift of energetic (10 to 200 keV) charged particles trapped on field lines between ~ 2 and 7 Earth's radii.

The charged particles that make up the **ring current** and **radiation belts** are trapped in the Earth's magnetic field, bouncing back and forth along the magnetic field lines between "mirror points" in the northern and southern hemispheres.



Ring current circles the Earth in the equatorial plane and is generated by the longitudinal drift of energetic (10 to 200 keV) charged particles trapped on field lines.

Physical Variable Written by Ring Current and Radiation Belt Simulations

- All variables are **averaged over particle bounce motion** along magnetic field lines between “mirror points”.
- Magnetic field lines are identified by the location of their crossing of the equatorial plane (X, Y).
- Particle Fluxes are presented in spatial coordinates in the equatorial plane at (X, Y), equatorial pitch angle, and 12 **energy levels**.
- Fluxes **F** for electrons (**e-**) and hydrogen ions (**H+**): identified by the (sine of the) equatorial pitch angle ($F_{PA}=?$???)
- Pitch-angle-integrated fluxes identified by:
 - **_tot**: **Total flux for species** (all pitch angles),
 - **_par**: Fluxes along magnetic field B (Pitch angle <60 deg, "PA" <0.866),
 - **_perp**: Fluxes perpendicular to B (Pitch angle >60 deg, "PA" >0.866),
 - **_anis**: Pitch-angle anisotropy $(F_{perp}-F_{par})/F_{tot}$.

10.0.1.5/support/ILWS/runs.php Search

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- [Demo run and tutorial](#)
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Local Network:

<http://10.0.1.5/support/ILWS/runs.php>

L1 to Geospace:

Magnetosphere

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- [Real event simulations](#)

Internet:

<http://ccmc.gsfc.nas.gov/support/ILWS/runs.php>

Inner Magnetosphere

Results of inner magnetospheric models simulations (Ring Current, Radiation Belt and CIMI models)

- [Demo run and tutorial](#)
- [CIMI model run](#)

[Click here](#)

Ionosphere

Results of CTIPe model simulations:

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- [Real event simulations](#)

Local Physics

Results of PIC-Hesse model simulation:

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Demo run and tutorial

[Click here](#)

Demo (practice) run

Run Number	Key Words	Model	Model Version	Start Time	End Time	Dipole Tilt (in the X-Z Plane) at Start deg	N	V _x
HSS2012_SWMF_052212_1	HSS2012, North-South IMF turning, SSW16	SWMF	v20110131	2000/01/01 00:00	2000/01/01 05:00	0.00	5.00000	-400.00000

Tutorial

- [Ring Current / Radiation Belt Visualization Tutorial](#)
- [Ring Current En 22keV Movie](#)
- [Ring Current Midnight Movie](#)



On-Line Visualization: Ring Current Electrons

HSS2012_SWMF_052212_1

Title/Introduction:

Key Word: HSS2012, North-South IMF turning

Model Type: GM

Model: SWMF version v20110131

Click here

- [View solar wind input data](#)
- [List solar wind input data in ASCII format \(see format description here\).](#)
- [View Magnetosphere](#)
- [Create Timeseries in Magnetosphere](#)
- [View Ionosphere](#)

View pre-computed timeseries data:

- [Northern hemisphere polar cap flux and area](#)
 - [Southern hemisphere polar cap flux and area](#)
 - [Magnetopause standoff and closest approach within 30 deg. of Sun-Earth line \(local noon\)](#)
 - [Polar cap boundary at 24 magnetic local times](#)
 - [Ionospheric dissipation](#)
- [View Fok Ring Current Electrons](#)
 - [View Fok Ring Current Protons](#)

Make a First Plot with Default Selections

Click here

3D Simulation Results: Model: Fok Ring Current Run: HSS2012_SWMF_052212_1 e-

This is the web interface for the visualization of results of a three-dimensional simulation of Earth's environment.

Please review the **default selections** below and make your changes.

To start the graphics program click the *Update Plot* button. The resulting image will be displayed at this location of the page.

Should the result be a black image, then the graphics program encountered a programming error. Please report the set of input parameters used.

[Go back to web page of run](#)

Update Plot

Update Plot will update (generate) the plot with the chosen time and plot parameters below.

This will take some time (typically 10-30s) as data is read in and processed.

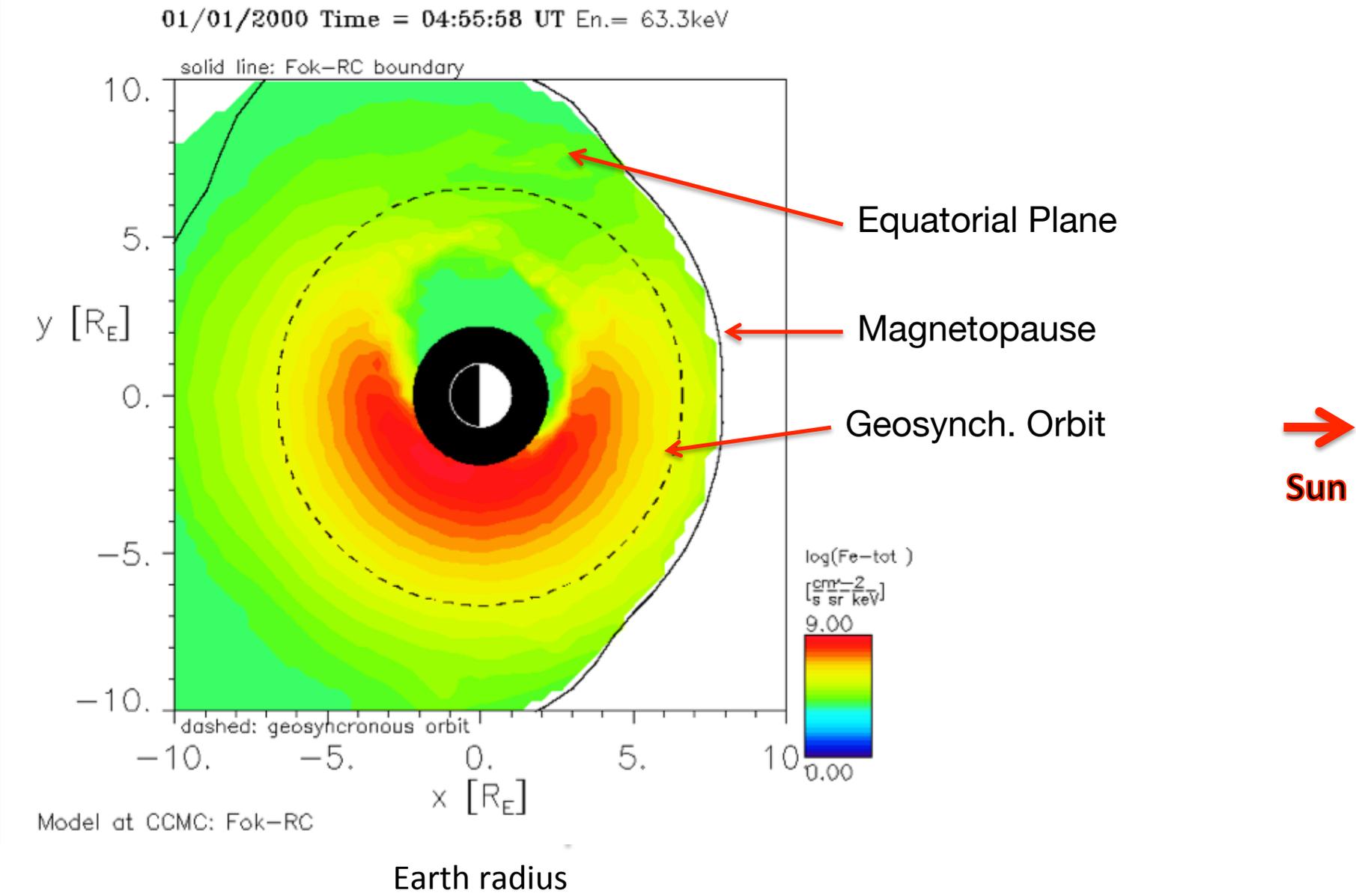
⊙ Choose data time:

Date: 2000/01/01 Time: 04:55:58

Choose time step from the pull-down menu

Click “**Update Plot**” to make a plot with default selections

Electron Total Flux. Energy 63.3 keV. Color Contour



Select Energy Level $E_n = 22.45$ keV

Choose Plot Area:

All **Plot Modes** except **Line Plot** and **Vertical Plot**: Select lower left corner of plot area on the left, and the upper right corner on the right.

Line Plot: Select start point of line on the left, the end point on the right.

Vertical Plot: Select X and Y position on the left.

X₁ X₂ Range: -10 ... 10 RE
Y₁ Y₂ Range: -10 ... 10 RE

Choose Cut Plane:

X=constant
Y=constant

Use (r,MLT) instead of (X, Y):

r₁ r₂ Range: 2.2 ... 13 RE
MLT₁ MLT₂ Range: 0 ... 24 hours

r=constant
MLT=constant

use log(Energy) to plot

Energy₁ Energy₂ Range: 1 ... 300 keV

Energy=constant

Reset Form will reset changes to the defaults specified by the previous script.

Update Plot will update (generate) the plot with the chosen time and parameters above.

List Data (check to get any of the following outputs which apply to movie request):

What: Plot variables from above

Include all primary model output parameters (**Warning:** text files may be large).

You have to select **vector magnitudes** (e.g., "B", "V", "J") explicitly for plotting them:

computed scalars such as

1.00000
1.67900
2.82100
4.73800
7.95700
13.3650
22.4470
37.7010
63.32
106.350
178.620
300.000

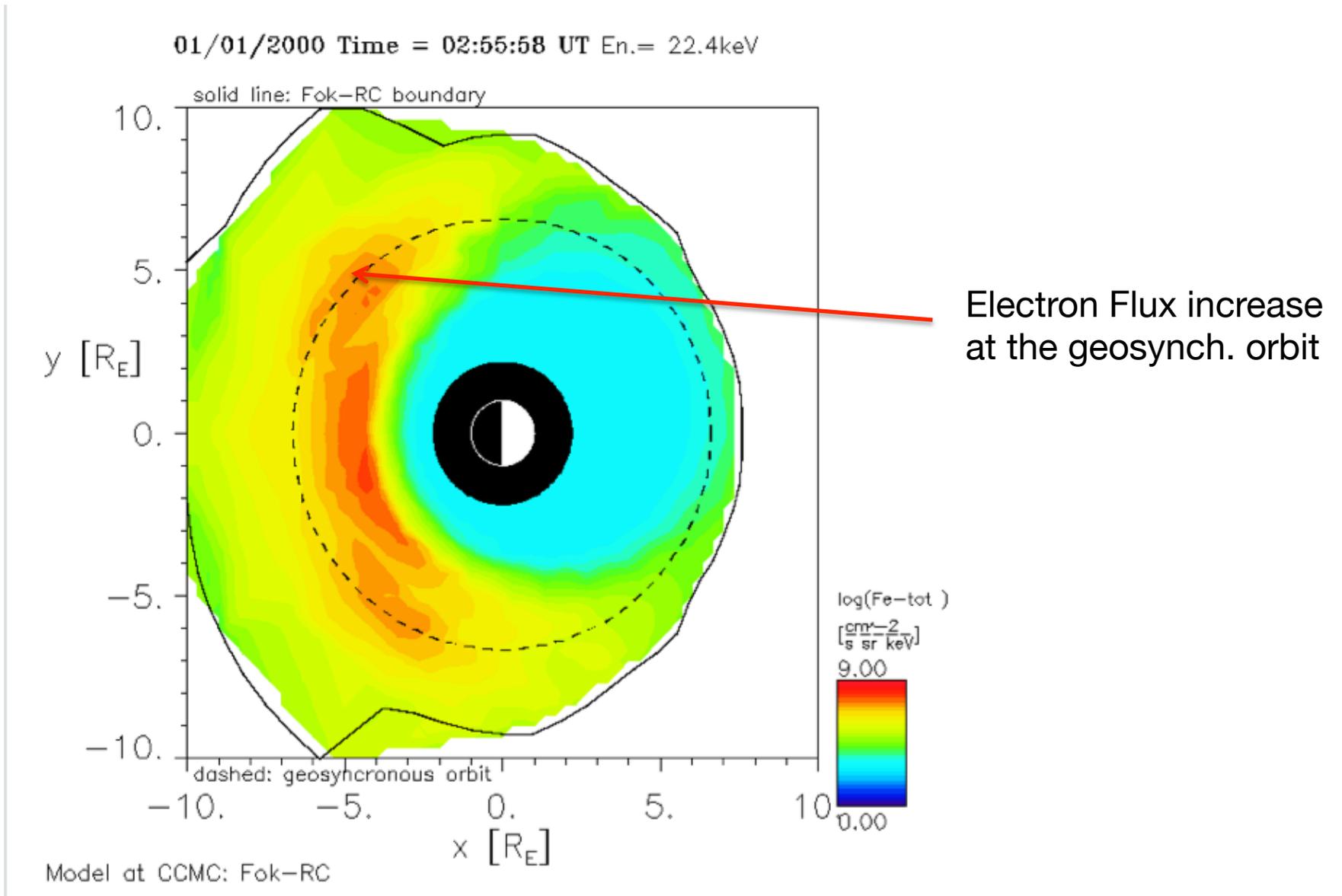


Choose $E_n=22.45$ keV from the Energy=constant pull-down menu

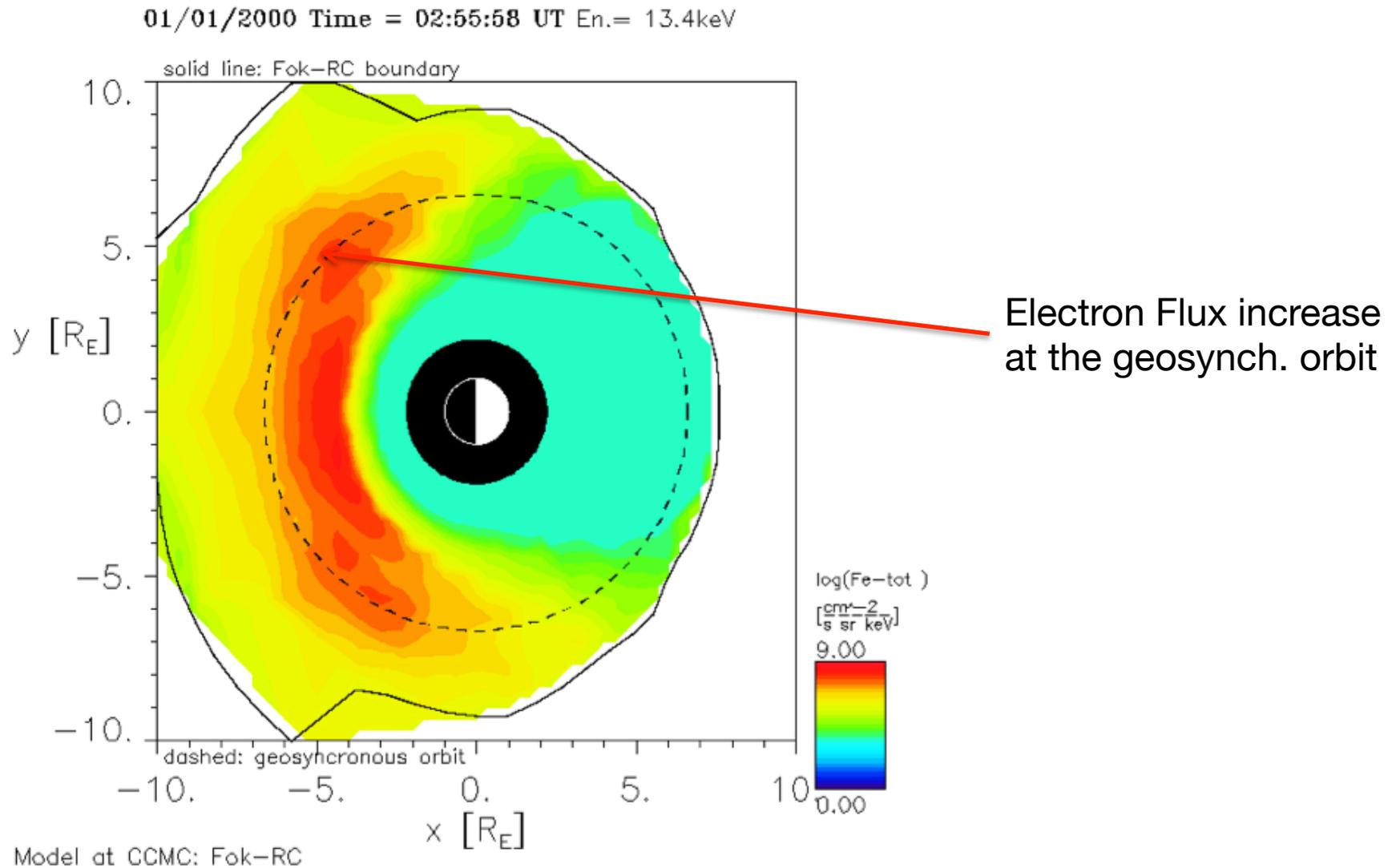
Select time 2:56

Click **“Update Plot”**

Electron Total Flux. Energy 22.45 keV. Color Contour



Electron Total Flux. Energy 13.4 keV. Color Contour



Space Weather Effect of Ring Current Electrons: Surface Charging

Electrons with energies in the range of several to several tens of keV are responsible for surface charging of spacecrafts in geosynchronous orbit.

The differential charging of spacecraft surfaces can give rise to destructive arc discharges, causing satellite operational anomalies.

Intense fluxes of these electrons can be caused by north-south IMF turning and substorms.

Surface charging occurs more often in the midnight to dawn sector.

Electron Fluxes in Energy Range 5 – 50 keV at the Night Side (Magnetic Local Time MLT = 0)

Choose Plot Area:

All **Plot Modes** except **Line Plot** and **Vertical Plot**: Select lower left corner of plot area on the left, and the upper right corner on the right.

Line Plot: Select start point of line on the left, the end point on the right.

Vertical Plot: Select X and Y position on the left.

X₁ X₂ Range: -10 ... 10 RE

Y₁ Y₂ Range: -10 ... 10 RE

Use (r,MLT) instead of (X, Y):

r₁ r₂ Range: 2.2 ... 13 RE

MLT₁ MLT₂ Range: 0 ... 24 hours

Choose Cut Plane:

X=constant

Y=constant

r=constant

MLT=constant



use log(Energy) to plot

Energy₁ Energy₂ Range: ~~1 ... 300 keV~~

Reset Form will reset changes to the defaults specified by the previous run of this script.

Update Plot will update (generate) the plot with the chosen time and plot parameters above.

Select MLT=constant
instead of
Energy=constant

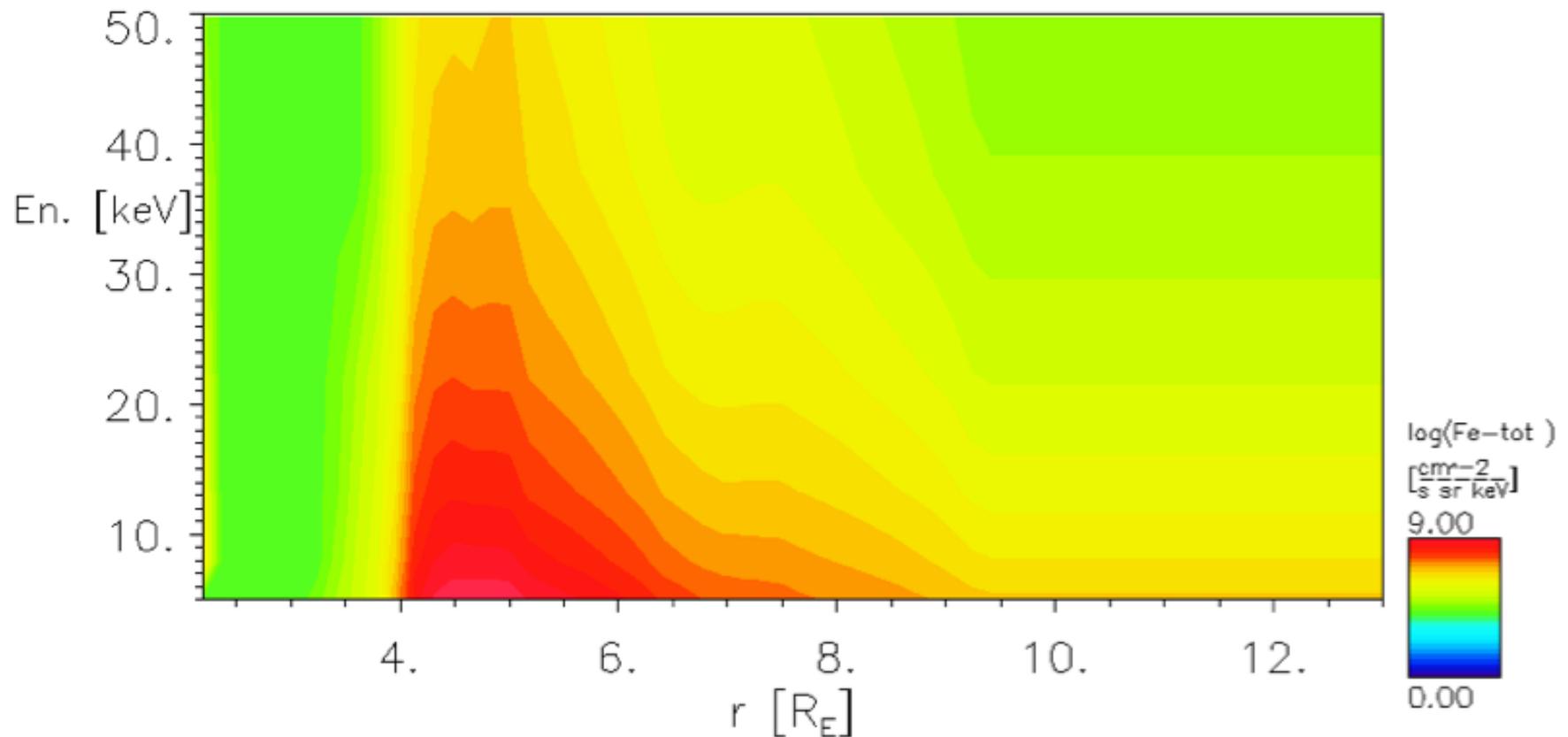
Set MLT=0 (midnight)

Set Energy range
between 5 and 50 keV
Select time 2:56

Click **“Update Plot”**

Electron Fluxes in Energy Range 5 – 50 keV at the Night Side (Magnetic Local Time MLT = 0)

01/01/2000 Time = 02:55:58 UT MLT= 0.00hr



Model at CCMC: Fok-RC