CDAWeb: Accessing NASA Data

Dr. Joseph B.H. Baker

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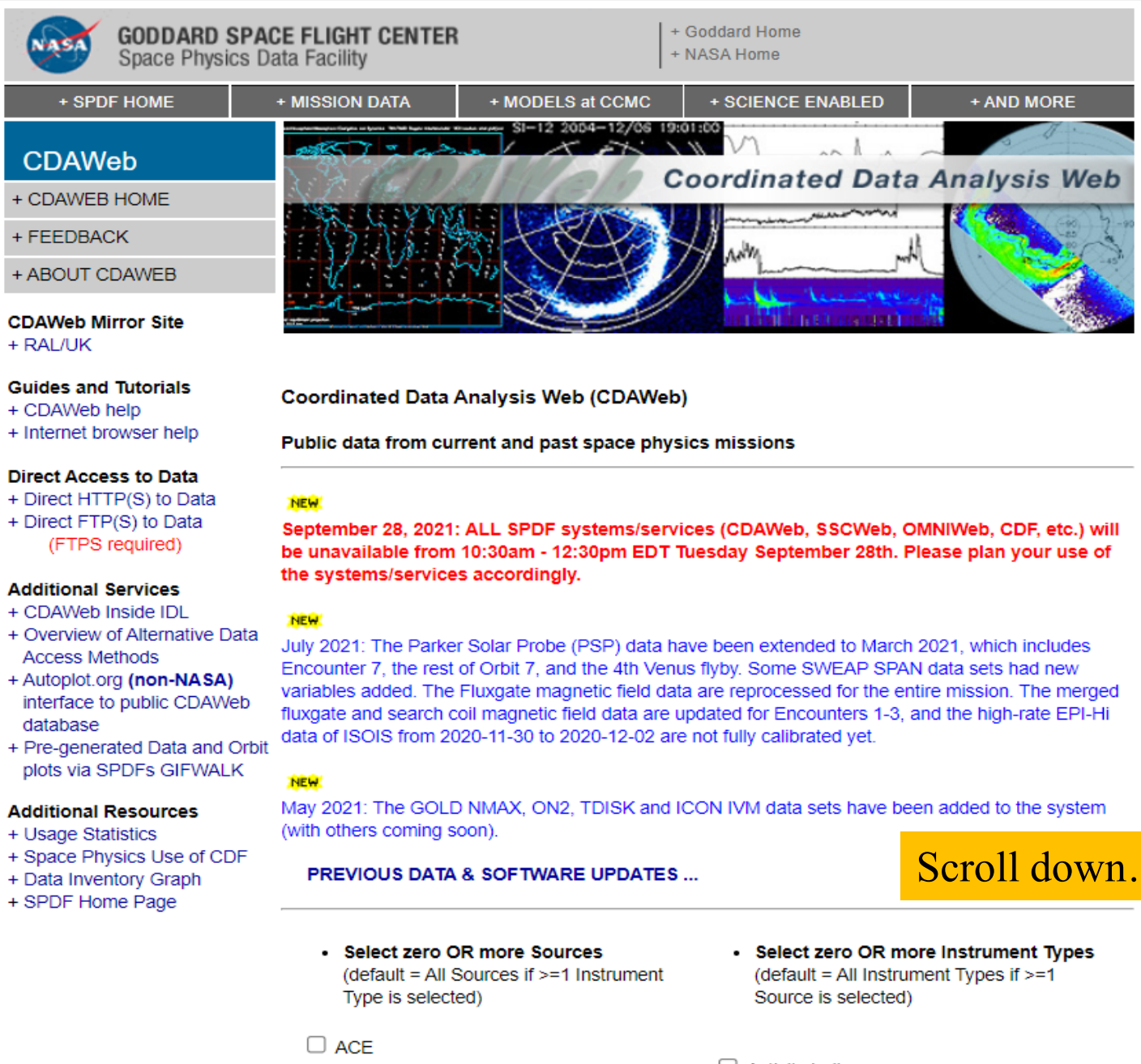
Blacksburg, VA, USA

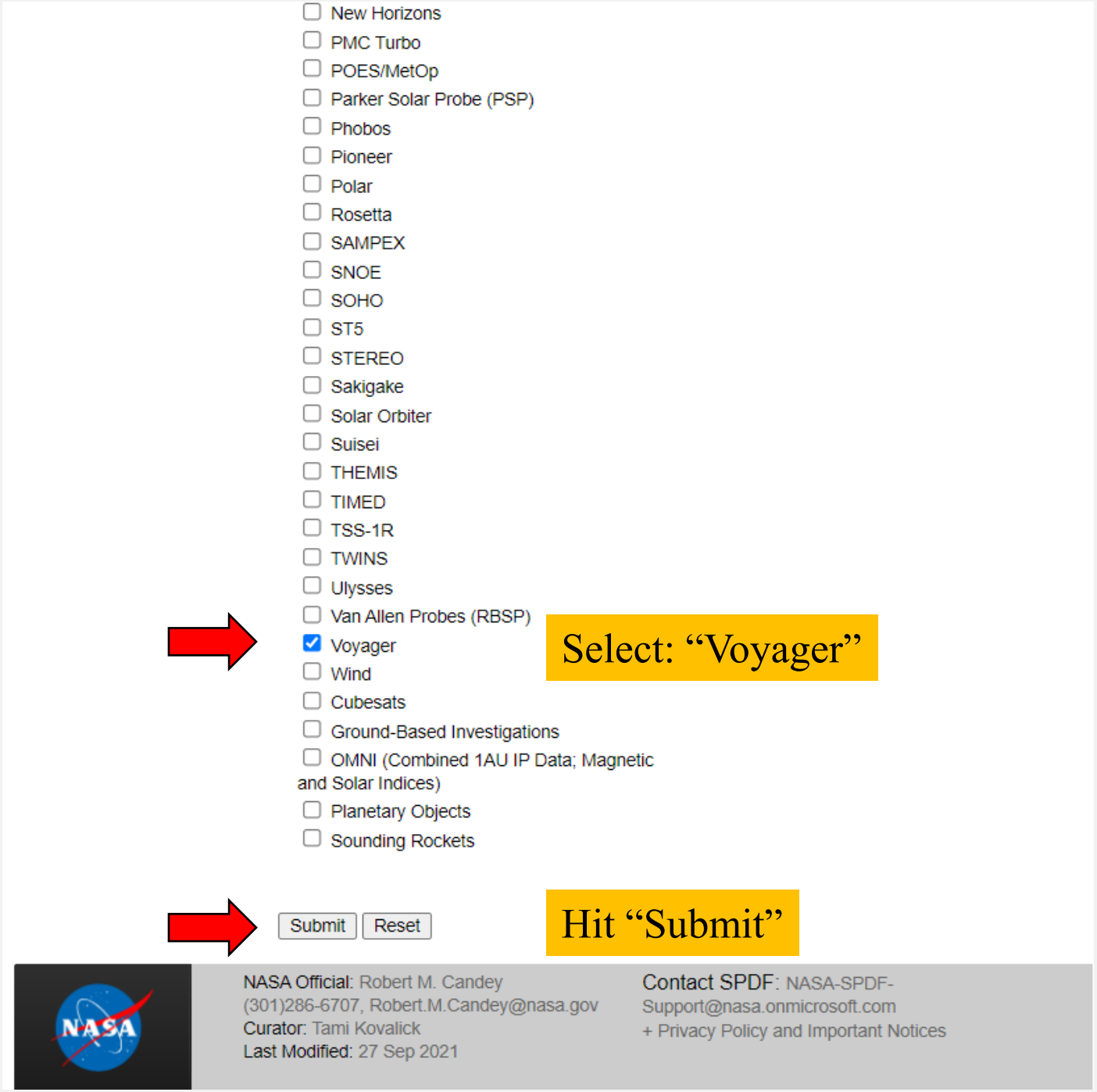
CDAWeb: Accessing NASA Data

Open a browser and go to this website:

http://cdaweb.gsfc.nasa.gov/



Scroll down……


New Horizons
PMC Turbo
POES/MetOp
Parker Solar Probe (PSP)
Phobos
Pioneer
Polar
Rosetta
SAMPEX
SNOE
SOHO
ST5
STEREO
Sakigake
Solar Orbiter
Suisei
THEMIS
TIMED
TSS-1R
TWINS
Ulysses
Van Allen Probes (RBSP)
Voyager
Wind
Cubesats
Ground-Based Investigations
OMNI (Combined 1AU IP Data; Magnetic and Solar Indices)
Planetary Objects
Sounding Rockets
Select: "Voyager"
Submit
Reset
Hit "Submit"
NASA Official: Robert M. Candey
(301)286-6707, Robert.M.Candey@nasa.gov
Curator: Tami Kovalick
Last Modified: 27 Sep 2021
Contact SPDF: NASA-SPDF-Support@nasa.onmicrosoft.com
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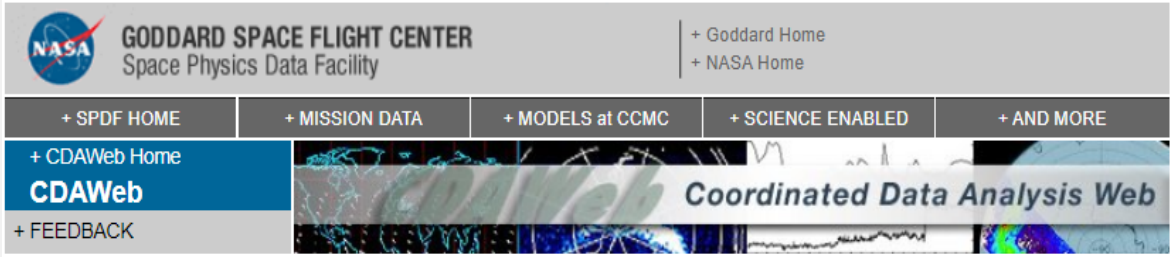


CDAWeb Data Selector

- To go forward to plot, list and retrieve your selected data, press the "submit" button directly below or at the bottom of this page.
- For any special notes on usage of a given data set, please click on that data set name below.
- As needed to select the datasets of actual interest to you:

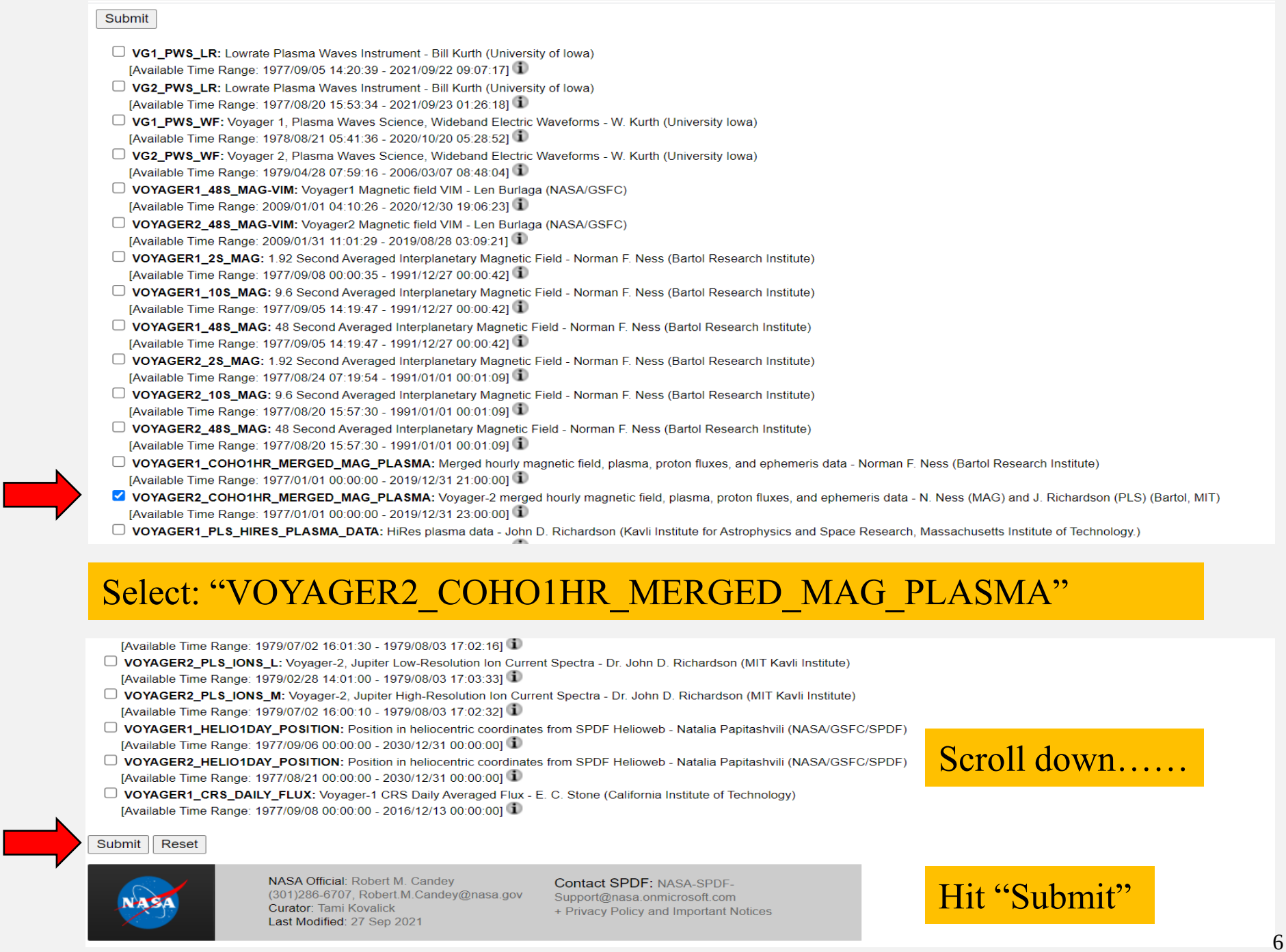
  - manually check/uncheck one or more data sets from the list below OR
  - Click here to CLEAR All checkboxes, OR
  - Click here to SELECT All checkboxes

Hit "CLEAR All"

Submit

- **VG1_PWS_LR:** Lowrate Plasma Waves Instrument - Bill Kurth (University of Iowa)
  [Available Time Range: 1977/09/05 14:20:39 - 2021/09/22 09:07:17]
- **VG2_PWS_LR:** Lowrate Plasma Waves Instrument - Bill Kurth (University of Iowa)
  [Available Time Range: 1977/08/20 15:53:34 - 2021/09/23 01:26:18]
- **VG1_PWS_WF:** Voyager 1, Plasma Waves Science, Wideband Electric Waveforms - W. Kurth (University Iowa)
  [Available Time Range: 1978/08/21 05:41:36 - 2020/10/20 05:28:52]
- **VG2_PWS_WF:** Voyager 2, Plasma Waves Science, Wideband Electric Waveforms - W. Kurth (University Iowa)
  [Available Time Range: 1979/04/28 07:59:16 - 2006/03/07 08:48:04]
- **VOYAGER1_48S_MAG-VIM:** Voyager1 Magnetic field VIM - Len Burlaga (NASA/GSFC)
  [Available Time Range: 2009/01/01 04:10:26 - 2020/12/30 19:06:23]
- **VOYAGER2_48S_MAG-VIM:** Voyager2 Magnetic field VIM - Len Burlaga (NASA/GSFC)
  [Available Time Range: 2009/01/31 11:01:29 - 2019/08/28 03:09:21]
- **VOYAGER1_2S_MAG:** 1.92 Second Averaged Interplanetary Magnetic Field - Norman F. Ness (Bartol Research Institute)
  [Available Time Range: 1977/09/08 00:00:35 - 1991/12/27 00:00:42]
- **VOYAGER1_10S_MAG:** 9.6 Second Averaged Interplanetary Magnetic Field - Norman F. Ness (Bartol Research Institute)
  [Available Time Range: 1977/09/05 14:19:47 - 1991/12/27 00:00:42]
- **VOYAGER1_48S_MAG:** 48 Second Averaged Interplanetary Magnetic Field - Norman F. Ness (Bartol Research Institute)
  [Available Time Range: 1977/09/05 14:19:47 - 1991/12/27 00:00:42]
- **VOYAGER2_2S_MAG:** 1.92 Second Averaged Interplanetary Magnetic Field - Norman F. Ness (Bartol Research Institute)
  [Available Time Range: 1977/08/24 07:19:54 - 1991/01/01 00:01:00]

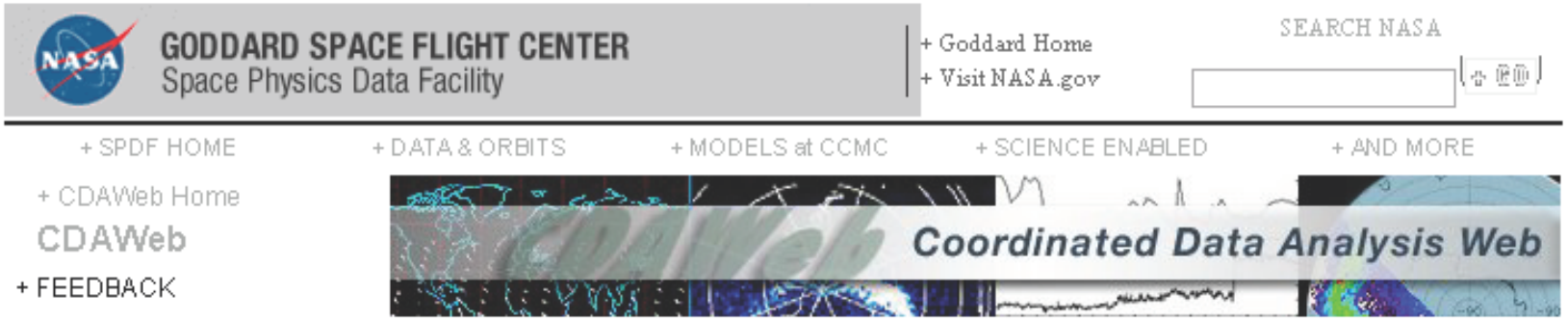
Scroll down……



Select: "VOYAGER2_COHO1HR_MERGED_MAG_PLASMA"

Scroll down……

Hit "Submit"



CDAWeb Data Explorer

Start: 1977/08/24 00:00:00.000

Stop: 1992/01/01 00:00:00.000

Select start and stop times from which to GET or PLOT data:

Start time (YYYY/MM/DD HH:MM:SS.mmm): 1977/08/24 00:00:00.000

Stop time (YYYY/MM/DD HH:MM:SS.mmm): 1992/01/01 00:00:00.000

Select an activity:

Plot Data : *select one or more variables from list below and press submit.*

- **Also create PS and PDF outputs** (all plot types except images and plasmagrams).
  Many panels per dataset are allowed but <=4 panels optimal for standard Y-axis height and single page display.
- **Use coarse noise filtering** to remove values outside 3 deviations from mean of all values in the plotted time interval.
- **Increase the Y-axis height** for time-series and spectrogram plots. NEW
- **Combine all time-series and spectrogram plots**, for all requested datasets, into one plot file.
- **Plot overlay options.** NEW

Scroll down……

List Data (ASCII): *select one or more variables from list below and press submit. (Works best for < 31 days)*

Download original CDFs : *press submit button to retrieve list of files. (Max. 200 days - use FTP site for larger requests)*

Create V3.6 CDFs for download or VIRBO Autoplot demonstration: *select one or more variables from the list below and press submit.*

Note: CDF patch required for reading Version 3.6 CDFs in IDL or MATLAB.
Get CDFX - IDL GUI plotting/listing toolkit software. To be used with either the daily or "created" CDF files available above.

NEW **Pressing the "Submit" button will spawn a new window/tab in order to support the new "Previous" and "Next" functions.**

NEW **Pressing the "Submit" button will spawn a new window/tab in order to support the new "Previous" and "Next" functions.**

Submit Reset

Hit “Submit”

Variable parameters (required for Listing, Creating and Plotting data only)

VOYAGER2_COHO1HR_MERGED_MAG_PLASMA

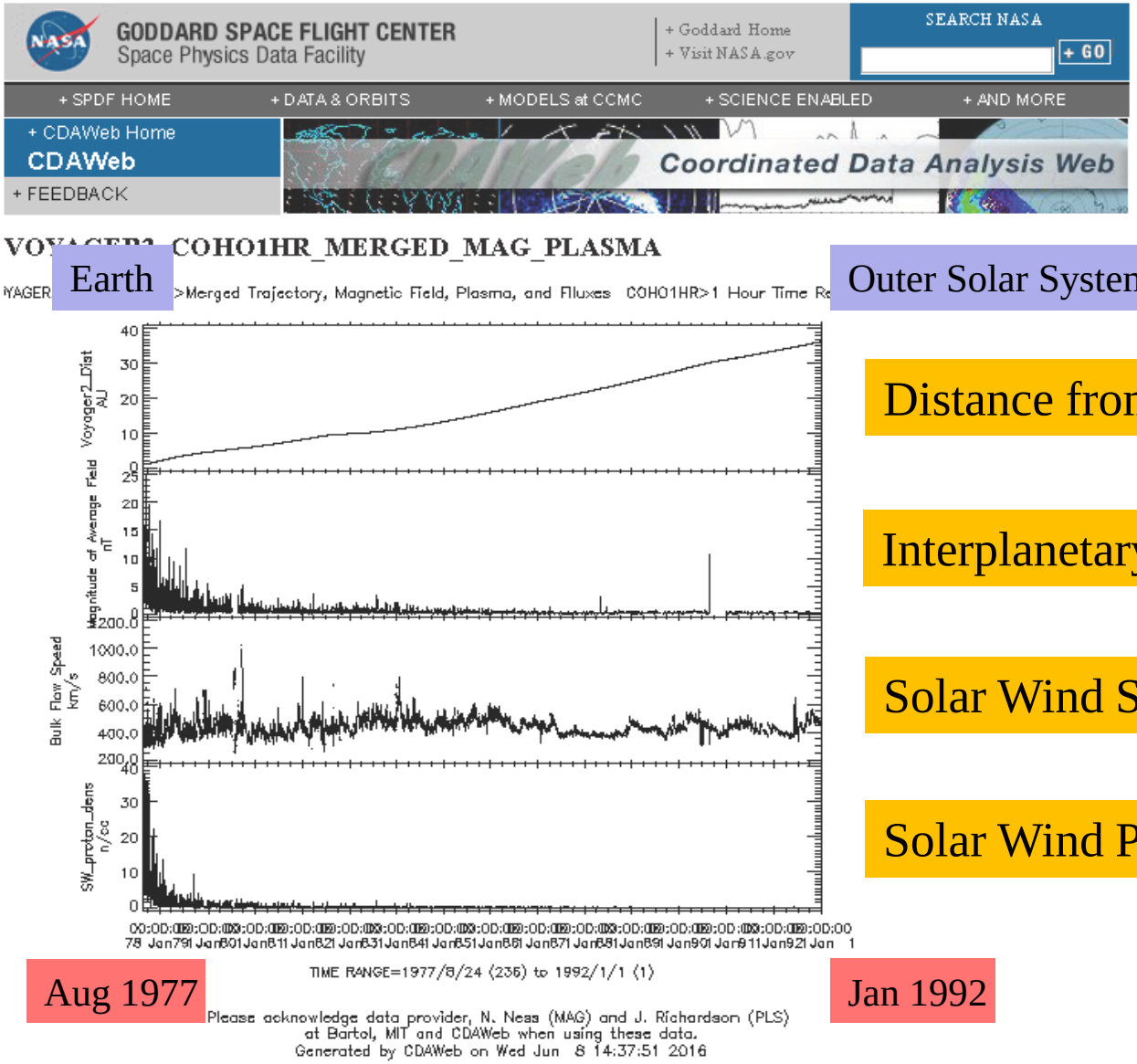
Voyager-2 merged hourly magnetic field, plasma, proton fluxes, and ephemeris data - N. Ness (MAG) and J. Richardson (PLS) (Bartol, MIT)

Available dates: 1977/08/24 00:00:00 - 2016/05/11 06:00:00
(Continuous coverage not guaranteed - check the inventory graph for coverage)

- [x] Heliocentric Distance
- [ ] HelioGraphic Inertial (HGI) latitude of the spacecraft position at the start of data interval
- [ ] HelioGraphic Inertial (HGI) longitude of the spacecraft position at the start of data interval
- [ ] B Field Magnitude (average of fine scale magnitudes)
- [x] Magnitude of Average Field, sqrt(Bx^2+By^2+Bz^2), nT
- [ ] BR in RTN (Radial-Tangential-Normal) coordinate system (w/ uncertainty)
- [ ] BT in RTN coordinate system (w/ uncertainty)
- [ ] BN in RTN coordinate system (w/ uncertainty)
- [x] Bulk Flow Speed
- [ ] THETA - elevation angle of the velocity vector (RTN)
- [ ] PHI - azimuth angle of the velocity vector (RTN)
- [x] Proton density
- [ ] Proton Temperature (calculated from thermal speed width T=60.5*Vth*Vth)
- [ ] Proton Flux 0.52 - 1.45 energy bins, MeV, LECP
- [ ] Proton Flux 3.04 - 17.3 energy bins, MeV, LECP
- [ ] Proton Flux 22.0 - 30.0 energy bins, MeV, LECP
- [ ] Proton Flux 1.853 - 2.624 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 1.884 - 2.629 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 1.891 - 2.654 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 4.200 - 6.000 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 3.496 - 8.073 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 3.472 - 8.151 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 3.535 - 8.590 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 6.184 - 42.020.0 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 17.86 - 26.810 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 30.09 - 69.410 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 130.3 - 225.2 energy bins, MeV, CRS (6-hr)

Select:
“Heliocentric Distance”
“Magnitude of Average Field”
“Bulk Flow Speed”
“Proton Density”

[COHO dataset Documentation]
[Additional analysis tools for these data from the COHOWeb service]



CONCLUSION: As a spacecraft moves away from the sun, the solar wind speed stays high but its plasma density and magnetic field strength both decay.

But where are the Voyager spacecraft now??? To answer this question…..

Submit

- [ ] VOYAGER1_48S_MAG-VIM: Voyager1 Magnetic field VIM - Len Burlaga (NASA/GSFC)
  [Available Time Range: 2009/01/01 04:10:26 - 2016/08/26 10:13:44]
- [ ] VOYAGER2_48S_MAG-VIM: Voyager2 Magnetic field VIM - Len Burlaga (NASA/GSFC)
  [Available Time Range: 2009/01/31 11:01:29 - 201
- [ ] VOYAGER1_2S_MAG: 1.92 Second Averaged
  [Available Time Range: 1977/09/05 14:19:47 - 19
- [ ] VOYAGER1_10S_MAG: 9.6 Second Averaged Interplanetary Magnetic Field - Norman F. Ness (Bartol Research Institute)
  [Available Time Range: 1977/09/05 14:19:47 - 199
- [ ] VOYAGER1_48S_MAG: 48 Second Averaged I
  [Available Time Range: 1977/09/05 14:19:47 - 19
- [ ] VOYAGER2_2S_MAG: 1.92 Second Averaged Interplanetary Magnetic Field - Norman F. Ness (Bartol Research Institute)
  [Available Time Range: 1977/08/20 15:57:30 - 1991/01/01 00:01:09]
- [ ] VOYAGER2_10S_MAG: 9.6 Second Averaged Interplanetary Magnetic Field - Norman F. Ness (Bartol Research Institute)
  [Available Time Range: 1977/08/20 15:57:30 - 1991/01/01 00:01:09]
- [ ] VOYAGER2_48S_MAG: 48 Second Averaged Interplanetary Magnetic Field - Norman F. Ness (Bartol Research Institute)
  [Available Time Range: 1977/08/20 15:57:30 - 1991/01/01 00:01:09]
- [x] VOYAGER1_COHO1HR_MERGED_MAG_PLASMA: Merged hourly magnetic field, plasma, proton fluxes, and ephemeris data - Norman F. Ness (Bartol Research Institute)
  [Available Time Range: 1977/01/01 00:00:00 - 2016/12/31 23:00:00]
- [x] VOYAGER2_COHO1HR_MERGED_MAG_PLASMA: Voyager-2 merged hourly magnetic field, plasma, proton fluxes, and ephemeris data - N. Ness (MAG) and J. Richardson (PLS) (Bartol, MIT)
  [Available Time Range: 1977/01/01 00:00:00 - 2017/05/22 20:00:00]
- [ ] VOYAGER1_PLS_HIRES_PLASMA_DATA: HiRes plasma data - John D. Richardson (Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology.)
  [Available Time Range: 1977/09/07 09:21:34 - 1980/12/31 17:56:35]
- [ ] VOYAGER2_PLS_HIRES_PLASMA_DATA: HiRes plasma data - John D. Richardson (Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology.)
  [Available Time Range: 1977/08/21 03:55:17 - 2007/08/30 23:33:11]

Submit Reset

Make your way back to this page

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Select ***both*** Voyager Spacecraft

Hit "Submit"

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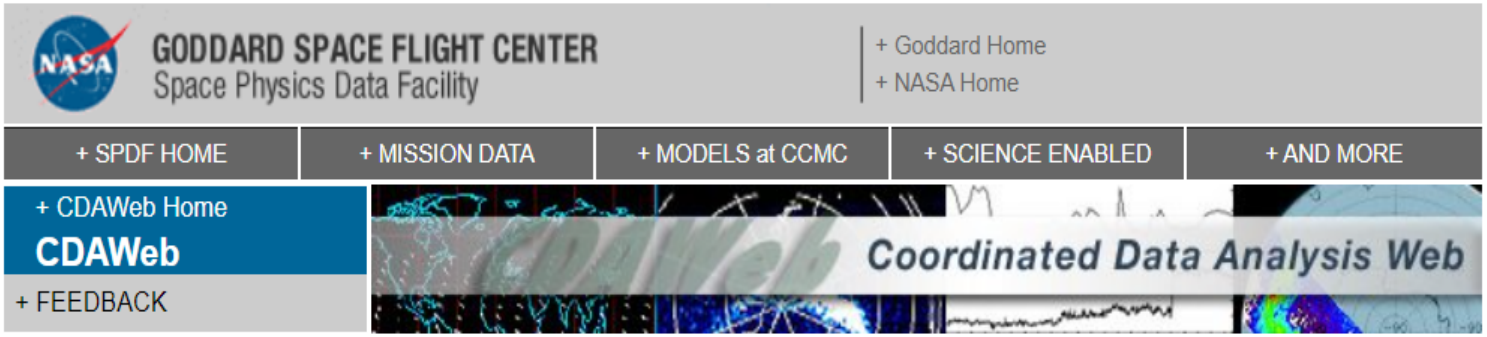
Curator: Tami Kovalick
NASA Official: Robert McGuire
(301)286-7794, Robert.E.McGuire@nasa.gov
Updated: Daily



CDAWeb Data Explorer

Select start and stop times from which to GET or PLOT data:

Start time (YYYY/MM/DD HH:MM:SS.mmm): 2000/01/01 00:00:00.000

Stop time (YYYY/MM/DD HH:MM:SS.mmm): 2019/12/31 23:00:00.000

Start: 2000/01/01 00:00:00.000
Stop: 2019/12/31 23:00:00.000

☐ **Compute uniformly spaced binned data for scalar/vector/spectrogram data (not available with noise filtering)** NEW

☐ **Use spike removal to filter data without binning** (not available with noise filtering)(Warning: Experimental !!).

Select an activity:

◉ Plot Data : *select one or more variables from list below and press submit.*

- ☐ **Also create PS and PDF best quality outputs** (all plot types except images and plasmagrams).
  Many panels per dataset are allowed but <=4 panels optimal for standard Y-axis height and single page display.
- ☐ **Use coarse noise filtering** to remove values outside 3 deviations from mean of all values in the plotted time interval.
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- ☐ **Plot overlay options.** NEW

Scroll down……

○ List Data (ASCII/CSV): *select one or more variables from list below and press submit. (Works best for < 31 days)*

○ Download original files : *press submit button to retrieve list of files. (Max. 200 days - use HTTPS site for larger requests)*

○ Create V3.8 CDFs for download or Autoplot demonstration: *select one or more variables from the list below and press submit.*

Variable parameters (required for Listing, Creating and Plotting data only)

VOYAGERI_COHO1HR_MERGED_MAG_PLASMA

Merged hourly magnetic field, plasma, proton fluxes, and ephemeris data - Norman F. Ness (Bartol Research Institute)

Available dates: 1977/09/07 00:00:00 - 2014/12/31 17:00:00
(Continuous coverage not guaranteed - check the inventory graph for coverage)

- [x] Heliocentric Distance
- [ ] HelioGraphic Inertial (HGI) latitude of the spacecraft position at the start of data interval
- [ ] HelioGraphic Inertial (HGI) longitude of the spacecraft position at the start of data interval
- [ ] B Field Magnitude (average of fine scale magnitudes)
- [x] Magnitude of Average Field, sqrt(Bx^2+By^2+Bz^2), nT
- [ ] BR in RTN (Radial-Tangential-Normal) coordinate system (w/ uncertainty)
- [ ] BT in RTN coordinate system (w/ uncertainty)
- [ ] BN in RTN coordinate system (w/ uncertainty)
- [x] Bulk Flow Speed
- [ ] THETA - elevation angle of the velocity vector (RTN)
- [ ] PHI - azimuth angle of the velocity vector (RTN)
- [x] Proton density
- [ ] Proton Temperature (calculated from thermal speed width T=60.5*Vth*Vth)
- [ ] Proton Flux 0.57 - 1.78 energy bins, MeV, LECP
- [ ] Proton Flux 3.40 - 17.6 energy bins, MeV, LECP
- [ ] Proton Flux 22.0 - 31.0 energy bins, MeV, LECP
- [ ] Proton Flux 1.894 - 2.605 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 4.200 - 6.240 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 3.256 - 8.132 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 3.276 - 8.097 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 6.343 - 42.03 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 17.88 - 26.81 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 30.29 - 69.47 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 132.8 - 242.0 energy bins, MeV, CRS (6-hr)

[COHO dataset Documentation]
[Additional analysis tools for these data from the COHOWeb service]

For Voyager-1 Select:
"Heliocentric Distance"
"Magnitude of Average Field"
"Bulk Flow Speed"
"Proton Density"

Scroll down……

VOYAGER2_COHO1HR_MERGED_MAG_PLASMA

Voyager-2 merged hourly magnetic field, plasma, proton fluxes, and ephemeris data - N. Ness (MAG) and J. Richardson (PLS) (Bartol, MIT)

Available dates: 1977/08/24 00:00:00 - 2016/05/11 06:00:00
(Continuous coverage not guaranteed - check the inventory graph for coverage)

- [x] Heliocentric Distance
- [ ] HelioGraphic Inertial (HGI) latitude of the spacecraft position at the start of data interval
- [ ] HelioGraphic Inertial (HGI) longitude of the spacecraft position at the start of data interval
- [ ] B Field Magnitude (average of fine scale magnitudes)
- [x] Magnitude of Average Field, sqrt(Bx^2+By^2+Bz^2), nT
- [ ] BR in RTN (Radial-Tangential-Normal) coordinate system (w/ uncertainty)
- [ ] BT in RTN coordinate system (w/ uncertainty)
- [ ] BN in RTN coordinate system (w/ uncertainty)
- [x] Bulk Flow Speed
- [ ] THETA - elevation angle of the velocity vector (RTN)
- [ ] PHI - azimuth angle of the velocity vector (RTN)
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- [ ] Proton Temperature (calculated from thermal speed width T=60.5*Vth*Vth)
- [ ] Proton Flux 0.52 - 1.45 energy bins, MeV, LECP
- [ ] Proton Flux 3.04 - 17.3 energy bins, MeV, LECP
- [ ] Proton Flux 22.0 - 30.0 energy bins, MeV, LECP
- [ ] Proton Flux 1.853 - 2.624 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 1.884 - 2.629 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 1.891 - 2.654 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 4.200 - 6.000 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 3.496 - 8.073 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 3.472 - 8.151 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 3.535 - 8.590 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 6.184 - 42.020.0 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 17.86 - 26.810 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 30.09 - 69.410 energy bins, MeV, CRS (6-hr)
- [ ] Proton Flux 130.3 - 225.2 energy bins, MeV, CRS (6-hr)

For Voyager-2 Select:
“Heliocentric Distance”
“Magnitude of Average Field”
“Bulk Flow Speed”
“Proton Density”

[COHO dataset Documentation]
[Additional analysis tools for these data from the COHOWeb service]

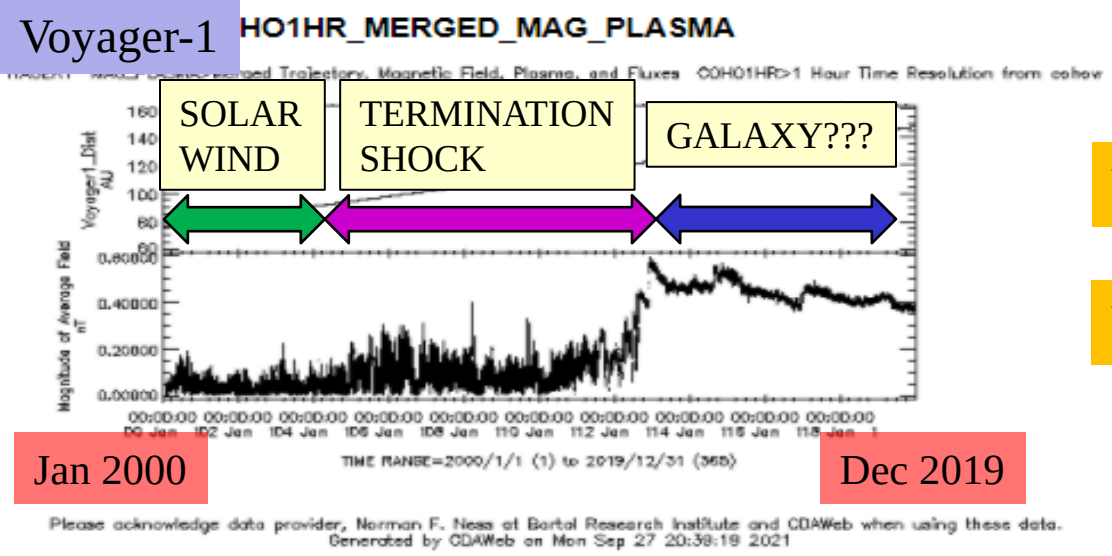
NEW **Pressing the "Submit" button will spawn a new window/tab in order to support the new "Previous" and "Next" functions.**

Submit Reset

Hit “Submit”

Notices/Warnings
Data Inventory Graph

Voyager-1



Voyager-1 Distance from Sun

Voyager-1 Magnetic Field (IMF)

Voyager-2

Voyager-2 Distance from Sun

Voyager-2 Magnetic Field (IMF)

Voyager-2 Solar Wind Speed

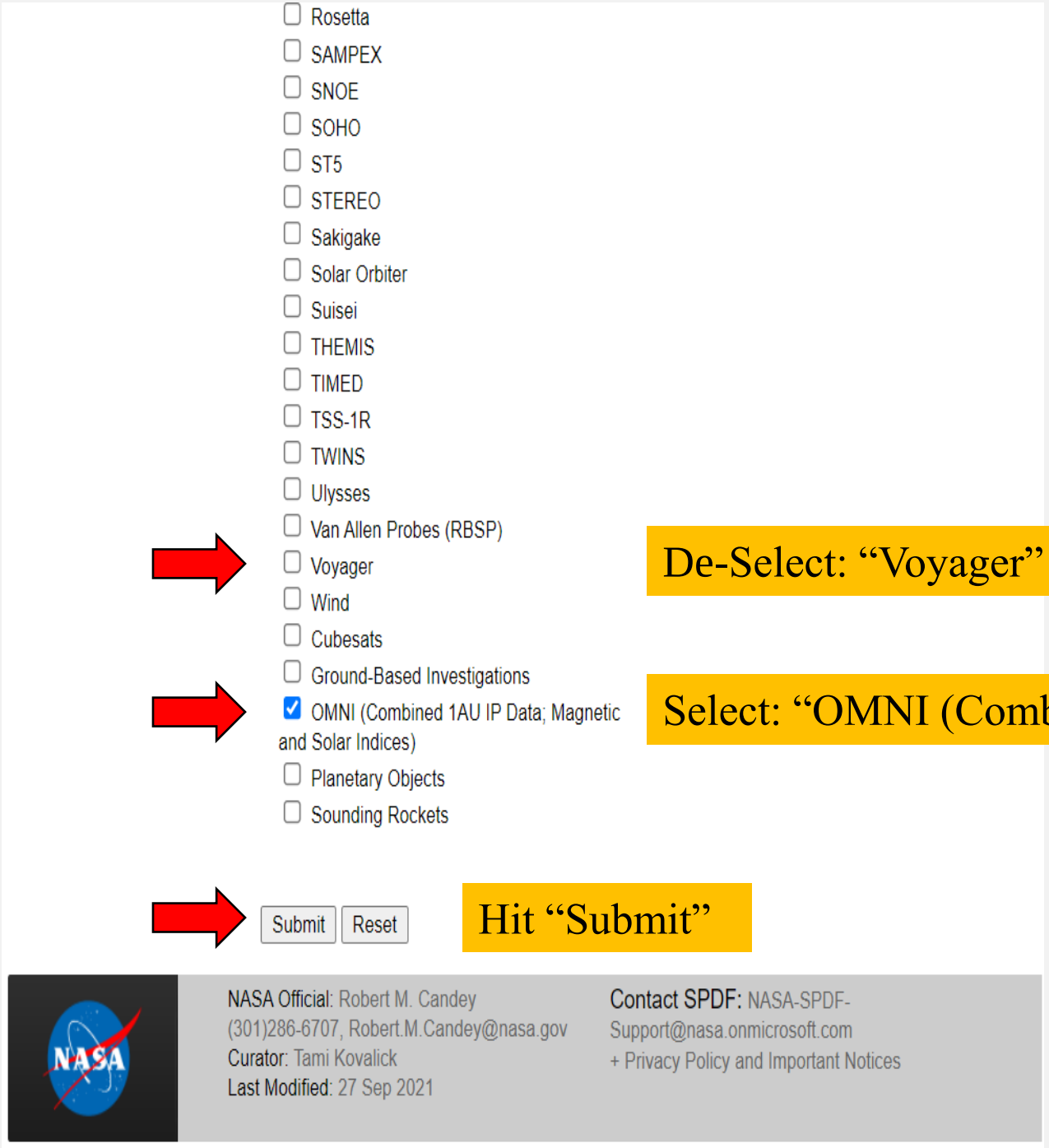
Voyager-2 Solar Wind Density

We can also use CDAWeb to examine solar cycle effects on space weather over time

Make your way back to this page

Close any other tabs/windows still open

Scroll down……


Rosetta
SAMPEX
SNOE
SOHO
ST5
STEREO
Sakigake
Solar Orbiter
Suisei
THEMIS
TIMED
TSS-1R
TWINS
Ulysses
Van Allen Probes (RBSP)
Voyager
Wind
Cubesats
Ground-Based Investigations
OMNI (Combined 1AU IP Data; Magnetic and Solar Indices)
Planetary Objects
Sounding Rockets
Submit
Reset
De-Select: "Voyager"
Select: "OMNI (Combined 1AU IP Data….)"
Hit "Submit"
NASA Official: Robert M. Candey
(301)286-6707, Robert.M.Candey@nasa.gov
Curator: Tami Kovalick
Last Modified: 27 Sep 2021
Contact SPDF: NASA-SPDF-Support@nasa.onmicrosoft.com
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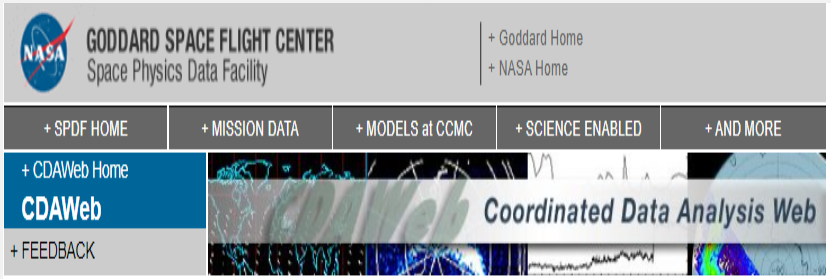

CDAWeb Data Selector

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- For any special notes on usage of a given data set, please click on that data set name below.
- As needed to select the datasets of actual interest to you:

  - manually check/uncheck one or more data sets from the list below OR
  - Click here to CLEAR All checkboxes, OR
  - Click here to SELECT All checkboxes

Hit "CLEAR ALL"

Submit

- ☐ **OMNI_HRO_1MIN:** OMNI Combined, Definitive, 1-minute IMF and Plasma Data Time-Shifted to the Nose of the Earth's Bow Shock, plus Magnetic Indices - J.H. King, N. Papatashvilli (AdnetSystems, NASA GSFC)
  [Available Time Range: 1981/01/01 00:00:00 - 2021/08/31 23:59:00]
- ☐ **OMNI_HRO_5MIN:** OMNI Combined, Definitive, 5-minute IMF and Plasma, and Energetic Proton Fluxes, Time-Shifted to the Nose of the Earth's Bow Shock, plus Magnetic Indices - J.H. King, N. Papatashvilli (AdnetSystems, NASA GSFC)
  [Available Time Range: 1981/01/01 00:00:00 - 2021/08/31 23:55:00]
- ☐ **OMNI_HRO2_1MIN:** OMNI Combined, Definitive 1-minute IMF and Definitive Plasma Data Time-Shifted to the Nose of the Earth's Bow Shock, plus Magnetic Indices - J.H. King, N. Papatashvilli (AdnetSystems, NASA GSFC)
  [Available Time Range: 1995/01/01 00:00:00 - 2021/08/11 02:59:00]
- ☐ **OMNI_HRO2_5MIN:** OMNI Combined, Definitive 5-minute IMF and Definitive Plasma, and Energetic Proton Fluxes, Time-Shifted to the Nose of the Earth's Bow Shock, plus Magnetic Indices - J.H. King, N. Papatashvilli (AdnetSystems, NASA GSFC)
  [Available Time Range: 1995/01/01 00:00:00 - 2021/08/11 02:55:00]
- ☑ **OMNI2_H0_MRG1HR:** OMNI Combined, Definitive, Hourly IMF and Plasma , N. Papitashvili (ADNET, NASA GSFC)
  [Available Time Range: 1963/01/01 00:00:00 - 2021/09/13 17:00:00]
- ☐ **OMNI_COHO1HR_MERGED_MAG_PLASMA:** OMNI Combined merged hourly magnetic field, plasma and ephermis data - J.H. King, N. Papatashvilli (AdnetSystems, NASA GSFC)
  [Available Time Range: 1963/01/01 00:00:00 - 2021/09/07 01:00:00]

Select: "OMNI2_H0_MRG1HR"

Submit Reset

Hit "Submit"

NASA Official: Robert M. Candey
(301)286-6707, Robert.M.Candey@nasa.gov
Curator: Tami Kovalick
Last Modified: 27 Sep 2021

Contact SPDF: NASA-SPDF-Support@nasa.onmicrosoft.com
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CDAWeb Data Explorer

Select start and stop times from which to GET or PLOT data:

Start time (YYYY/MM/DD HH:MM:SS.mmm): 1963/01/01 00:00:00.000
Stop time (YYYY/MM/DD HH:MM:SS.mmm): 2021/09/13 17:00:00.000

Start: 1963/01/01 00:00:00.000
Stop: 2021/09/13 17:00:00.000

☐ **Compute uniformly spaced binned data for scalar/vector/spectrogram data (not available with noise filtering)** NEW

☐ **Use spike removal to filter data without binning** (not available with noise filtering)(Warning: Experimental !!).

Select an activity:

◉ Plot Data : *select one or more variables from list below and press submit.*

- ☐ **Also create PS and PDF best quality outputs** (all plot types except images and plasmagrams).
  Many panels per dataset are allowed but <=4 panels optimal for standard Y-axis height and single page display.
- ☐ **Use coarse noise filtering** to remove values outside 3 deviations from mean of all values in the plotted time interval.
- ☐ **Increase the Y-axis height** for time-series and spectrogram plots. NEW
- ☐ **Combine all time-series and spectrogram plots**, for all requested datasets, into one plot file.
- ☐ **Plot overlay options.** NEW

○ List Data (ASCII/CSV): *select one or more variables from list below and press submit. (Works best for < 31 days)*
○ Download original files : *press submit button to retrieve list of files. (Max. 200 days - use HTTPS site for larger requests)*
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○ Create audio files based on data from selected variables. NEW

More information about audification is available here.

Note: CDF patch required for reading Version 3.8 CDFs in IDL or MATLAB.
Get CDFX - IDL GUI plotting/listing toolkit software. To be used with either the daily or "created" CDF files available above.

Scroll down……

OMNI Combined, Definitive, Hourly IMF and Plasma Data, and Energetic Proton Fluxes, Time-Shifted to the Nose of the Earth's Bow Shock, plus Solar and Magnetic Indices - J.H. King, N. Papatashvilli (ADNET, NASA GSFC)

Available dates: 1963/01/01 00:00:00 - 2016/05/27 14:00:00
(Continuous coverage not guaranteed - check the inventory graph for coverage)

- [ ] Bartels Rotation Number
- [ ] OMNI ID code for the source spacecraft for time-shifted IMF values (see OMNI documentation link for codes)
- [ ] OMNI ID code for the source spacecraft for time-shifted IP plasma values (see OMNI documentation link for codes)
- [ ] # fine time scale IMF points
- [ ] # fine time scale plasma points
- [ ] 1AU IP Average B Field Magnitude, nT, (last currently-available OMNI B-field data May 06, 2016)
- [x] 1AU IP Magnitude of average field vector (nT)
- [ ] 1AU IP Latitude/Theta of average B vector (deg)
- [ ] 1AU IP Longitude/Phi of average B vector (deg)
- [ ] 1AU IP Bx (nT), GSE
- [ ] 1AU IP By (nT), GSE
- [ ] 1AU IP Bz (nT), GSE
- [ ] 1AU IP By (nT), GSM
- [ ] 1AU IP Bz (nT), GSM
- [ ] RMS deviation of average B magnitude (nT)
- [ ] RMS deviation of magnitude of the average vector field (nT)
- [ ] RMS deviation Bx (nT), GSE
- [ ] RMS deviation By (nT), GSE
- [ ] RMS deviation Bz (nT), GSE
- [ ] 1AU IP Plasma Temperature, deg K, (last currently-available OMNI plasma data May 14, 2016)
- [x] 1AU IP Ion number density (per cc)
- [x] 1AU IP plasma flow speed (km/s)
- [ ] 1AU IP plasma flow direction longitude (deg), phi
- [ ] 1AU IP plasma flow direction latitude (deg), theta
- [ ] 1AU IP Alpha/proton ratio
- [ ] 1AU IP Flow pressure (nPa)
- [ ] RMS deviation of plasma temperature (deg k)
- [ ] RMS deviation of ion number density (per cc)
- [ ] RMS deviation in plasma flow velocity (km/s)

Select:
"1AU IP Magnitude of average field vector"
"1AU IP Ion number density"
"1AU IP plasma flow speed"

Scroll down……

- [ ] RMS deviation in plasma flow direction latitude (deg), theta
- [ ] RMS deviation alpha/proton ratio
- [ ] 1AU IP Electric Field (mV/m)
- [ ] 1AU IP Plasma beta
- [ ] 1AU IP Alfven mach number
- [ ] 1AU IP Magnetosonic mach number
- [ ] 1AU Proton flux > 1 MeV, 1/(SQcm-ster-s), (last currently-available OMNI proton fluxes May 22, 2017)
- [ ] 1AU Proton flux >2 MeV (1/(SQcm-ster-s))
- [ ] 1AU Proton flux >4 MeV (1/(SQcm-ster-s))
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- [ ] 1AU Proton flux >60 MeV (1/(SQcm-ster-s))
- [ ] Magnetospheric Contamination of 1AU Proton Flux code (6=No,<=5 see OMNI documentation)
- [x] Daily sunspot number V2, from http://sidc.oma.be/silso/datafiles/ (1963/001-2017/120)
- [ ] F10.7 - Daily 10.7 cm solar radio flux, units: 10**(-22) Joules/second/square-meter/Hertz, from NGDC (1963/001-2017/143),
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- [x] AL - 1-hour AL-index, from WDC Kyoto (1963/001-1988/182), Provisional (1990/001-2016/366), fro
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- [ ] Solar Lyman-alpha (1963/001-2017/126)

Select:
“Daily sunspot number”
“Kp”
“Dst”
“AL”

[OMNI Data documentation]
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[Recent 1-hr OMNI Updates Release Notes]

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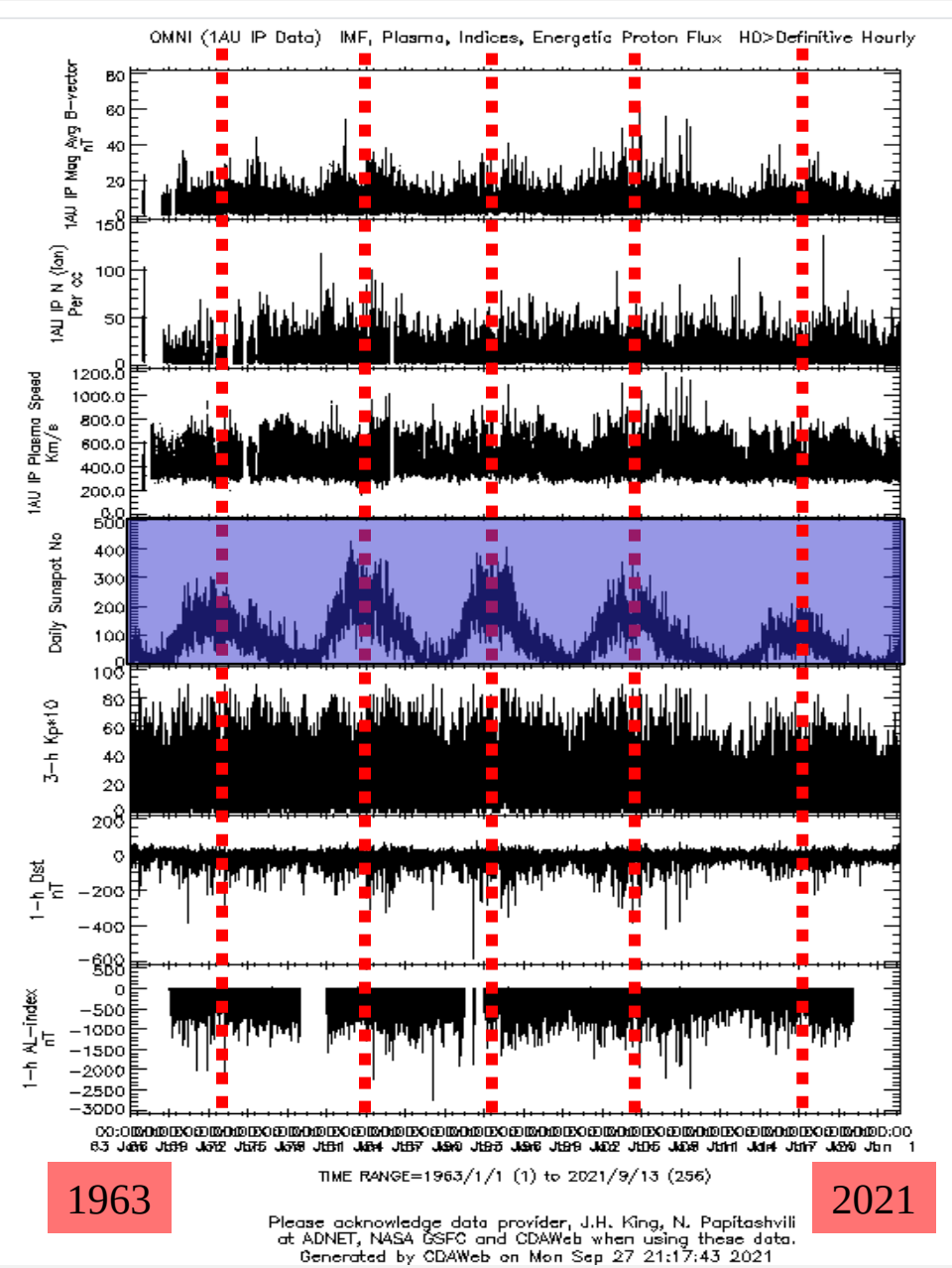
Hit “Submit”

- Notices/Warnings
- Data Inventory Graph
- CDFX - IDL GUI plotting/listing toolkit software.
- CDAWeb FTP site (shows actual data inventory)
- SPDF Home Page

Curator: Tami Kovalick



1963

2021

Interplanetary Magnetic Field (IMF)

Solar Wind Density

Solar Wind Speed

Sunspot Number (Solar Activity)

Kp Index (Planetary Activity)

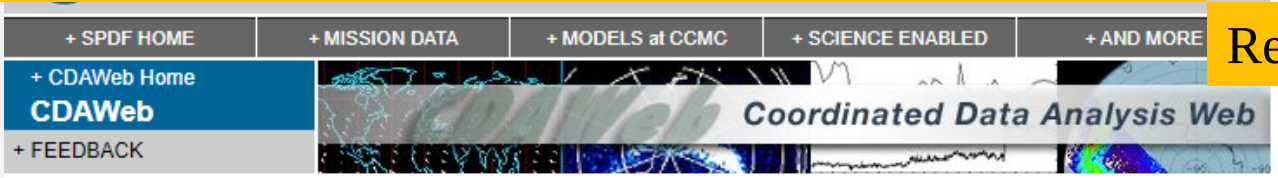
Dst Index (Ring Current Activity)

AL Index (Auroral Activity)

CONCLUSION: Near-Earth space weather is controlled by sunspots!!!!!

Next, we'll examine a particular space weather event in detail

Return to this page



CDAWeb Data Explorer

Start: 2000/07/14 00:00:00.000

Stop: 2000/07/17 00:00:00.000

Select start and stop times from which to GET or PLOT data:

Start time (YYYY/MM/DD HH:MM:SS.mmm): 2000/07/14 00:00:00.000
Stop time (YYYY/MM/DD HH:MM:SS.mmm): 2000/07/17 00:00:00.000

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Use the same parameter selections

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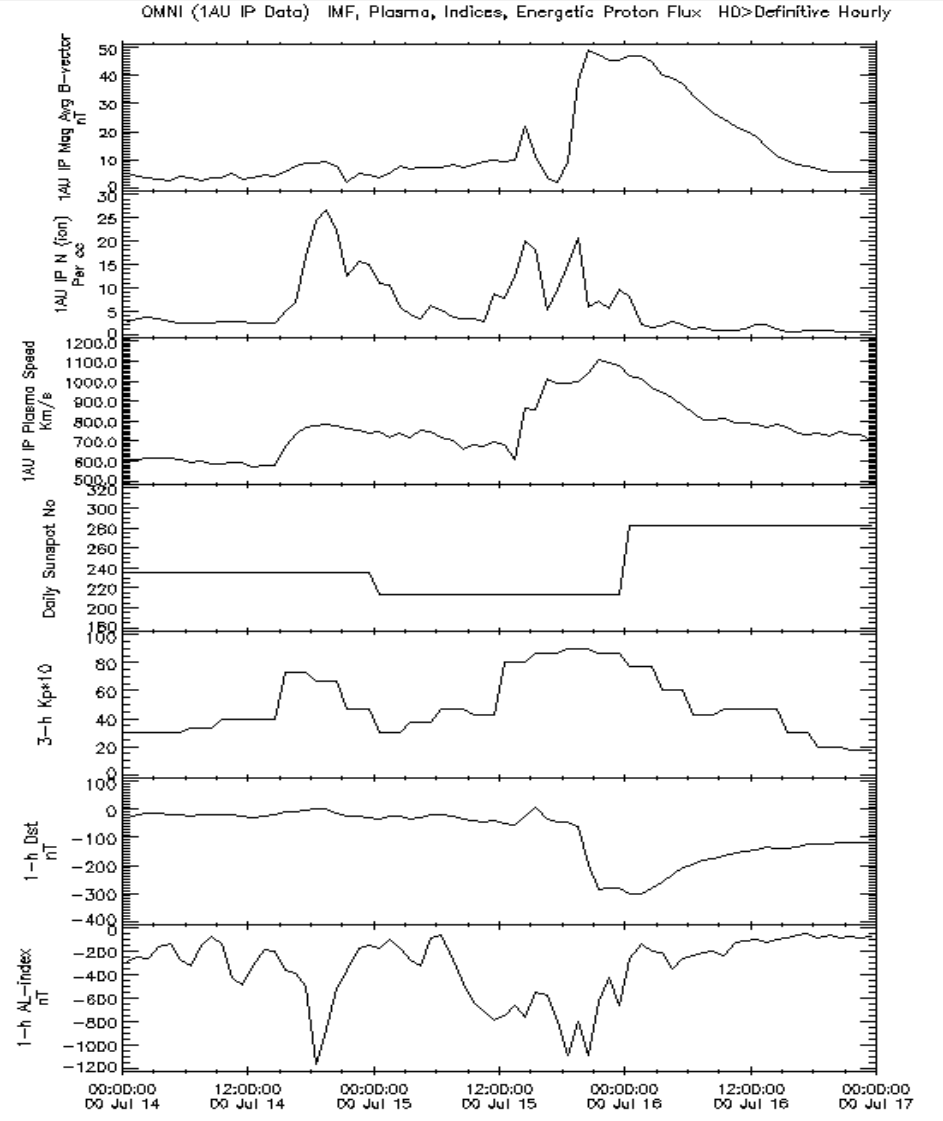
Curator: Tami Kovalick



2000/07/14

2000/07/17

Interplanetary Magnetic Field (IMF)

Solar Wind Density

Solar Wind Speed

Sunspot Number (Solar Activity)

Kp Index (Planetary Activity)

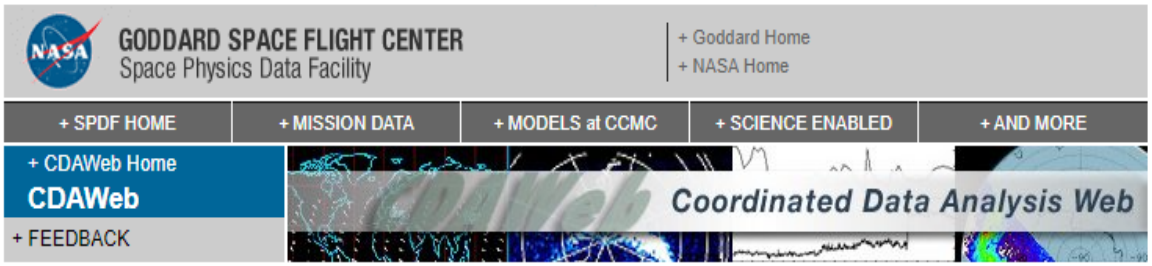
Dst Index (Ring Current)

AL Index (Auroral Activity)

This is a "stack-plot" of data for the "***Bastille Day***" space weather storm.

It would be nice to actually get our hands on this data! Can we do that?

Yes!!!



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Select an activity:

Click: "List Data (ASCII/CSV)"

○ Plot Data : *select one or more variables from list below and press submit.*

◉ List Data (ASCII/CSV): *select one or more variables from list below and press submit. (Works best for < 31 days)*

- ☐ Output listing times as year and seconds of year (Default is dd-mm-yyyy hh:mm:ss)
- ☐ CSV options. NEW

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GODDARD SPACE FLIGHT CENTER
Space Physics Data Facility

+ Goddard Home
+ NASA Home

+ SPDF HOME | + MISSION DATA | + MODELS at CCMC | + SCIENCE ENABLED | + AND MORE

+ CDAWeb Home
CDAWeb
+ FEEDBACK

Available CDAWeb data from 2000/07/14 00:00:00.000 to 2000/07/17 00:00:00.000

Select dataset listings to view/download:

OMNI2_H0_MRG1HR

(click here for) Combined Dataset Listing (tar/gzip, all times and all datasets selected)

OMNI2_H0_MRG1HR_167226.txt (14K)

Click: "OMNI_H0_MRG1HR_167226.txt"

gzip listing (3K)

Variable F is not NRV and does not have a DEPEND_0 attribute. Setting VAR_TYPE to "ignore_data" to prevent listing.

Variable N is not NRV and does not have a DEPEND_0 attribute. Setting VAR_TYPE to "ignore_data" to prevent listing.

Variable V is not NRV and does not have a DEPEND_0 attribute. Setting VAR_TYPE to "ignore_data" to prevent listing.

Variable R is not NRV and does not have a DEPEND_0 attribute. Setting VAR_TYPE to "ignore_data" to prevent listing.

Variable KP is not NRV and does not have a DEPEND_0 attribute. Setting VAR_TYPE to "ignore_data" to prevent listing.

Variable DST is not NRV and does not have a DEPEND_0 attribute. Setting VAR_TYPE to "ignore_data" to prevent listing.

Variable AL_INDEX is not NRV and does not have a DEPEND_0 attribute. Setting VAR_TYPE to "ignore_data" to prevent listing.

Variable Epoch is not NRV and does not have a DEPEND_0 attribute. Setting VAR_TYPE to "ignore_data" to prevent listing.

Combined Listing (tar/gzip, all times and all datasets selected) (3K)

Notes:

- Click on the hyperlinked words above to view/download the listings for the selected datasets.
- Listings are often wider than the screen, so listings saved to disk must be saved as **"source"** (AS IS) and not as **"text"** to avoid wrapping the lines.
- Very wide listings (many variables or variables with many dimensions) may not correctly display with all browsers, even once downloaded as a file. Listings of this nature can only be viewed when they are downloaded as files and then opened with a text or word processing editor.
- Listings and plots are automatically deleted after 8 hours (DO NOT SAVE THE URLs TO THESE FILES) -- **save these files to your computer now**.

<< Previous time range | Next time range >> NEW

>> Zoom IN time range << | << Zoom OUT time range >> NEW

< Pan left | Pan right > NEW

Return to: CDAWeb Data Explorer NEW

```
#              ************************************
#              *****    GLOBAL ATTRIBUTES    ******
#              ************************************
#
#     PROJECT                          NSSDC
#     DISCIPLINE                       Space Physics>Interplanetary Studies
#     SOURCE_NAME                      OMNI (1AU IP Data)>Merged 1 Hour Interplantary OMNI data
#     DATA_TYPE                        H0>Definitive Hourly
#     DESCRIPTOR                       IMF, Plasma, Indices, Energetic Proton Flux
#     DATA_VERSION                     1
#     TITLE                            Near-Earth Heliosphere Data (OMNI)
#     TEXT                             Hourly averaged definitive multispacecraft interplanetary parameters data
#                                      OMNI Data Documentation: http://omniweb.gsfc.nasa.gov/html/ow_data.html
#                                      Additional data access options available at  SPDF's OMNIWeb Service:
http://omniweb.gsfc.nasa.gov/ow.ht
#                                      COHOWeb-formatted OMNI_M merged magnetic field and plasma data http://cohoweb.gsfc.nasa.gov/
#                                      Recent OMNI 1-HR Updates News: http://omniweb.gsfc.nasa.gov/html/ow_news.html
#     MODS                             created August 2003;
#                                      conversion to ISTP/IACG CDFs via SKTEditor Feb 2000
#                                      Time tags in CDAWeb version were modified in March 2005 to use the
#                                      CDAWeb convention of having mid-average time tags rather than OMNI's
#                                      original convention of start-of-average time tags.
#     LOGICAL_FILE_ID                  omni2_h0_mrg1hr_00000000_v01
#     PI_NAME                          J.H. King, N. Papatashvilli
#     PI_AFFILIATION                   ADNET, NASA GSFC
#     GENERATION_DATE                  Ongoing
#     ACKNOWLEDGEMENT                  NSSDC
#     ADID_REF                         NSSD0110
#     RULES_OF_USE                     Public
#     INSTRUMENT_TYPE                  Plasma and Solar Wind
#                                      Magnetic Fields (space)
#                                      Particles (space)
#                                      Electric Fields (space)
#                                      Activity Indices
#     GENERATED_BY                     King/Papatashvilli
#     TIME_RESOLUTION                  1 hour
#     LOGICAL_SOURCE                   omni2_h0_mrg1hr
#     LOGICAL_SOURCE_DESCRIPTION       OMNI Combined, Definitive, Hourly IMF and Plasma Data, and Energetic Proton
#     LOGICAL_SOURCE_DESCRIPTION        Fluxes, Time-Shifted to the Nose of the Earth's Bow Shock, plus Solar and Magnetic
#                                       Indices
#     LINK_TITLE                       OMNI Data documentation
#                                      SPDF's OMNIWeb Service
#                                      COHOWeb-formatted OMNI_M merged magnetic field and plasma data
#                                      Release Notes
#     HTTP_LINK                        http://omniweb.gsfc.nasa.gov/html/ow_data.html
#                                      http://omniweb.gsfc.nasa.gov/ow.html
#                                      http://cohoweb.gsfc.nasa.gov/
#                                      http://omniweb.gsfc.nasa.gov/html/ow_news.html
#     ALT_LOGICAL_SOURCE               Combined_OMNI_1AU-MagneticField-Plasma-Particles_mrg1hr_1hour_cdf
#     MISSION_GROUP                    OMNI (Combined 1AU IP Data; Magnetic and Solar Indices)
#                                      ACE
#                                      Wind
#                                      IMP (All)
#                                      !___Interplanetary Data near 1 AU
#     SPASE_DATASETRESOURCEID          spase://VMO/NumericalData/OMNI/PT1H
#     CDFMAJOR                         ROW_MAJOR
#
#              ************************************
#              ****   RECORD VARYING VARIABLES  ****
#              ************************************
```

This is the descriptive header

Scroll down for……

The Data!!

Date/Time | IMF | SW Density | SW Speed | Sunspots | KP | Dst | AL

```
#
#           ***********************************
#           ****   RECORD VARYING VARIABLES   ****
#           ***********************************
#
#  1. Time_at_center_of_hour
#  2. 1AU IP Magnitude of average field vector (nT)
#  3. 1AU IP Ion number density (per cc)
#  4. 1AU IP plasma flow speed (km/s)
#  5. Daily sunspot number V2, from  http://sidc.om  fil  -2016/121)
#       *10 (Kp=1-,1,1+ co   to   GDC   16/
#       st index (1963/001-   P   (20   90)   1-   )   DC Kyoto
#       -index (1963/001-19   Pro   001   rom
#
```

TIME_AT_CENTER_OF_HOUR	1AU_IP_MAG_AVG_B-VECTOR	1AU_IP_N_(ION)	1AU_IP_PLASMA_SPEED	DAILY_SUNSPOT_NO	3-H_KP*10	1-H_DST	1-H_AE
dd-mm-yyyy hh:mm:ss.ms	nT	Per_cc	Km/s			nT	nT
14-07-2000 00:30:00.000	5.10000	2.80000	606.000	236	30	-30	513
14-07-2000 01:30:00.000	4.20000	3.40000	611.000	236	30	-21	409
14-07-2000 02:30:00.000	3.70000	3.70000	615.000	236	30	-13	377
14-07-2000 03:30:00.000	2.80000	3.40000	616.000	236	30	-15	264
14-07-2000 04:30:00.000	2.50000	2.70000	614.000	236	30	-21	229
14-07-2000 05:30:00.000	3.90000	2.50000	607.000	236	30	-20	515
14-07-2000 06:30:00.000	3.40000	2.50000	591.000	236	33	-24	441
14-07-2000 07:30:00.000	2.40000	2.50000	598.000	236	33	-18	274
14-07-2000 08:30:00.000	3.50000	2.50000	585.000	236	33	-18	190
14-07-2000 09:30:00.000	[illegible]	[illegible]	[illegible]	236	40	-18	336
14-07-2000 10:30:00.000	[illegible]	[illegible]	[illegible]	236	40	-18	933
14-07-2000 11:30:00.000	[illegible]	[illegible]	[illegible]	236	40	-24	854
14-07-2000 12:30:00.000	[illegible]	[illegible]	[illegible]	236	40	-28	526
14-07-2000 13:30:00.000	4.30000	2.30000	575.000	236	40	-24	312
14-07-2000 14:30:00.000	[illegible]	[illegible]	[illegible]	[illegible]	40	-20	356
14-07-2000 15:30:00.000	[illegible]	[illegible]	[illegible]	[illegible]	73	-8	665
14-07-2000 16:30:00.000	[illegible]	[illegible]	[illegible]	[illegible]	73	-10	698
14-07-2000 17:30:00.000	8.50000	16.7000	767.000	236	73	-2	1248
14-07-2000 18:30:00.000	8.70000	24.3000	778.000	236	67	1	1657
14-07-2000 19:30:00.000	[illegible]	[illegible]	782.000	236	67	2	1312
14-07-2000 20:30:00.000	[illegible]	[illegible]	777.000	236	67	-15	874
14-07-2000 21:30:00.000	[illegible]	[illegible]	765.000	236	47	-25	622
14-07-2000 22:30:00.000	4.80000	15.6000	754.000	236	47	-24	403
14-07-2000 23:30:00.000	4.40000	14.9000	738.000	236	47	-29	319
15-07-2000 00:30:00.000	3.50000	10.9000	745.000	213	30	-34	288
15-07-2000 01:30:00.000	4.80000	10.7000	719.000	213	30	-26	232
15-07-2000 02:30:00.000	7.50000	5.80000	741.000	213	30	-26	252
15-07-2000 03:30:00.000	6.70000	4.30000	721.000	213	37	-33	461
15-07-2000 04:30:00.000	7.30000	3.30000	758.000	213	37	-29	488
15-07-2000 05:30:00.000	7.30000	6.30000	745.000	213	37	-18	197
15-07-2000 06:30:00.000	7.40000	5.30000	718.000	213	47	-19	160
15-07-2000 07:30:00.000	8.00000	3.80000	705.000	213	47	-22	531
15-07-2000 08:30:00.000	[illegible]	[illegible]	660.000	213	47	-33	844
15-07-2000 09:30:00.000	[illegible]	[illegible]	678.000	213	43	-39	1090
15-07-2000 10:30:00.000	[illegible]	[illegible]	677.000	213	43	-44	1046
15-07-2000 11:30:00.000	[illegible]	[illegible]	694.000	213	43	-42	1187
15-07-2000 12:30:00.000	9.50000	7.90000	683.000	213	80	-50	1422
15-07-2000 13:30:00.000	[illegible]	[illegible]	[illegible]	[illegible]	80	-57	1453
15-07-2000 14:30:00.000	[illegible]	[illegible]	[illegible]	[illegible]	80	-24	1561
15-07-2000 15:30:00.000	[illegible]	[illegible]	[illegible]	[illegible]	87	7	1225
15-07-2000 16:30:00.000	[illegible]	[illegible]	[illegible]	[illegible]	87	-37	1278
15-07-2000 17:30:00.000	2.00000	9.80000	991.000	213	87	-46	1509
15-07-2000 18:30:00.000	9.40000	15.0000	993.000	213	90	-43	1927
15-07-2000 19:30:00.000	38.0000	20.6000	1000.00	213	90	-61	2023
15-07-2000 20:30:00.000	49.4000	5.90000	1040.00	213	90	-198	1501
15-07-2000 21:30:00.000	47.5000	7.20000	1107.00	213	87	-289	993
15-07-2000 22:30:00.000	45.6000	5.70000	1089.00	213	87	-281	1133
15-07-2000 23:30:00.000	45.6000	9.70000	1079.00	213	87	-281	1210

Right Click on “Save as…”

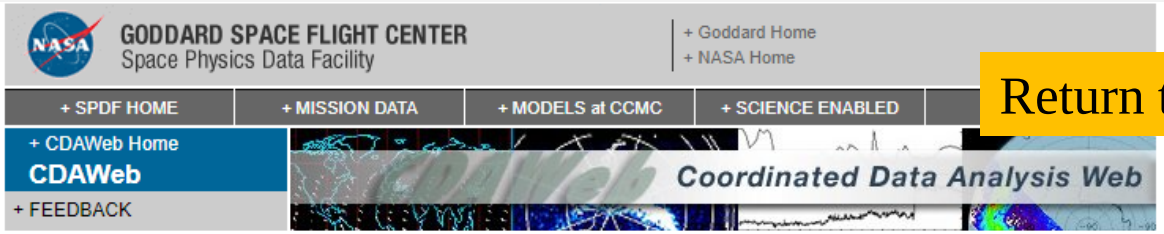
Select a directory on your computer

Hit “Save”

Congratulations!!!!

You now ***own*** a chunk of NASA data!

Let's now look at the Bastille Day event in more detail



Return to this page

CDAWeb Data Explorer

Select start and stop times from which to GET or PLOT data:

Start time (YYYY/MM/DD HH:MM:SS.mmm): 2000/07/07 00:00:00.000
Stop time (YYYY/MM/DD HH:MM:SS.mmm): 2000/07/11 00:00:00.000

Start: 2000/07/07 00:00:00.000
Stop: 2000/07/11 00:00:00.000

☐ **Compute uniformly spaced binned data for scalar/vector/spectrogram data (not available with noise filtering)** NEW

☐ **Use spike removal to filter data without binning** (not available with noise filtering)(Warning: Experimental !!).

Select an activity:

◉ Plot Data : *select one or more variables from list below and press submit.*

"Plot Data"

- ☐ **Also create PS and PDF best quality outputs** (all plot types except images and plasmagrams). Many panels per dataset are allowed but <=4 panels optimal for standard Y-axis height and single page display.
- ☐ **Use coarse noise filtering** to remove values outside 3 deviations from mean of all values in the plotted time interval.
- ☐ **Increase the Y-axis height** for time-series and spectrogram plots. NEW
- ☐ **Combine all time-series and spectrogram plots**, for all requested datasets, into one plot file.
- ☐ **Plot overlay options.** NEW

○ List Data (ASCII/CSV): *select one or more variables from list below and press submit. (Works best for < 31 days)*
○ Download original files : *press submit button to retrieve list of files. (Max. 200 days - use HTTPS site for larger requests)*
○ Create V3.8 CDFs for download or Autoplot demonstration: *select one or more variables from the list below and press submit.*
○ Create audio files based on data from selected variables. NEW

More information about audification is available here.

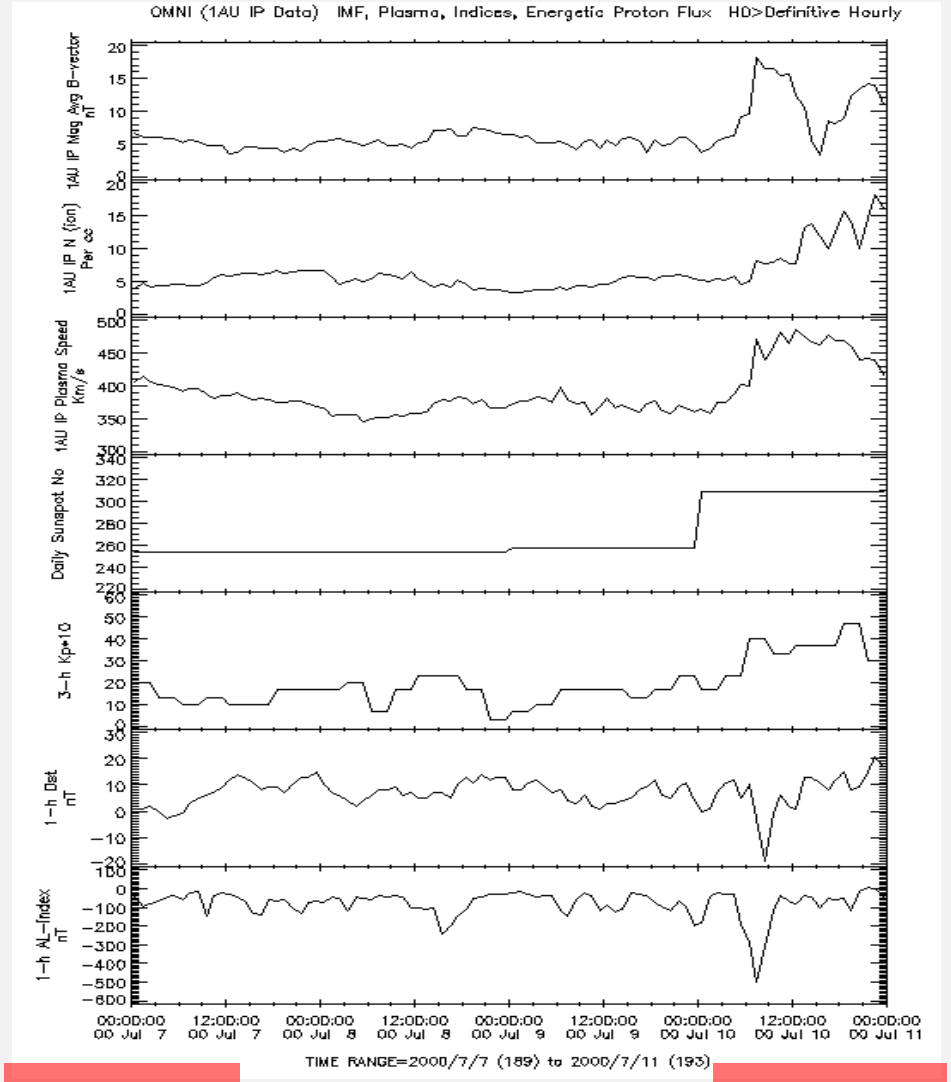
Note: CDF patch required for reading Version 3.8 CDFs in IDL or MATLAB.
Get CDFX - IDL GUI plotting/listing toolkit software. To be used with either the daily or "created" CDF files available above.

NEW **Pressing the "Submit" button will spawn a new window/tab in order to support the new "Previous" and "Next" functions.**

Submit Reset

"Submit"

Variable parameters (required for Listing, Creating and Plotting data only)



2000/07/07

2000/07/11

Interplanetary Magnetic Field (IMF)

Solar Wind Density

Solar Wind Speed

Sunspot Number (Solar Activity)

Kp Index (Planetary Activity)

Dst Index (Ring Current)

AL Index (Auroral Activity)

Leave this browser open. We'll come back to it soon.

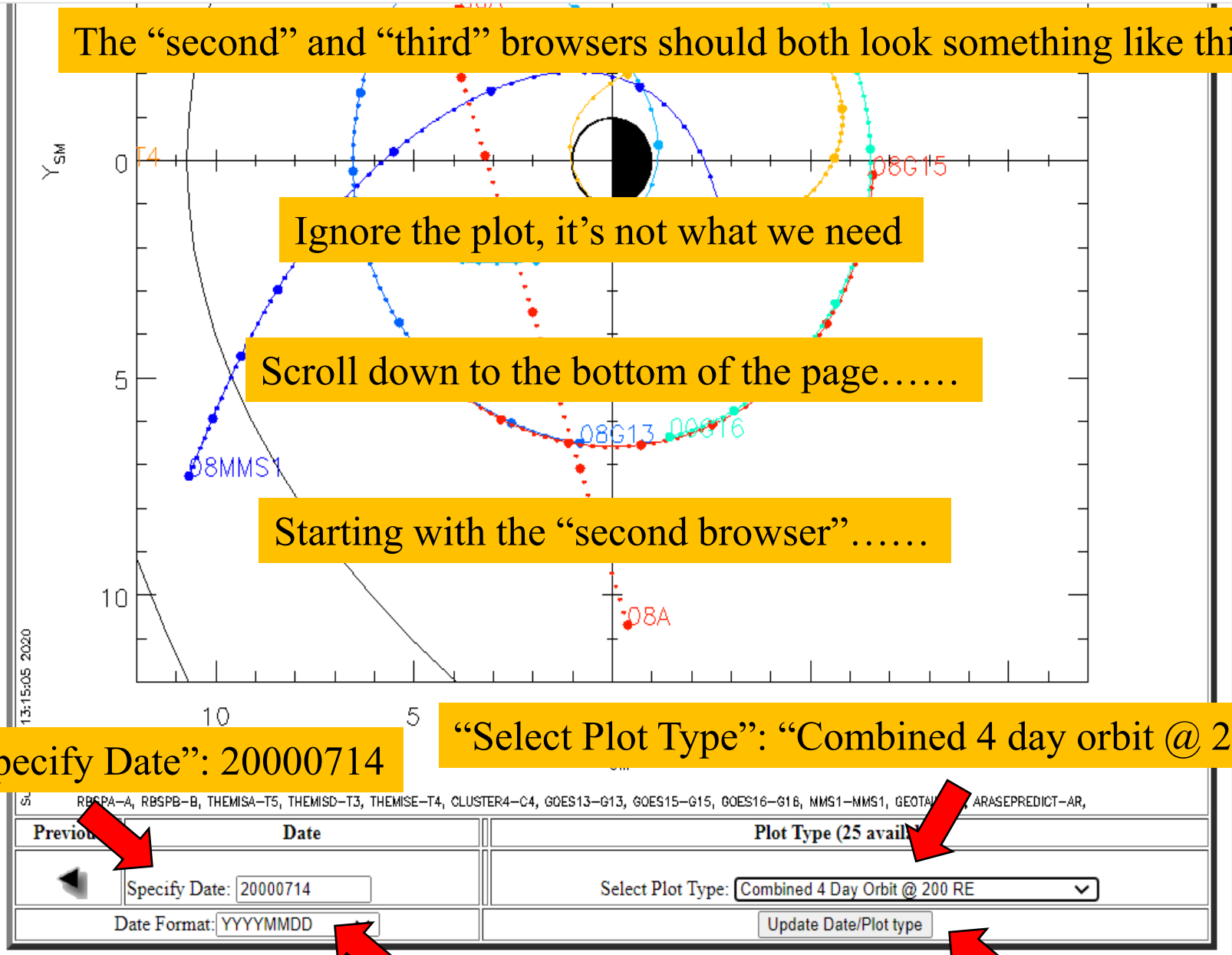
We want to look at multiple things together, so…..

Open ***TWO*** new browsers to this page again

We'll use all three browsers to examine data obtained by the Japanese Geotail spacecraft during the Bastille Day event

In the 2 new browsers, click **"Pre-generated Data and Orbit plots via SPDFs GIFWALK"**

The “second” and “third” browsers should both look something like this

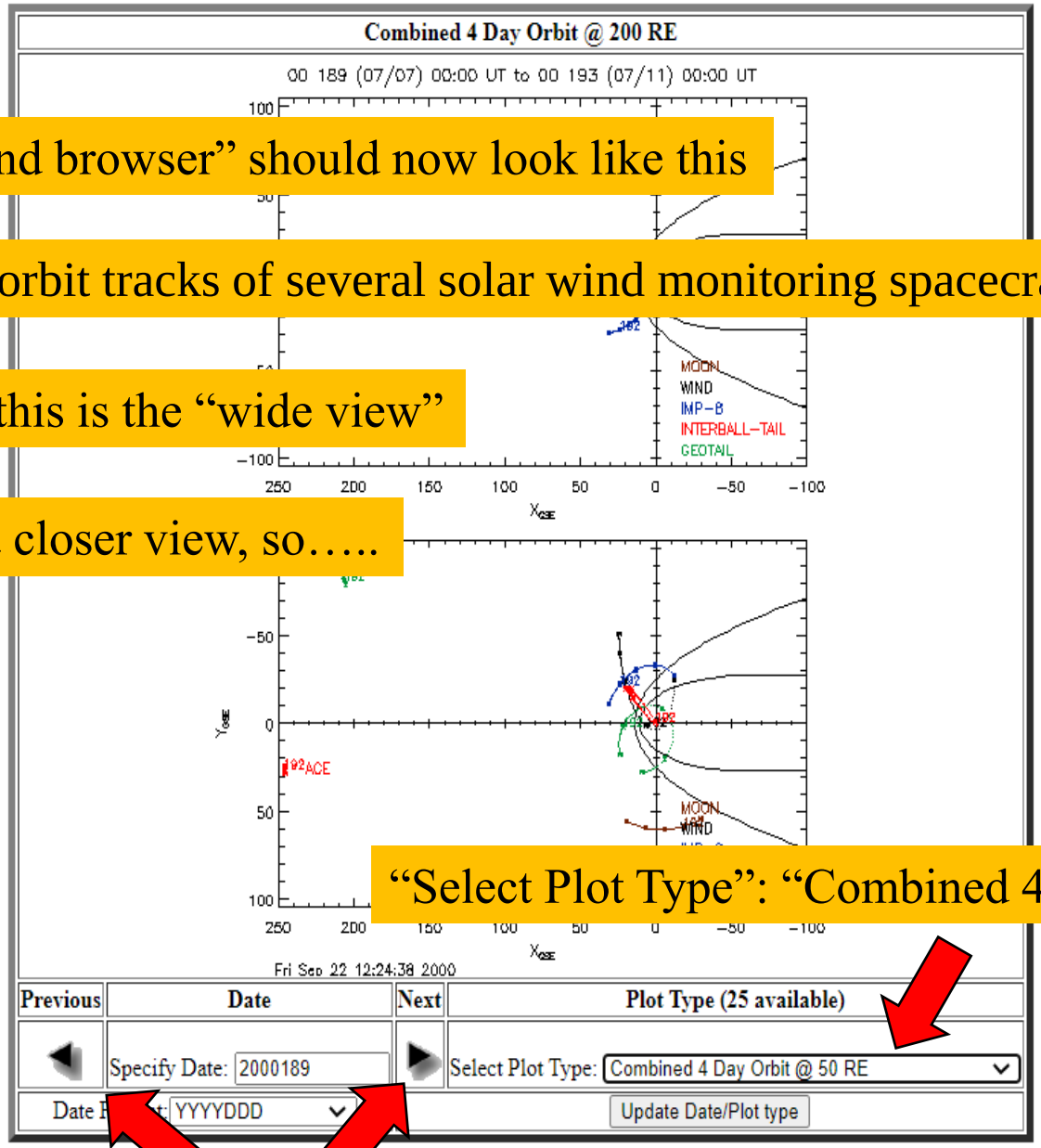


The "second browser" should now look like this

These are orbit tracks of several solar wind monitoring spacecraft

However, this is the "wide view"

We want a closer view, so…..



ACE

SOHO

WIND

MOON

IMP-8

INTERBALL

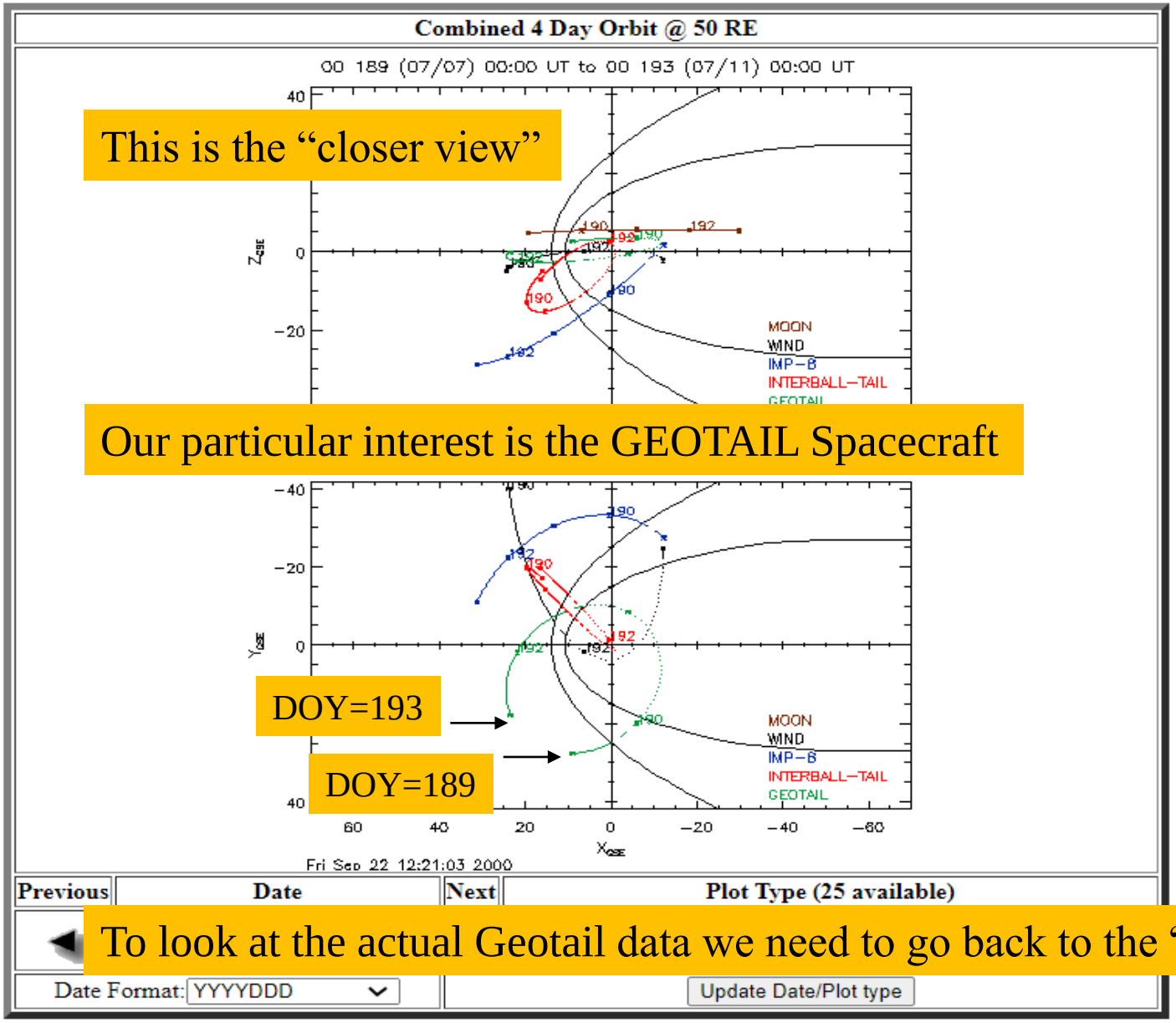
GEOTAIL

"Select Plot Type": "Combined 4 day orbit @ 50 RE"

Click arrows to select "2000189"

Click "Update Date/Plot type"

The “second browser” should now look like this



To look at the actual Geotail data we need to go back to the “third browser”

ACE

SOHO

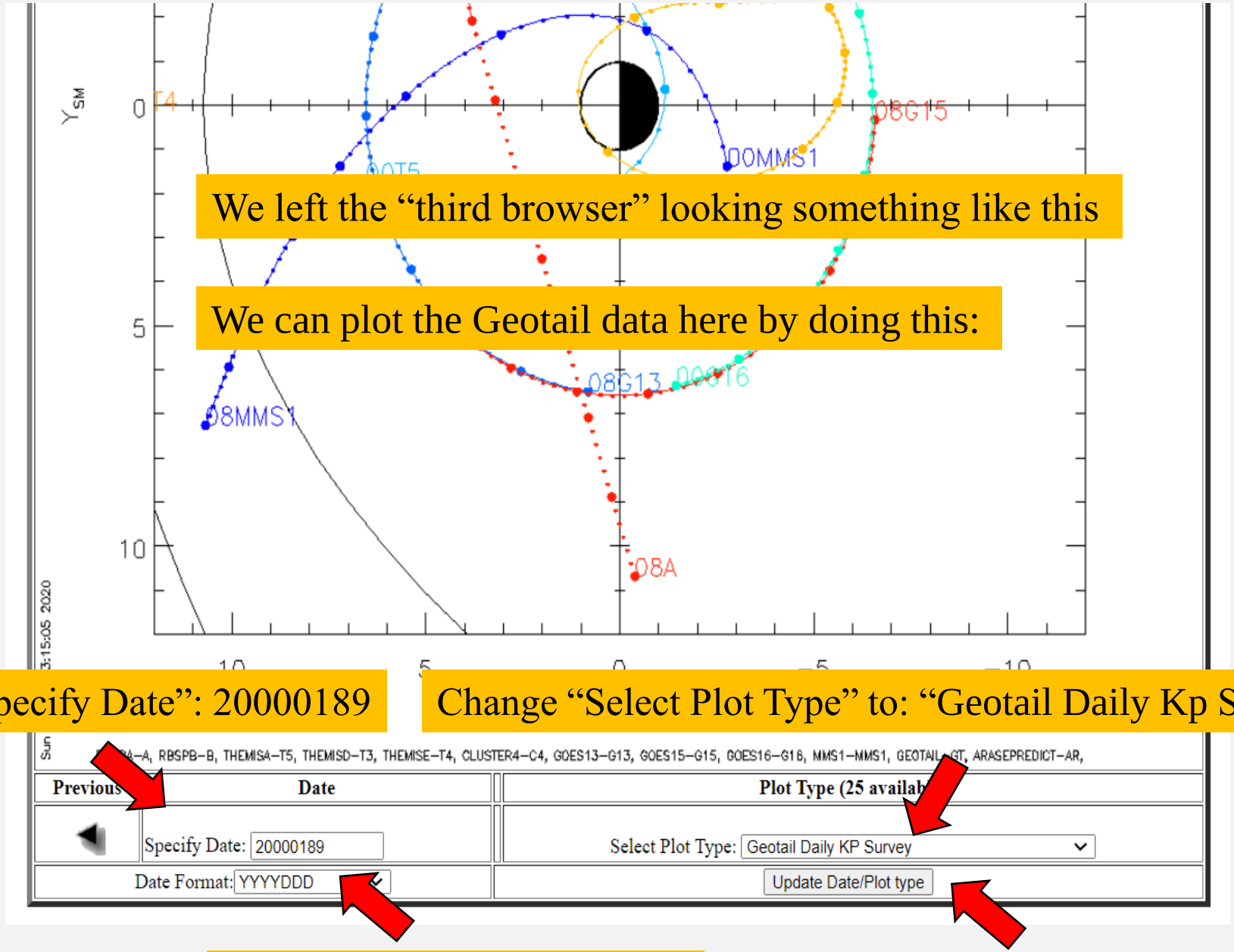
WIND

MOON

IMP-8

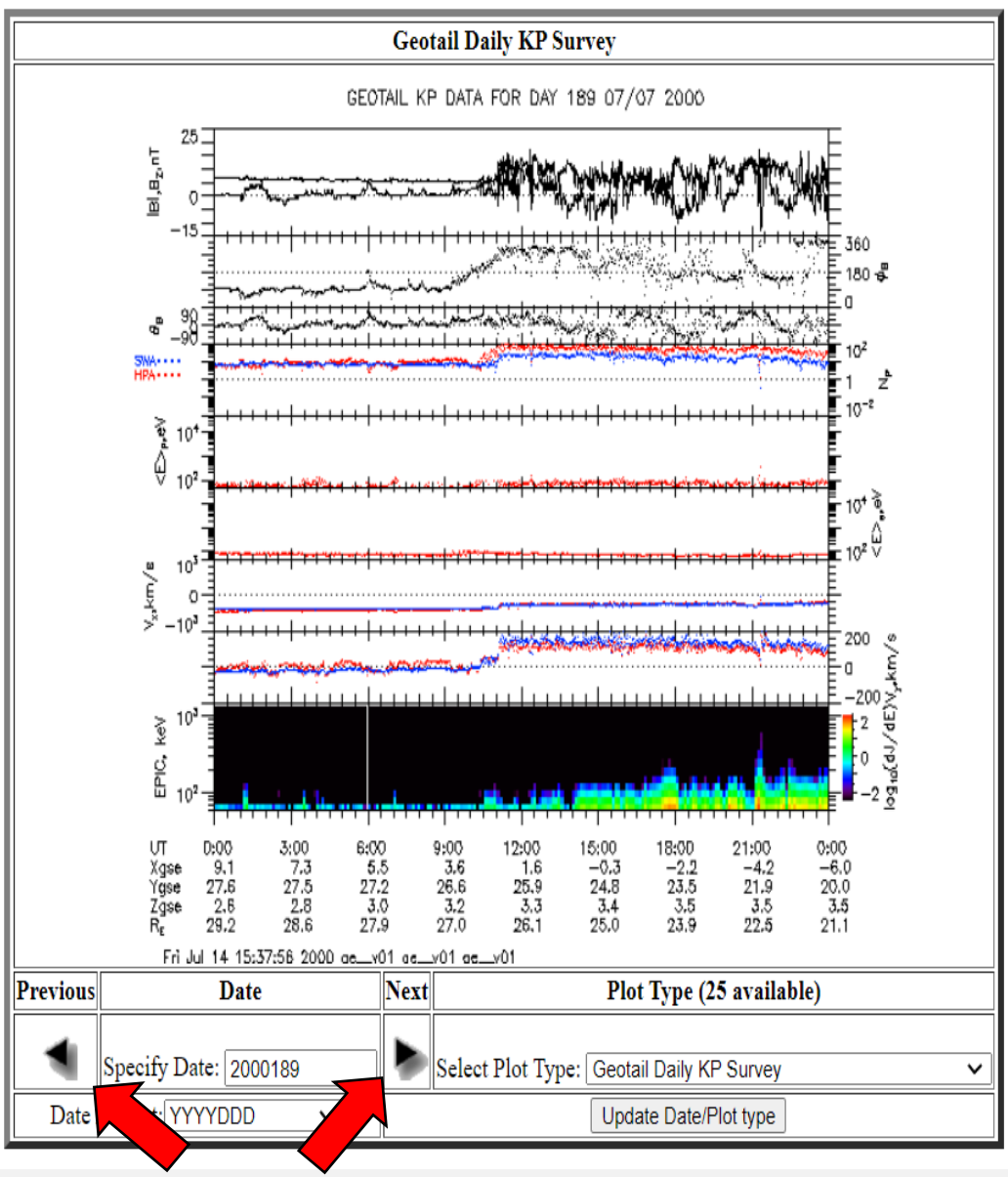
INTERBALL

GEOTAIL


We left the “third browser” looking something like this
We can plot the Geotail data here by doing this:
“Specify Date”: 20000189
Change “Select Plot Type” to: “Geotail Daily Kp Survey”
“Date Format”: YYYYDDD
Click “Update Date/Plot type”
Previous
Date
Plot Type (25 availab
Specify Date: 20000189
Select Plot Type: Geotail Daily KP Survey
Date Format: YYYYDDD
Update Date/Plot type
D8MMS1
D8G13
D8A
D8G15
D0MMS1

The “third browser” should now look like this

This is Geotail data for 2000/07/07



- Magnetic Field Strength (|B| & Bz)
- Magnetic Field Angle
- Proton Density (SWA & HPA)
- Average Proton Energy
- Average Electron Energy
- Bulk Vx Speed (SWA & HPA)
- Bulk Vy Speed (SWA & HPA)
- Ion Energy Spectrum (EPIC)

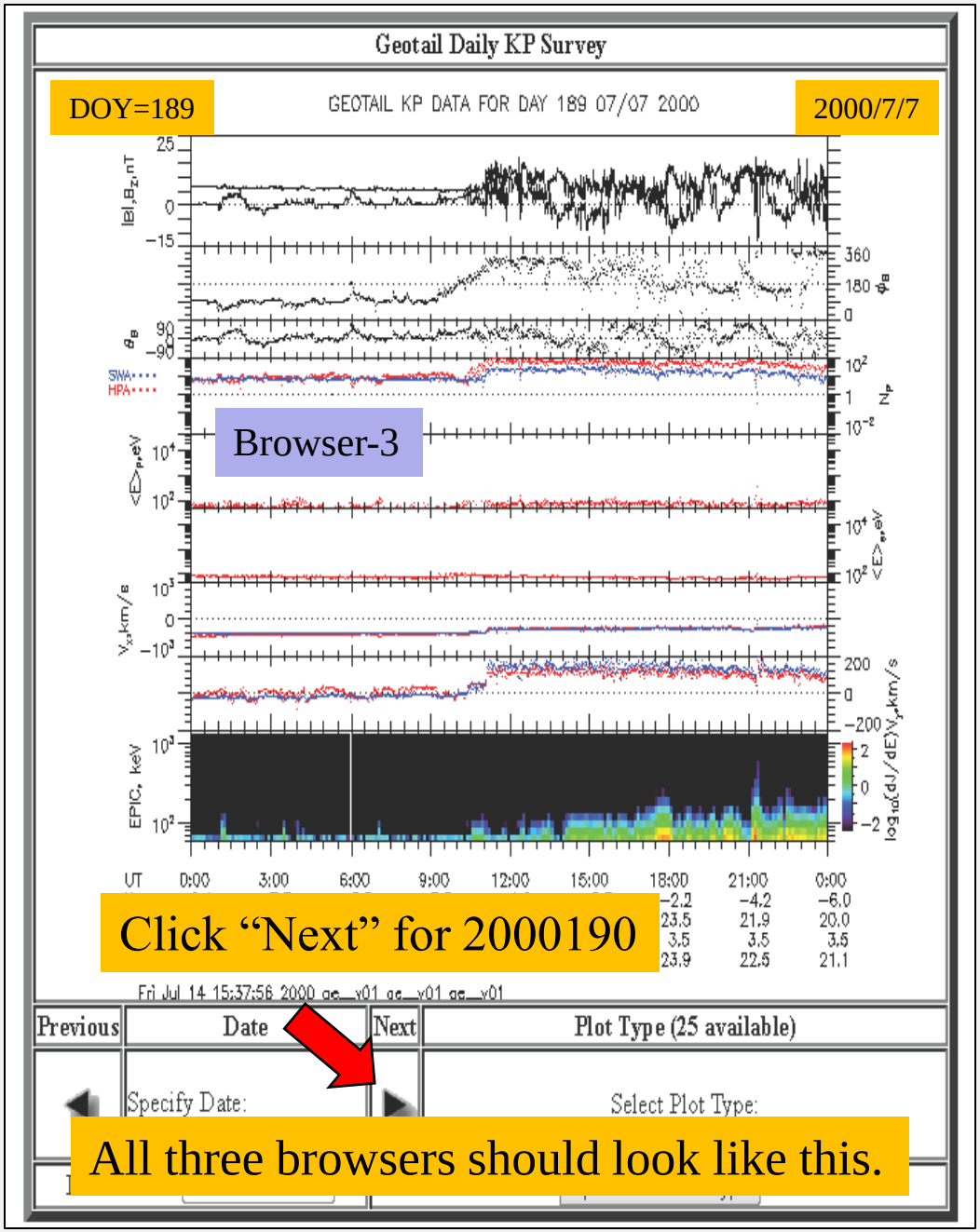
EPIC: Energetic Particle and Ion Composition

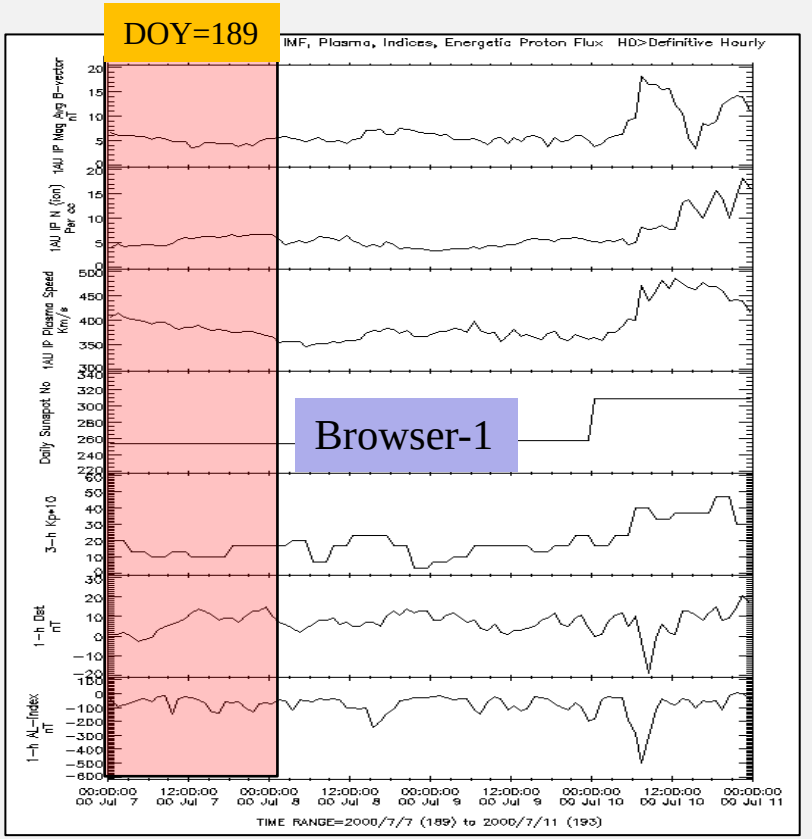
HPA: Hot Plasma Analyzer

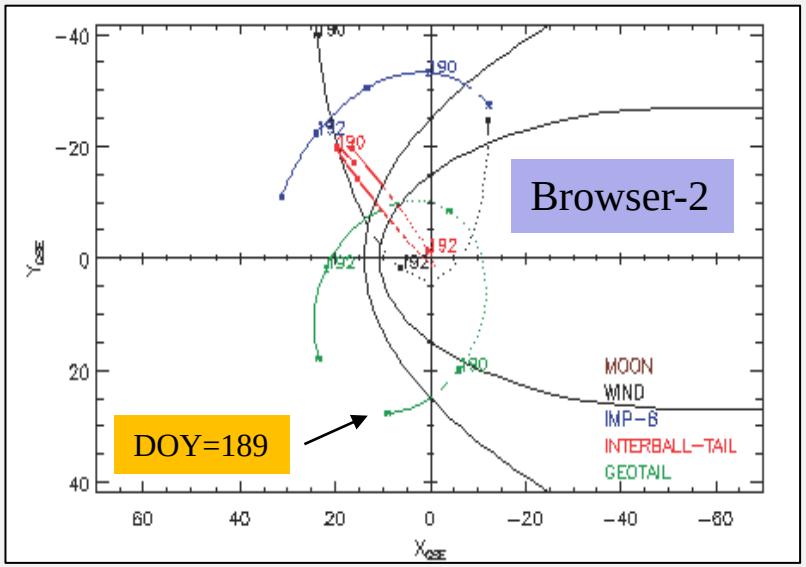
SWA: Solar Wind Analyzer

Use “Previous” or “Next” arrows get to “2000189”, if necessary

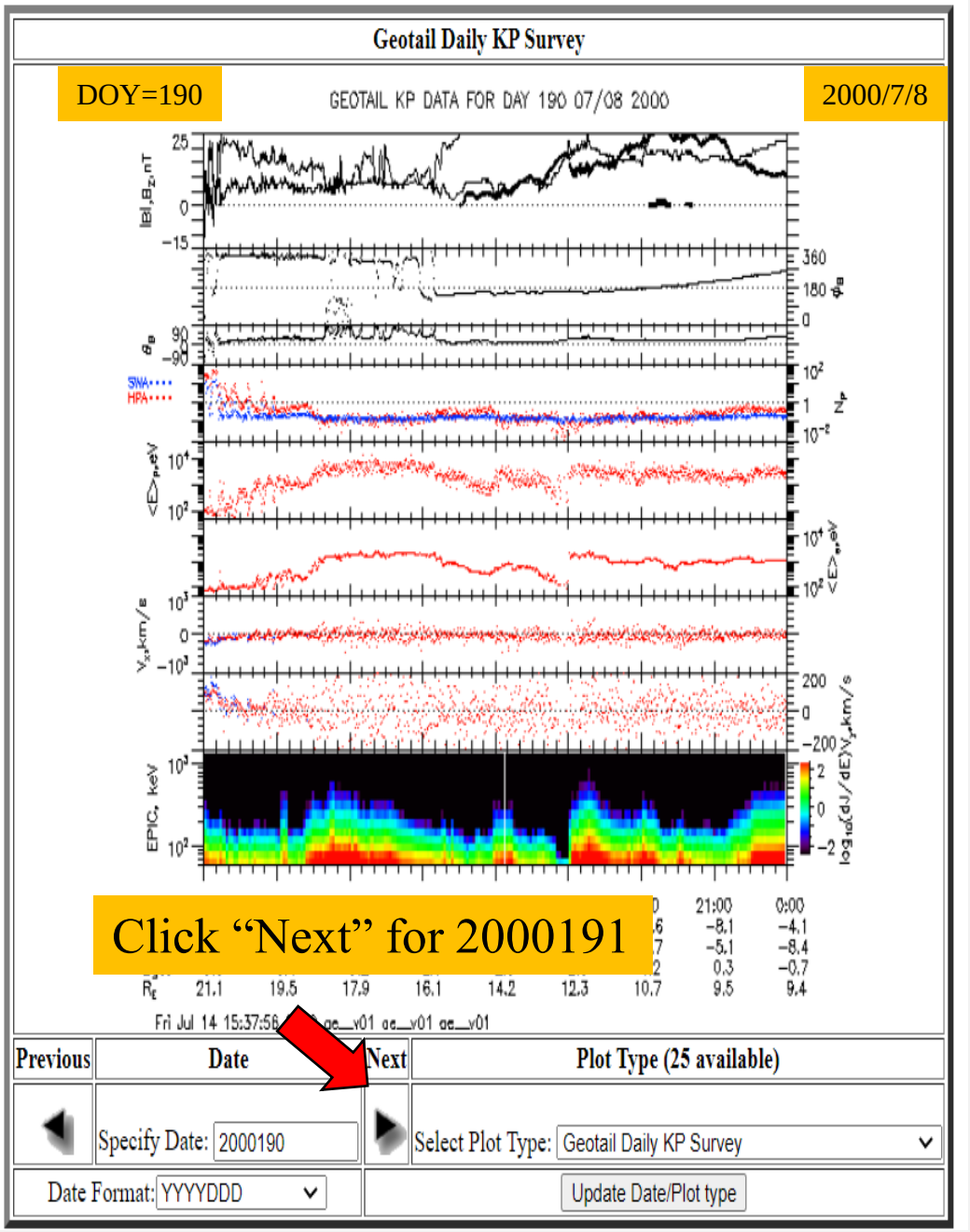
SOLAR WIND MAGNETOSHEATH

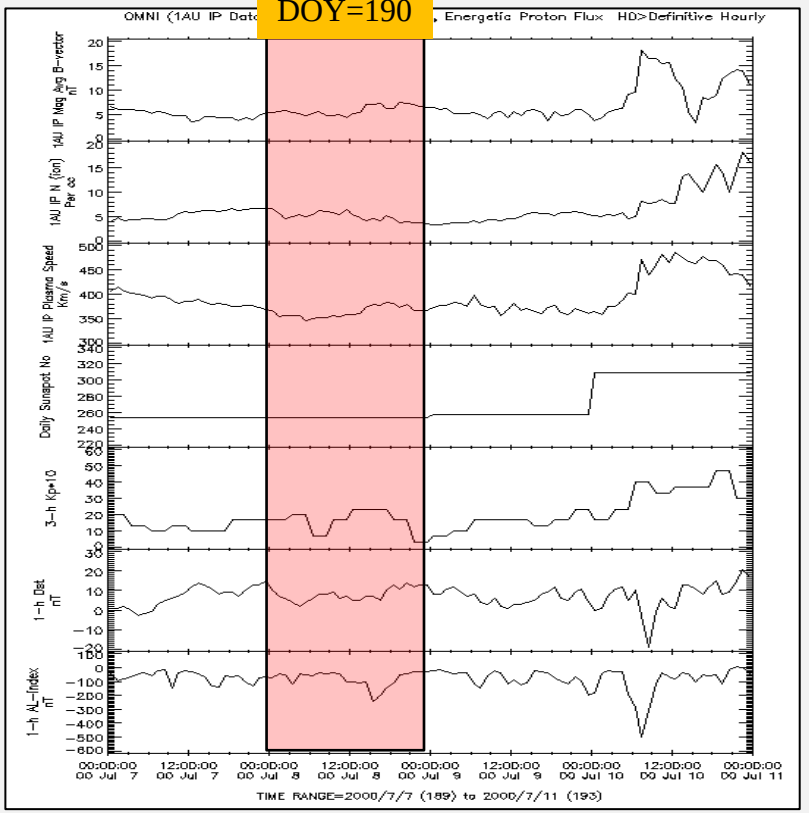


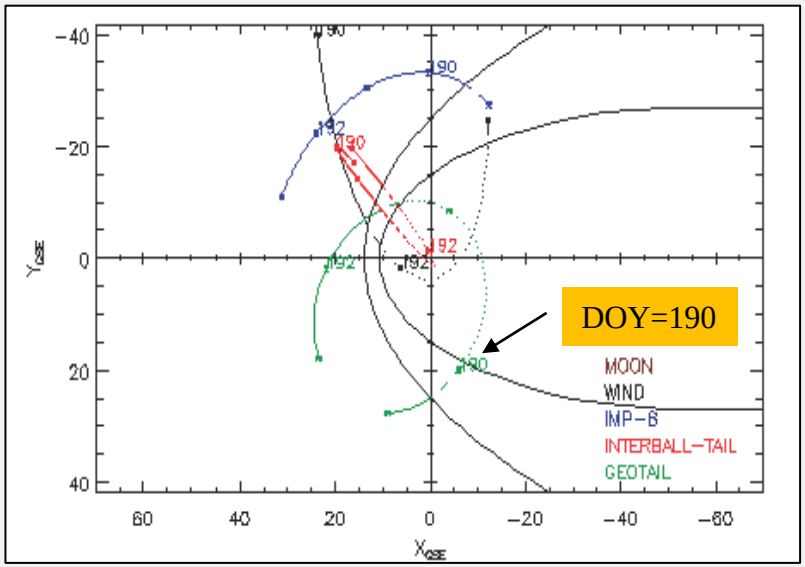




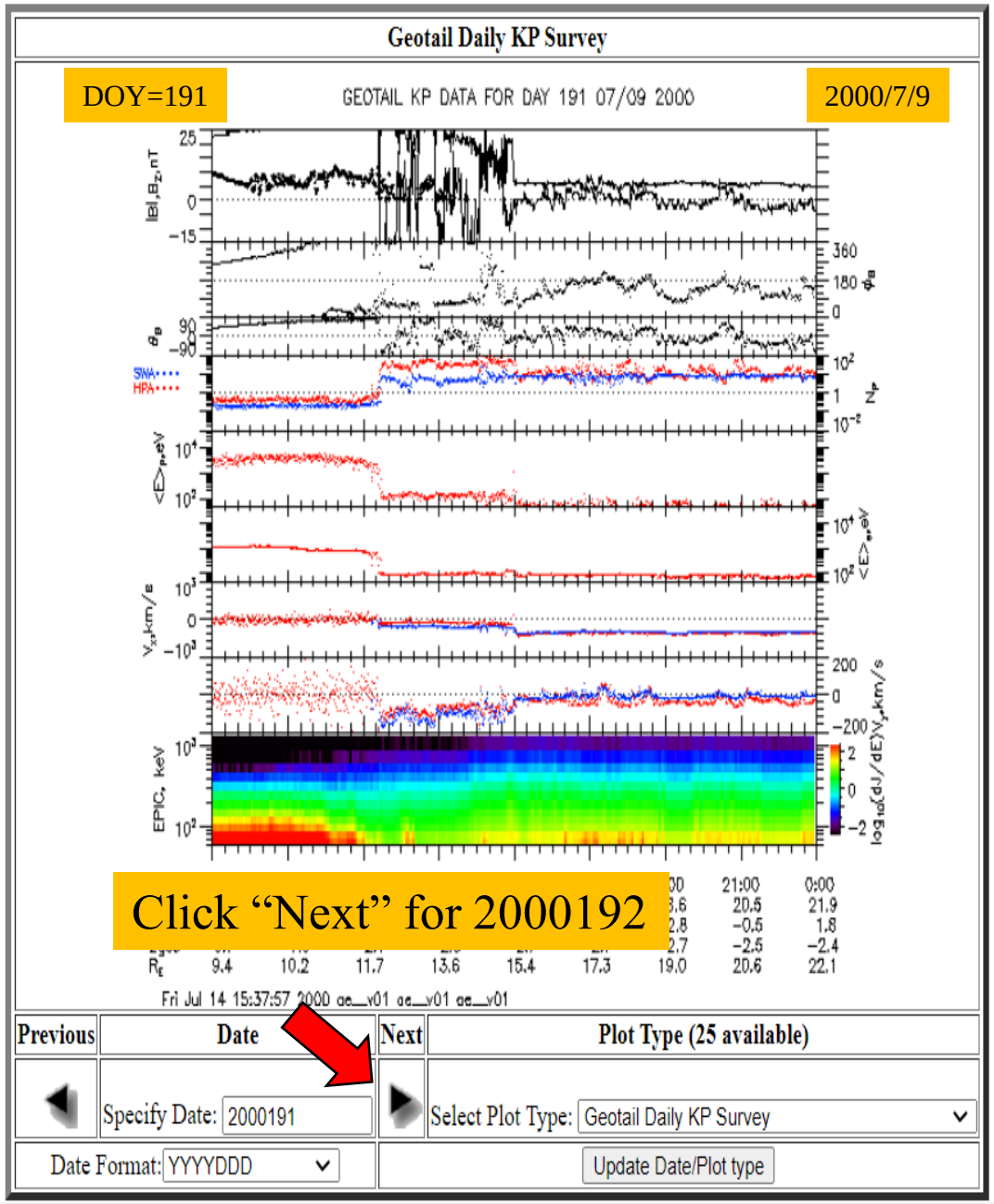
MAGNETOSHEATH MAGNETOSPHERE

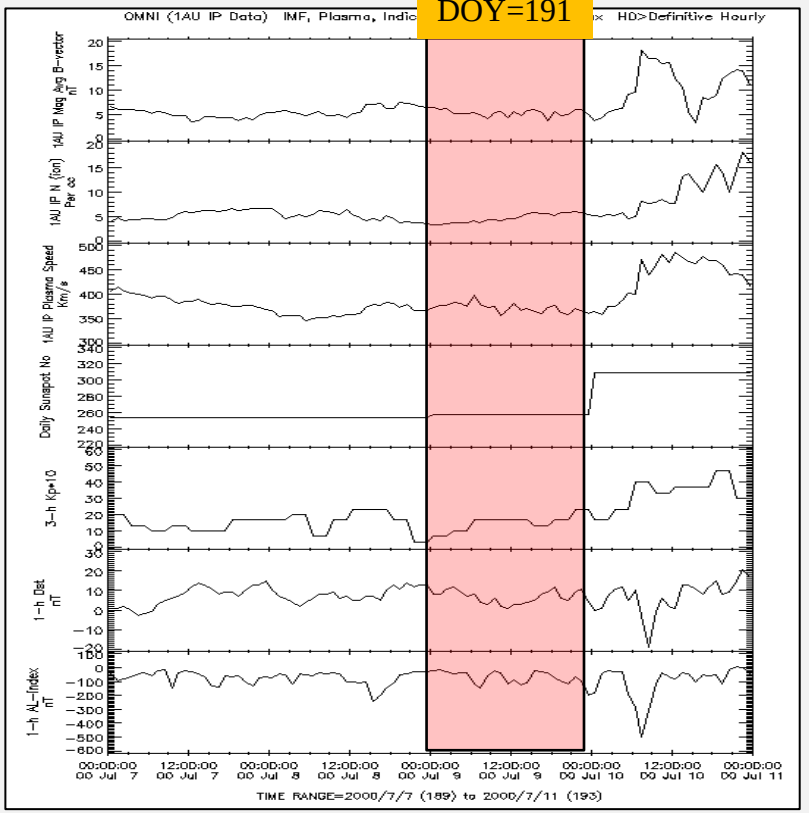


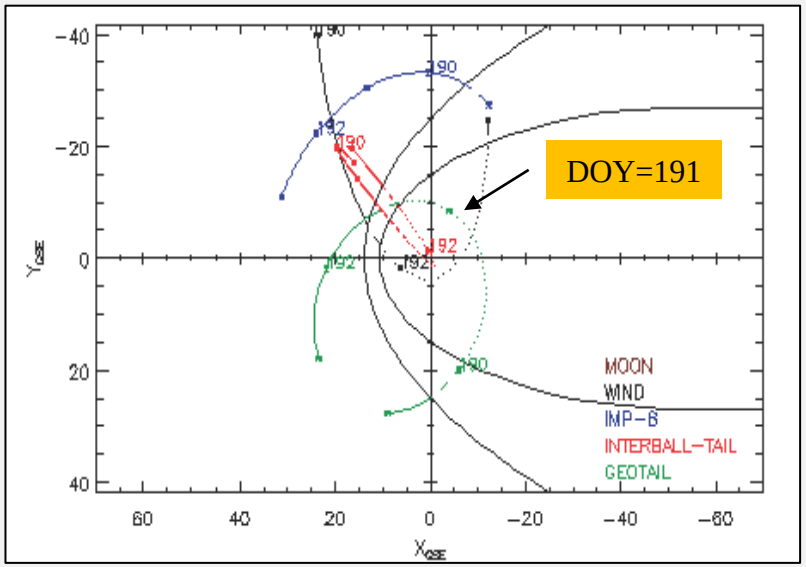




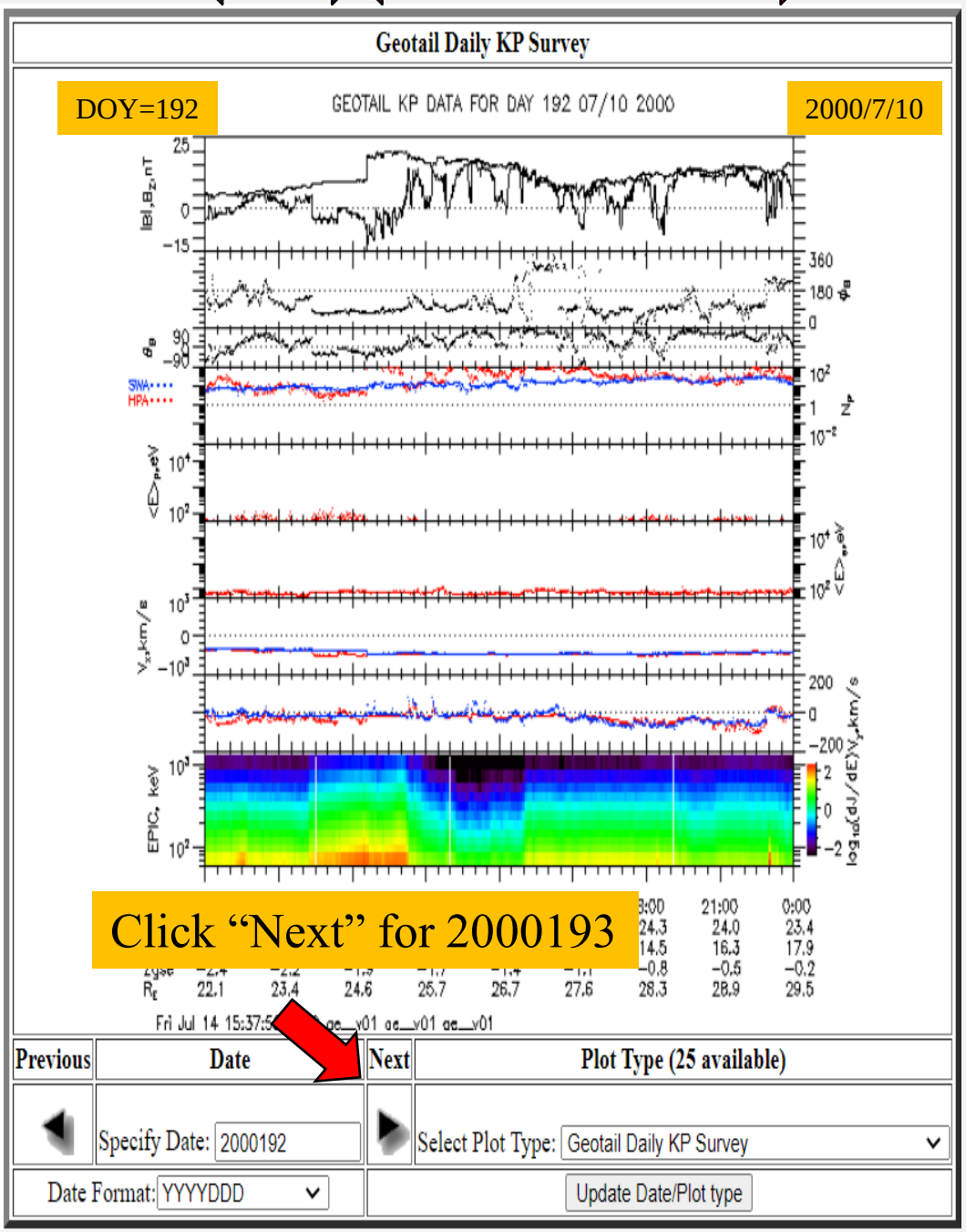
SPHERE SHEATH SOLAR WIND

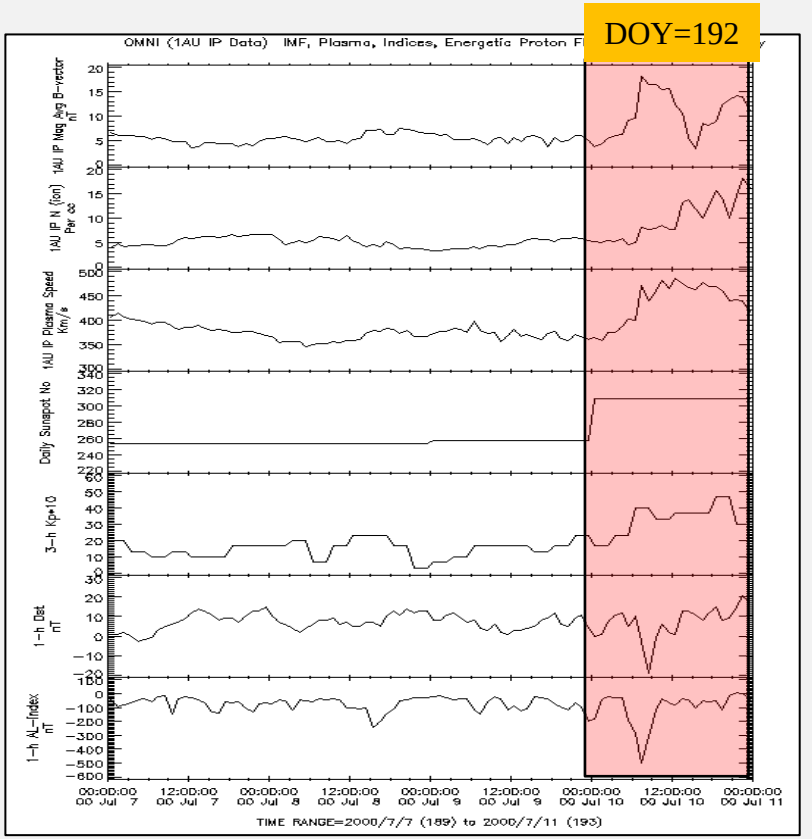


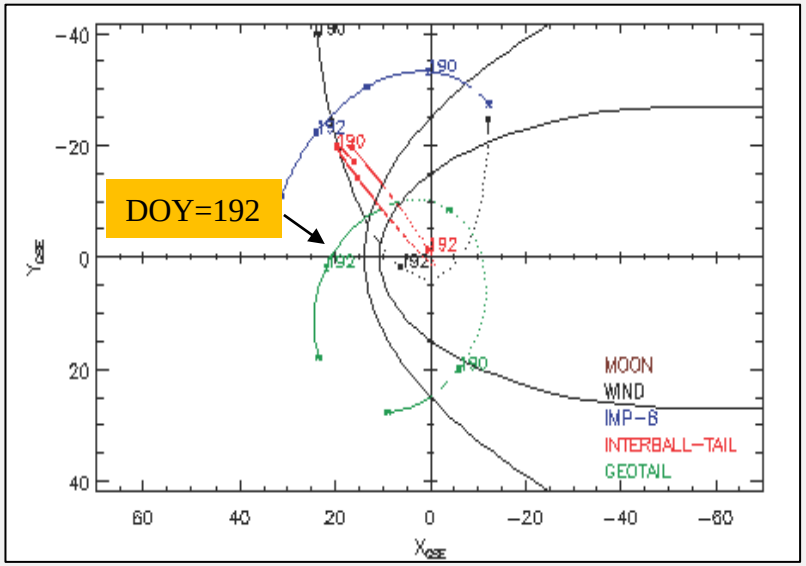




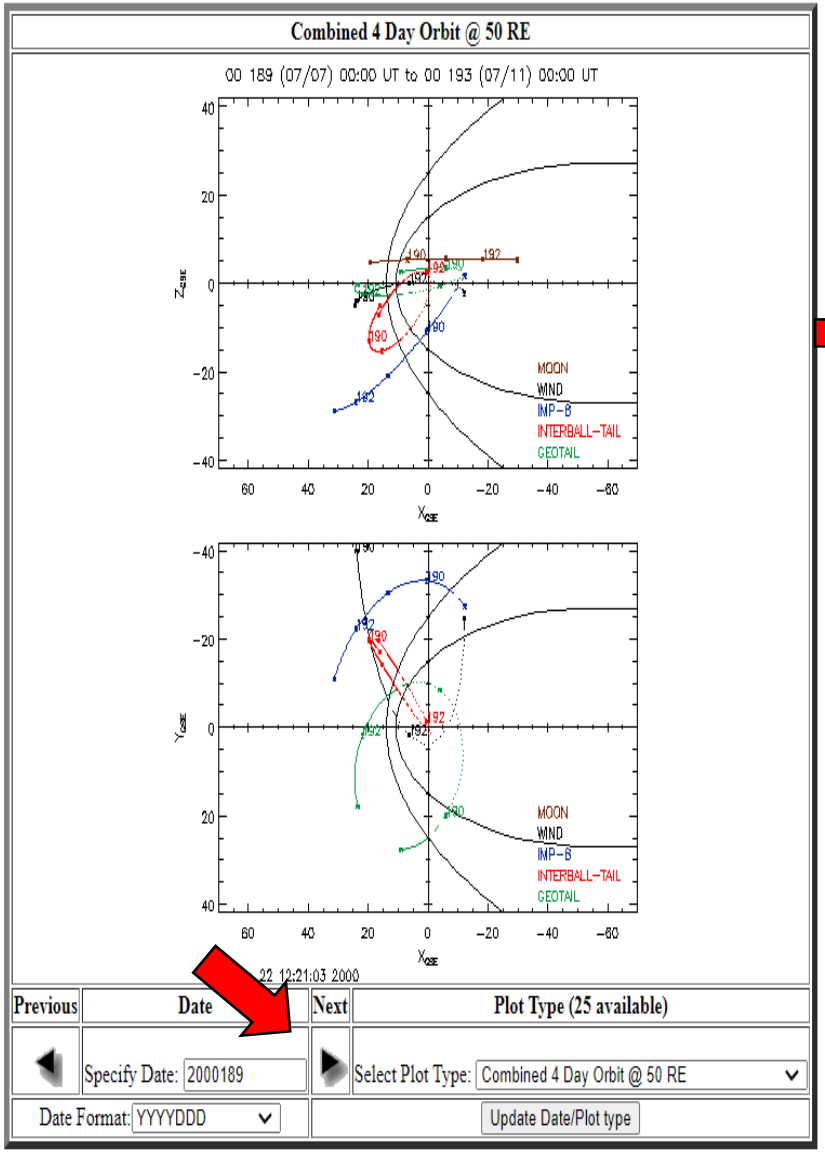
QUIET SOLAR WIND ENHANCED SOLAR WIND







Update the Orbit Plot (Browser-2)



Click “Next”

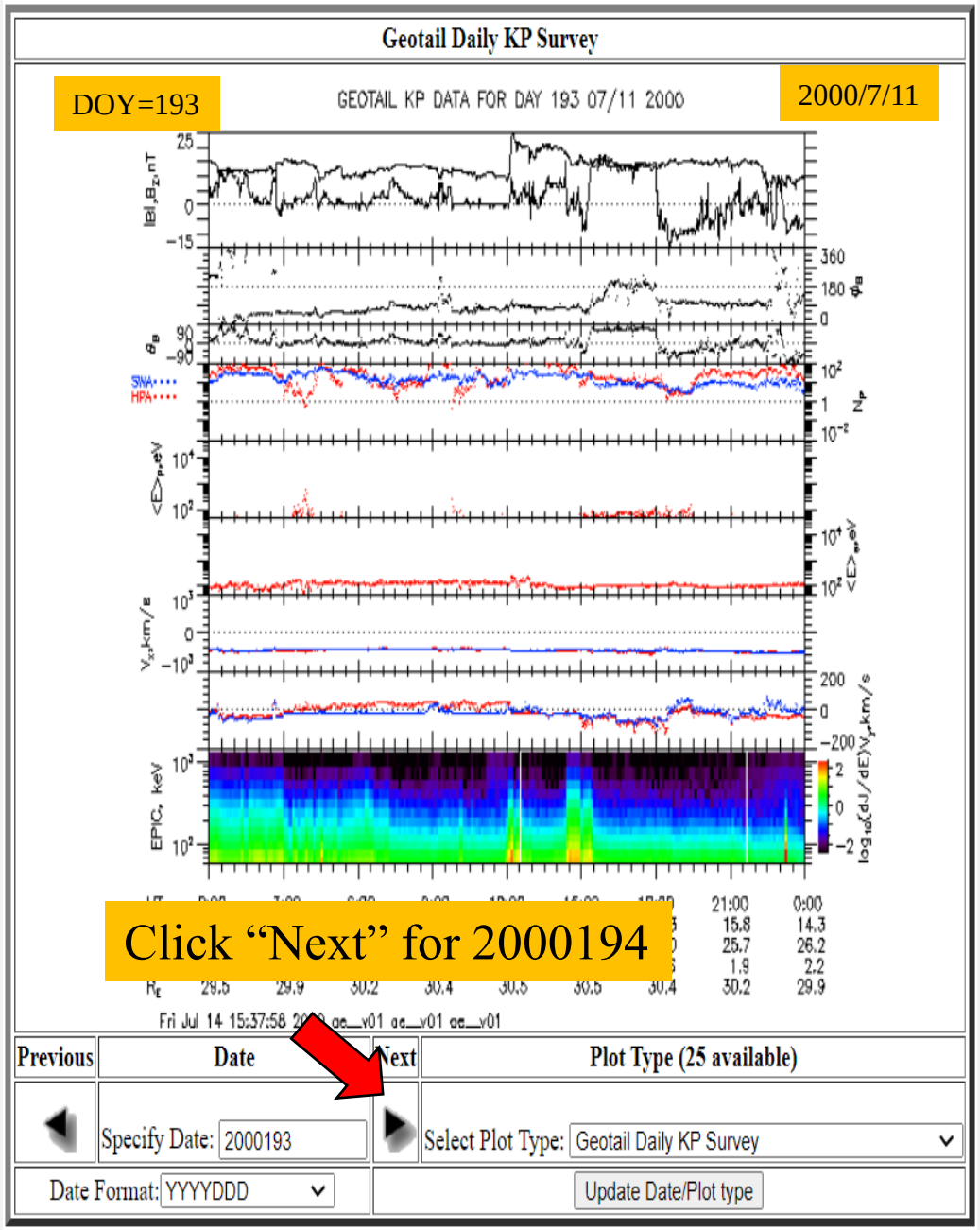
Update the Omni Data Plot (Browser-1)

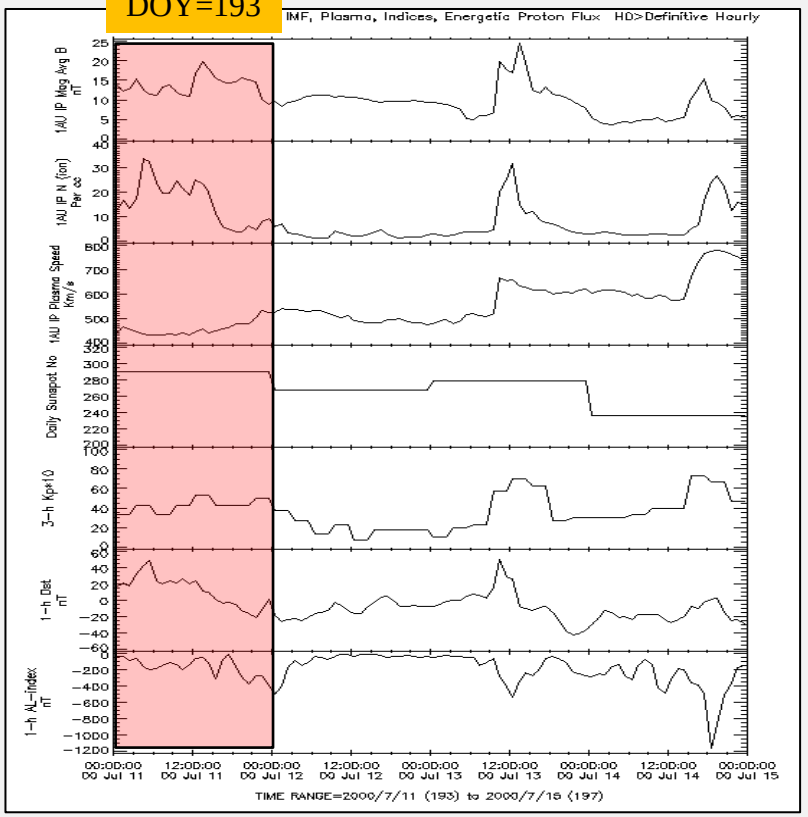
Start: 2000/07/11 00:00:00.000

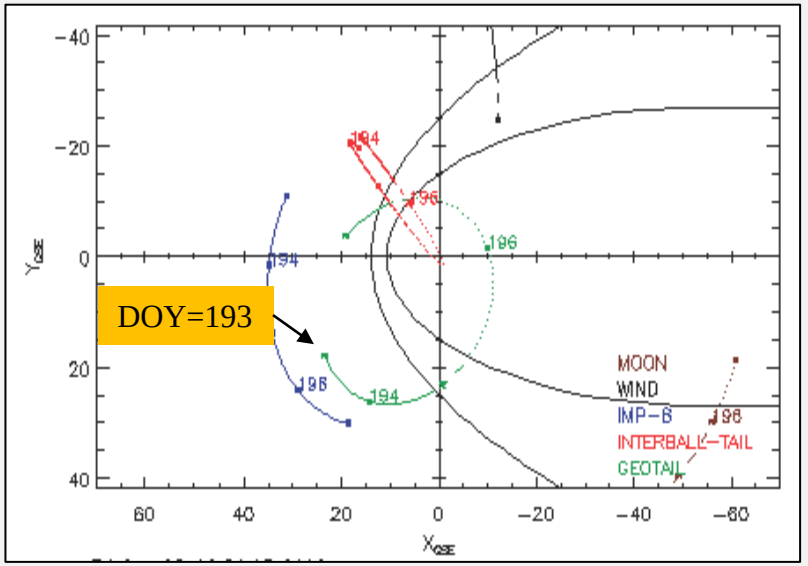
Stop: 2000/07/15 00:00:00.000

Click “Submit”

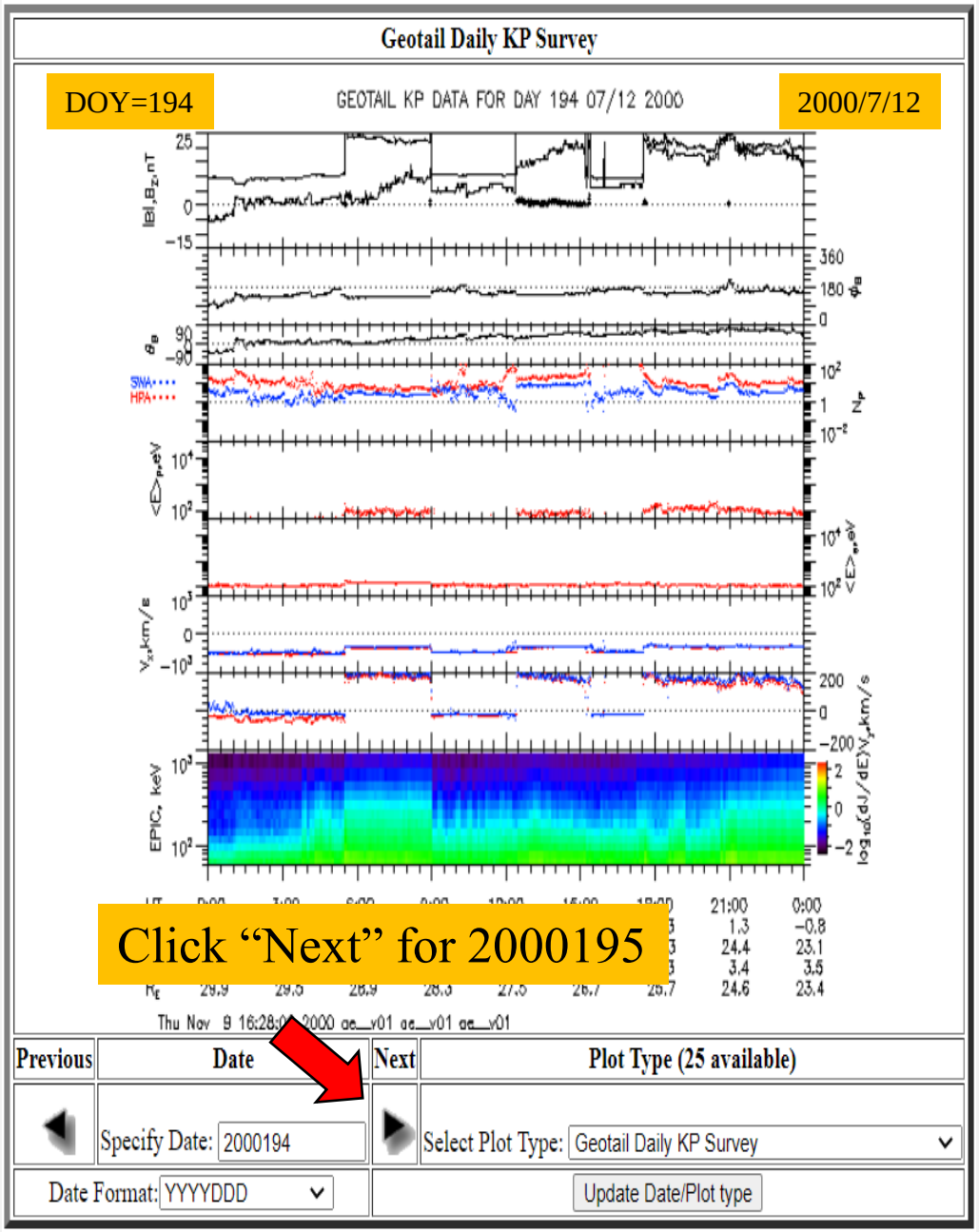
ENHANCED SOLAR WIND ANOTHER ENHANCEMENT

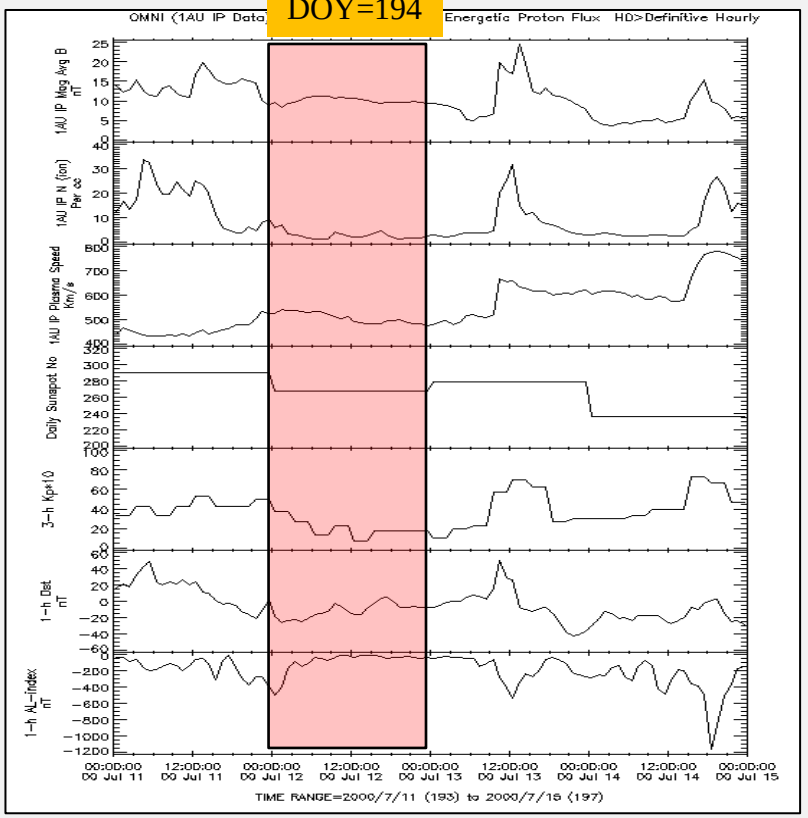


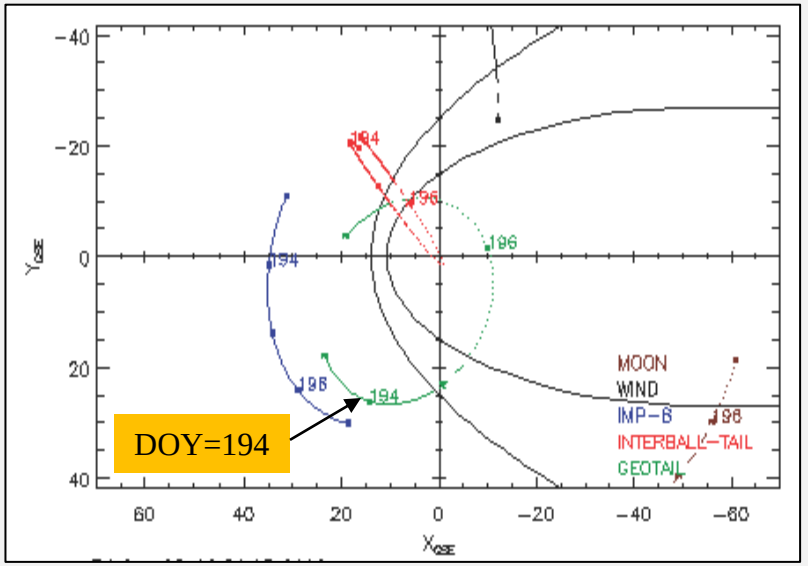




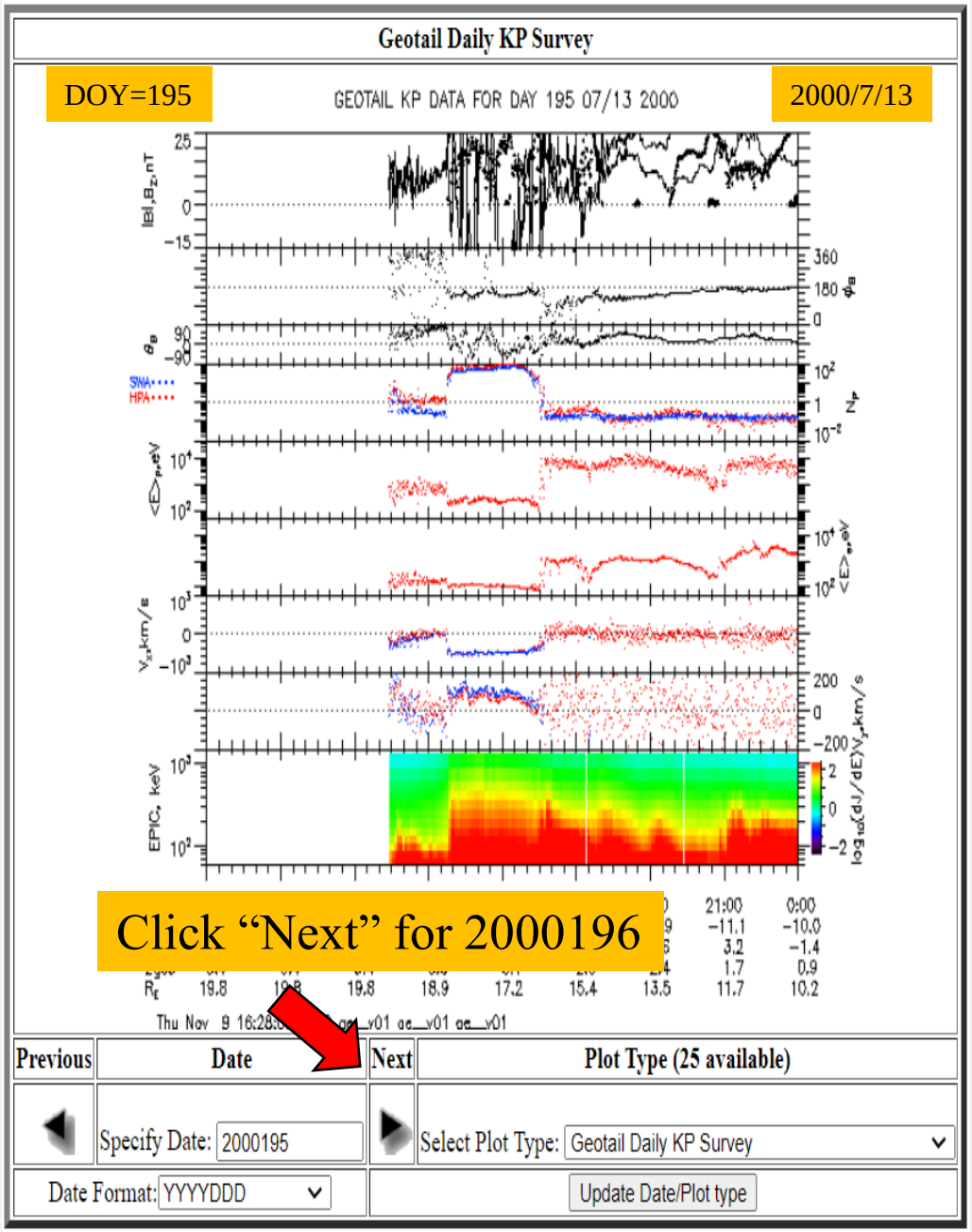
SOLAR WIND? MAGNETOSHEATH? BIT OF BOTH?

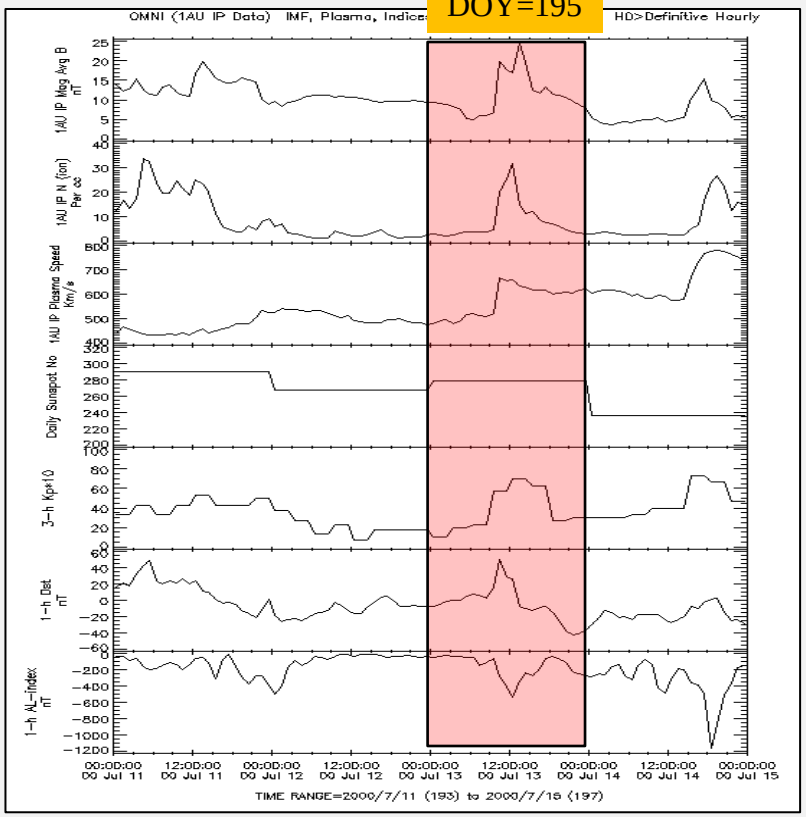


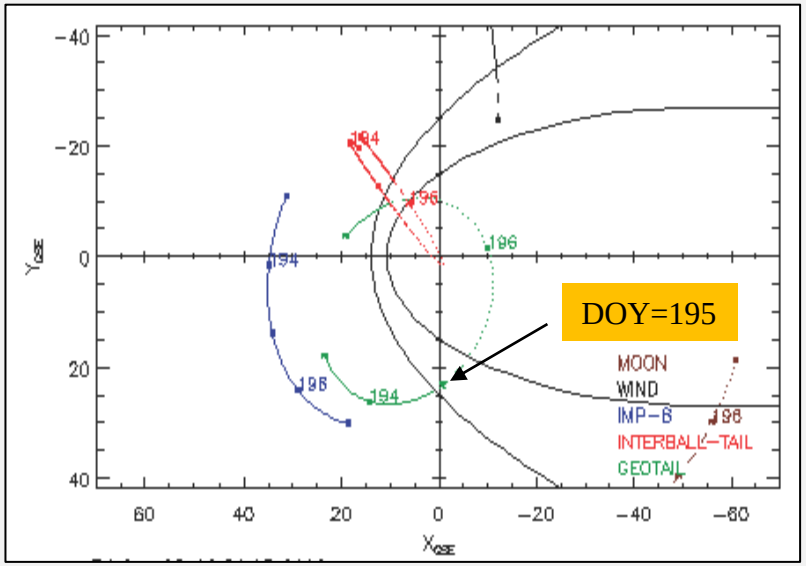




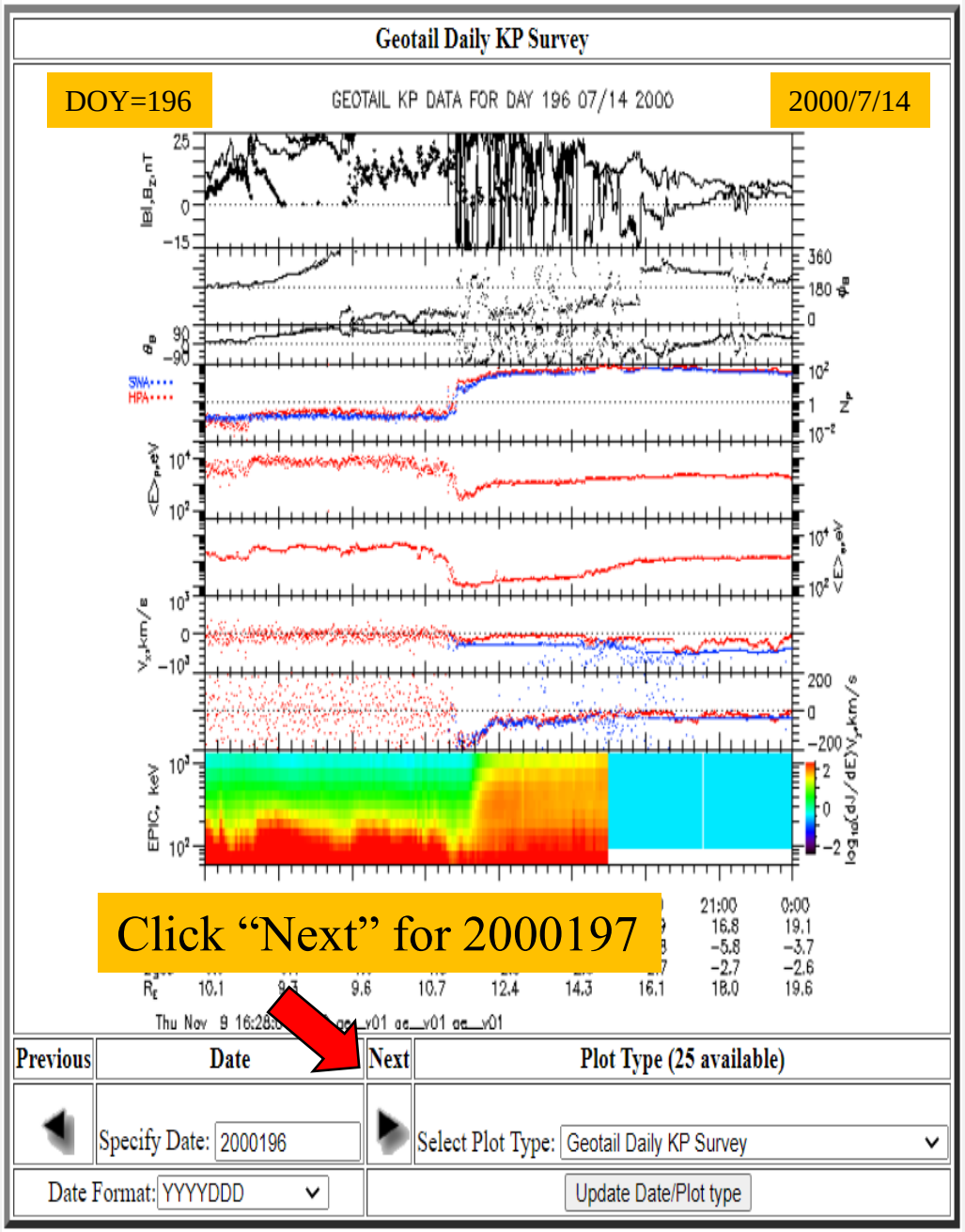
ENERGIZED MAGNETOSHEATH & MAGNETOTAIL

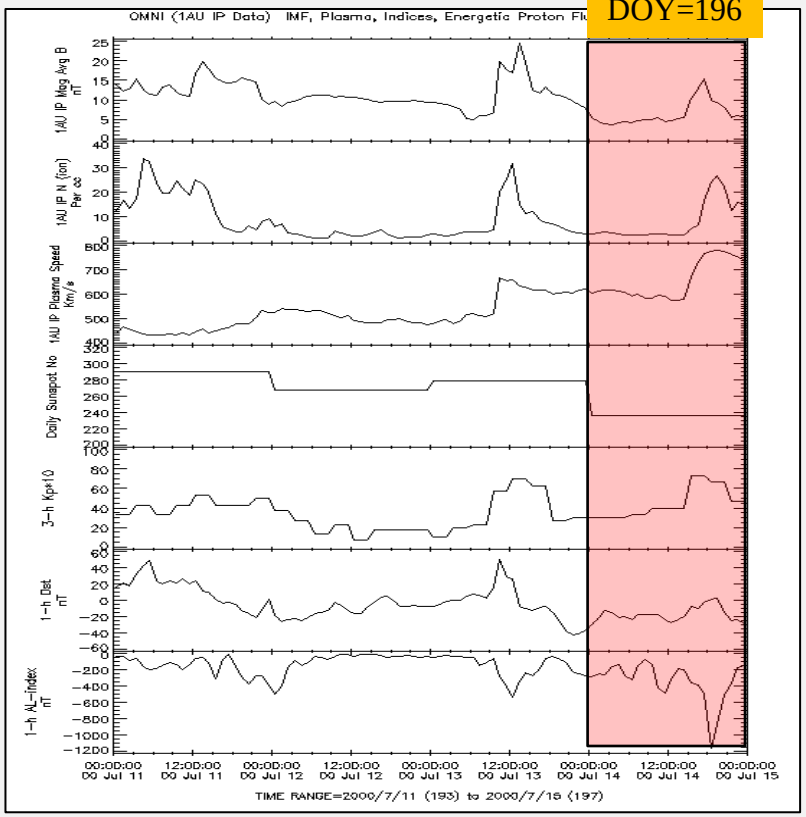


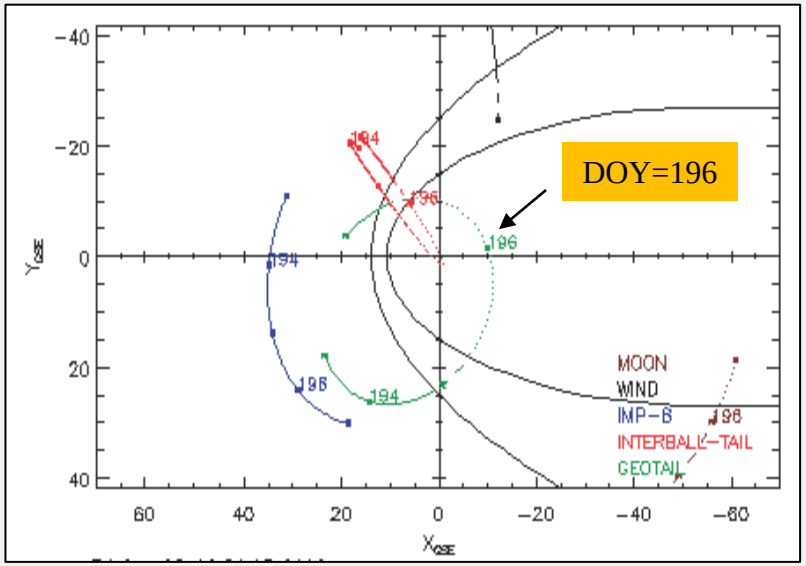




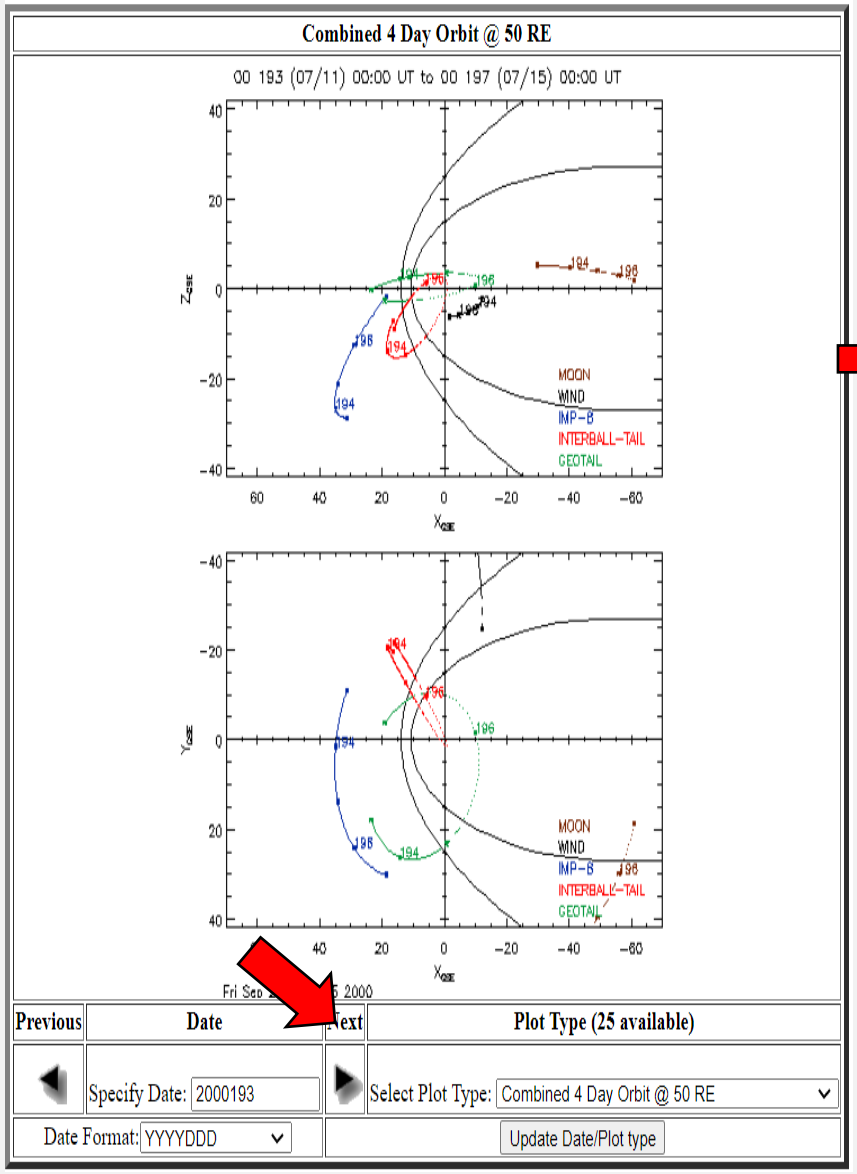
ENERGIZED MAGNETOTAIL & MAGNETOSHEATH





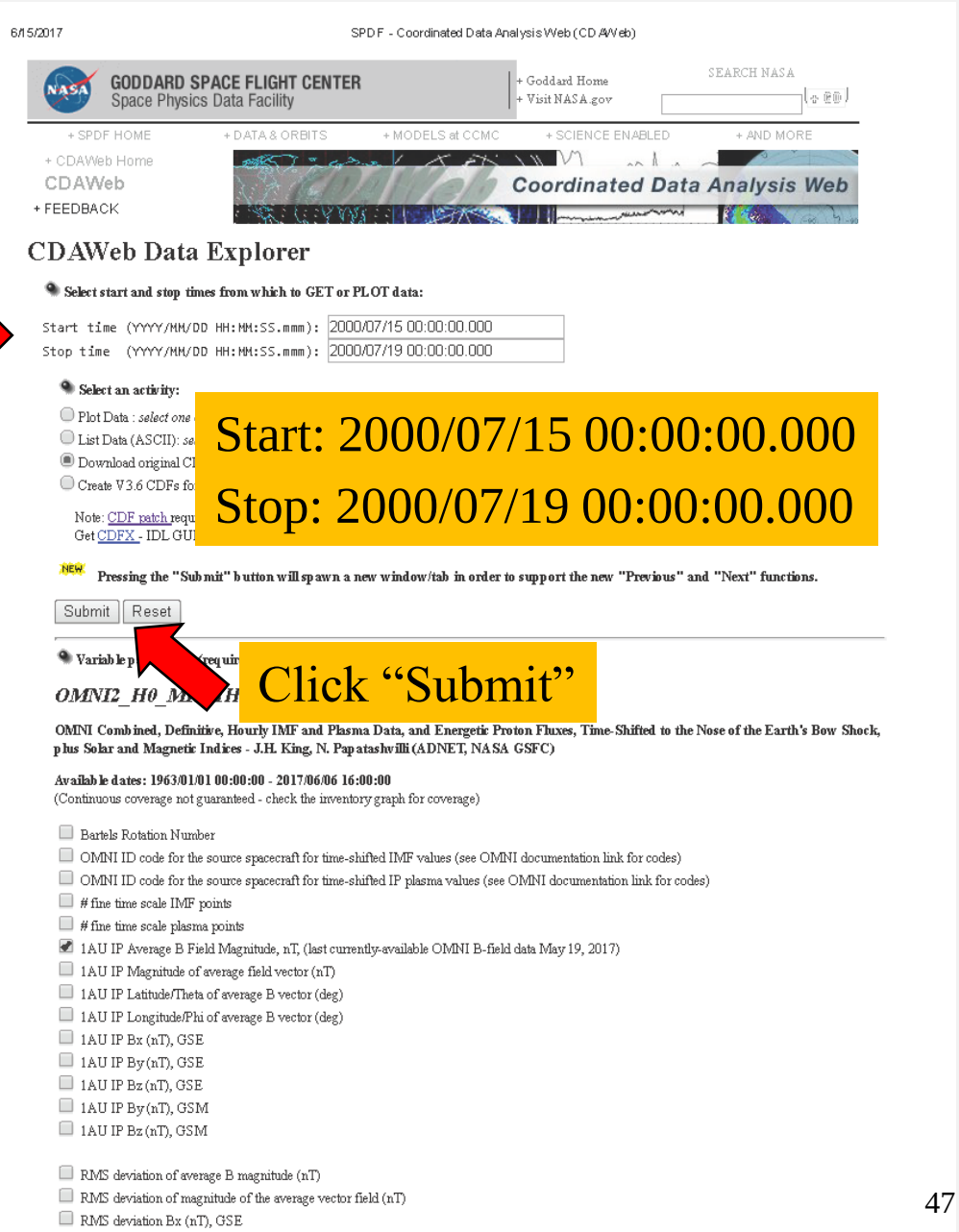


Update the Orbit Plot (Browser-2)



Click “Next”

Update the Omni Data Plot (Browser-1)



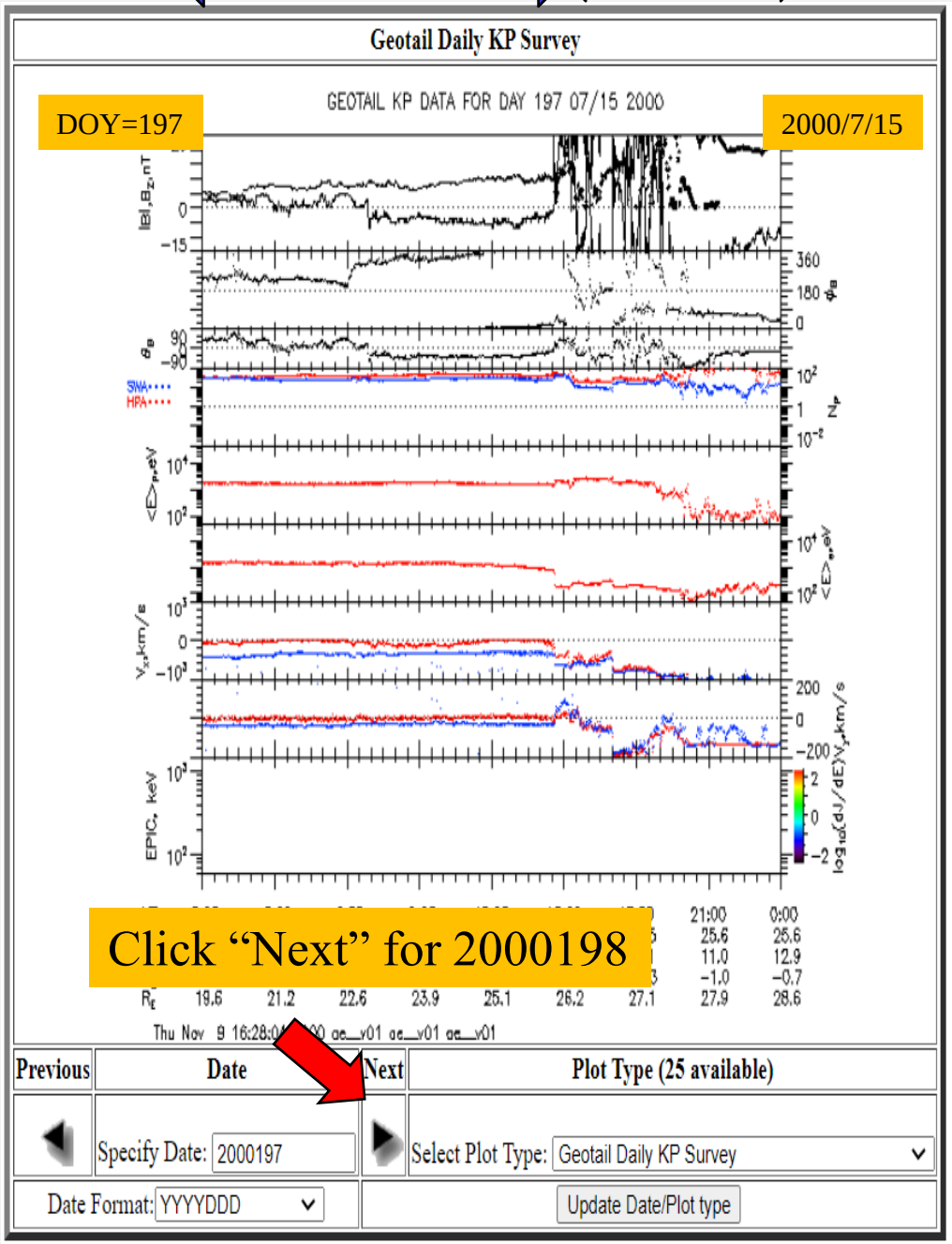
Start: 2000/07/15 00:00:00.000

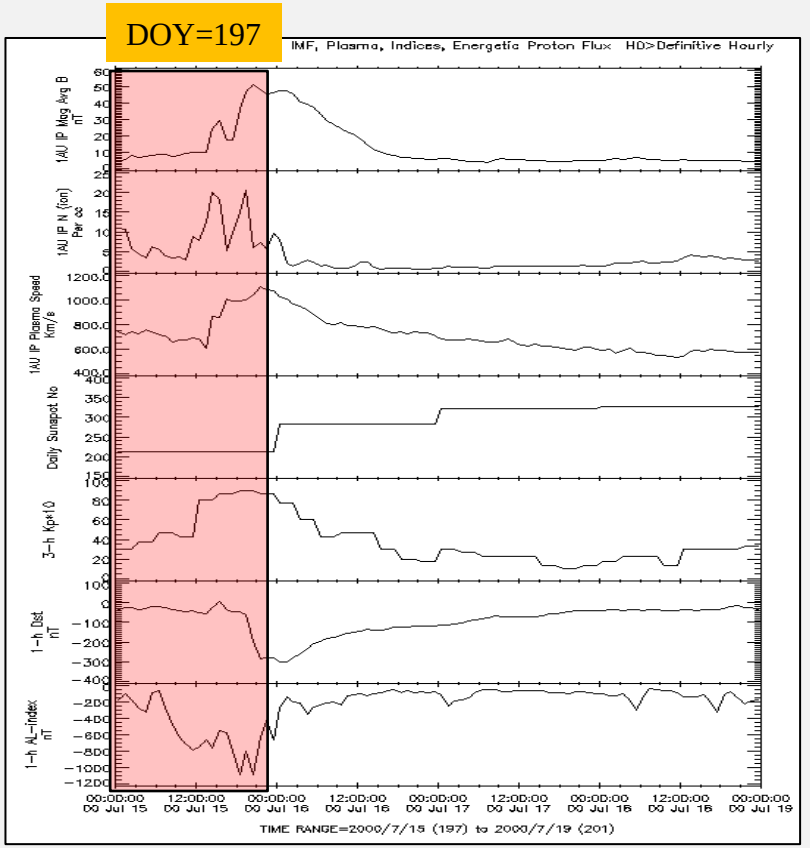
Stop: 2000/07/19 00:00:00.000

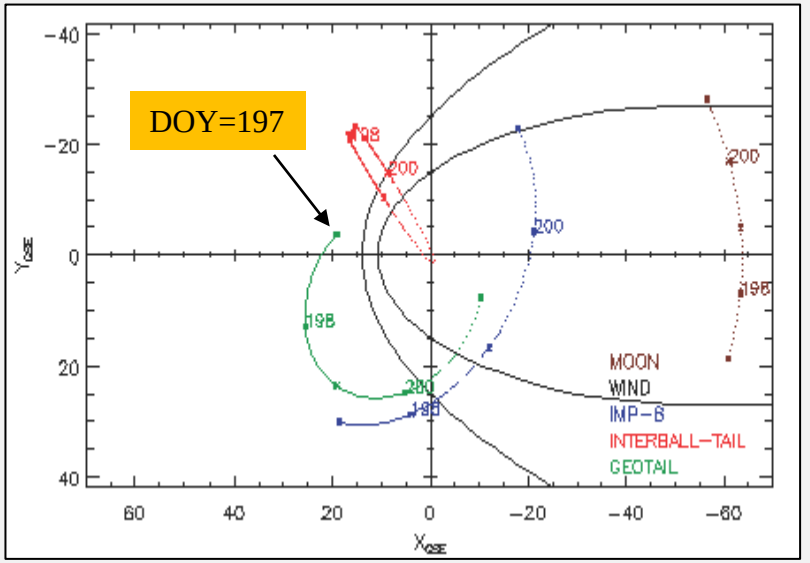
Click “Submit”

ENHANCED SOLAR WND

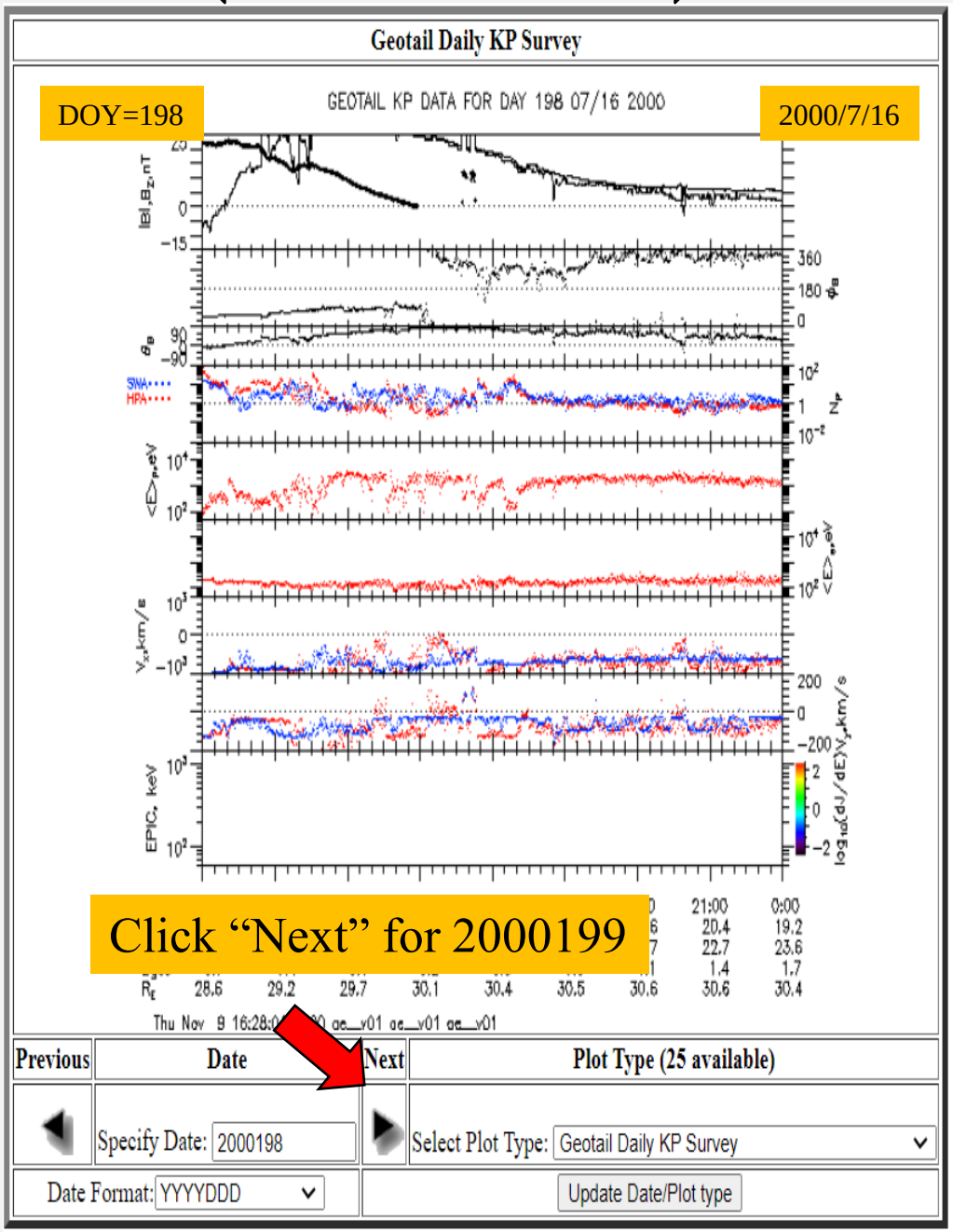
MAGNETIC CLOUD

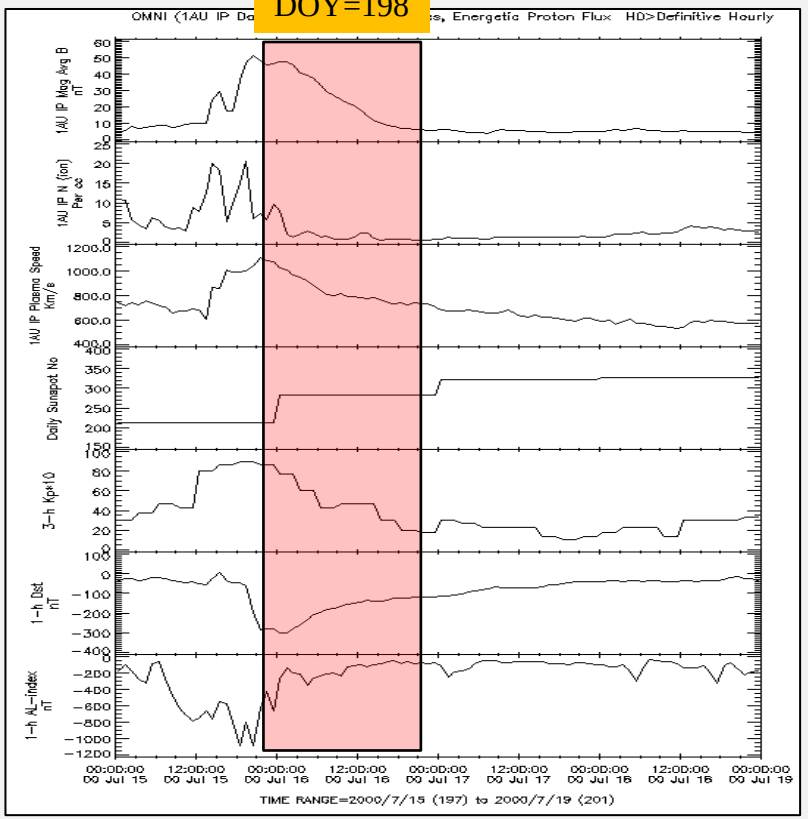


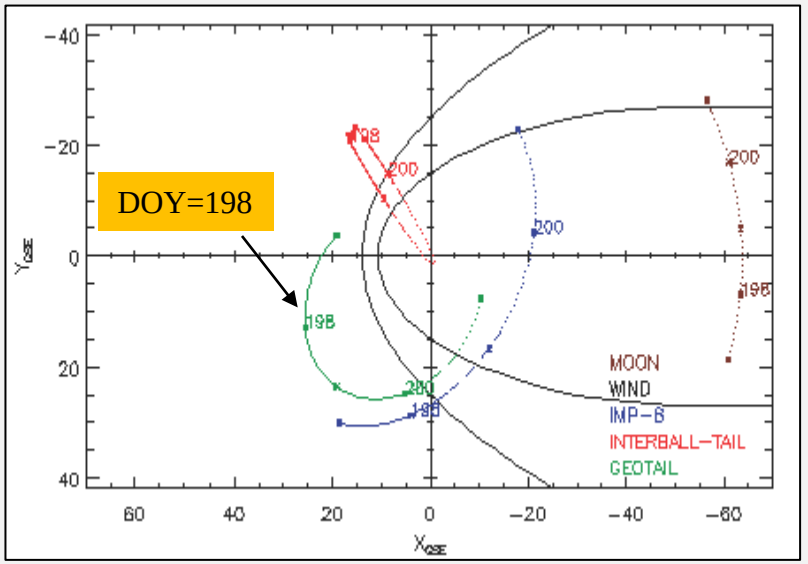




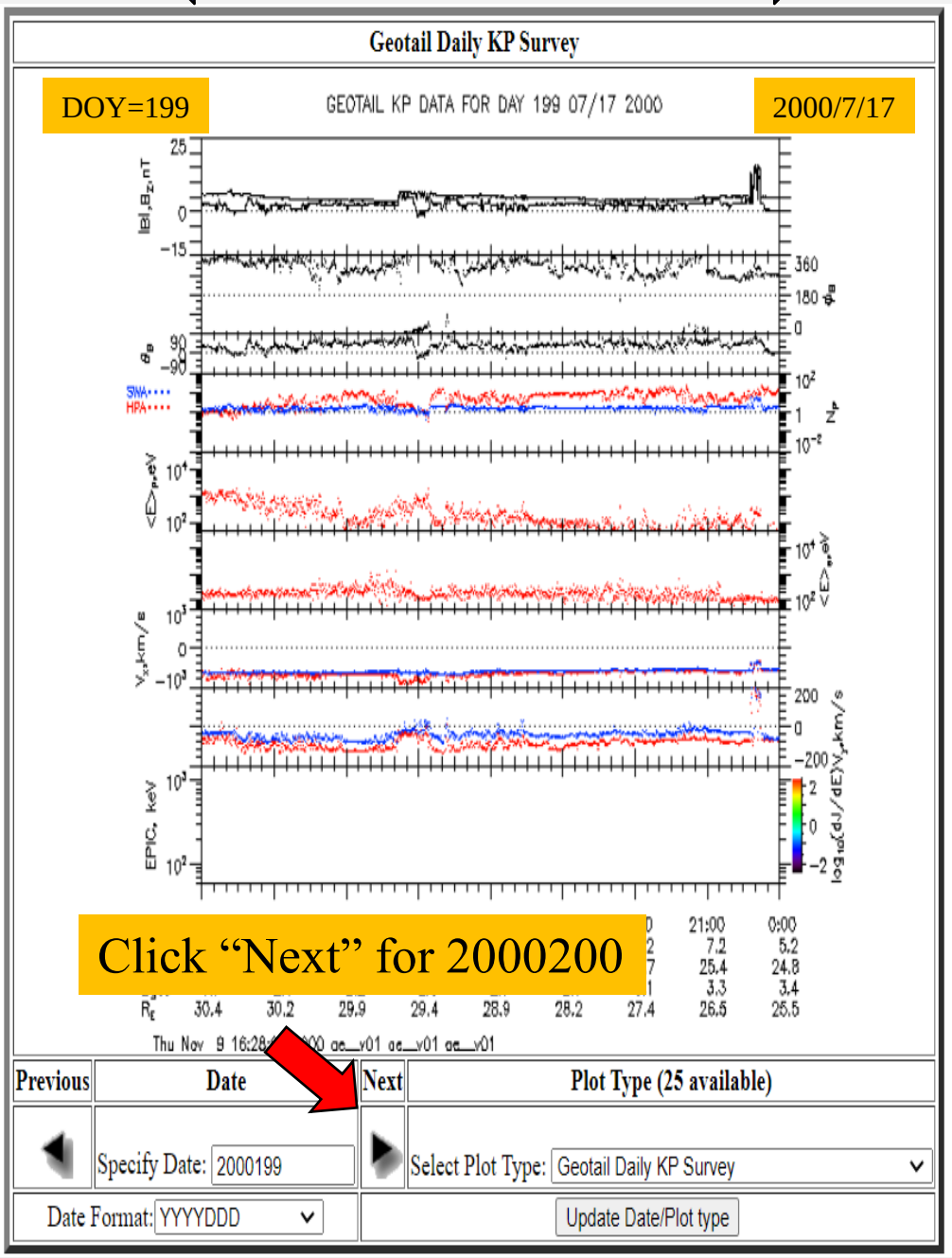
MAGNETIC CLOUD

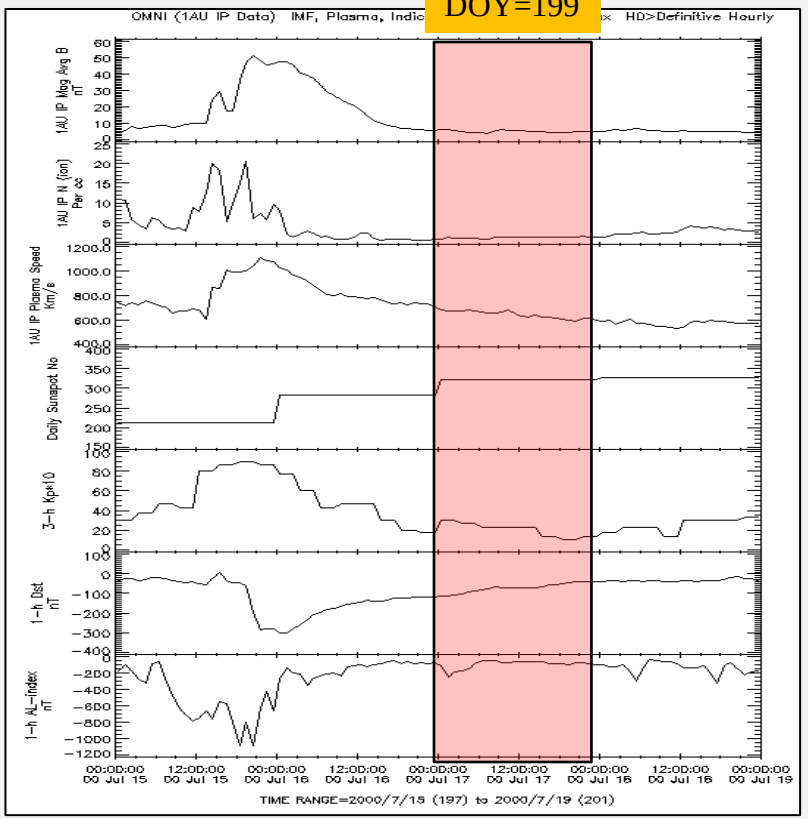


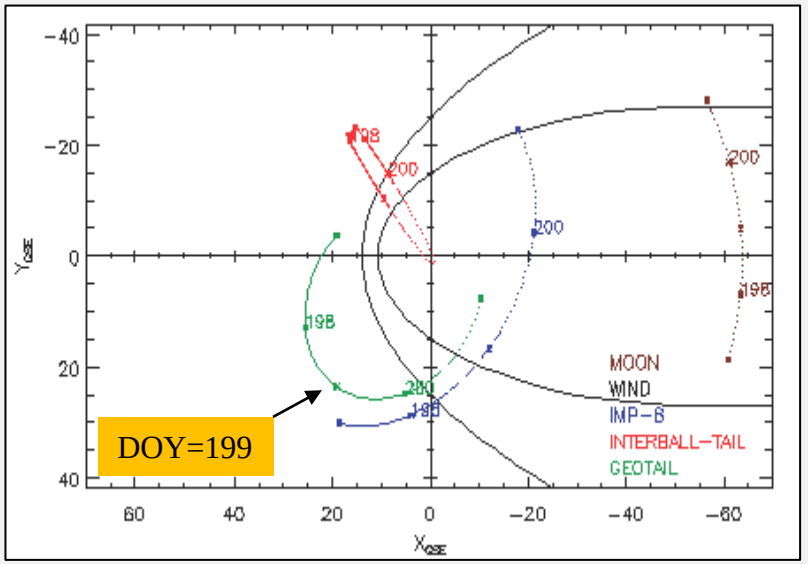




NORMAL SOLAR WND

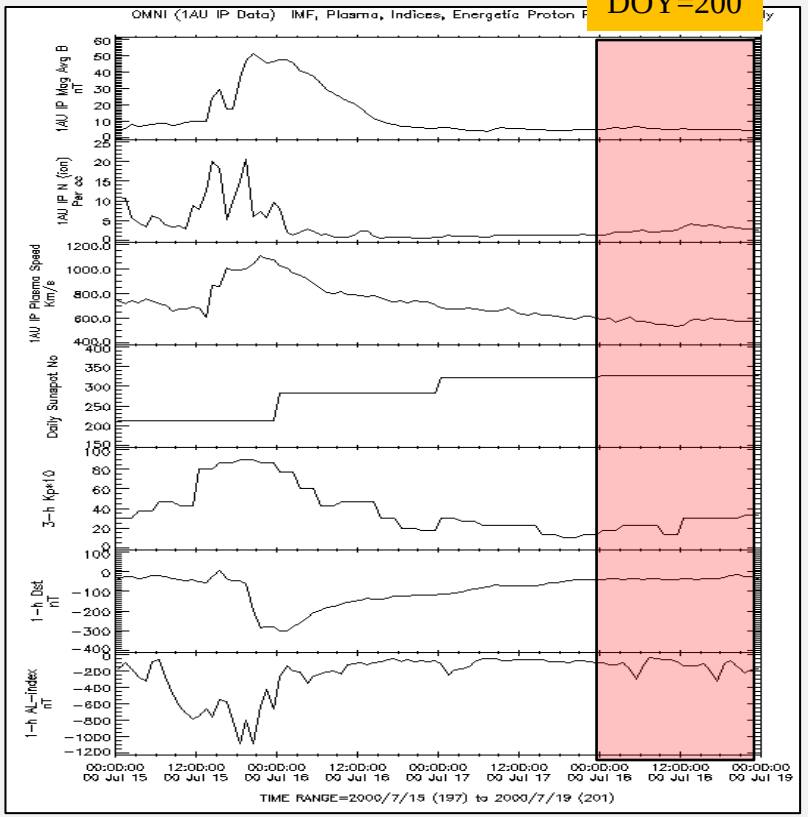






MAGNETOSHEATH MAGNETOSPHERE

DOY=200

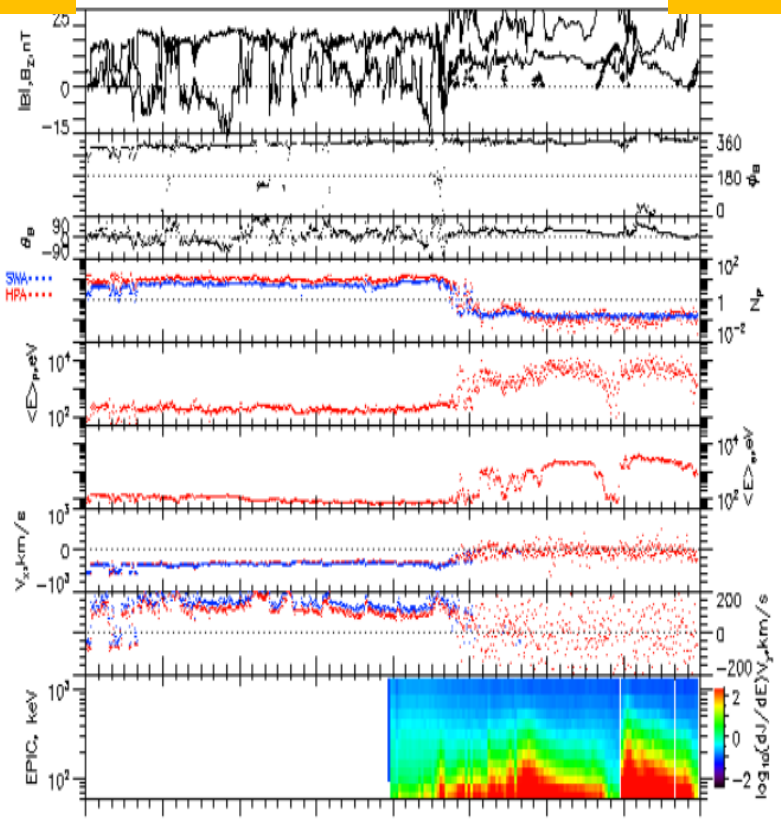


Geotail Daily KP Survey

DOY=200

GEOTAIL KP DATA FOR DAY 200 07/18 2000

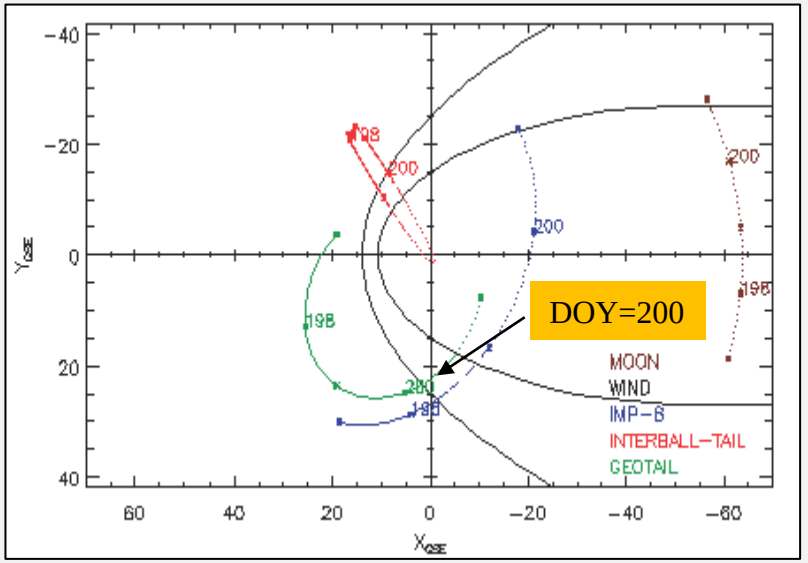
2000/7/18



The Bastille Day event is now over.

Thu Nov 9 16:28:05 2000 ae__v01 ae__v01 ae__v01

Previous	Date	Next	Plot Type (25 available)
◀	Specify Date: 2000200	▶	Select Plot Type: Geotail Daily KP Survey
Date Format: YYYYDDD			Update Date/Plot type



We can also look at spacecraft auroral imaging during the Bastille Day event

+ SPDF HOME | + MISSION DATA | + MODELS at CCMC | + SCIENCE ENABLED | + AND MORE

CDAWeb

+ CDAWEB HOME
+ FEEDBACK
+ ABOUT CDAWEB

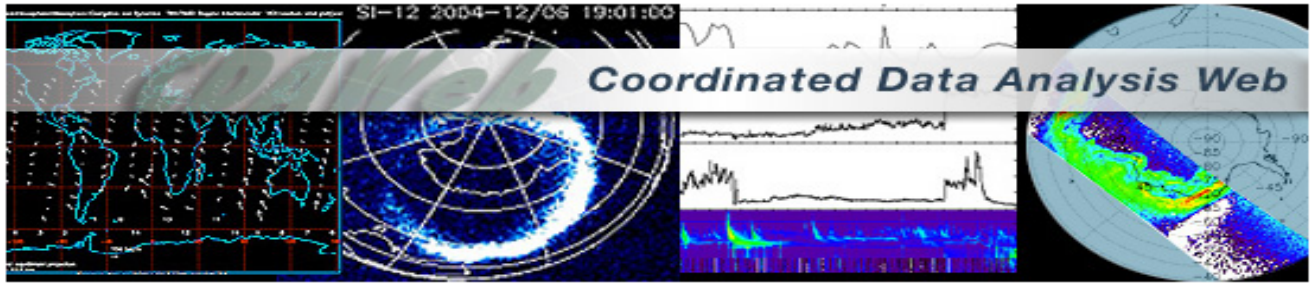
CDAWeb Mirror Site
+ RAL/UK

Guides and Tutorials
+ CDAWeb help
+ Internet browser help

Direct Access to Data
+ Direct HTTP(S) to Data
+ Direct FTP(S) to Data
  (FTPS required)

Additional Services
+ CDAWeb Inside IDL
+ Overview of Alternative Data Access Methods
+ Autoplot.org **(non-NASA)** interface to public CDAWeb database
+ Pre-generated Data and Orbit plots via SPDFs GIFWALK

Additional Resources
+ Usage Statistics
+ Space Physics Use of CDF
+ Data Inventory Graph
+ SPDF Home Page



Coordinated Data Analysis Web (CDAWeb)

Public data from current and past space physics missions

NEW
September 28, 2021: ALL SPD… be unavailable from 10:30am … the systems/services accordi…

Open a ***FOURTH*** browser to this page

NEW
July 2021: The Parker Solar Probe (PSP) data have been extended to March 2021, which includes Encounter 7, the rest of Orbit 7, and the 4th Venus flyby. Some SWEAP SPAN data sets had new variables added. The Fluxgate magnetic field data are reprocessed for the entire mission. The merged fluxgate and search coil magnetic field data are updated for Encounters 1-3, and the high-rate EPI-Hi data of ISOIS from 2020-11-30 to 2020-12-02 are not fully calibrated yet.

NEW
May 2021: The GOLD NMAX, ON2, TDISK and ICON IVM data sets have been added to the system (with others coming soon).

PREVIOUS DATA & SOFTWARE UPDATES ...

- **Select zero OR more Sources** (default = All Sources if >=1 Instrument Type is selected)

- **Select zero OR more Instrument Types** (default = All Instrument Types if >=1 Source is selected)

Scroll down…….

☐ ACE
☐ AMPTE
☐ Activity Indices

- [ ] Helios
- [x] IMAGE
- [ ] IMP (All)
- [ ] ISS
- [ ] Interball
- [ ] LANL
- [ ] MESSENGER
- [ ] MMS
- [ ] NOAA
- [ ] OMNI (Combined 1AU IP Data; Magnetic and Solar Indices)
- [ ] POES/MetOp
- [ ] Pioneer
- [ ] Polar
- [ ] ROCSAT-1(FORMOSAT-1)/IPEI
- [ ] SAMPEX
- [ ] SNOE
- [ ] SOHO
- [ ] ST5
- [ ] STEREO
- [ ] THEMIS
- [ ] TIMED
- [ ] TWINS
- [ ] Ulysses
- [ ] Van Allen Probes (RBSP)
- [ ] Voyager
- [ ] Wind
- [ ] Ground-Based Investigations
- [ ] Particles (space)
- [ ] Plasma and Solar Wind
- [ ] Radio and Plasma Waves (space)
- [ ] Spacecraft Potential Control
- [ ] Ground Based Magnetometers
- [ ] Ground-Based HF-Radars
- [ ] Ground-Based Imagers
- [ ] Ground-Based Magnetometers, Riometers, Sounders
- [ ] Ground-Based VLF/ELF/ULF, Photometers

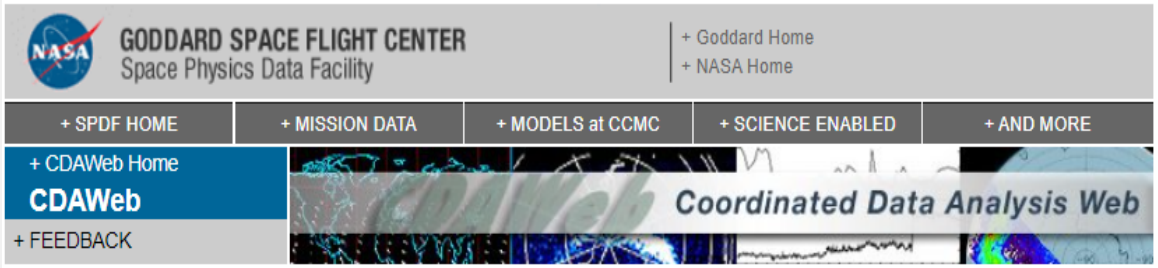
Select: “IMAGE”

Submit Reset

Hit “Submit”

+ USA.gov
+ Privacy Policy and Important Notices

Curator: Tami Kovalick
NASA Official: Robert McGuire
(301)286-7794, Robert.E.McGuire@nasa.gov
Updated: Daily



CDAWeb Data Selector

- To go forward to plot, list and retrieve your selected data, press the "submit" button directly below or at the bottom of this page.
- For any special notes on usage of a given data set, please click on that data set name below.
- As needed to select the datasets of actual interest to you:

  - manually check/uncheck one or more data sets from the list below OR
  - Click here to CLEAR All checkboxes, OR
  - Click here to SELECT All checkboxes

Hit "CLEAR All"

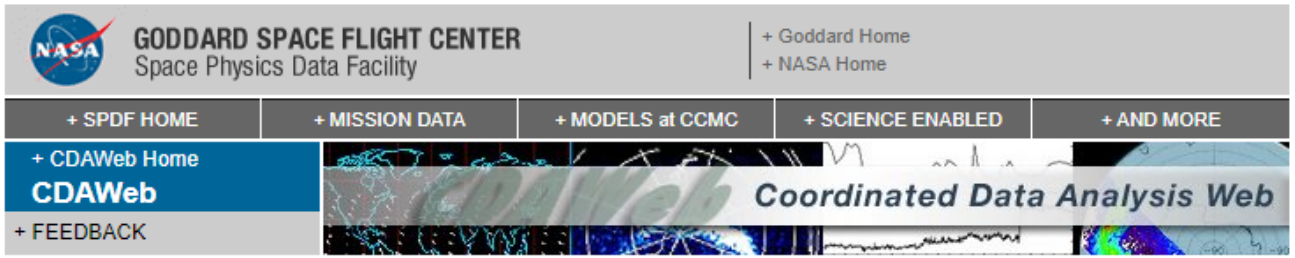
Submit

- [ ] **IMAGE_M2_EUV:** Imager for Magnetospause-to-Aurora Global Extreme Ultraviolet Imager Modified Data 2 - R. M. Katus (Eastern Michigan University)
  [Available Time Range: 2000/05/03 20:20:00 - 2005/12/17 23:49:59]
- [ ] **IM_K0_EUV:** Ion Images, Key Parameters, IMAGE Extreme UltraViolet (EUV) experiment - Bill Sandel (U/Arizona)
  [Available Time Range: 2000/03/28 09:56:32 - 2005/12/18 02:49:43]
- [ ] **IM_K0_SIE:** Electron Auroral Images @ 1356A, Key Parameters, IMAGE Far UltraViolet (FUV) Spectrographic Imaging camera Electrons (SIE) - S. Mende (UC/Berkeley/SSL)
  [Available Time Range: 2000/04/25 09:52:03 - 2005/12/18 07:35:42]
- [ ] **IM_K0_SIP:** Proton Auroral Images @ 1218A, Key Parameters, IMAGE Far UltraViolet (FUV) Spectrographic Imaging camera Protons (SIP) - S. Mende (UC/Berkeley/SSL)
  [Available Time Range: 2000/04/25 09:41:42 - 2005/12/18 07:35:42]
- [x] **IM_K0_WIC:** Auroral Images, Key Parameters, IMAGE Far UltraViolet (FUV)
  [Available Time Range: 2000/04/25 07:44:03 - 2005/12/18 07:35:41]

Select: "IM_K0_WIC: Auroral Images"

- [ ] **IM_K0_HENA:** High Energy Neutral Atom (HENA) H Images, Key Parameters, IMAGE - Dr. Don Mitchell (APL)
  [Available Time Range: 2000/04/21 01:50:04 - 2005/12/18 07:28:01]
- [ ] **IM_K0_LENA:** IMAGE Low Energy Neutral Atom (LENA) Imager Key Parameters - Dr. Tom Moore (GSFC)
  [Available Time Range: 2000/05/24 00:00:00 - 2005/12/18 07:31:59]
- [ ] **IM_K0_MENA:** Medium Energy Neutral Atom (MENA) H Images, Key Parameters, IMAGE - Dr. Craig Pollock (SwRI)
  [Available Time Range: 2000/04/04 12:56:37 - 2005/12/18 07:34:05]
- [ ] **IM_K0_RPI:** RPI Plasmagram/Echomap, Key Parameters, IMAGE Radio Plasma Imager (RPI) - B.W. Reinisch (UMLCAR)
  [Available Time Range: 2000/03/26 07:51:50 - 2005/12/18 07:40:47]

Scroll Down and Hit "Submit"



CDAWeb Data Explorer

Select start and stop times from which to GET or PLOT data:

Start time (YYYY/MM/DD HH:MM:SS.mmm): 2000/07/15 00:00:00.000
Stop time (YYYY/MM/DD HH:MM:SS.mmm): 2000/07/16 00:00:00.000

Start: 2000/07/15 00:00:00.000
Stop: 2000/07/16 00:00:00.000

☐ **Compute uniformly spaced binned data for scalar/vector/spectrogram data (not available with noise filtering)** NEW

☐ **Use spike removal to filter data without binning** (not available with noise filtering)(Warning: Experimental !!).

Select an activity:

◉ Plot Data : *select one or more variables from list below and press submit.*

- ☐ **Also create PS and PDF best quality outputs** (all plot types except images and plasmagrams).
  Many panels per dataset are allowed but <=4 panels optimal for standard Y-axis height and single page display.
- ☐ **Use coarse noise filtering** to remove values outside 3 deviations from mean of all values in the plotted time interval.
- ☐ **Increase the Y-axis height** for time-series and spectrogram plots. NEW
- ☐ **Combine all time-series and spectrogram plots**, for all requested datasets, into one plot file.
- ☐ **Plot overlay options.** NEW

○ List Data (ASCII/CSV): *select one or more variables from list below and press submit. (Works best for < 31 days)*
○ Download original files : *press submit button to retrieve list of files. (Max. 200 days - use HTTPS site for larger requests)*
○ Create V3.8 CDFs for download or Autoplot demonstration: *select one or more variables from the list below and press submit.*
○ Create audio files based on data from selected variables. NEW

More information about audification is available here.

Scroll down……

Note: CDF patch required for reading Version 3.8 CDFs in IDL or MATLAB.
Get CDFX - IDL GUI plotting/listing toolkit software. To be used with either the daily or "created" CDF files available above.

NEW **Pressing the "Submit" button will spawn a new window/tab in order to support the new "Previous" and "Next" functions.**

Submit Reset

Variable parameters (required for Listing, Creating and Plotting data only)

IM_K0_WIC

Auroral Images, Key Parameters, IMAGE Far UltraViolet (FUV) Wide-band Imaging Camera (WIC) - S. Mende (UC/Berkeley/SSL)

Available dates: 2000/04/25 07:44:03 - 2005/12/18 07:35:41
(Continuous coverage not guaranteed - check the inventory graph for coverage)

- [x] FUV/WIC LBH Auroral Images (raw cnts/14 bits, no grid, small format, linear scale)
- [ ] ---> FUV/WIC LBH Auroral Images, as above (large format)
- [ ] ---> as above (movie format)
- [ ] ---> FUV/WIC LBH Auroral Images, as above (small format, log10 scaling)
- [ ] ---> FUV/WIC LBH Auroral Images, as above (large format, log10 scaling)
- [ ] ---> as above (movie format log10 scaling)
- [ ] [DO NOT USE] FUV/WIC LBH Auroral Mapped Images (raw cnts/14 bits, large format, linear scale)
- [ ] ---> [DO NOT USE] FUV/WIC LBH Auroral Mapped images, as above (movie format)
- [ ] ---> [DO NOT USE] FUV/WIC LBH Auroral Mapped Images, as above (log10 scaling)
- [ ] ---> [DO NOT USE] FUV/WIC LBH Auroral Mapped Images, as above (movie format, log10 scaling)
- [ ] WIC spin number (time_equivalent)
- [ ] WIC Quality parameter (1=Good, 2=Bad)
- [ ] IMAGE Geocentric Distance
- [ ] HV setting for WIC Phosphor
- [ ] HV setting for WIC MCP
- [ ] expansion factor for FOV
- [ ] spin phase angle
- [ ] orientation direction cosine X (direction of true spin axis at WIC Snapshot Time)
- [ ] orientation direction cosine Y (direction of true spin axis at WIC Snapshot Time)
- [ ] orientation direction cosine Z
- [ ] IMAGE GCI position X
- [ ] IMAGE GCI position Y
- [ ] IMAGE GCI position Z
- [ ] WIC spin axis orientation direction cosine X-direction, s/c frame
- [ ] WIC spin axis orientation direction cosine Y-direction, s/c frame
- [ ] WIC spin axis orientation direction cosine Z-direction, s/c frame

Select: "FUV/WIC LBH Auroral Images"

[Summary plots, monthly overviews and substorm onsets at IMAGE FUV website at UCB]

NEW **Pressing the "Submit" button will spawn a new window/tab in order to support the new "Previous" and "Next" functions.**

Submit Reset

Hit "Submit"

GODDARD SPACE FLIGHT CENTER
Space Physics Data Facility

+ Goddard Home
+ Visit NASA.gov

SEARCH NASA
+ GO

+ SPDF HOME | + DATA & ORBITS | + MODELS at CCMC | + SCIENCE ENABLED | + AND MORE

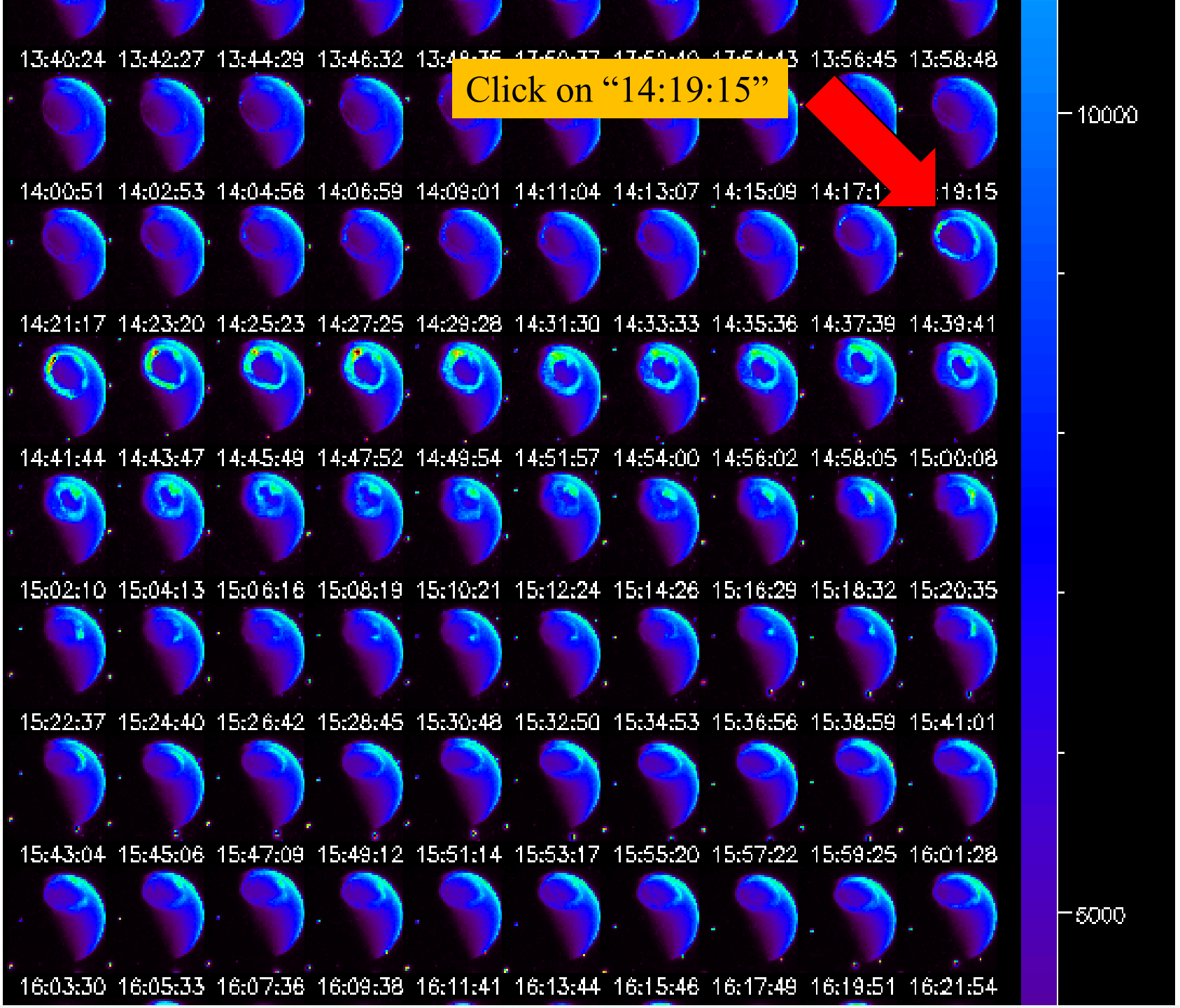
+ CDAWeb Home
CDAWeb
+ FEEDBACK

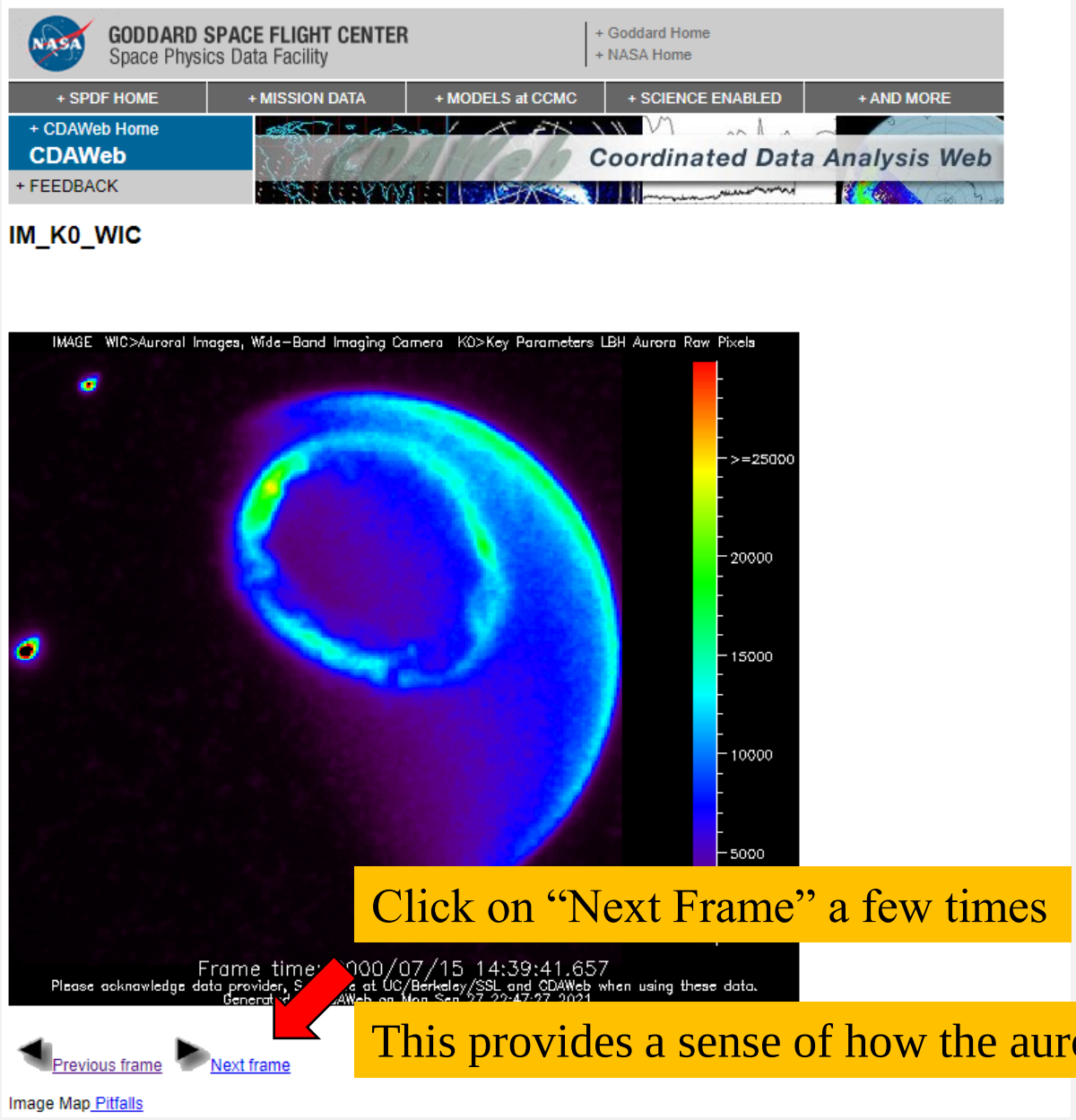
Coordinated Data Analysis Web

Note: Expand by clicking on any thumbnail image below.

IM_K0_WIC

Scroll down……


13:40:24 13:42:27 13:44:29 13:46:32 13:56:45 13:58:48
Click on “14:19:15”
14:00:51 14:02:53 14:04:56 14:06:59 14:09:01 14:11:04 14:13:07 14:15:09
14:21:17 14:23:20 14:25:23 14:27:25 14:29:28 14:31:30 14:33:33 14:35:36 14:37:39 14:39:41
14:41:44 14:43:47 14:45:49 14:47:52 14:49:54 14:51:57 14:54:00 14:56:02 14:58:05 15:00:08
15:02:10 15:04:13 15:06:16 15:08:19 15:10:21 15:12:24 15:14:26 15:16:29 15:18:32 15:20:35
15:22:37 15:24:40 15:26:42 15:28:45 15:30:48 15:32:50 15:34:53 15:36:56 15:38:59 15:41:01
15:43:04 15:45:06 15:47:09 15:49:12 15:51:14 15:53:17 15:55:20 15:57:22 15:59:25 16:01:28
16:03:30 16:05:33 16:07:36 16:09:38 16:11:41 16:13:44 16:15:46 16:17:49 16:19:51 16:21:54
10000
5000



Click on "Next Frame" a few times

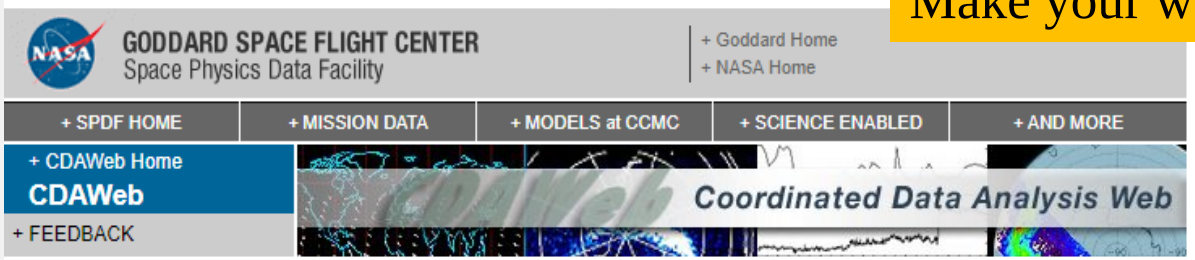
This provides a sense of how the aurora evolves with time

However, this is a cumbersome process.

Can we make a movie?

Yes!!!!

Make your way back to this page



CDAWeb Data Explorer

Select start and stop times from which to GET or PLOT data:

Start time (YYYY/MM/DD HH:MM:SS.mmm): 2000/07/15 05:30:00.000
Stop time (YYYY/MM/DD HH:MM:SS.mmm): 2000/07/15 14:00:00.000

Start: 2000/07/15 05:30:00.000
Stop: 2000/07/15 14:00:00.000

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○ Download original files : *press submit button to retrieve list of files. (Max. 200 days - use HTTPS site for larger requests)*
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Submit Reset

Scroll down……

Variable parameters (required for Listing, Creating and Plotting data only)

IM_K0_WIC

Auroral Images, Key Parameters, IMAGE Far UltraViolet (FUV) Wide-band Imaging Camera (WIC) - S. Mende (UC/Berkeley/SSL)

Available dates: 2000/04/25 07:44:03 - 2005/12/18 07:35:41
(Continuous coverage not guaranteed - check the inventory graph for coverage)

- [ ] FUV/WIC LBH Auroral Images (raw cnts/14 bits, no grid, small format, linear scale)
- [ ] ---> FUV/WIC LBH Auroral Images, as above (large format)
- [x] ---> as above (movie format)
- [ ] ---> FUV/WIC LBH Auroral Images, as above (small format, log10 scaling)
- [ ] ---> FUV/WIC LBH Auroral Images, as above (large format, log10 scaling)
- [ ] ---> as above (movie format log10 scaling)
- [ ] [DO NOT USE] FUV/WIC LBH Auroral Mapped Images (raw cnts/14 bits, large format, linear scale)
- [ ] ---> [DO NOT USE] FUV/WIC LBH Auroral Mapped images, as above (movie format)
- [ ] ---> [DO NOT USE] FUV/WIC LBH Auroral Mapped Images, as above (log10 scaling)
- [ ] ---> [DO NOT USE] FUV/WIC LBH Auroral Mapped Images, as above (movie format, log10 scaling)
- [ ] WIC spin number (time_equivalent)
- [ ] WIC Quality parameter (1=Good, 2=Bad)
- [ ] IMAGE Geocentric Distance
- [ ] HV setting for WIC Phosphor
- [ ] HV setting for WIC MCP
- [ ] expansion factor for FOV
- [ ] spin phase angle
- [ ] orientation direction cosine X (direction of true spin axis at WIC Snapshot Time)
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- [ ] WIC spin axis orientation direction cosine X-direction, s/c frame
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[Summary plots, monthly overviews and substorm onsets at IMAGE FUV website at UCB]

NEW **Pressing the "Submit" button will spawn a new window/tab in order to support the new "Previous" and "Next" functions.**

Submit Reset

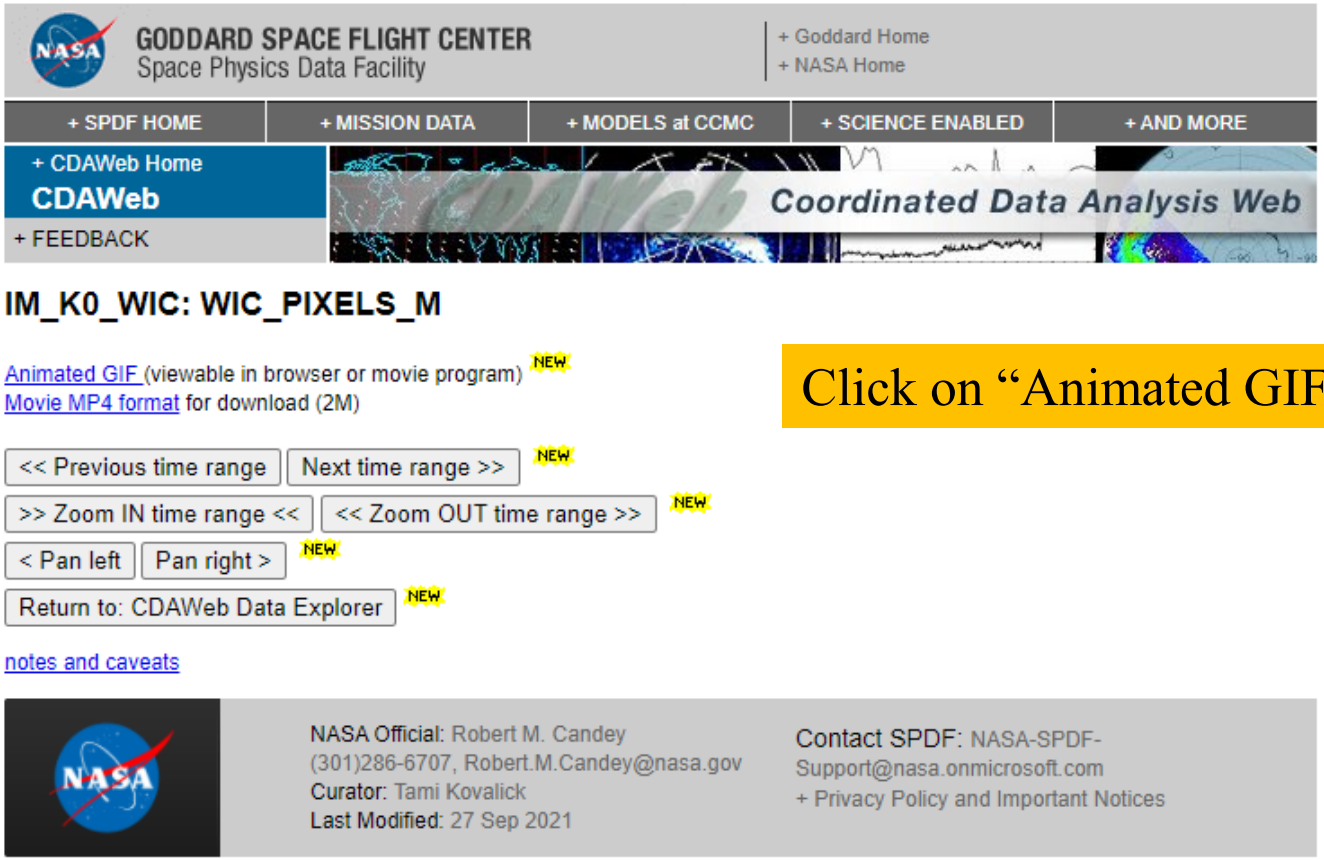
- Notices/Warnings
- Data Inventory Graph
- CDFX - IDL GUI plotting/listing toolkit software.
- CDAWeb FTP site (shows actual data inventory)
- SPDF Home Page

+ USA.gov
+ Privacy Policy and Important Notices

Curator: Tami Kovalick
NASA Official: Robert McGuire
(301)286-7794, Robert.E.McGuire@nasa.gov
Updated: Daily

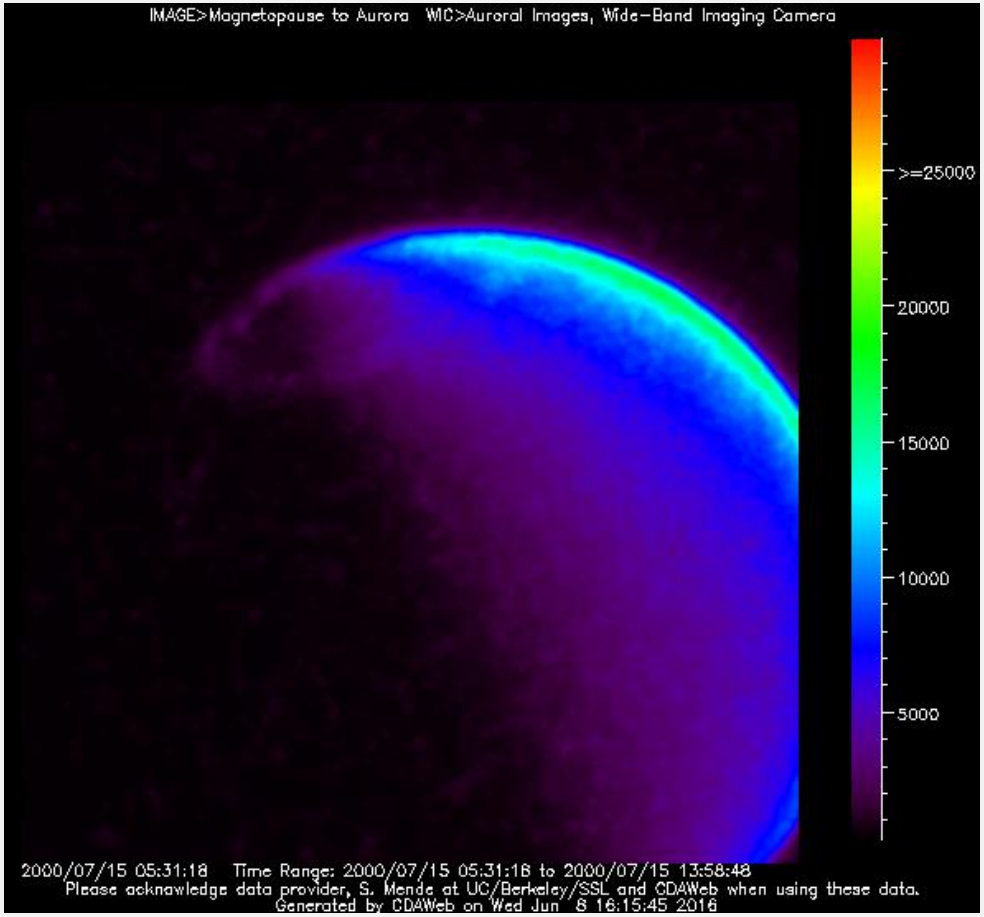
Select: “as above (movie format)”

Hit “Submit”

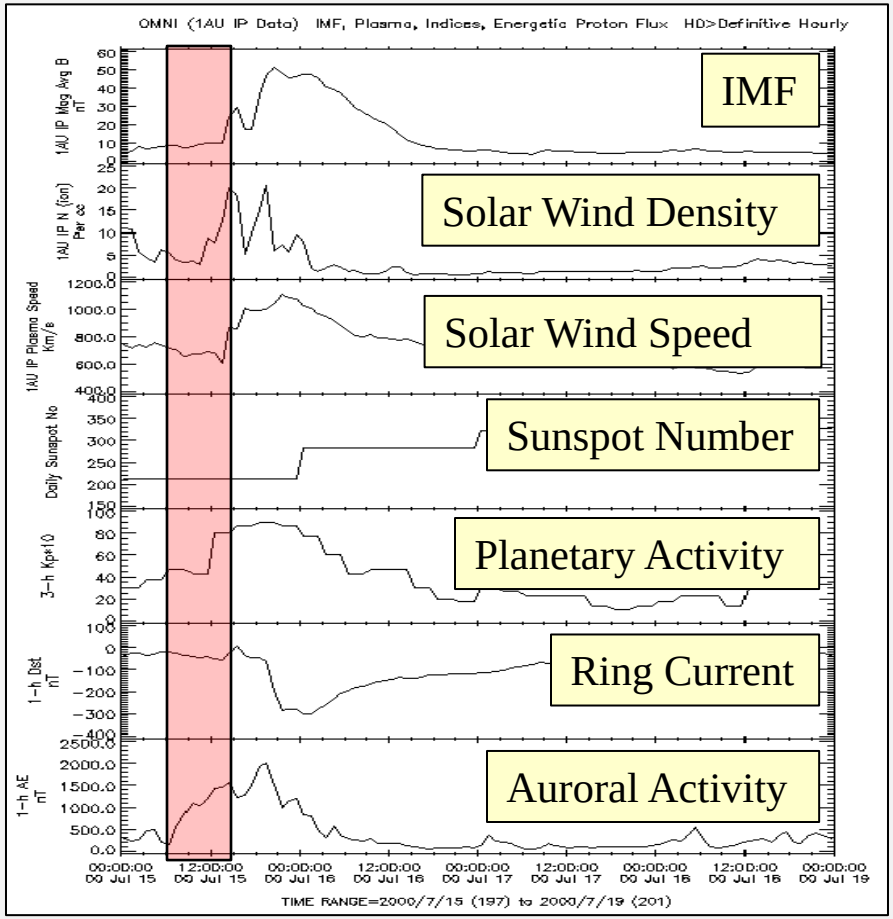


Click on “Animated GIF”

The movie should look like this….



….corresponding to these conditions



Start: 2000/07/15 05:30:00.000

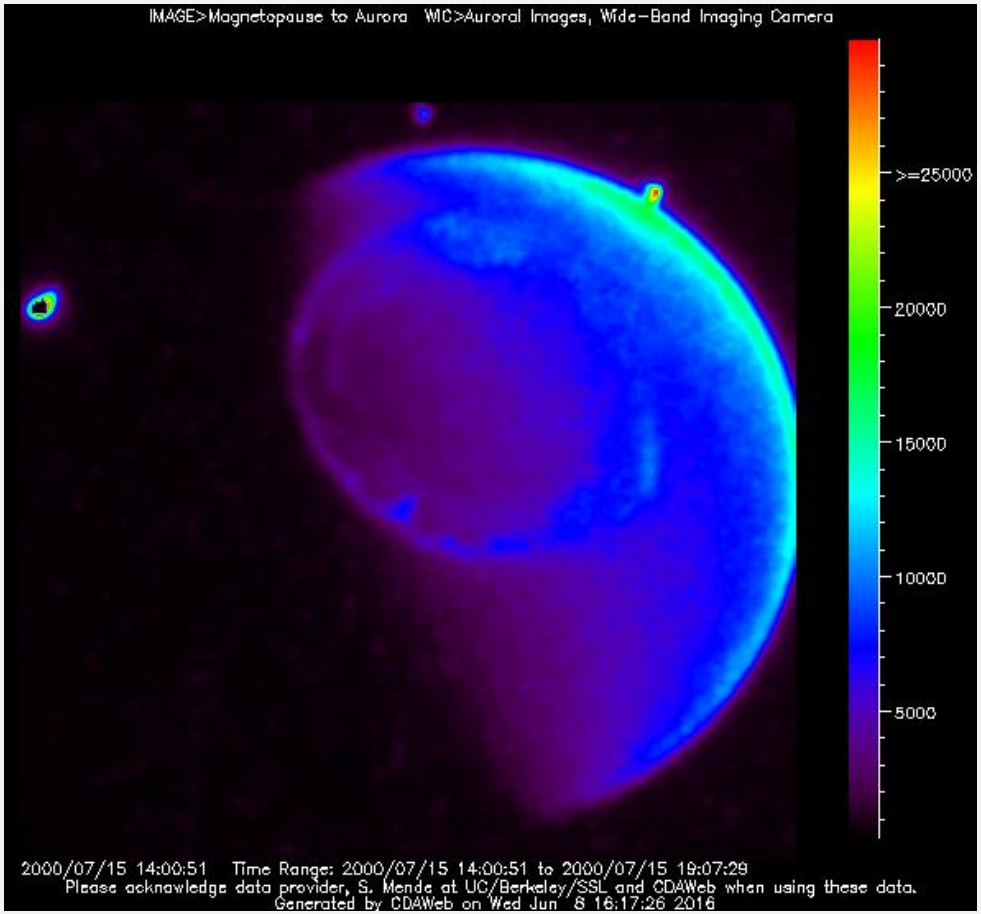
Stop: 2000/07/15 14:00:00.000

i.e. Arrival of the Magnetic Cloud…

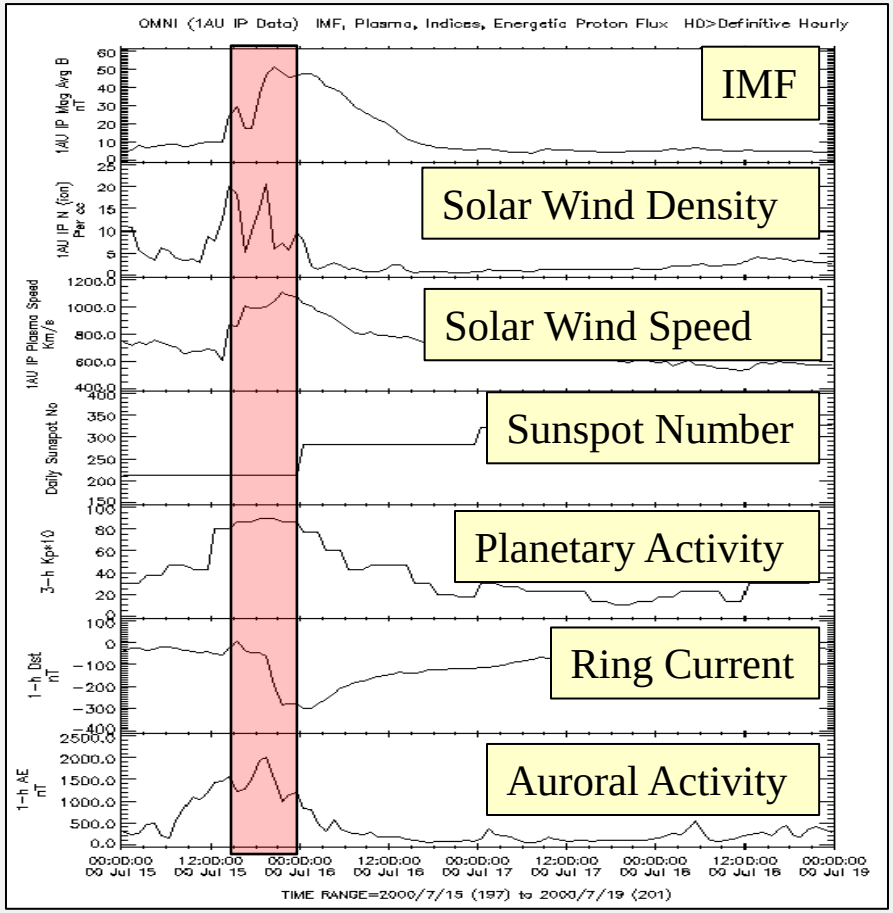
…and *increased* space weather….

…and *increased* auroral activity

Later, the movie looks like this….



….corresponding to these conditions



Start: 2000/07/15 14:00:00.000

Stop: 2000/07/16 00:00:00.000

i.e. Peak of Magnetic Cloud….

…and ***maximum*** space weather….

…and ***maximum*** auroral activity

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+ SPDF HOME | + MISSION DATA | + MODELS at CCMC | + SCIENCE ENABLED | + AND MORE

CDAWeb

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+ FEEDBACK
+ ABOUT CDAWEB

CDAWeb Mirror Site
+ RAL/UK

Guides and Tutorials
+ CDAWeb help
+ Internet browser help

Direct Access to Data
+ Direct HTTP(S) to Data
+ Direct FTP(S) to Data
(FTPS required)

Additional Services
+ CDAWeb Inside IDL
+ Overview of Alternative Data Access Methods
+ Autoplot.org **(non-NASA)**

That's it for our introductory tour of NASA CDAWeb!!!

Coordinated Data Analysis Web (CDAWeb)

Public data from current and past space physics missions

NEW

September 28, 2021: ALL SPDF systems/services (CDAWeb, SSCWeb, OMNIWeb, CDF, etc.) will be unavailable from 10:30am - 12:30pm EDT Tuesday September 28th. Please plan your use of the systems/services accordingly.

NEW

July 2021: The Parker Solar Probe (PSP) data have been extended to March 2021, which includes Encounter 7, the rest of Orbit 7, and the 4th Venus flyby. Some SWEAP SPAN data sets had new variables added. The Fluxgate magnetic field data are reprocessed for the entire mission. The merged

RECAP:

(1) We used Voyager data to measure the large-scale structure of the solar wind

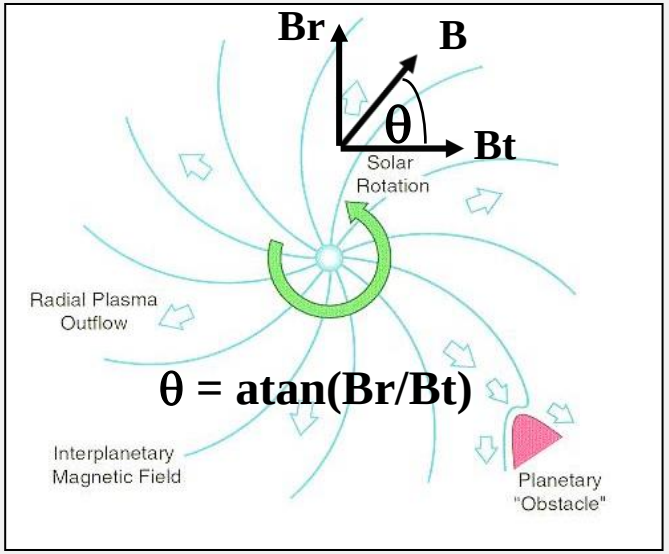
(2) We used OMNI data to show the 11-year solar cycle influence on space weather

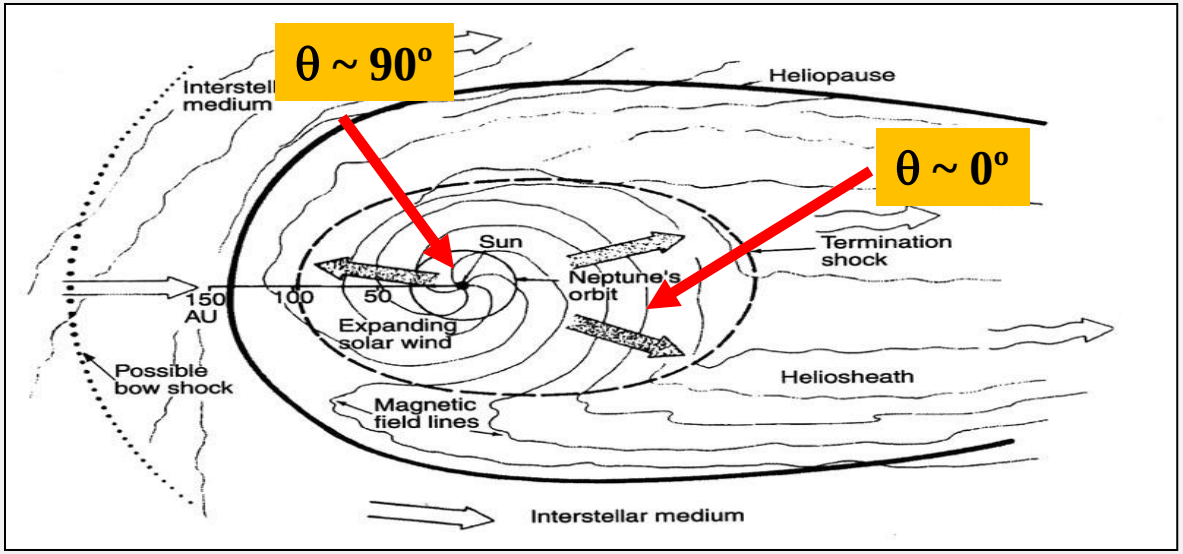
(3) We used Geotail data to see the space weather response to the Bastille Day event

(4) We looked at IMAGE spacecraft auroral movies during the Bastille Day event

You should continue exploring CDAWeb on your own over the next few days!!!

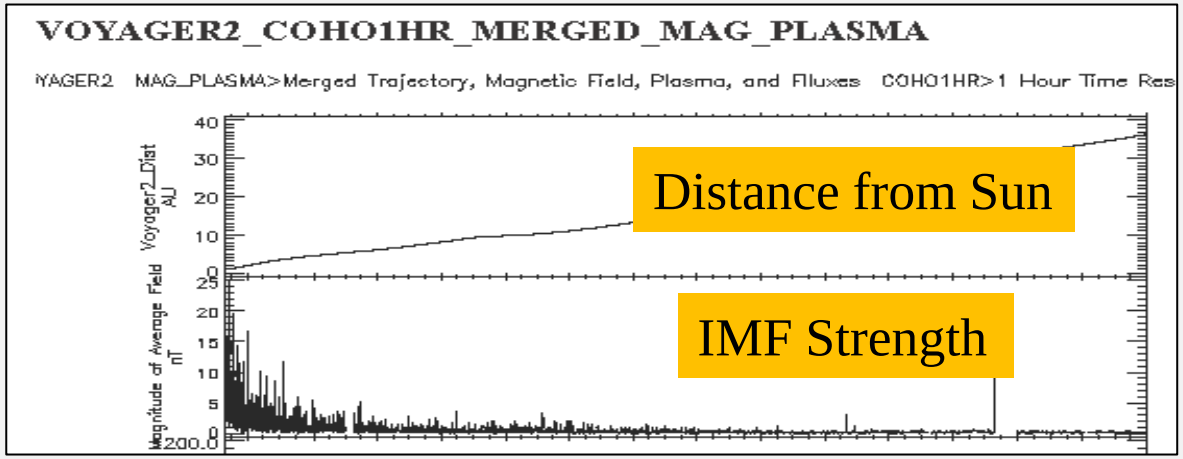
CDAWeb Application: *IMF Shape Verification*



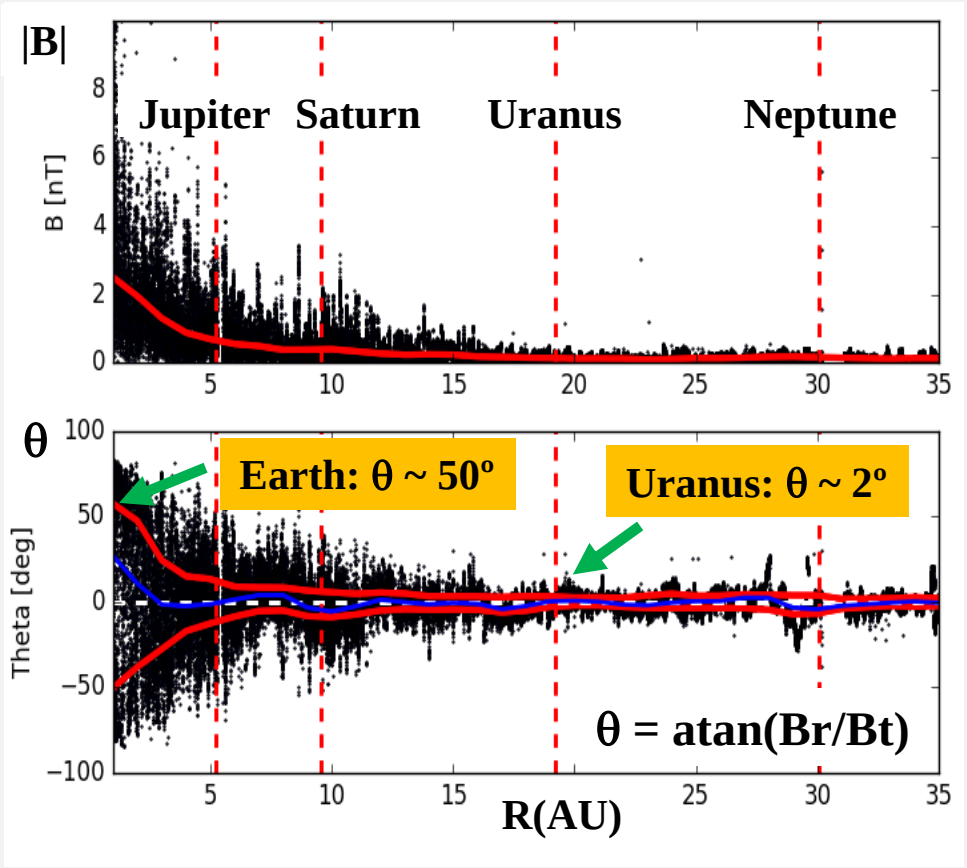


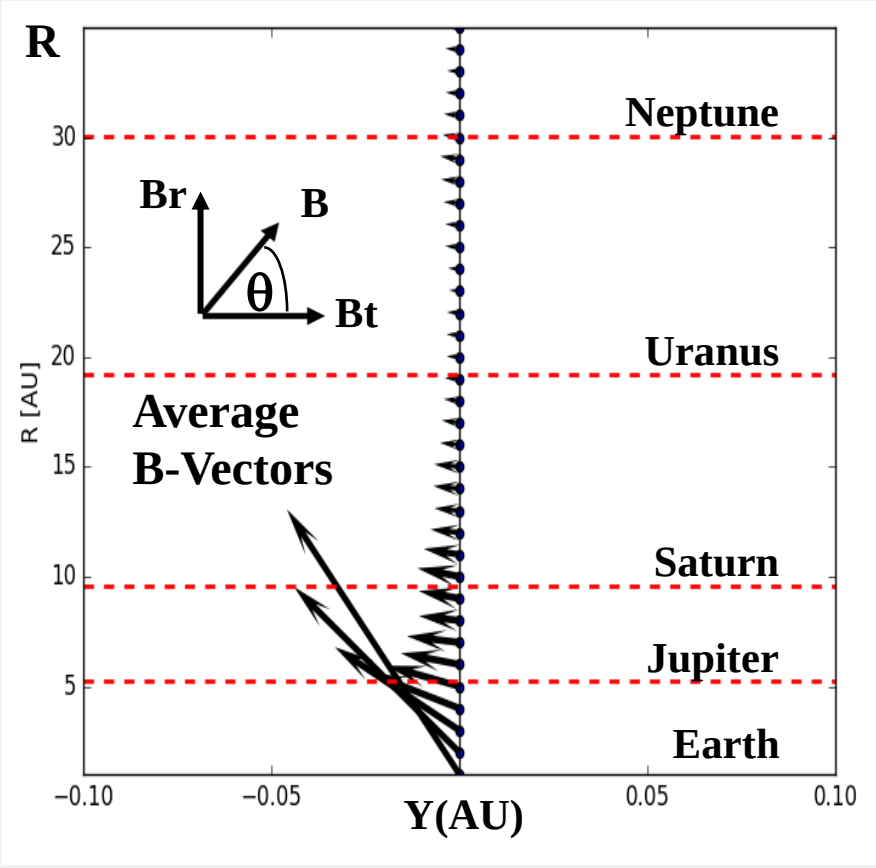
QUESTION: Does the IMF *really* look like this?

APPROACH: Look at the Voyager Data!!!!



RESULTS: *Shape of the IMF*





OBSERVATIONS:

(1) At Earth (*R* = 1 AU) the IMF is inclined ~50º to the orbital direction (i.e. Y)

(2) By Saturn, the inclination has dropped to ~6º and at Uranus it's down to ~2º

ANSWER: So…. Pretty much --- YES!! The IMF conforms to a Parker Spiral shape.