# On-Line Visualization

Quiet Ionosphere/Thermosphere

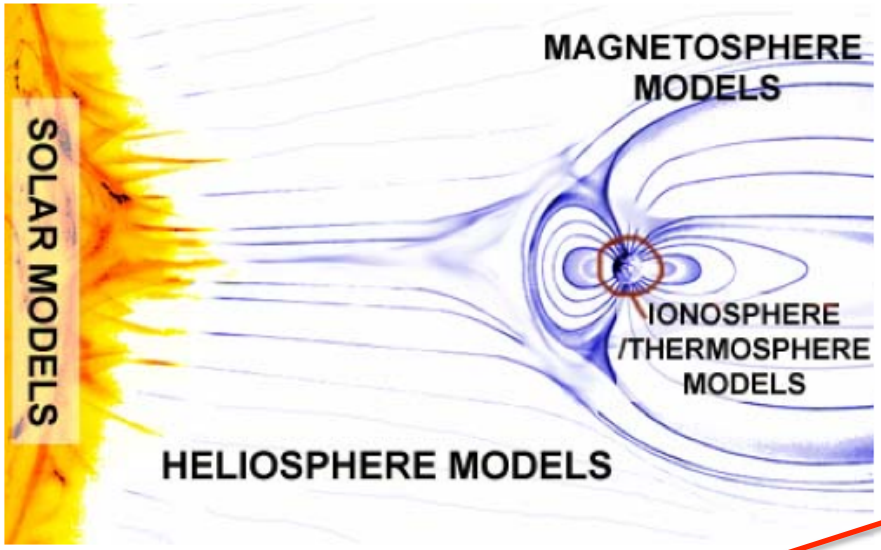
# Heliophysics Laboratory Primer
# Quiet Ionosphere/Thermosphere

## Heliophysics Laboratory Primer

This primer has been created to help you to:

1. use the CCMC tools designed to interrogate Heliophysics models at CCMC, and
2. obtain a top level view of the connectivity and naming of regions and parameters that comprize the heliophysics system.

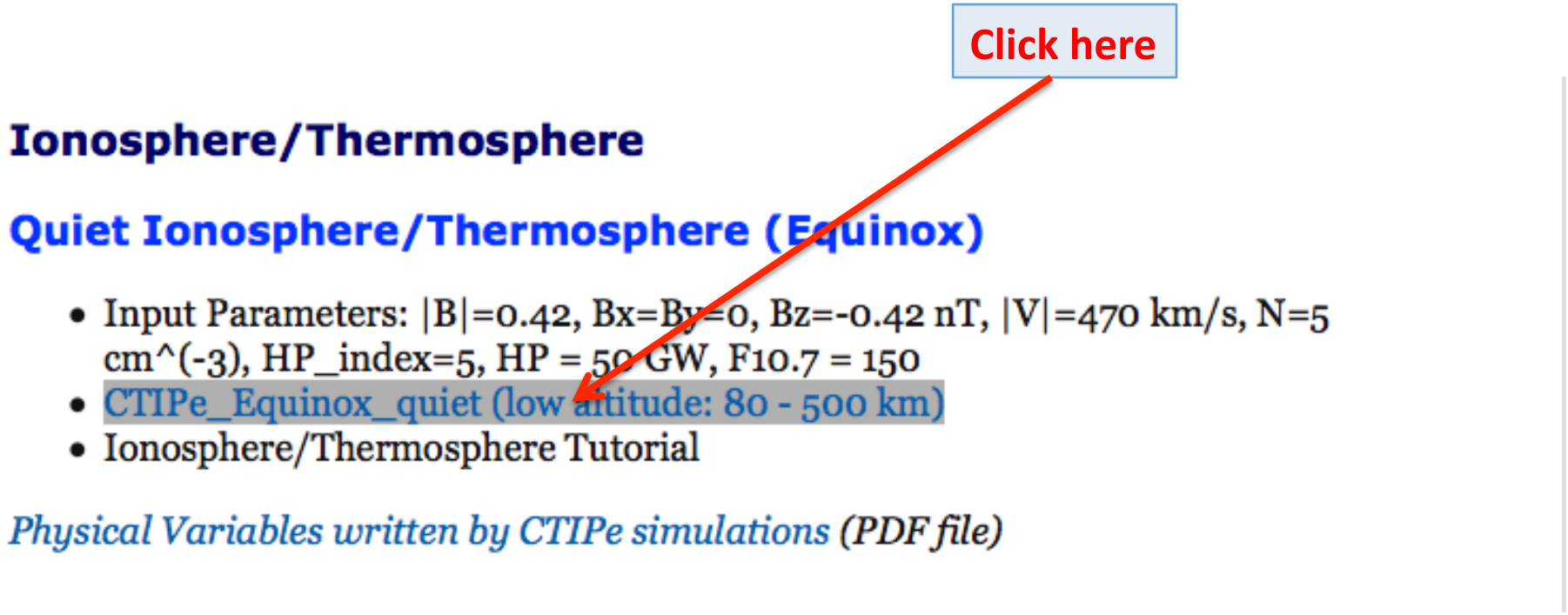
The heighest level picture of the Heliophysics system shows three components - the Sun, the solar wind, and the magnetosphere while buried inside the magnetosphere is the ionosphere and thermosphere. Click for the specific primer:



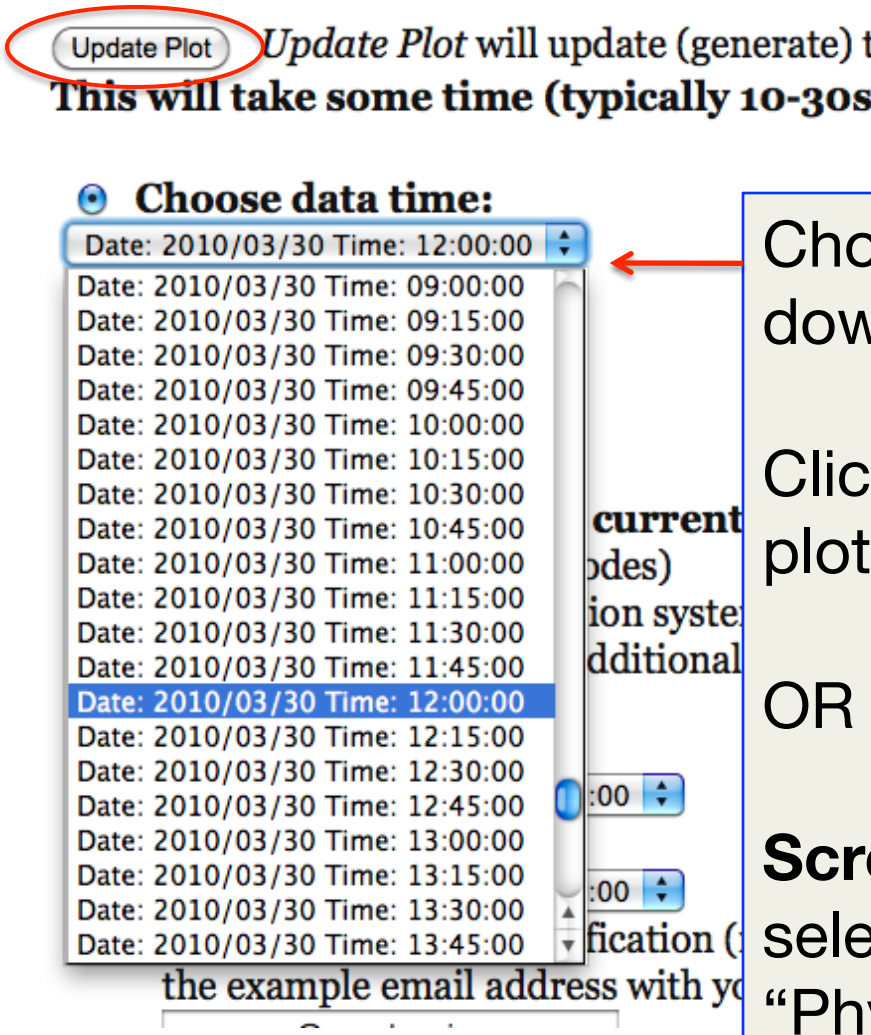

- Heliosphere
- Magnetosphere
- Ionosphere/Thermosphere

Click here

# On-Line Visualization
# Quiet Ionosphere/Thermosphere



# Select time step




Choose time step from the pull-down menu

Click "**Update Plot**" to make a first plot with default selections

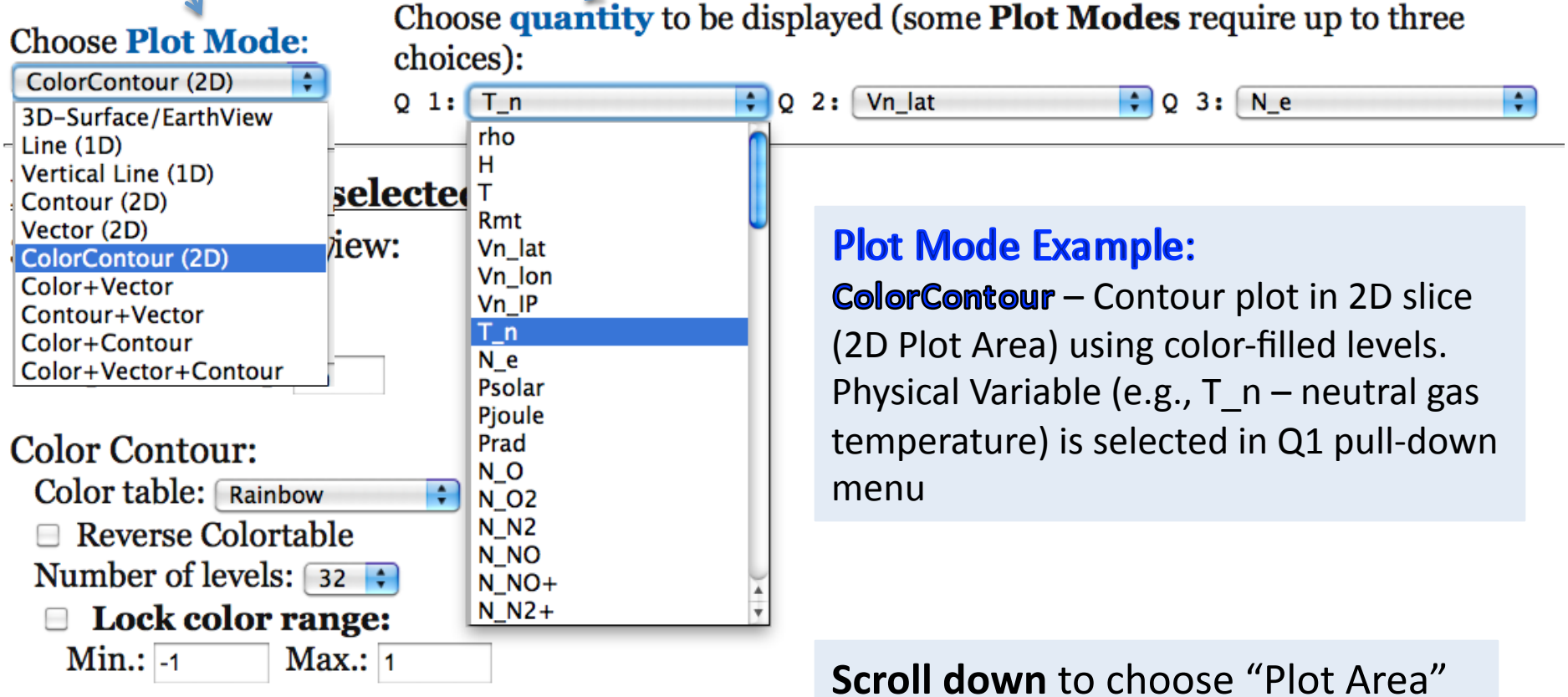
OR

**Scroll down** to modify default selections such as "Physical Variables", "Plot Mode", "Plot Area", "Plot Options", etc.

# Select Plot Mode and Physical Variables to be Displayed from Pull-Down Menus

**Click here** for Plot Modes description

**Click here** for the complete list of physical variables written by ionosphere model CTIPe




## Plot Mode Example:

**ColorContour** – Contour plot in 2D slice (2D Plot Area) using color-filled levels. Physical Variable (e.g., T_n – neutral gas temperature) is selected in Q1 pull-down menu

**Scroll down** to choose “Plot Area”

# Choose Plot Area

**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 lon and lat position on the left.

$lon_1$ 0 $lon_2$ 360 Range: 0 ... 360 deg

$lat_1$ -90 $lat_2$ 90 Range: -90 ... 90 deg

**CTIP** data: the vertical coordinate can either be IP or H for determining plot range or cut plane.

Note that the full range in H will not be reached at all times. Limits or selections of H may be modified within the plot.

$IP_1$ 1 $IP_2$ 15 Range: 1 ... 15 []

$H_1$ 80 $H_2$ 450 Range: 80 ... 1000 km

Render polar plot with maximum colatitude: 40

**Choose Cut Plane:**

lon=constant 180

lat=constant 0

IP=constant 8

H=constant 150

IP=8 cut plane Is selected for 2D Plot

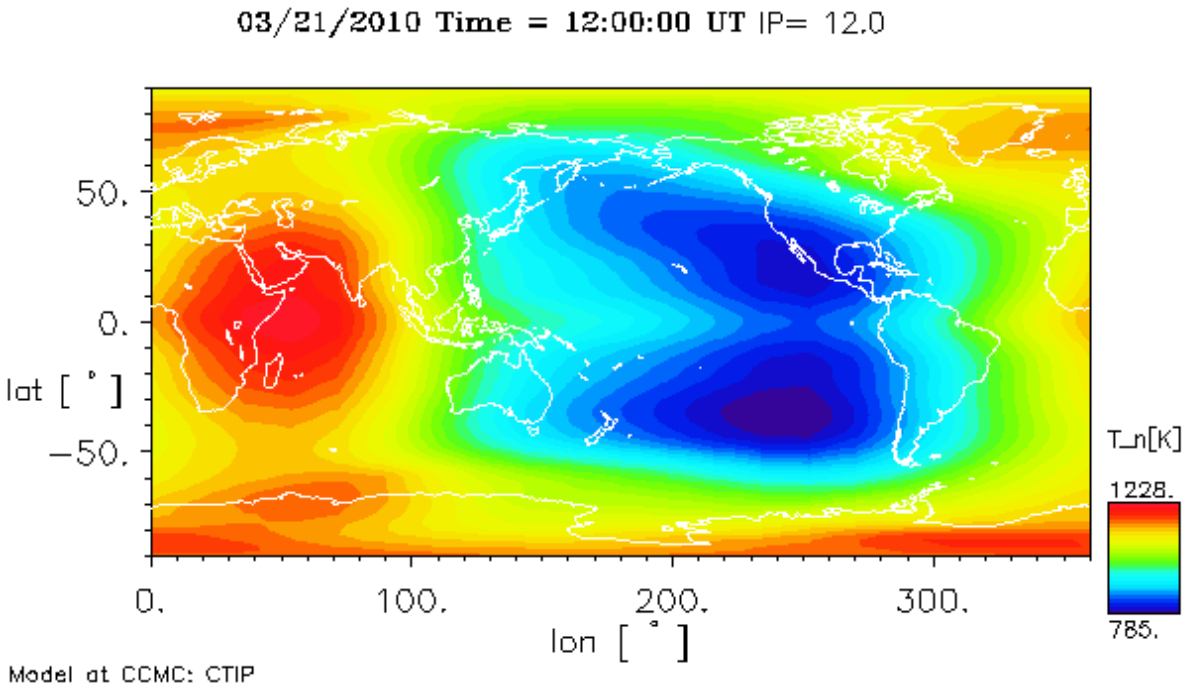
**H (height)** in [km] corresponding to pressure level number **IP**

The height of a pressure level varies spatially and with time. Heights covered start at about 80 km (**IP**=0) and reach a few hundred km above ground (the maximum found for **IP**=14, the top layer, is typically between 450 km and 1000 km).

The height can be used as an alternative 3rd coordinate for plotting.

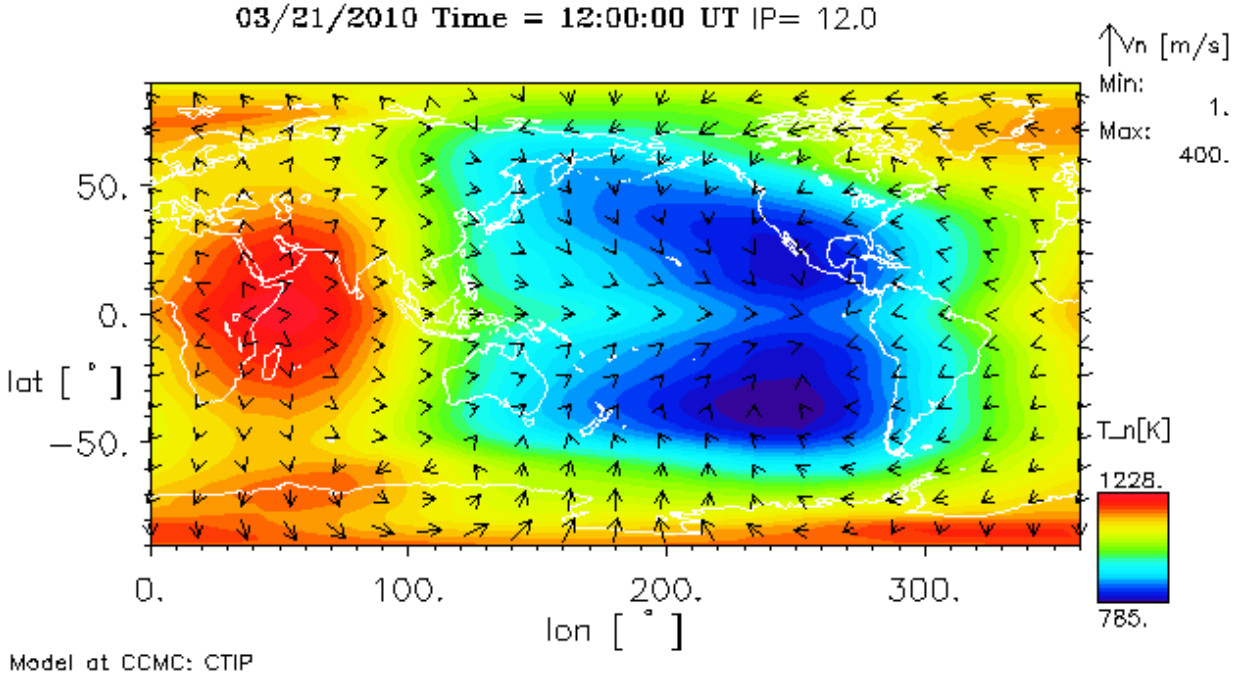
# Example: ColorContour Plot Mode
# Neutral Gas Temperature for IP=12

Select Time Step: e.g., Date: 2010/03/21 Time: 12:00:00
Choose Plot Mode: **ColorContour(2D)**
Choose Physical Variable for Color (Q1 menu): e.g., **T_n**
Choose Plot Area: **e.g., IP=constant=12**
Click "Update Plot"



# Example: Color+Vector Plot Mode
# Neutral Gas Temperature and Velocity Vectors

Select Time Step: Date: 2010/03/21 Time: 12:00:00
Choose Plot Mode: **Color+Vector**
Choose Physical Variable for Color (Q1 menu): **T_n**
Choose Physical Variable for Vector (Q2 menu): **any component of the neutral gas velocity (Vn_lat, Vn_lon, or Vn_IP)**
Choose Plot Area: **IP=constant=12**
Click "Update Plot"



# Example: Color+Vector Plot Mode
# Lock Color Range. Normalize Arrow Length

Check box

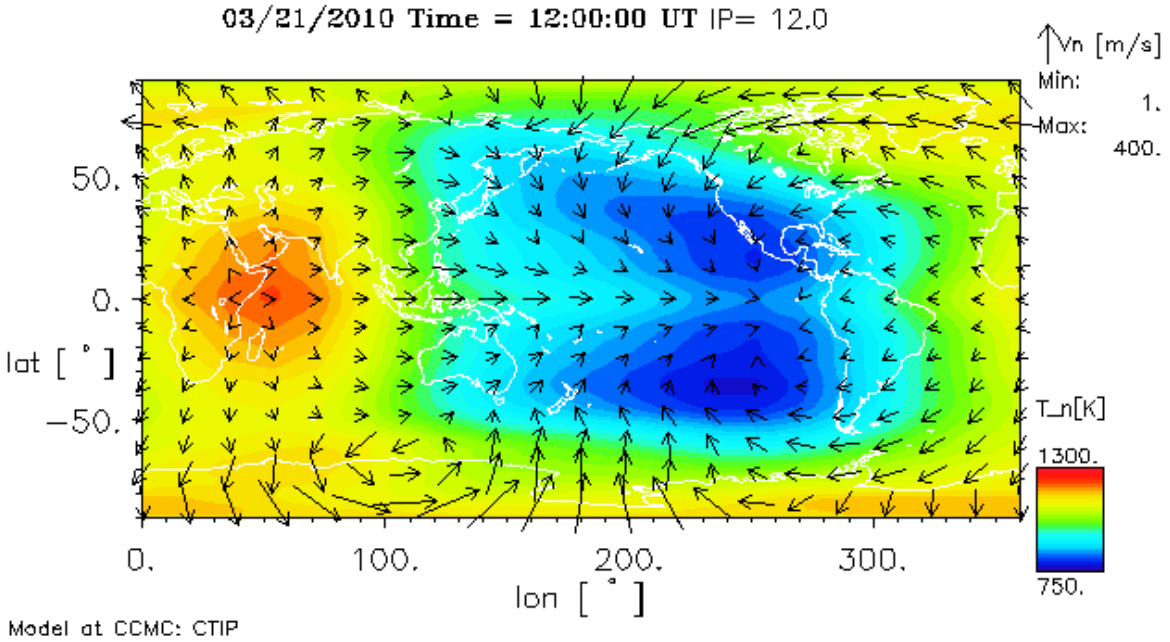
**Lock color range:**
Min.: 750 Max.: 1300
**Log scale** (use all data>0 in non-negative fields)

Select color range

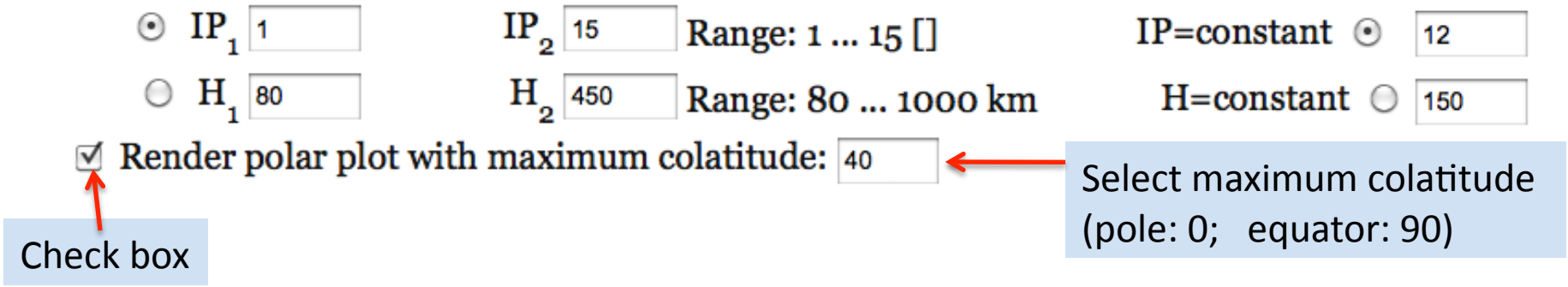
Check box

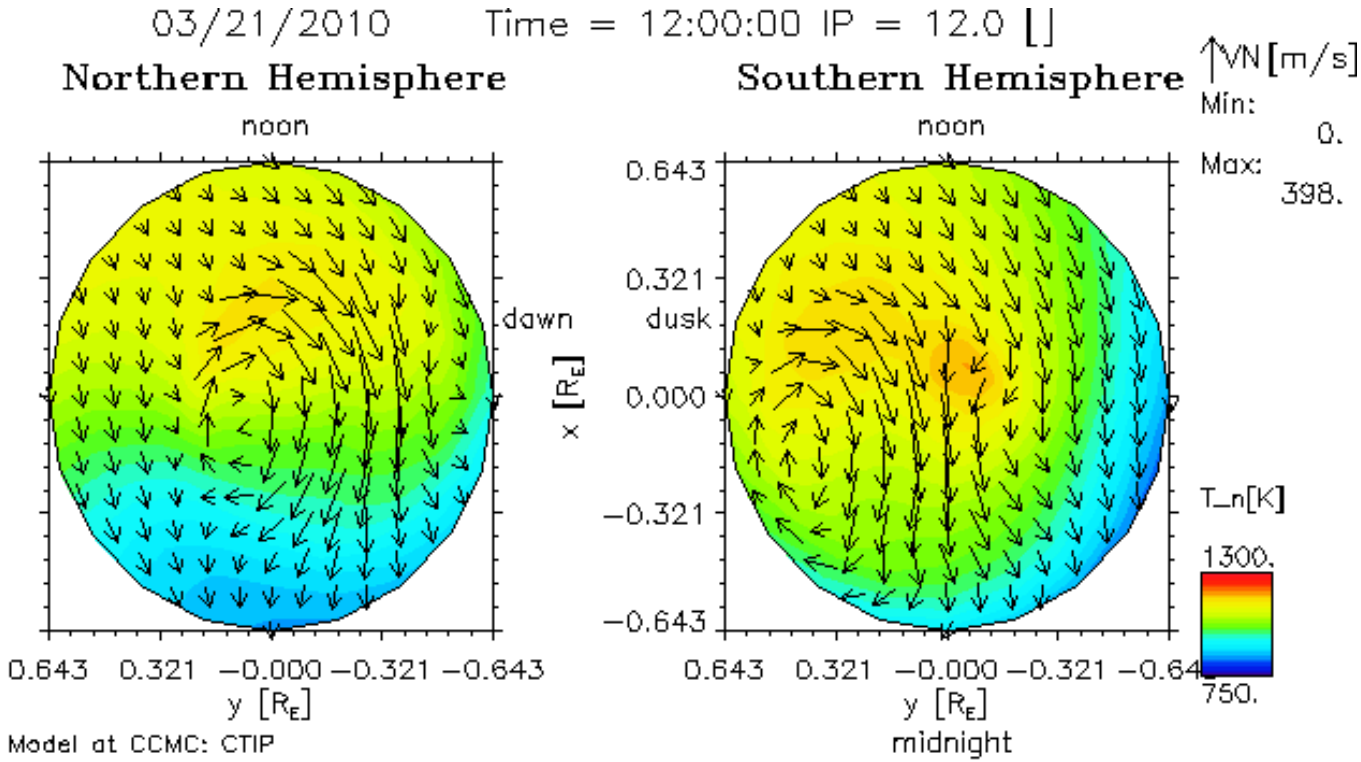
Vector:
**length of arrows:** 1.0
**Normalize arrow length**
Unit arrow length at: 150
**Log scale** (scale arrows logarithmically)

Select unit arrow length



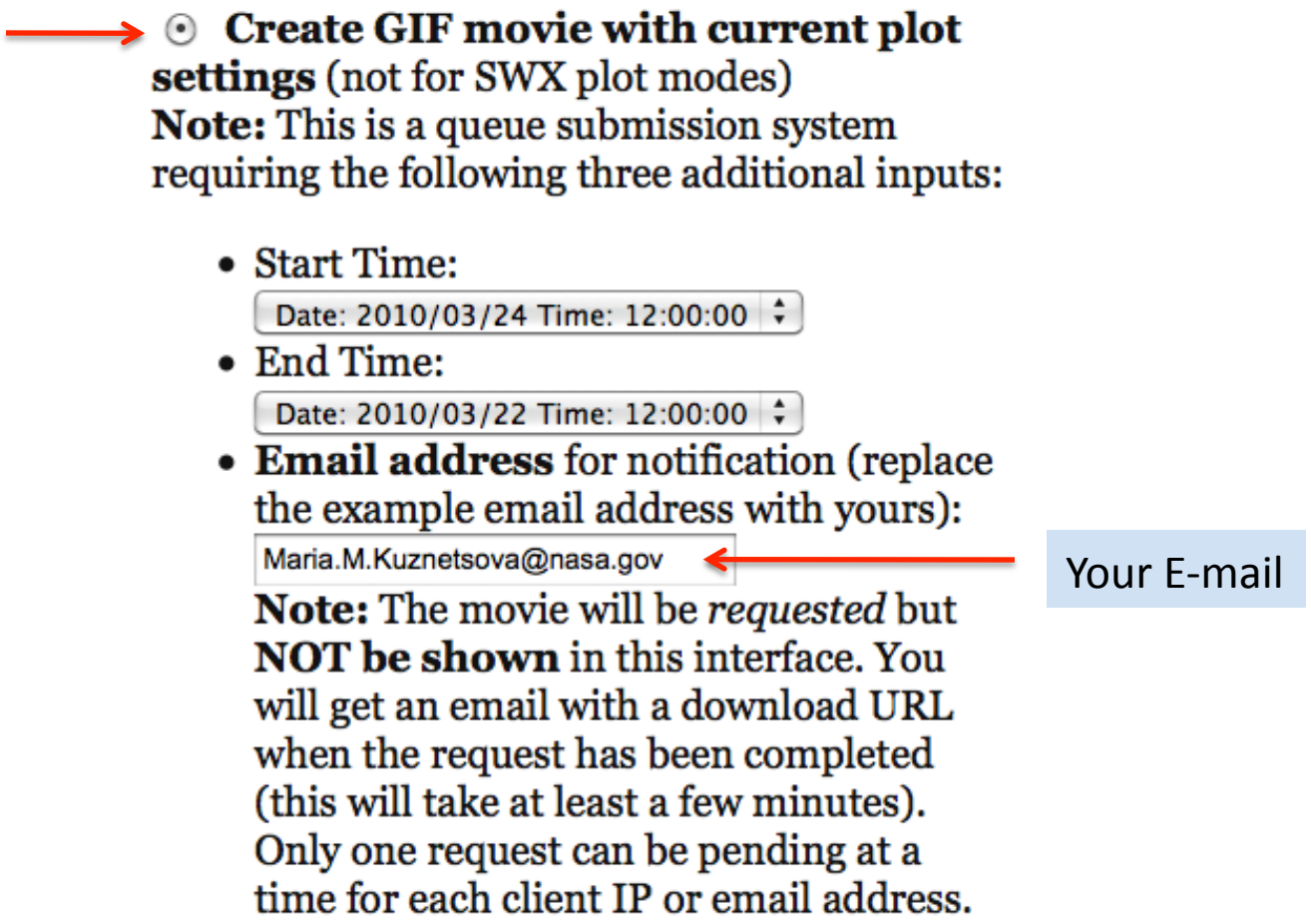
# Example: Color+Vector Plot Mode
# Polar Plot



# Request a Movie with Selected Plot Settings

Select radio button




Your E-mail

# Example: Vertical Line (1D)

Select Time Step: e.g., Date: 2010/03/21 Time: 18:00:00
Choose Plot Mode: **Vertical Line (1D)**
Choose 1st Physical Variable (Q1 menu): **rho**
Choose 2nd Physical Variable (Q2 menu): **Vn_lat**
Choose 3rd Physical Variable (Q3 menu): **Vn_lon**

**Vertical Plot:** Select lon and lat position on the left.

Set longitude and latitude

$lon_1$ 90 $lon_2$ 360 Range: 0 ... 360 deg

$lat_1$ 60 $lat_2$ 90 Range: -90 ... 90 deg

**CTIP** data: the vertical coordinate can either be IP or H for determining plot range or cut plane.
Note that the full range in H will not be reached at all times. Limits or selections of H may be modified within the plot.

Select vertical coordinate: H

○ $IP_1$ 1 $IP_2$ 15 Range: 1 ... 15 [] IP=constant ⊙ 8

⊙ $H_1$ 80 $H_2$ 450 Range: 80 ... 1000 km H=constant ○ 150

Click "Update Plot"

# Example: Vertical Line (1D) (results)

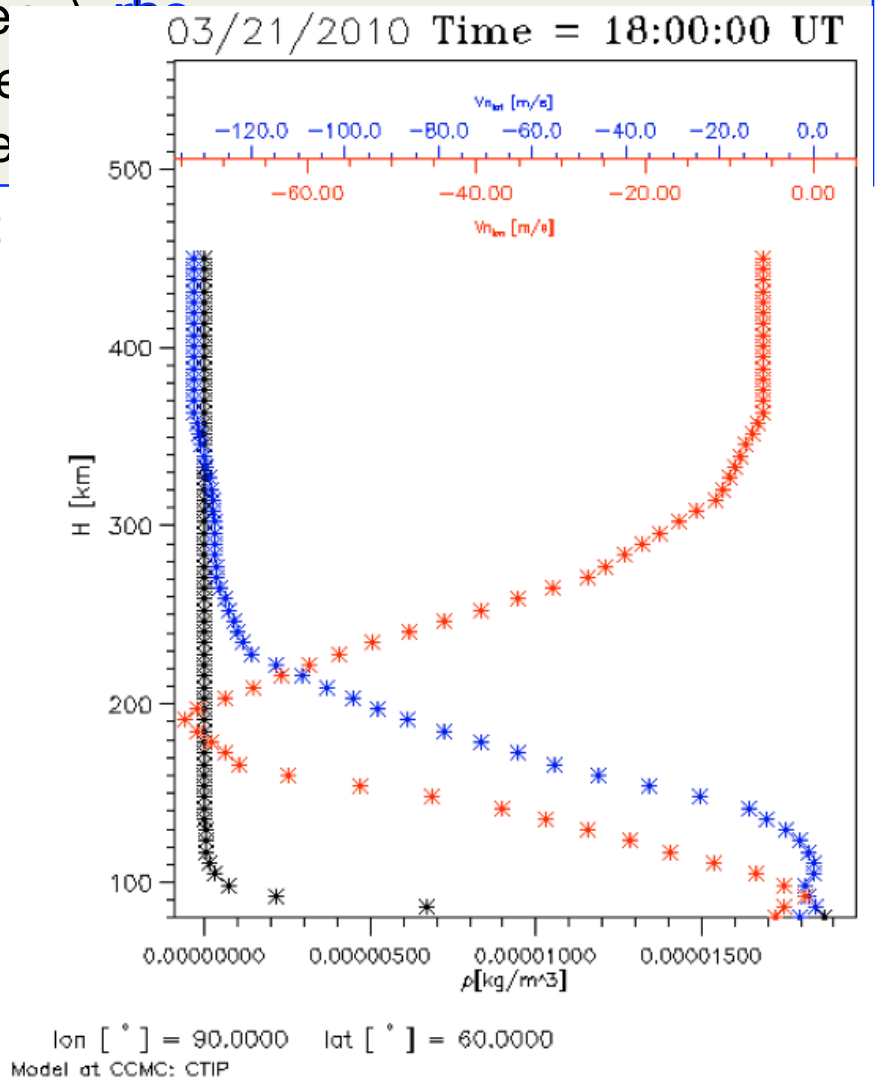
Select Time Step: e.g., Date: 2010/03/21 Time: 18:00:00
Choose Plot Mode: Vertical Line (1D)
Choose 1st Physical Variable (Q1 me
Choose 2nd Physical Variable (Q2 me
Choose 3rd Physical Variable (Q3 me

**Vertical Plot:** Select

Set longitude and latitude

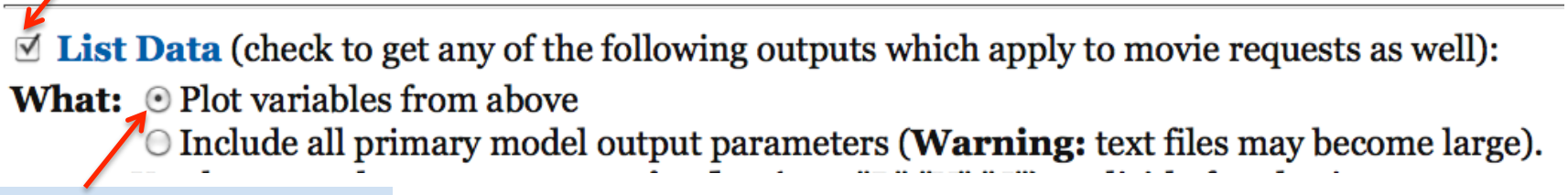
$lon_1$ 90
$lat_1$ 60

Click "Update Plot"



# List Data From the Plot in ASCII

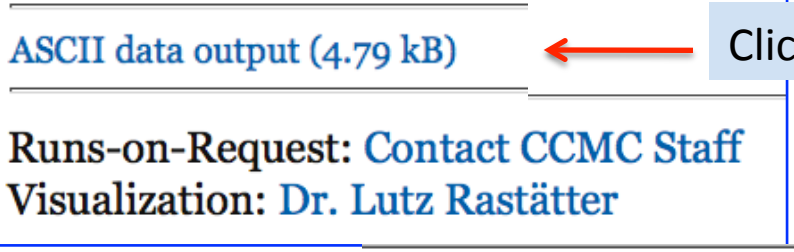
Check box




Select radio button

Click "Update Plot"

Scroll down to the bottom of the page

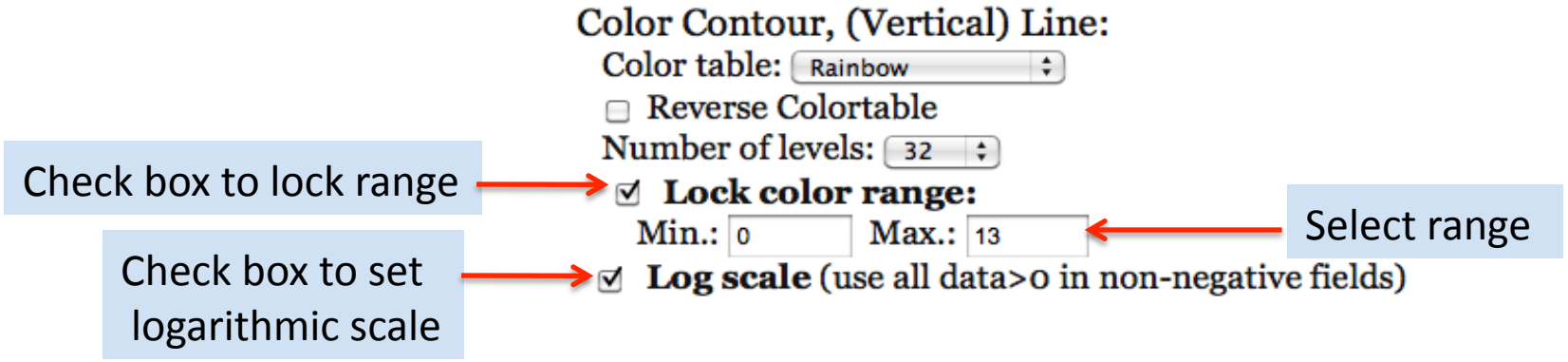



Click here to download data

```
# Data format string: '(6E12.4)'
# Data printout from CCMC-simulation: version 1.1
# Data type:  CTIP  ionosphere/thermosphere
# Run name:   CTIPe_Equinox_quiet_030510 Missing data:          NaN
# Date, time:          2010           3          21   18:00:00
# Output data: point locations with 61 elements
# lon          lat          H            rho          Vn_lat       Vn_lon
# [deg]        [deg]        km           [kg/m^3]     [m/s]        [m/s]
  9.0000E+01   6.0000E+01   8.0000E+01   1.8739E-05 -2.7295E+00 -4.5252E+00
  9.0000E+01   6.0000E+01   8.6167E+01   6.6990E-06  3.0762E-01 -3.4701E+00
  9.0000E+01   6.0000E+01   9.2333E+01   2.1612E-06 -1.1042E+00 -1.1246E+00
  9.0000E+01   6.0000E+01   9.8500E+01   7.2422E-07 -1.6075E+00 -3.6367E+00
  9.0000E+01   6.0000E+01   1.0467E+02   2.8674E-07  1.5463E-01 -6.8714E+00
```

# Example: Vertical Line (1D) (optional)
# Log Scale. Lock Range.

Select Time Step: e.g., Date: 2010/3/30 Time: 03:00:00
Choose Plot Mode: **Vertical Line (1D)**
Select Vertical Coordinate: **H**
Set Longitute: 284; Set Latitude: 55
Choose 1st Physical Variable (Q1 menu): **Ne**
Choose 2nd Physical Variable (Q2 menu): **N_O+**
Choose 3rd Physical Variable (Q3 menu): **N_O2+**




Click "Update Plot"

# Example: Vertical Line (1D) (optional)
# Log Scale. Lock Range.

Select Time Step: e.g., Date:
Choose Plot Mode: Vertical L
Select Vertical Coordinate: H
Set Longitute: 284; Set Latitu
Choose 1st Physical Variable
Choose 2nd Physical Variable
Choose 3rd Physical Variable

Color
Colo
Re
Num
I
Mi
L

Check box to lock range

Check box to set logarithmic scale

Click "Update Plot"