

3DVIEW Tutorial Version 2.2



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Revision History

Version	Date	Released by	Detail
1.0	July 17 th 2015	Michel Gangloff	Initial version
1.11	October 7 th 2016	Michel Gangloff	CDPP and Europlanet H2020 version Addition of a use case related to VESPA
1.11.2	May 4 th 2017	Laurent Beigbeder	Load map part completed and APIS map projection added for H2020 in §2.20
2.0	January 2 nd 2018	Michel Gangloff	Addition of a use case, provided by Frédéric Pitout, related to the Conjunction Search Tool §2.28
2.1	June 18 th 2024	D. Popescu K. Khum	Logo update and typos
2.2	October 4 th 2024	K. Khum	URL update (http to https) §2.1 Home page update §2.1 Add Need Help page §2.2

Note: Any notes here.

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1 INTRODUCTION

3DView offers 3D visualization of position and orientation of spacecraft and planetary ephemerides. This document contains several examples demonstrating some capabilities of 3DView developed during the IMPEX and Europlanet H2020 projects.

For a detailed description of the functions provided by 3DView, please read the User guide available at <https://3dview.cdpp.eu>

2 EXAMPLES

2.1 How to start 3DView

- Enter <https://3dview.cdpp.eu> in a browser



Features:

- Heliocentric/planetocentric/spaccraft view
- Bodies lighting, maps and stars
- Orbit, attitude, instrument bore sight
- Models for bow shock, magnetopause and magnetic fields
- Van allen belts (L-Shells), South Atlantic Anomaly
- Conjunctions search between spacecraft/stations
- Ground-based stations and data
- Image and movies generation
- Access to simulation and observation databases
- Cube, 2DCut, spectra, vector and scalar visualisation
- SAMP and EPN-TAP connections

2024/06/18: V2.19

- EscaPADE orbits
- Improvement of the spacecraft size management
- Fixes on crossing deletions
- Updates and fixes in the Conjunction Search Tool

2023/10/16: V2.18

- Parker field lines to all spacecraft
- REST web service access to CDAAWeb
- Option: scene without spacecraft attitude
- Improvement of footprints display in 2D/3D
- Model support for SMILE SXI (in collab. with LATMOS)

All release notes

Table of available footprints

3DView is a science tool that offers immediate 3D visualization of spacecraft position and attitude, planetary ephemerides, as well as scientific data (observations, simulations and models) representation. Orbits and attitudes are handled through SPICE kernels and related files from ESA or NASA repositories.

3DView was originally designed and owned by CNES. The software license is now GPLv3 (open source). The [source code](#) is available and any modification must keep the initial sources in GPLv3. CDPP advises any potential user to inform the 3DView team before re-using the code.

Recent important developments include: i) the ability to display ground-based instruments and their data when applicable in 2D; ii) the search for conjunctions between various types of instruments, ground-based and space-borne. These two new sets of functionalities are included in 3DView and are still developing. They are directly accessible from the main menu (Conjunction Search Tool).

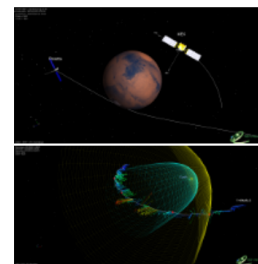
3DView is connected via web-services to several large databases (CDPP/AMDA, NASA/CDAAWeb, ESA/Cluster Science Archive) as well as to the LATMOS, FMI and SNIP model databases. 3DView also enables planetary science data discovery through a dedicated EPN-TAP client, as well as a connection to the APIS database. IVOA-SAMP is implemented for VOTable and CDF file exchange.

For a detailed description of the 3DView capabilities, please read the [tutorial](#) and the [user guide](#). Read also [the paper](#) published in Planetary and Space Science and access supplementary information [here](#).

3DView runs as a JAVA webstart application, it is compatible with Windows Vista, 7, 8, 10, 11 as well as MAC OSX and LINUX

JAVA 8+ required. See also [java3D requirements](#) and [FAQ](#).

When using multiple screens, the 3D scene must be initialized on the main one.




More pictures and movie samples [here](#).



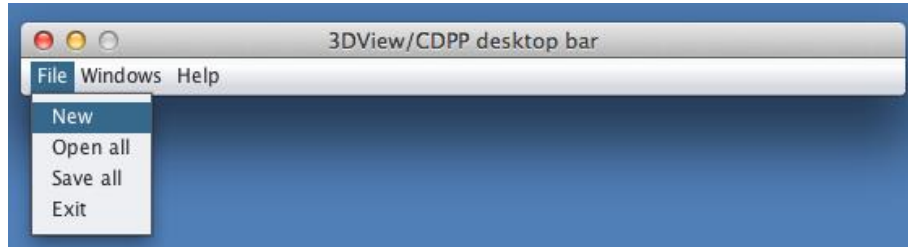
Europlanet 2020 RI has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654208

[disclaimer](#)

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Click on  , save the file as launch3dview.jnlp and run the application

- In the desktop bar, select “File/New to open a new 3D scene



2.2 Access to the Need Help page

- If you encounter any issues or need assistance, click on the “Help” icon next to the “Launch 3DView” button on the home page. This will open the help page in a new tab.

3DView Tutorial 2.2

Need Help ?

Minimum Requirements

The 1.7 version of the Java 3D API has been released for Linux (both x86 and amd64), Windows (both x86 and amd64), and Mac OS X (both PPC and x86). It requires at least the JRE (Java Runtime environment) 1.8.

Linux

The 1.7 version of Java 3D for Linux (x86 or amd64) requires the following:

- Graphics adapter with driver that supports the GLX extension: GLX 1.3 or later and OpenGL 1.3 or later. A graphics adapter with OpenGL 1.2 support will work, but with reduced texture mapping functionality.

Windows

The 1.7 version of Java 3D for Windows requires the following:

- Windows 10, Windows 2000, Windows XP, Windows Vista, 7 or 8
- Support for OpenGL as shown below.
OpenGL version
The (default) OpenGL renderer of Java 3D requires OpenGL 1.3 or later, available from your graphics card manufacturer.
- Java version: 11+
- Operating System: Windows 10, macOS 10.14, Linux
- Graphics Card: OpenGL 4.5 compatible, Driver version X or higher
- Browser: Chrome 89+, Firefox 85+, Safari 14+

Mac OS X

The 1.7 version of Java 3D for Mac OS X (PPC or x86) requires the following:

- Apple OS X 10.4 or more
- Support for OpenGL 1.3 or later

How to Launch

- Launch instructions: [see in user guide #3 How to launch 3D view on different operating systems](#)

Troubleshooting

For common issues, please refer to our [FAQ](#).

If you still have an issue, please fill out the form below and send us a request

Fields with * are required.

Contact (Name):

First name:

Email: *

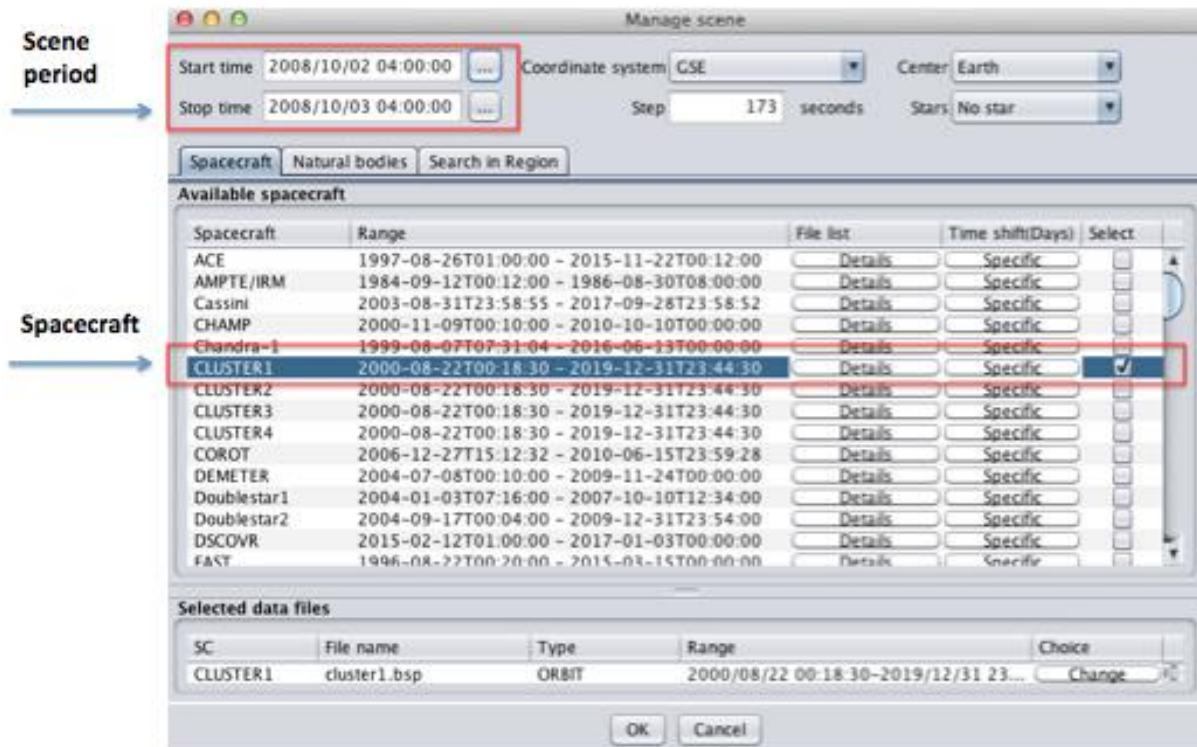
If you have some difficulties to launch the application:

- Check the Minimum Requirements to ensure your system is compatible.
- Click on the link provided in “How to Launch” section for instructions to launch the application, you will be redirected to the appropriate parts of the User Guide.
- The Troubleshooting section contains a link to the FAQ page to find answers to common questions.
- If your issue persists, fill out the form “If you still have an issue, please fill out the form below and send us a request”.
- Make sure to include all necessary information so the support team can diagnose the problem.
- Once you submit the form the support team will process your request and respond to you as soon as possible.

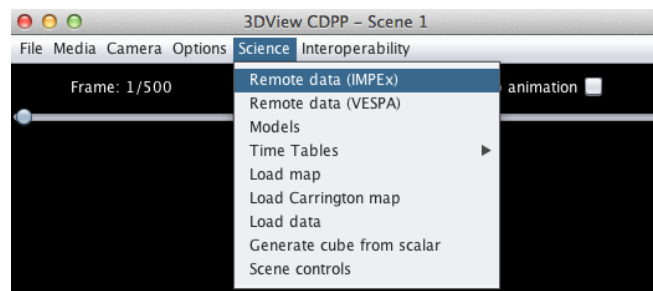
2.3 Compare simulations and observations along Cluster trajectory

- In the selection dialog box, select the following time interval
Start time: 2008-10-02T04:00:00
Stop time: 2008-10-03T04:00:00

and the spacecraft: CLUSTER1

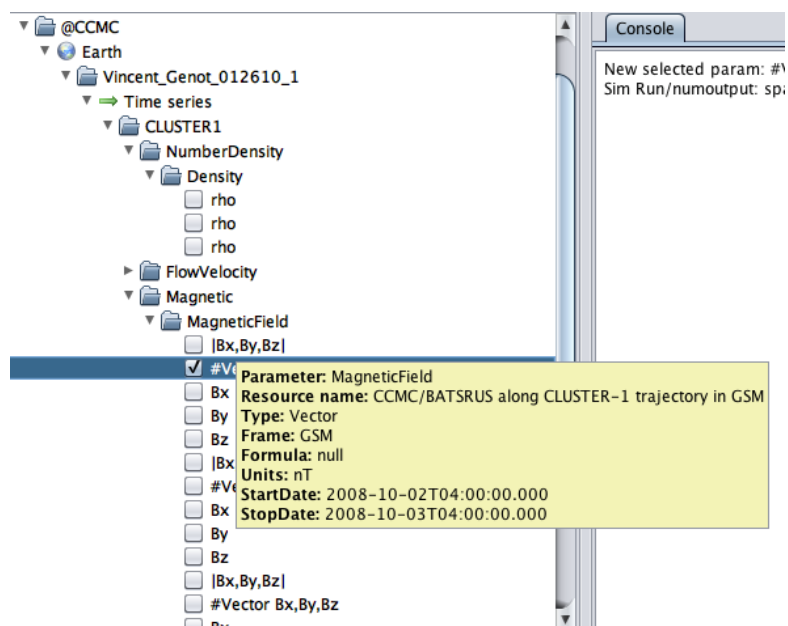


- Select **Remote data (IMPEX)** in the **Science** menu



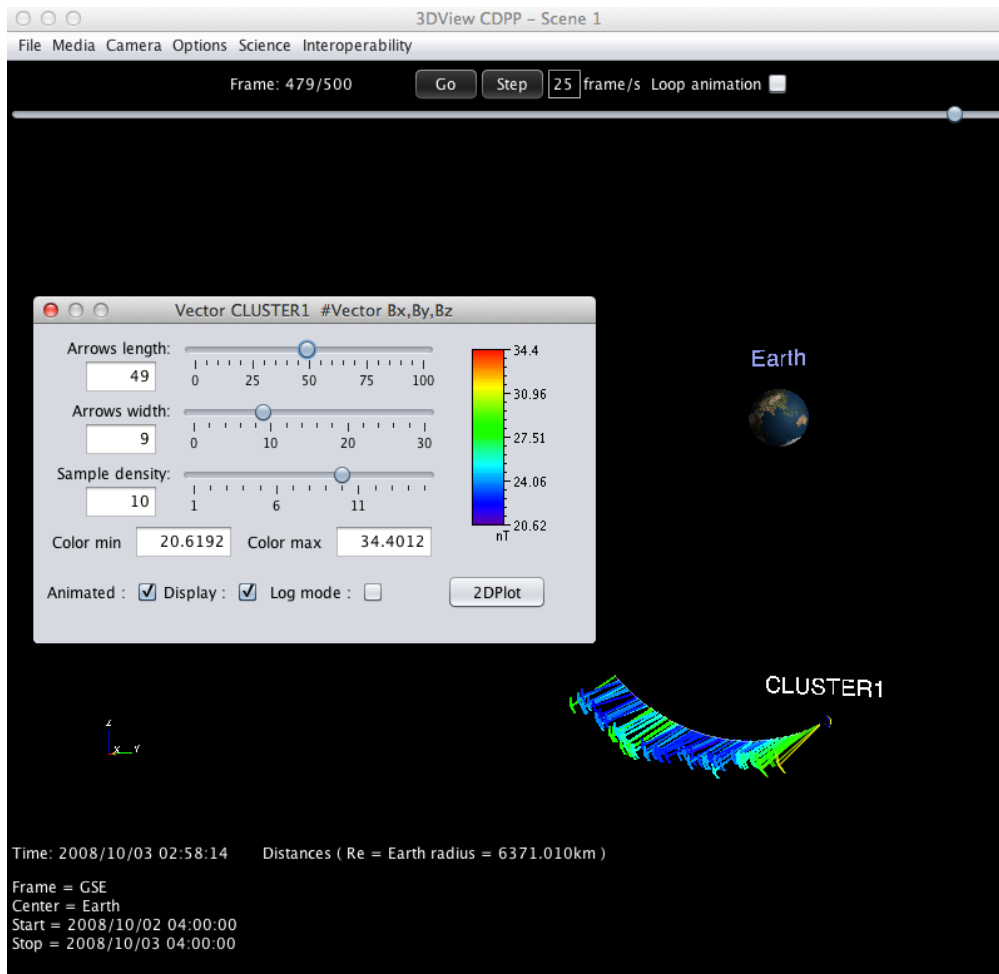
- Select the simulation data

following

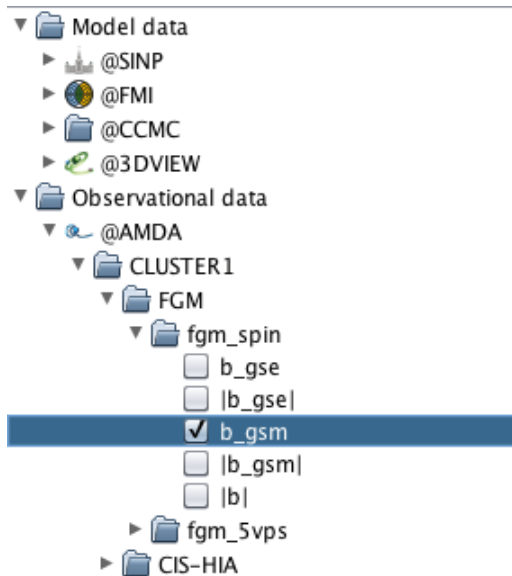


3DView Tutorial 2.2

- Click on **Add selected data to 3Dscene**; a control window is opened and the magnetic field vector is displayed along the trajectory of the S/C

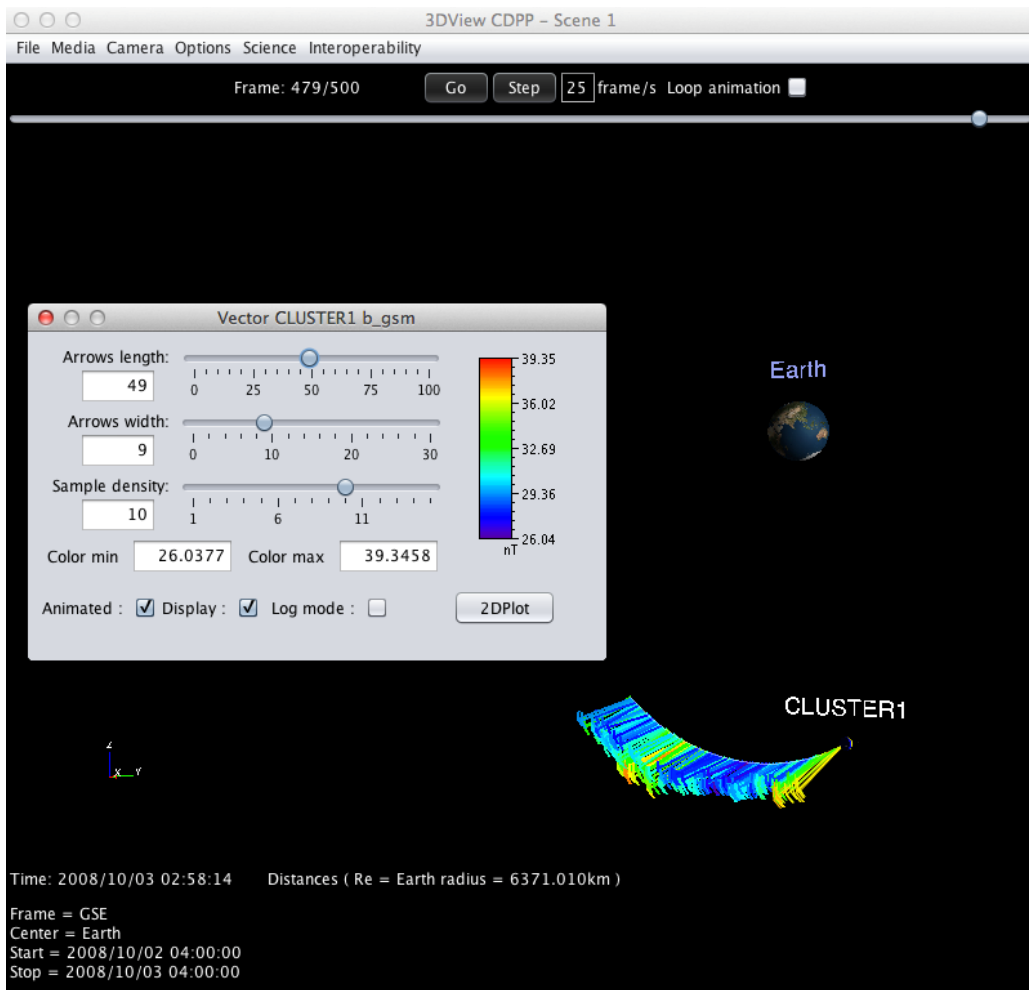


- Now, select from AMDA the observed magnetic field vector along the trajectory of CLUSTER1

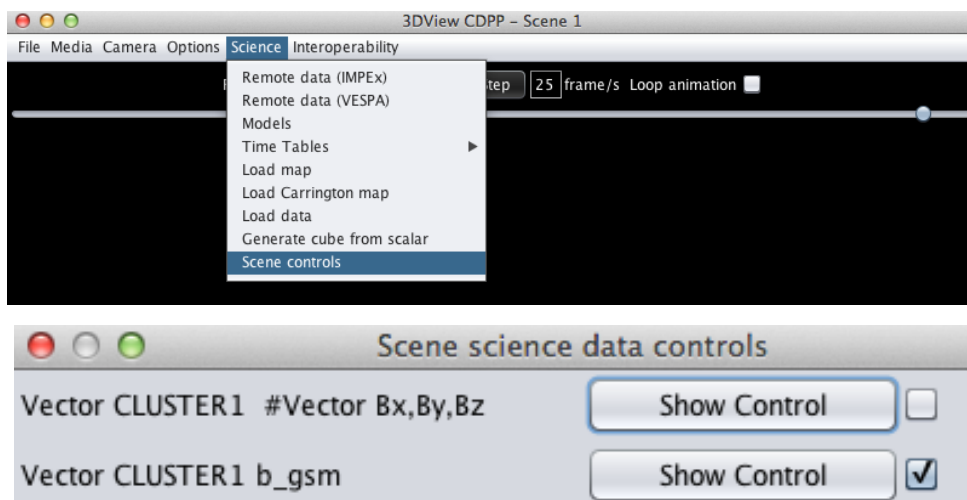


3DView Tutorial 2.2

- Click on **Add selected data to the 3Dscene**



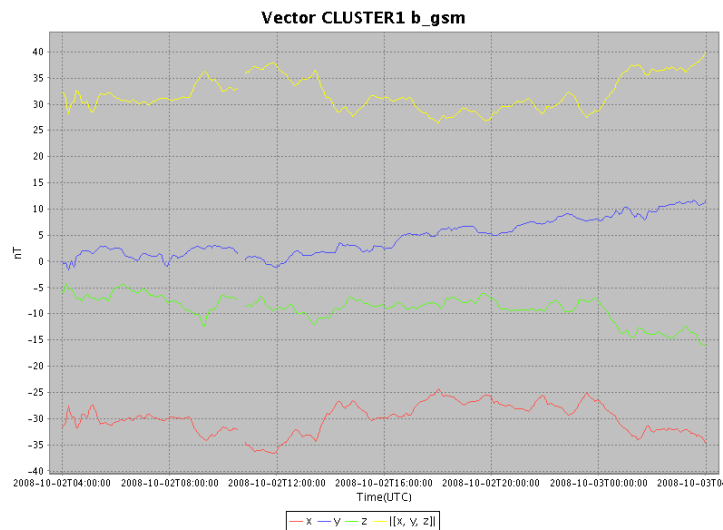
- Now, it is possible to select which vector is displayed on the scene with the **Science/Scene controls** menu



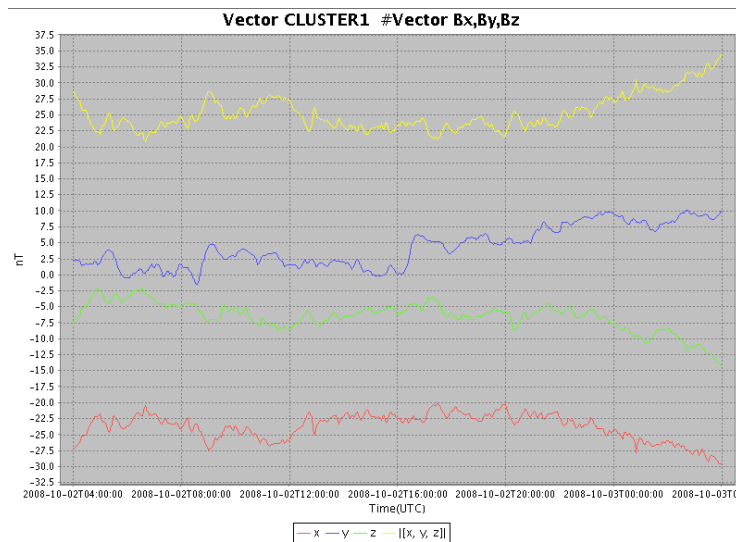
We will use the 2DPlot capability to compare simulations and observations in 2D.

3DView Tutorial 2.2

- In the control box of *b_gsm*, click on **2DPlot**



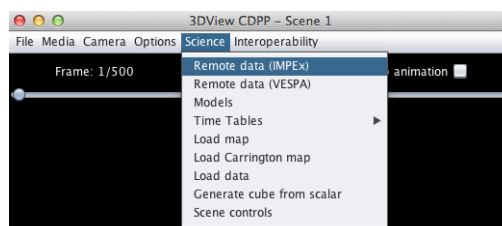
- In the control box of *#Vector Bx,By,Bz* click on **2DPlot**



2.4 Select and display a parameter from a 3D Cube from LATMOS

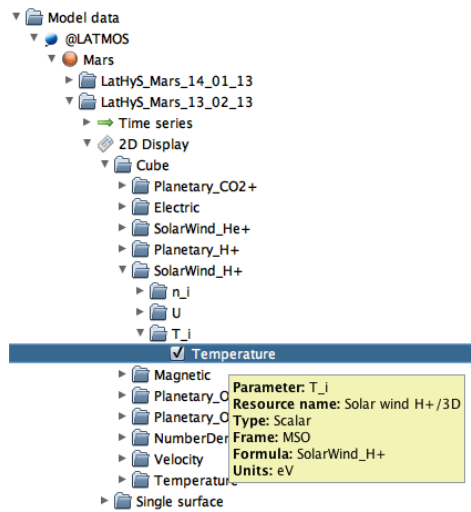
In this use case, we select a standard parameter from a Cube provided by LATMOS and add it to the 3D scene. A Cut on every axis, with its control box is displayed in the 3D scene.

- With the “Manage Scene” window, create a scene with:
 - Start: 2008/10/02 04:00:00
 - End: 2008/10/03 04:00:00
 - Spacecraft: MEX, Coordinate System: MSO
- Select the Science/Remote data (IMPEX) menu:

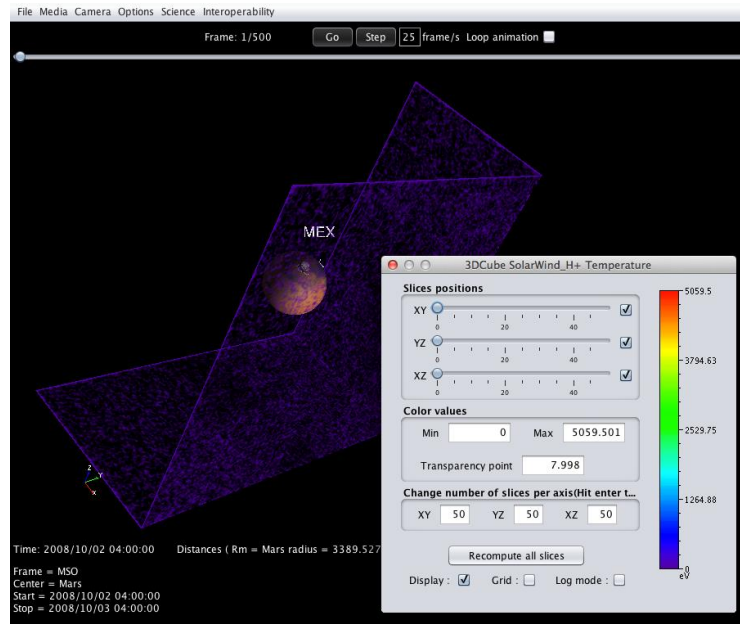


3DView Tutorial 2.2

- This opens the hierarchy of IMPEX data. Select the following parameter, in a Cube from LATMOS:

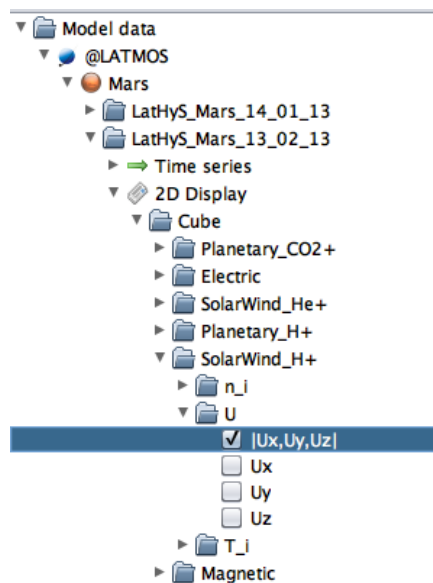


- Then click on *add to the 3D scene*. The following figure is displayed with its control box.



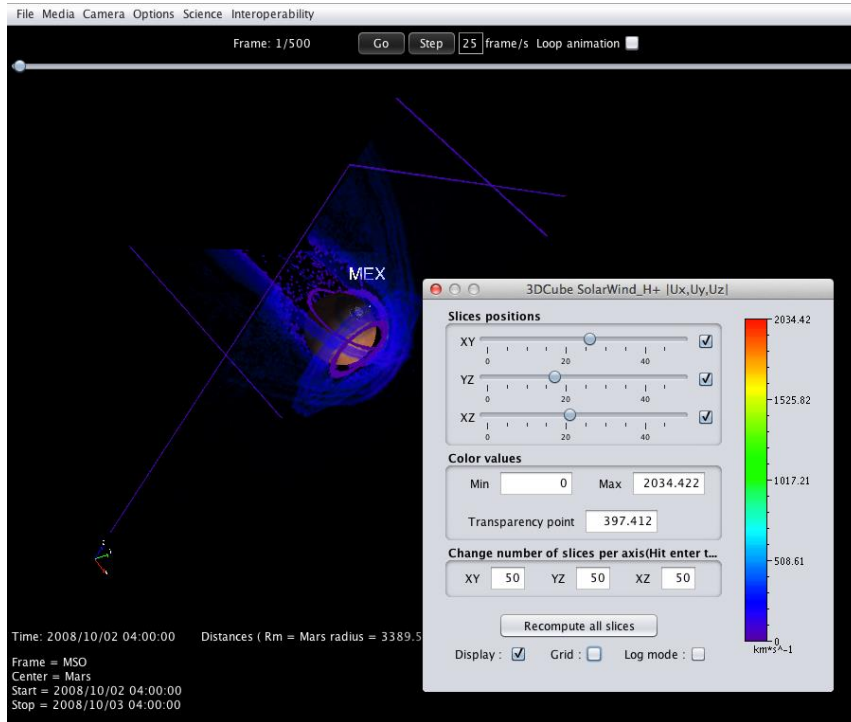
- Now select of a of type "vector":

the module parameter

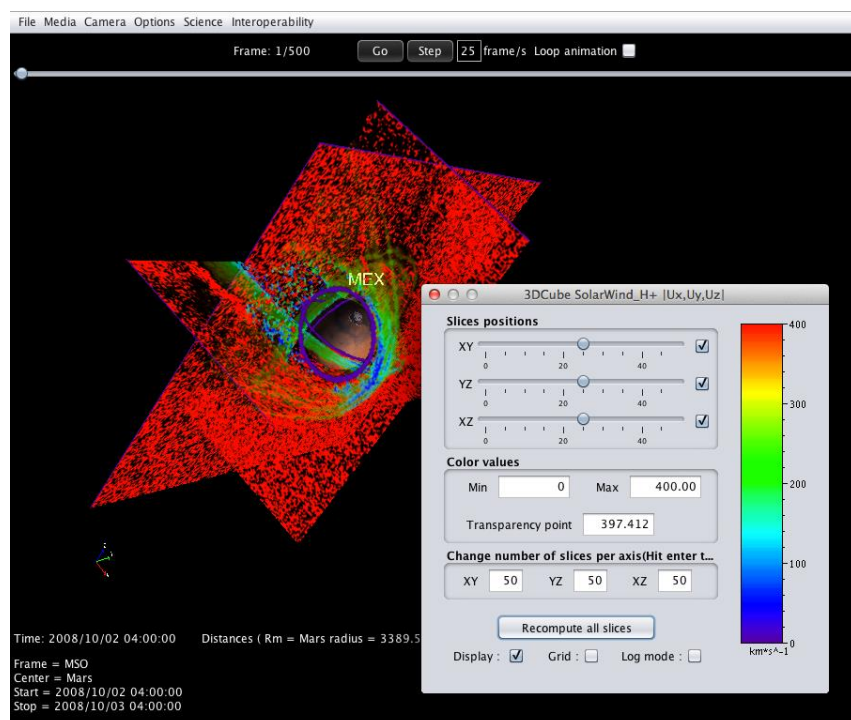


3DView Tutorial 2.2

- Then click on *add to the 3D scene*. The following figure is displayed with its control box.

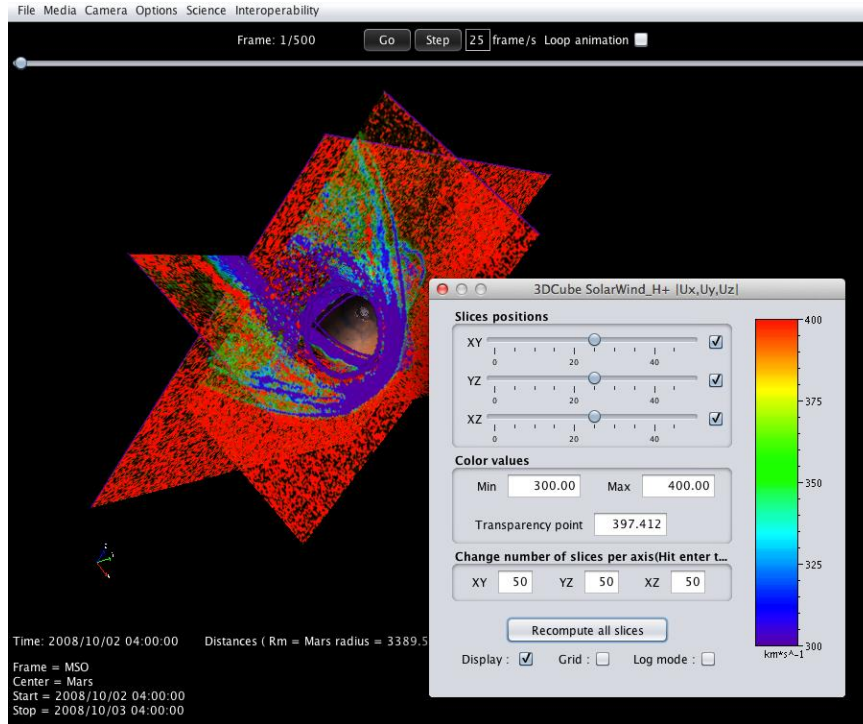


- Use the cursors to change the position of cuts displayed on each axis (slices positions), directly on the 3D scene.
- Set Max = 400 and click on « Recompute all slices ». The cube values that are greater than Max are displayed in red, and the colour bar is updated.

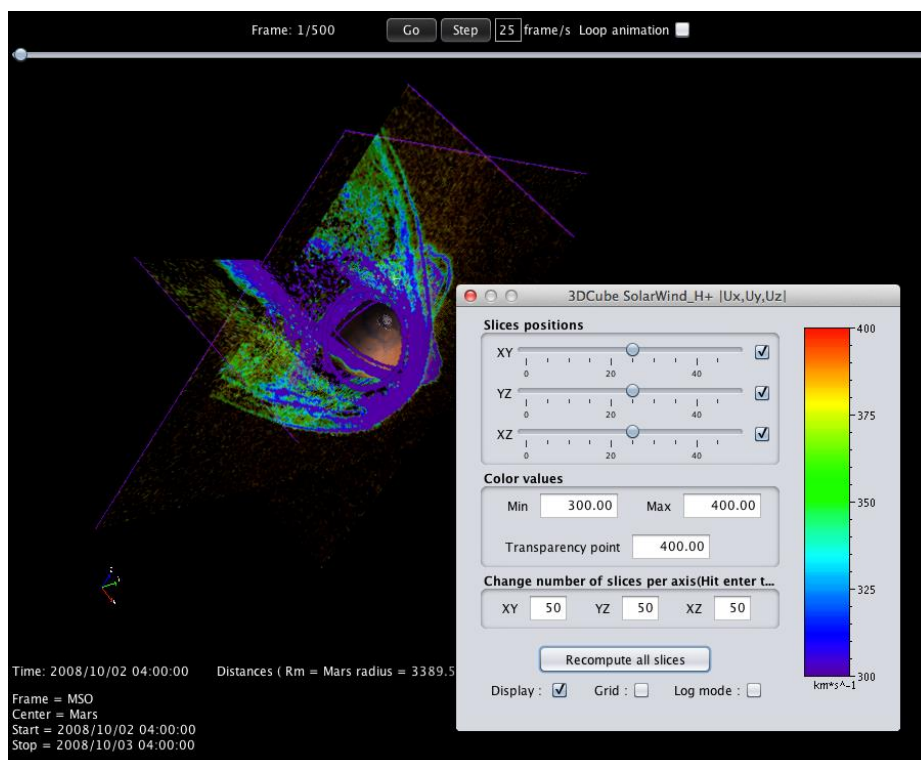


3DView Tutorial 2.2

- Set Min = 300 and click on « Recompute all slices ». The cube values that are lower than Min are now transparent.



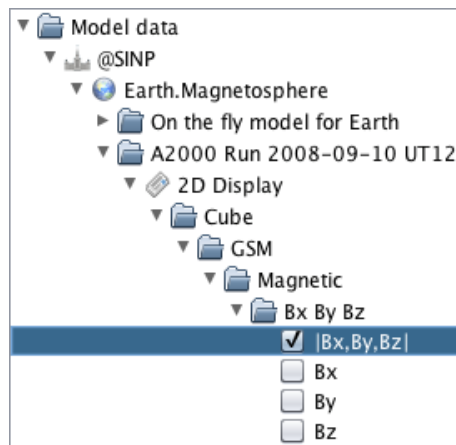
- Set Transparency point = 400 and click on « Recompute all slices ». Values that are close to Mean are transparent. For example, this value corresponding to Max, are values in red are now transparent.



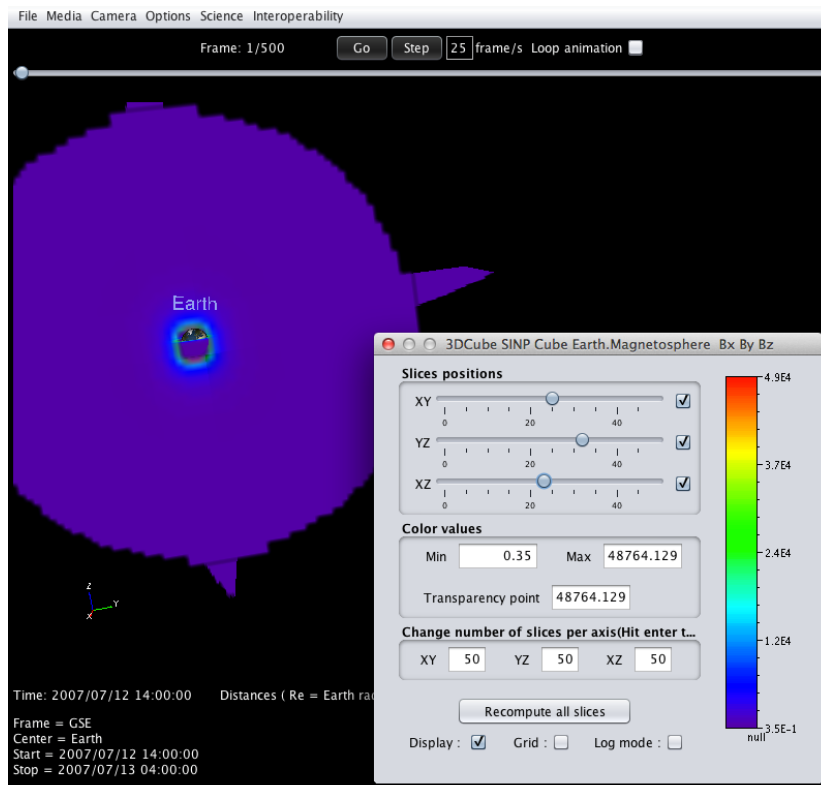
2.5 Select and display a parameter from a 3D Cube from SINP

In this use case, we select a standard parameter from a Cube provided by SINP and add it to the 3D scene. A Cut on every axis, with a control box is displayed in the 3D scene.

- Select the Science/Remote data (IMPEX) menu, to open the hierarchy of IMPEX data. Select the following parameter, in a Cube from SINP:

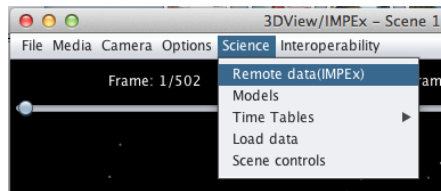


- Then click on *add to the 3D scene*. The following figure is displayed with its control box.

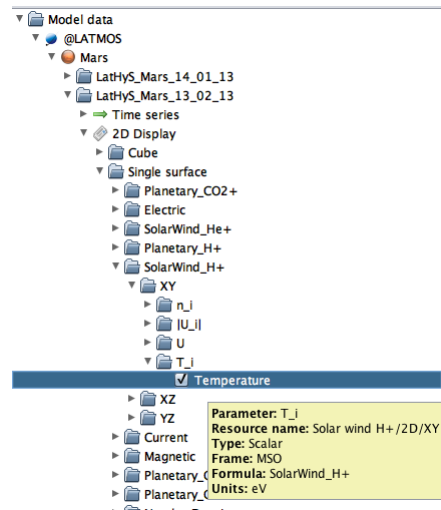


2.6 Select and display a 2D Cut

- With the “Manage Scene” window, create a scene with:
 - Start: 2008/10/02 04:00:00
 - End: 2008/10/03 04:00:00
 - Spacecraft: MEX, Coordinate System: MSO
- Select the Science/Remote data (IMPEX) menu:

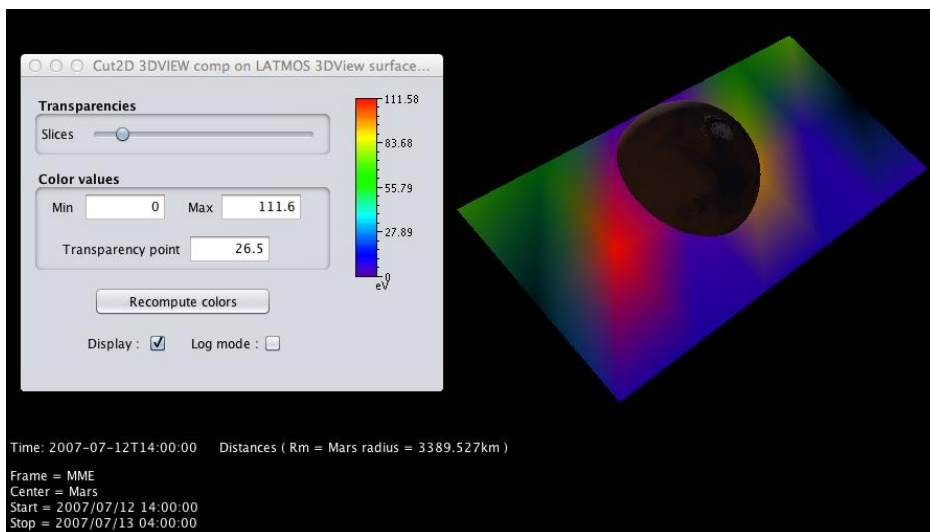


- Select the following parameter, a 2D Cut from LATMOS:



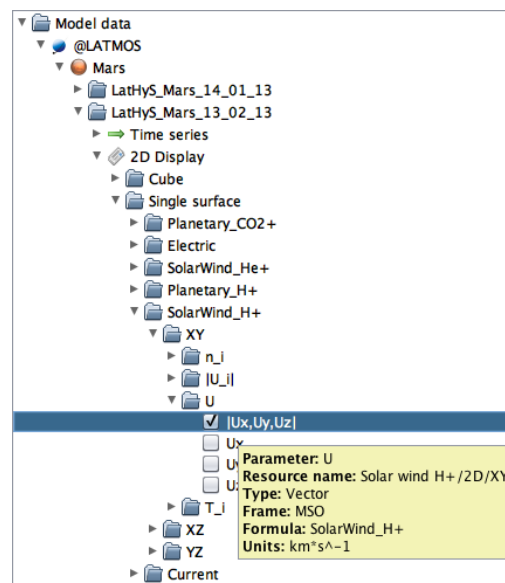
- Then click on *add* and a control box

are displayed in the 3D scene. The Cut

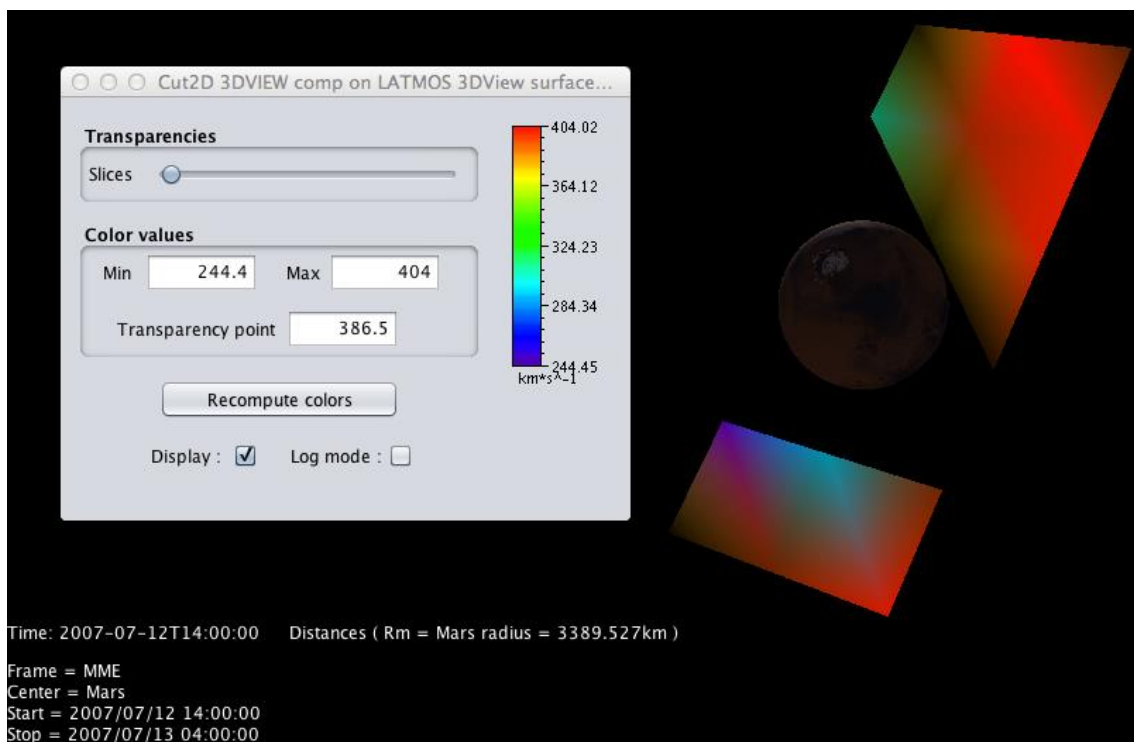


3DView Tutorial 2.2

- Now select the module of a “vector” parameter:

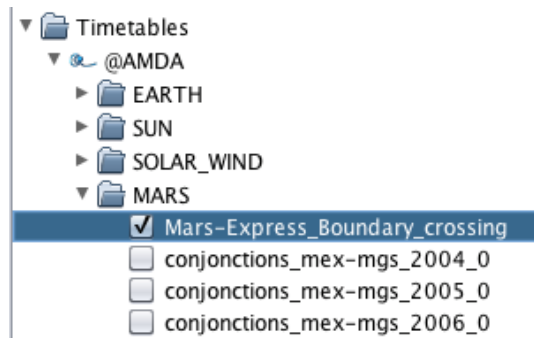


- Then click on *add to the 3D scene*. The Cut and a control box are displayed in the 3D scene.

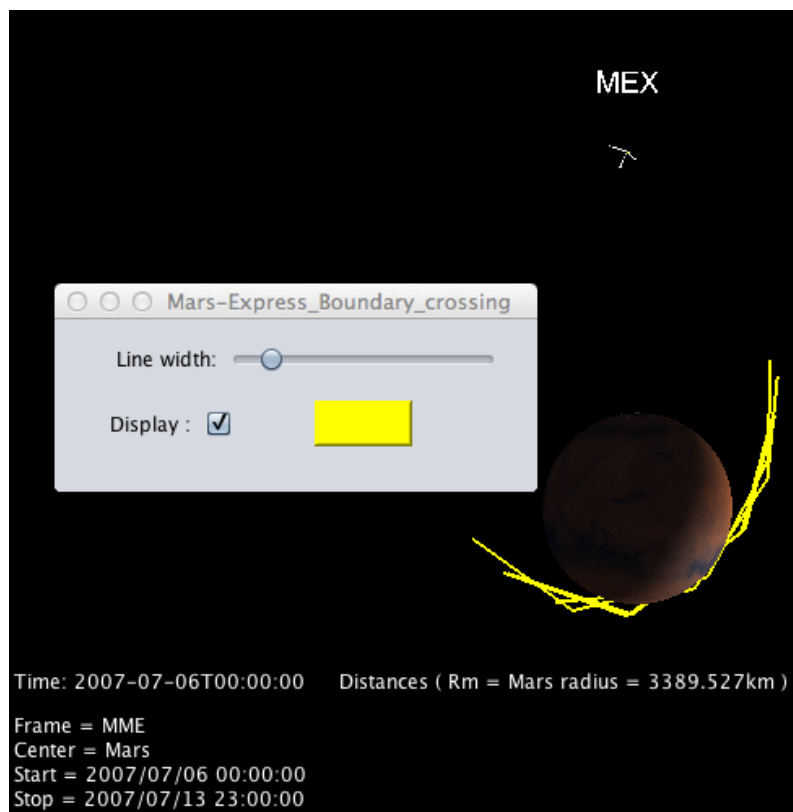


2.7 Select and display a Time Table

- Create a scene with MEX from 2007-07-06T00:00:00 to 2007-07-13T23:00:00.
- Select the Science/Remote data (IMPEX) menu to open the hierarchy of IMPEX data.
- Select the following time table and add it to the 3D scene



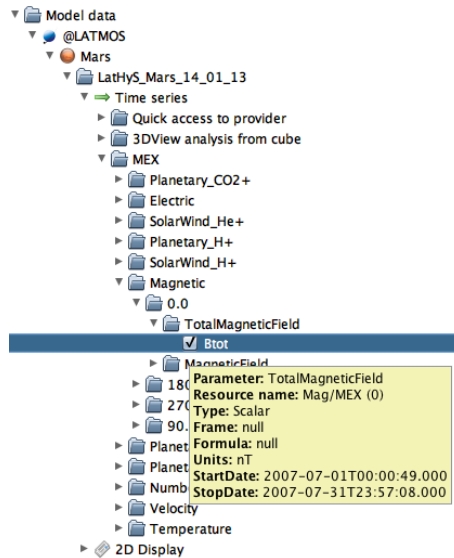
- The trajectory is highlighted from the position of MEX, and a control box is displayed



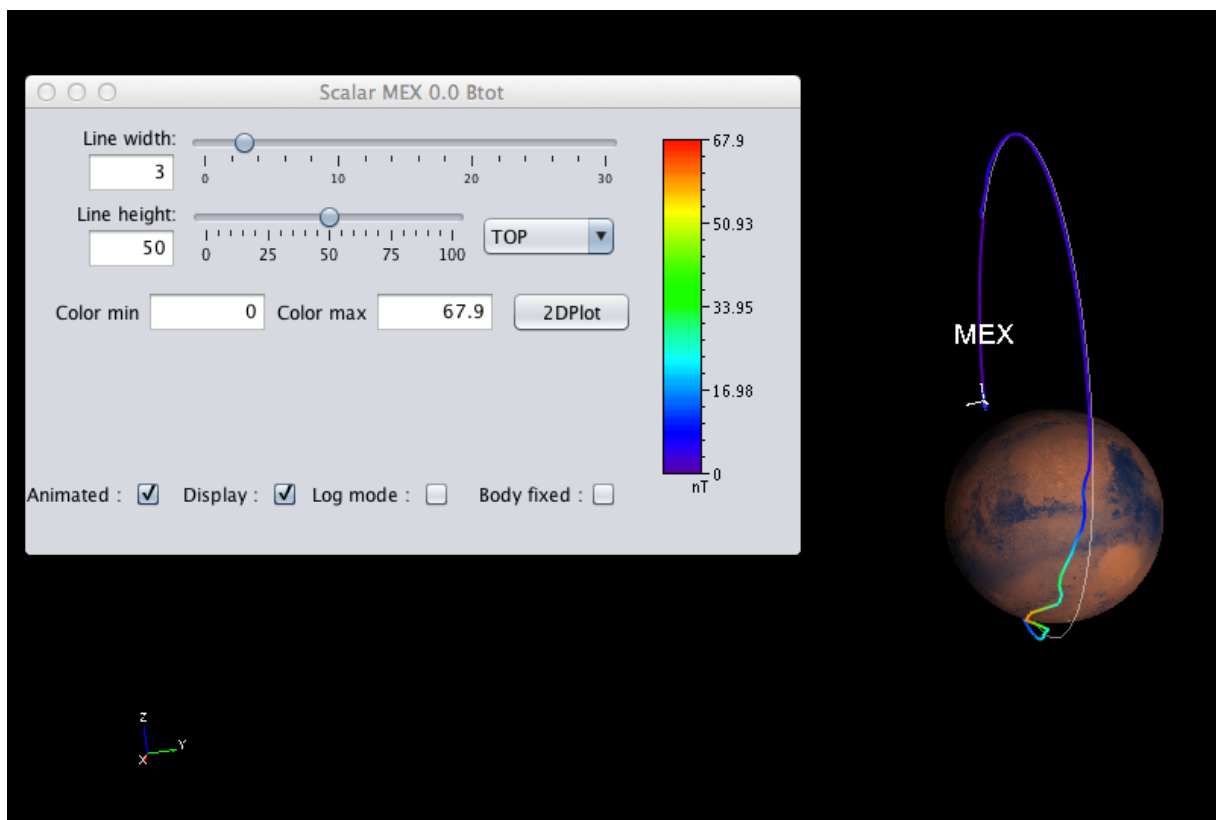
- Click on the color associated with the zone to change it. The cursor may be used to change the depth of the highlighted zone
- The list of Time Tables displayed in the 3D scene can be displayed via the **Science/Scene controls** menu

2.8 Select and Display Time Series

- Create a scene with MEX from 2007-07-12T14:00:00 to 2007-07-13T04:00:00 and move the cursor to the middle
- In the Science/Remote data (IMPEX) menu, select a scalar parameter

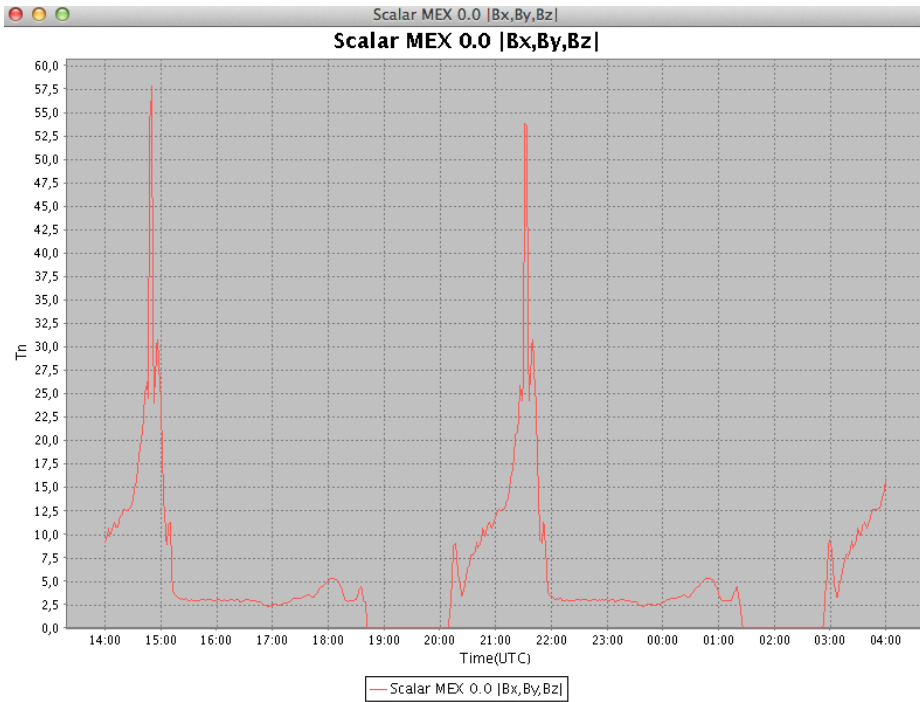


- Add it to the 3D scene. The parameter is displayed as a curve above the trajectory of the S/C

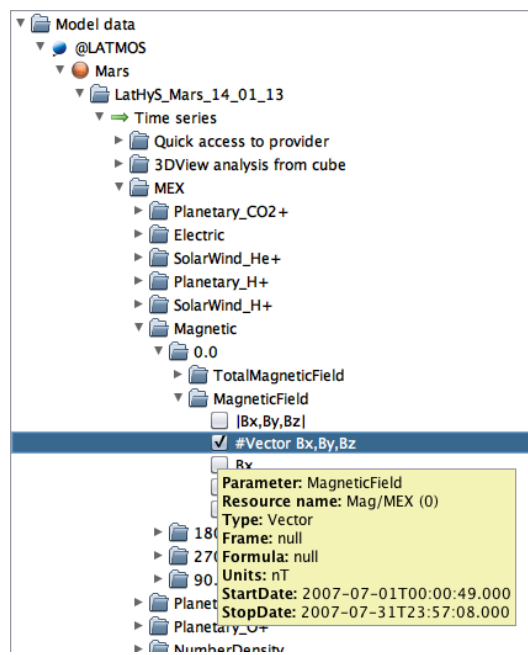


- Click on **2DPlot**. A window is opened, with the scalar parameter displayed as one curve.

3DView Tutorial 2.2

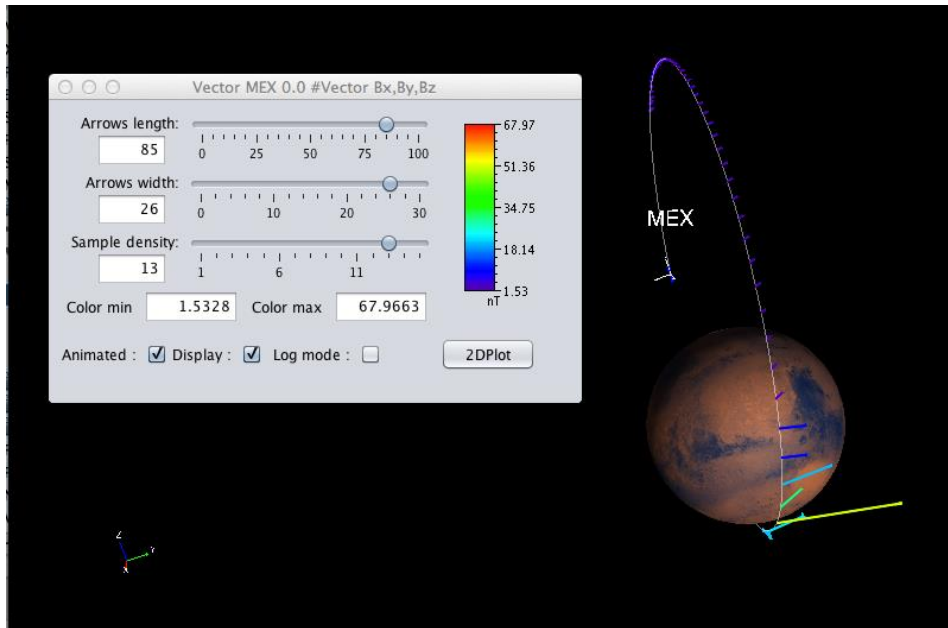


- Now, select a vector, and add it to the 3D scene

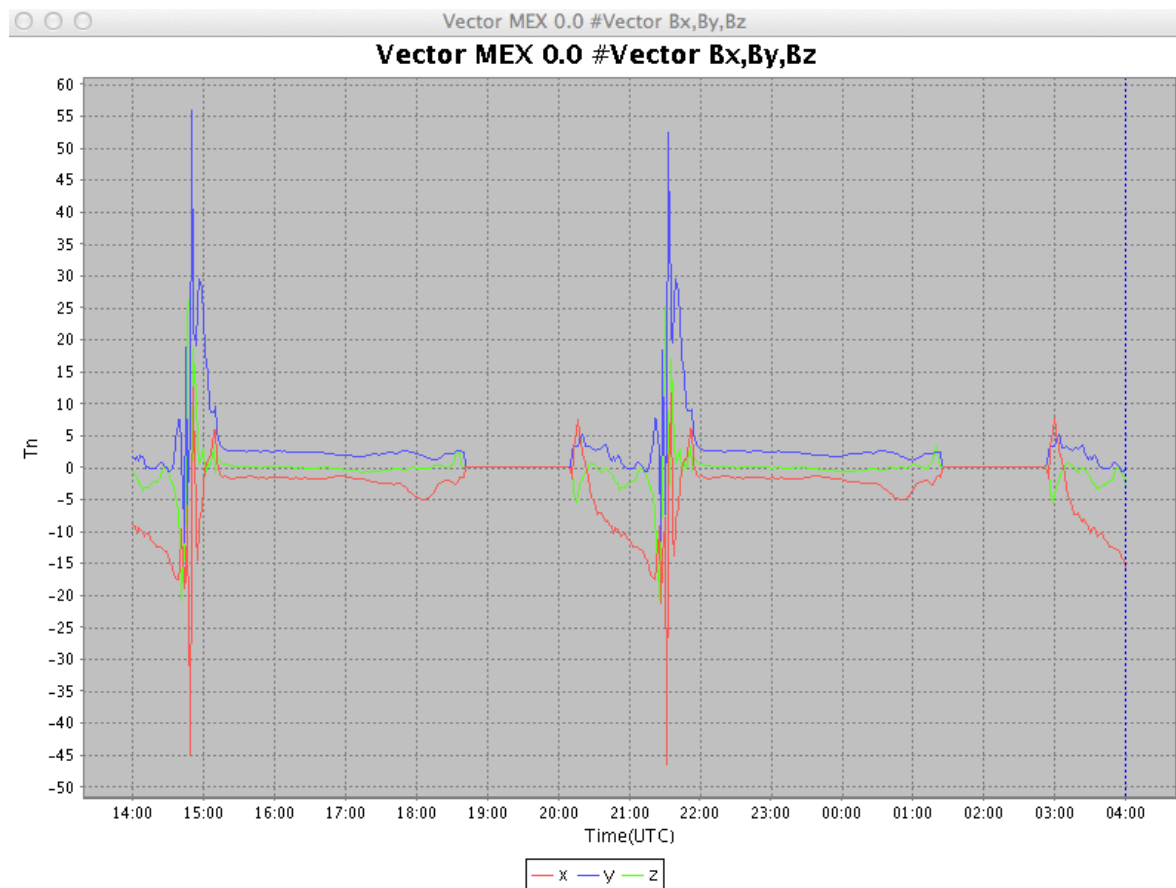


- The vector time series is displayed along the S/C trajectory

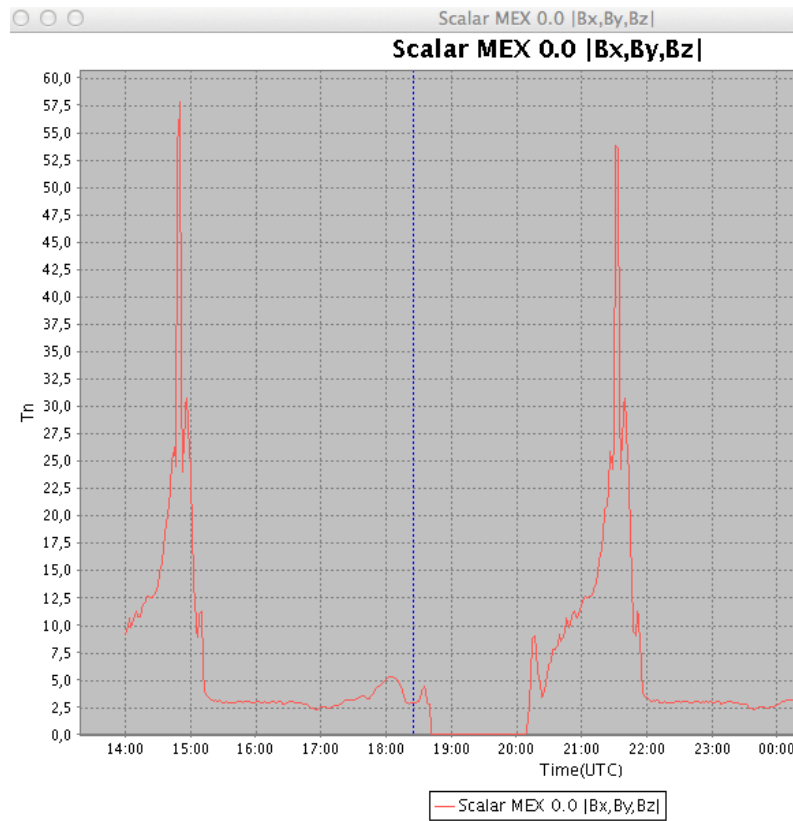
3DView Tutorial 2.2



- Click on **2DPlot**. A Window containing the plot of 3 parameters x/y/z displayed as 3 curves of different colors is displayed



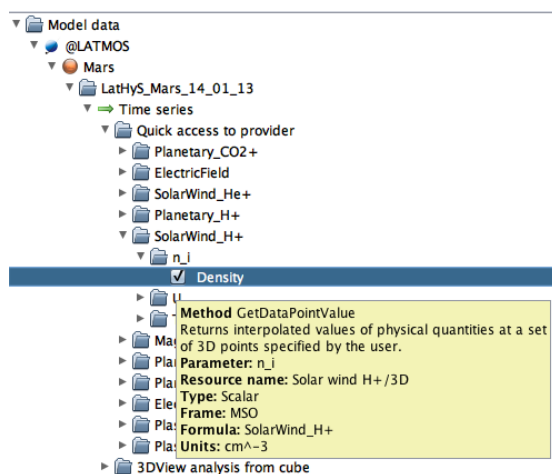
- During animation (“Go” in the 3D scene), a vertical cursor follows, in the 2D plot, the cursor of the 3D scene



2.9 Interpolation of a physical quantity at a set of 3D points

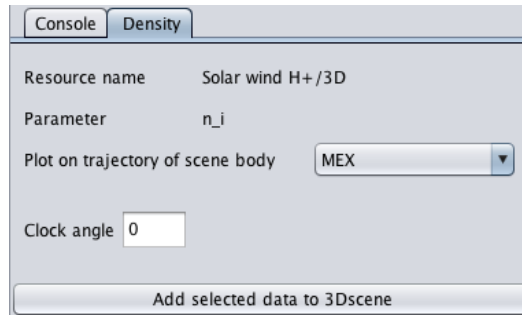
In this example, the interpolation of a physical quantity (scalar or vector) is done with the `getDataPointValue` method of LATMOS at a set of 3D points defined by the user.

- With the **File/Manage scene** menu, create a scene with MEX from 2007-07-12T14:00:00 to 2007-07-13T04:00:00 and move the cursor to the middle
- In the Science/Remote data (IMPEX) menu, select

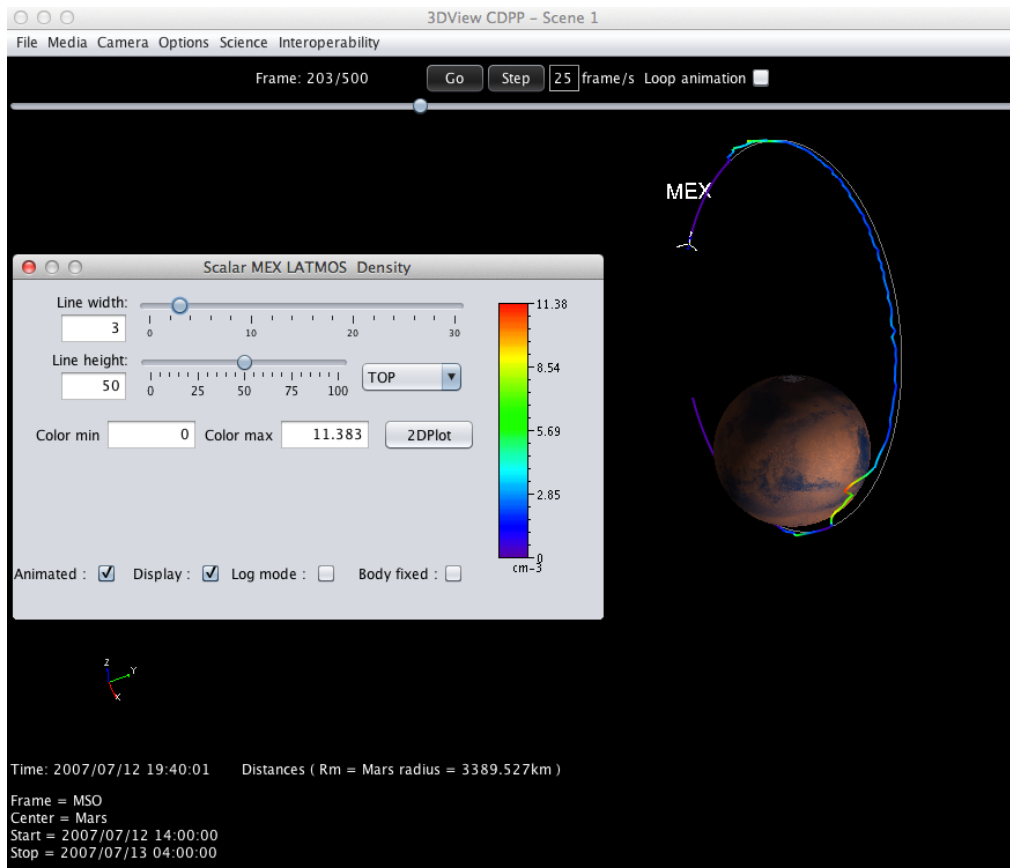


- In the panel on the right part, there is a tab containing the “Clock Angle” and the spacecraft for which we want data. When you unselect the parameter, the tab disappears

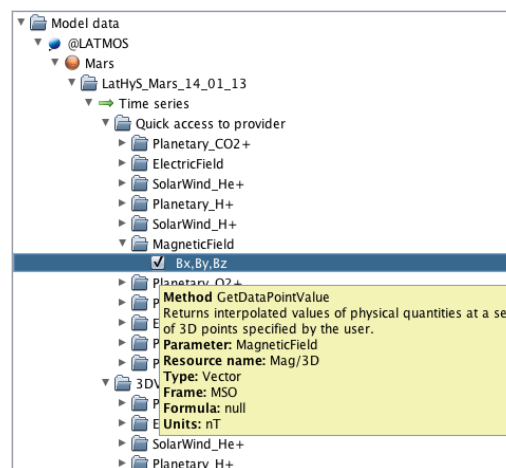
3DView Tutorial 2.2



- Click on **Add selected data to 3D scene**. When you unselect **Animated**, a curve is displayed above the spacecraft's trajectory, with the associated control box

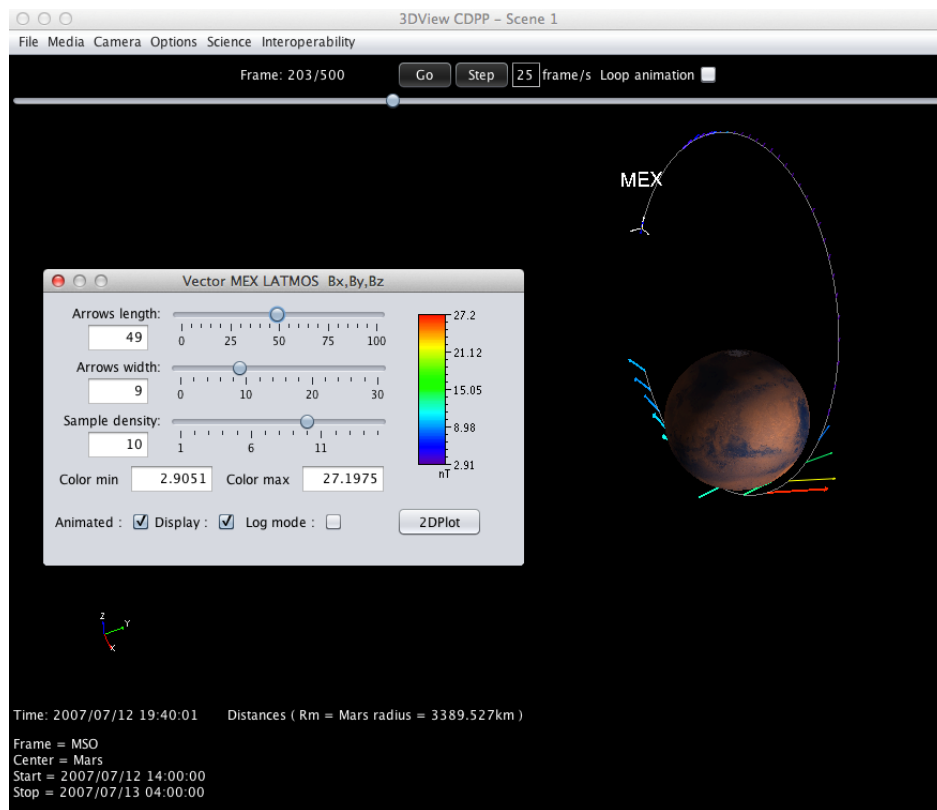


- Now, in the **Science/Remote data (IMPEX)** menu, select a vector



3DView Tutorial 2.2

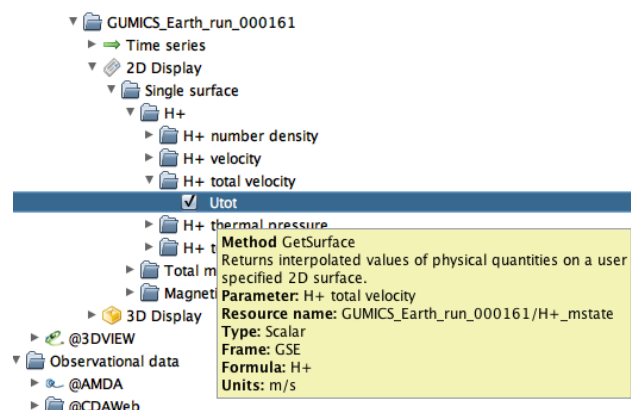
- In the panel on the right part, there is a tab containing the “Clock Angle” and the spacecraft for which we want data.
- Click on **Add selected data to 3D scene**. When you unselect **Animated**, a set of vectors is displayed above the spacecraft’s trajectory, with the associated control box



2.10 Interpolation of a physical quantity on a 2D surface

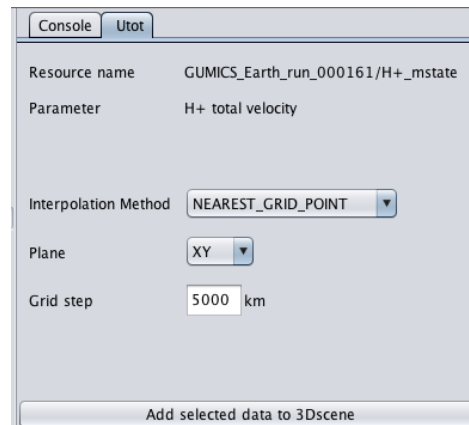
In this example, the interpolation of a physical quantity (scalar or vector) is done with the *getSurface* method of FMI on a 2D surface defined by the user.

- With the **File/Manage scene** menu, create a scene in GSE coordinates with Themis A from 2010-11-07T18:00:00 to 2010-11-07T23:00:00 and move the cursor to the middle.
- In the **Science/Remote data (IMPEX)** menu, select *Model data/@FMI/Earth*, then



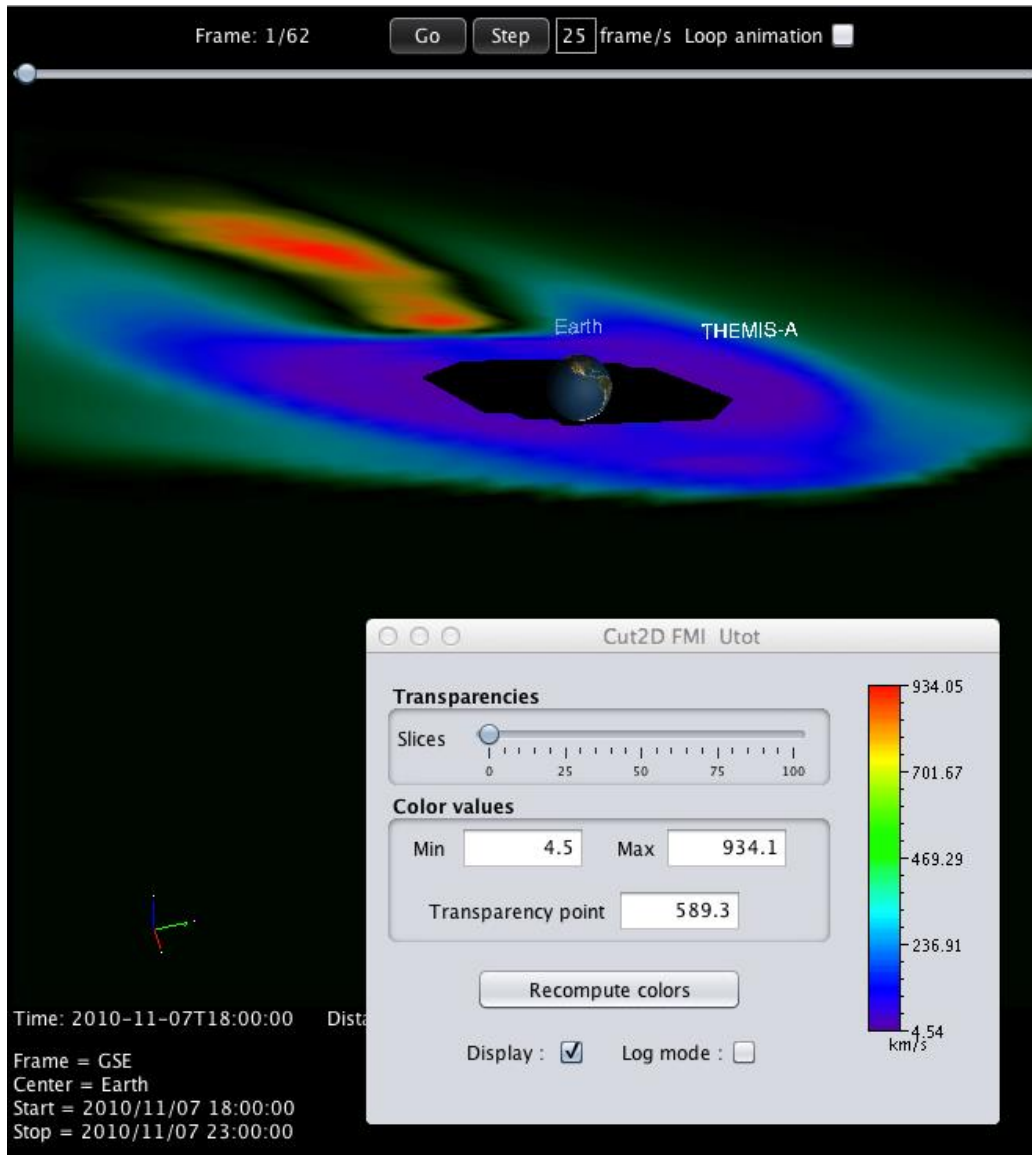
3DView Tutorial 2.2

- In the panel on the right part, there is a tab containing the interpolation method, the plane name, and the grid step. When you unselect the parameter, the tab disappears



- Select 5000 for the step, plane XY and NEAREST_GRID_POINT as interpolation method. Please note that a too small step may infer a calculate time greater than 30 seconds and generate a time out error from the FMI server. Click on **Add selected data to 3D scene**
- A 2D Cut is displayed with its control box

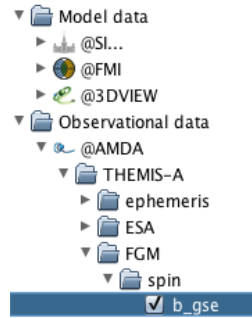
3DView Tutorial 2.2



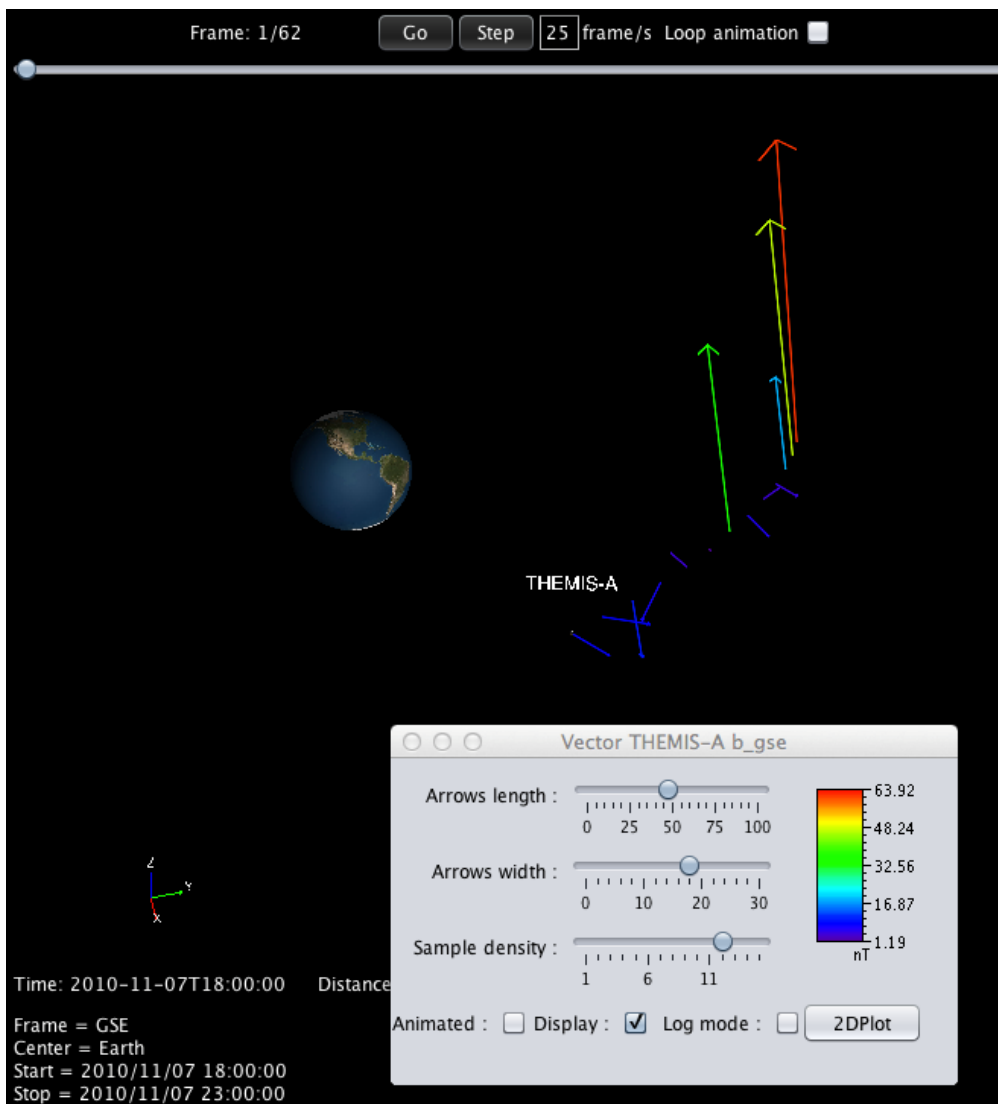
2.11 Get and Display a parameter from AMDA

In this example, the interpolation of a physical quantity (vector) along the trajectory of a spacecraft is done. The physical quantity is uploaded with the *getParameter* method of AMDA.

- With the **File/Manage scene** menu, create a scene in GSE coordinates with Themis A from 2010-11-07T18:00:00 to 2010-11-07T23:00:00 and move the cursor to the middle.
- In the **Science/Remote data (IMPEX)** menu, select



- Click on **Add selected data to 3D scene**

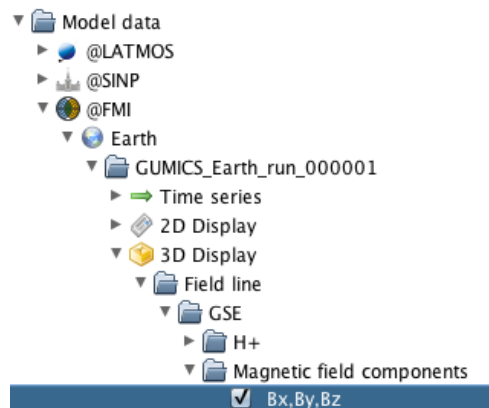


- When you unselect **Animated** the physical quantity is displayed in the form of a set of arrows along the trajectory of the spacecraft, with its associated control box.

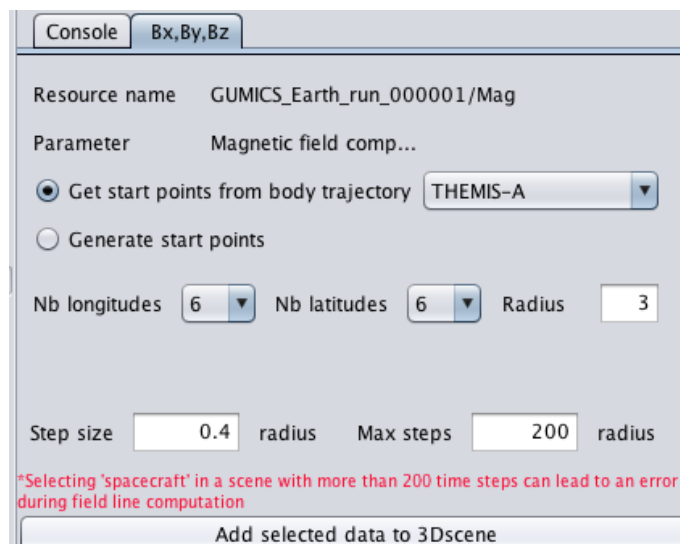
2.12 Display Magnetic Field Lines from a GUMICS run of FMI

In this example, the magnetic field lines are calculated with the *getFieldLine* method of FMI.

- With the **File/Manage scene** menu, create a scene in GSE coordinates with Themis A from 2010-03-27T00:00:00 to 2010-03-28T00:00:00 and a step of 500 seconds.
- In the **Science/Remote data (IMPEX)** menu, select the components of a magnetic field

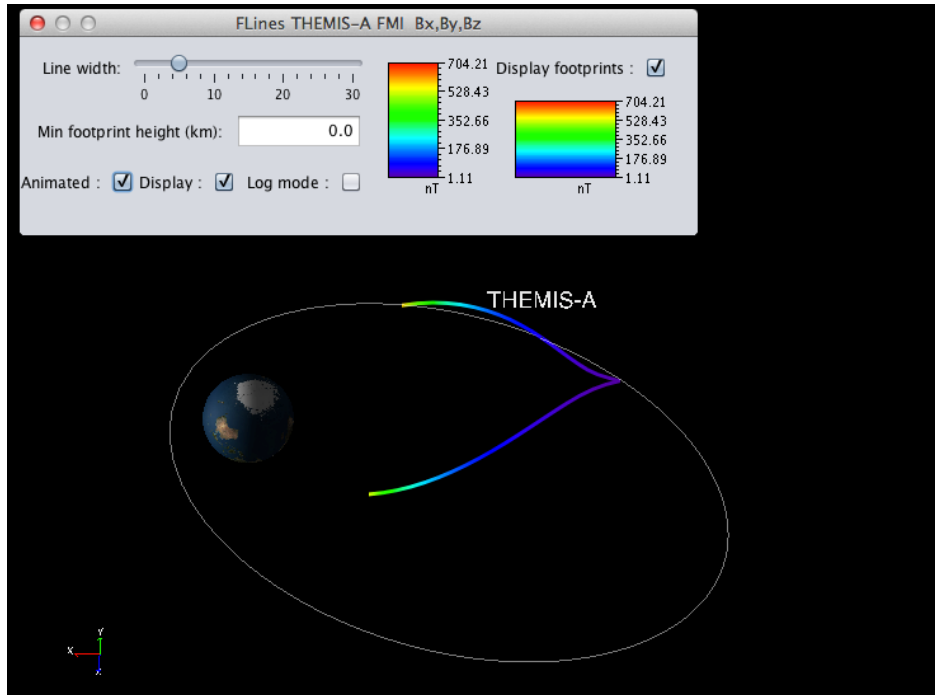


- A window called **Bx,By,Bz** is displayed in the right panel.

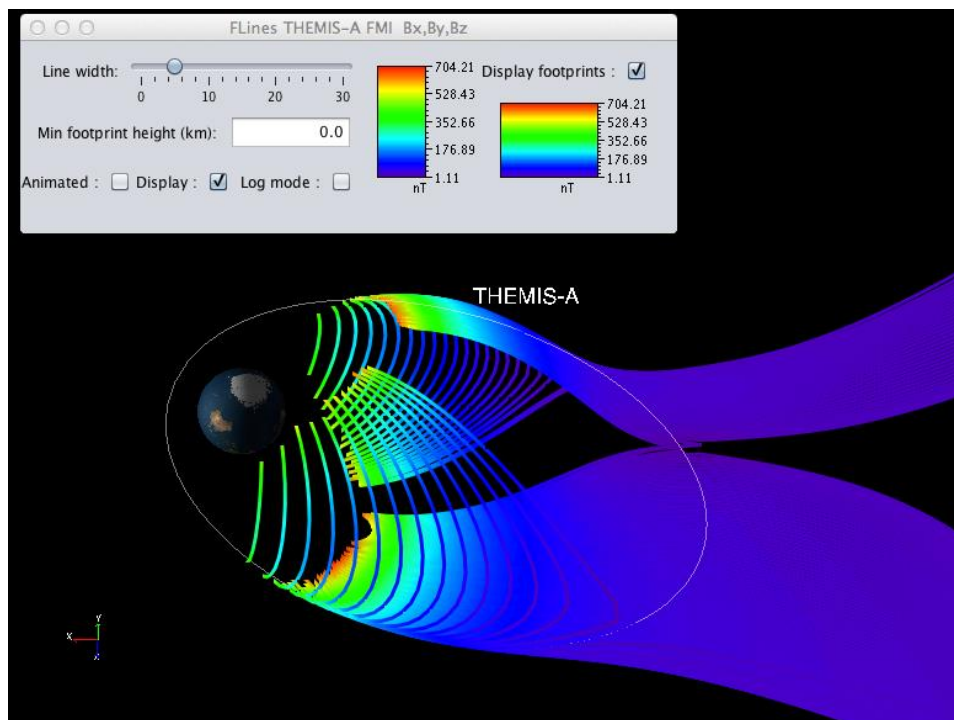


- Select the **Get start points from body trajectory** option with THEMIS-A as spacecraft and click on **Add selected data to 3Dscene**. A single line, corresponding to THEMIS-A is displayed.

3DView Tutorial 2.2



- Unselect **Animated** option to display the set of field lines

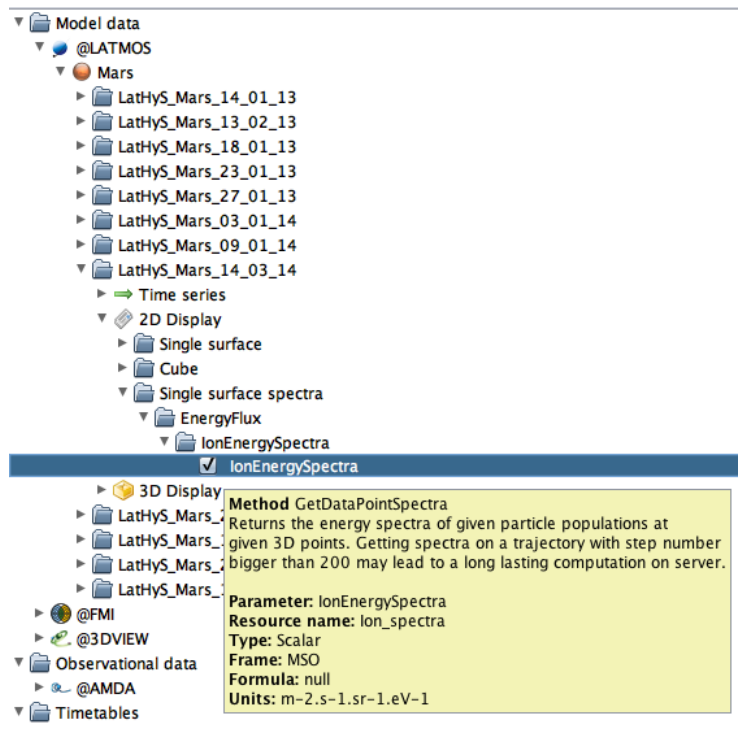


2.13 Display an Energy spectrum of LATMOS

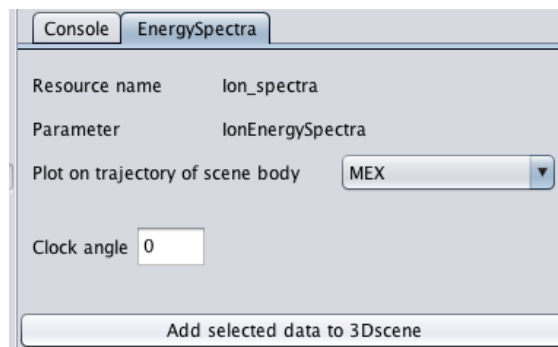
In this example, the energy spectrum of given particle populations at given points in 3D is displayed, using the *getDataPointSpectra* method of LATMOS.

- With the **File/Manage scene** menu, create a scene in MSO coordinates with MEX from 2010-03-27T00:00:00 to 2010-03-28T01:00:00 and a step of 7 seconds.

- In the **Science/Remote data (IMPEX)** menu, select a spectrum

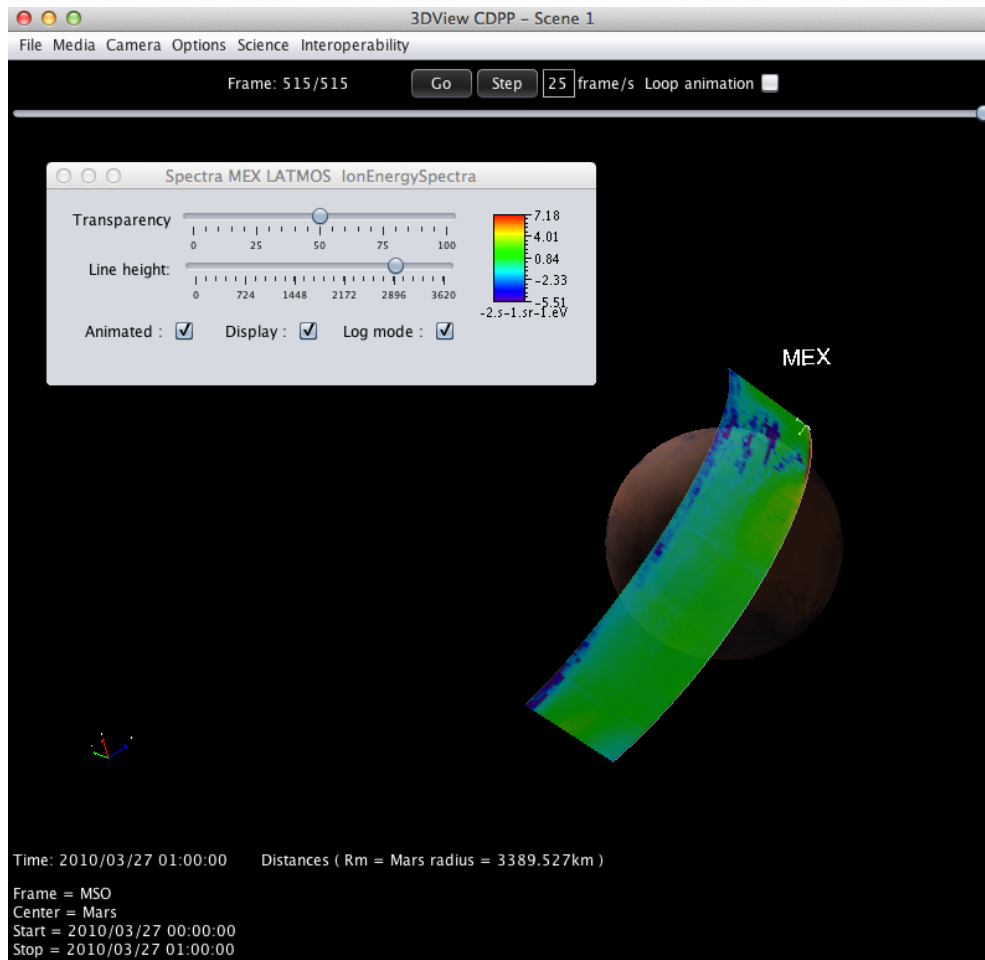


- When **IonEnergySpectra** is selected, a dialog box is displayed in the right panel.



- Select MEX, and click on **Add selected data to 3Dscene**, to display the spectrum, with the control box. Since there are a lot of calculations, this may take a long time (between one and two minutes).

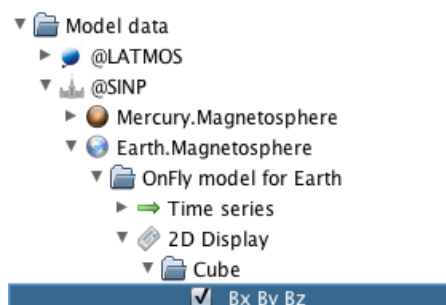
3DView Tutorial 2.2



2.14 Display the magnetic field calculated in a 3D Cube

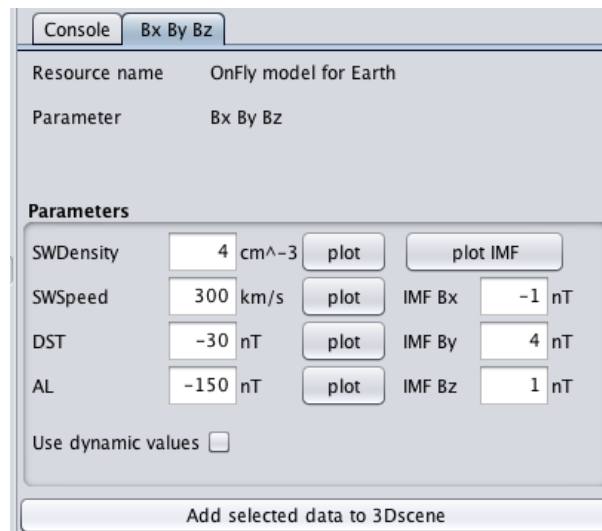
In this example, we use the *calculateCube* method of SINP. This method returns the magnetic field calculated by the *Paraboloid Model*, in grid points of a cube with chosen boundaries inside the planetary magnetosphere at a given time and sampling.

- With the **File/Manage scene** menu, create a scene in GSM coordinates with the Earth as central body.
- In the **Science/Remote data (IMPEX)** menu, select a Cube

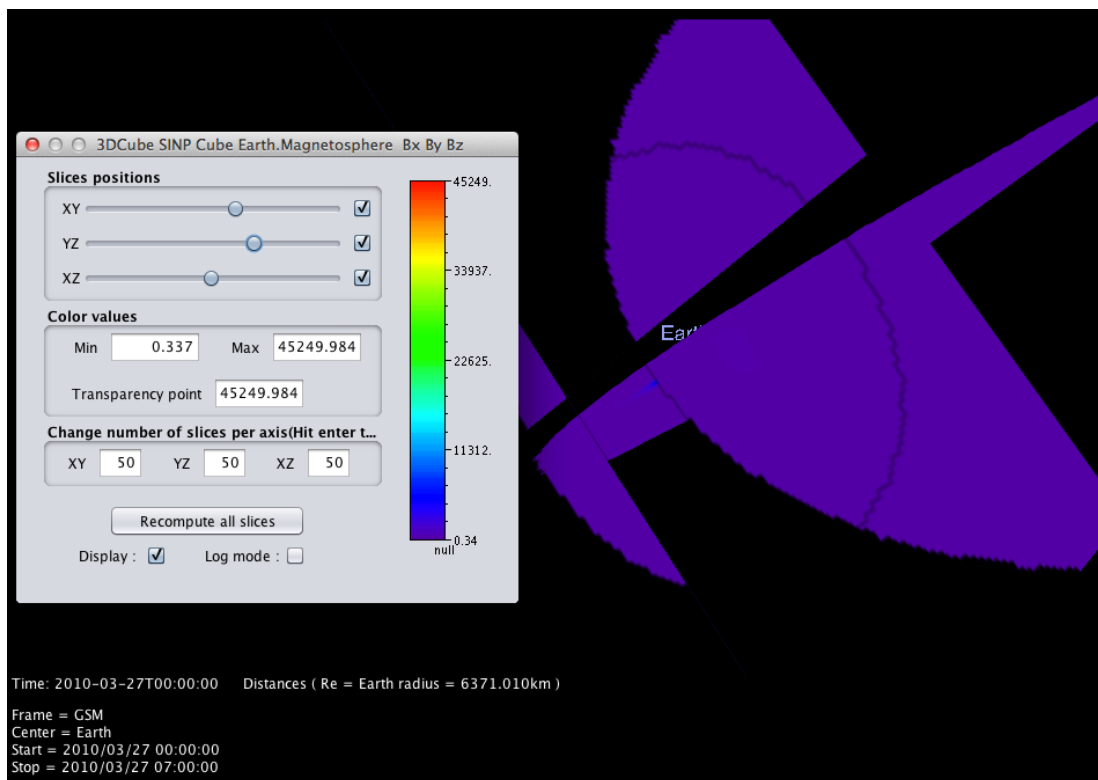


- The following dialog box is displayed in the right panel

3DView Tutorial 2.2



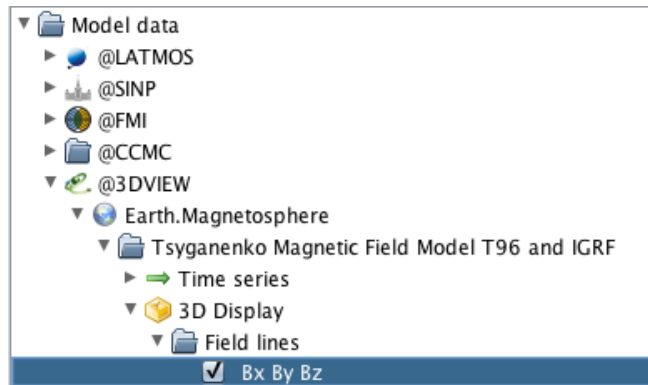
- Click on **Add selected data to 3Dscene**.



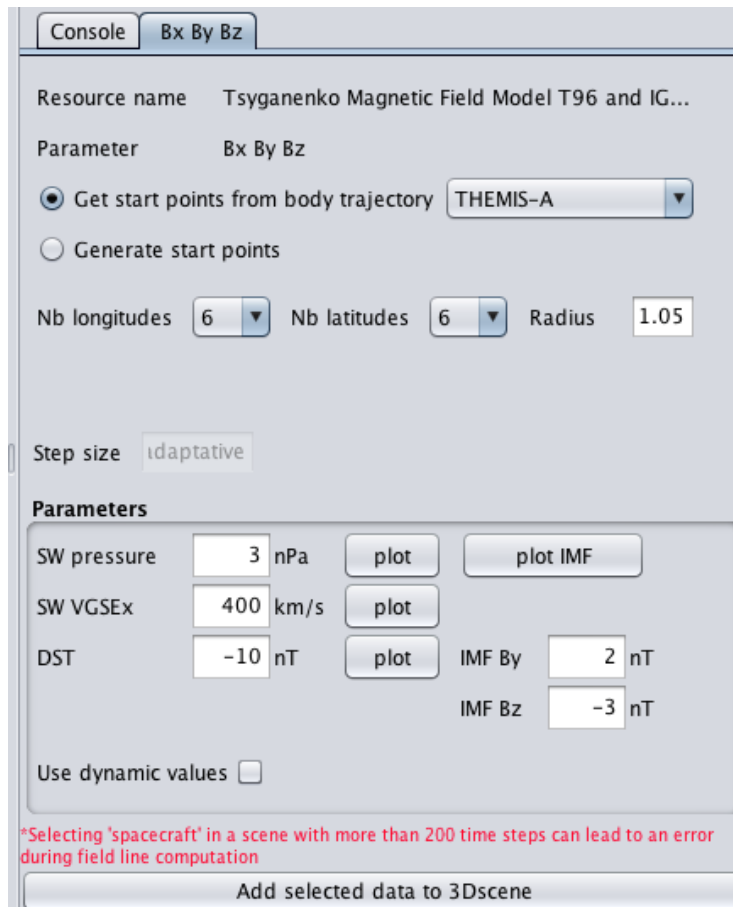
2.15 Display magnetic field lines calculated with Tsyganenko T96

In this example, we use the **Tsyganenko Magnetic Field Model T96** implemented on the 3DView server.

- With the **File/Manage scene** menu, create a scene in GSM coordinates with Themis-A from 2010-03-26T00:00:00 to 2010-03-27T00:00:00 with a step of 300 seconds.
- In the **Science/Remote data (IMPEX)** menu, select

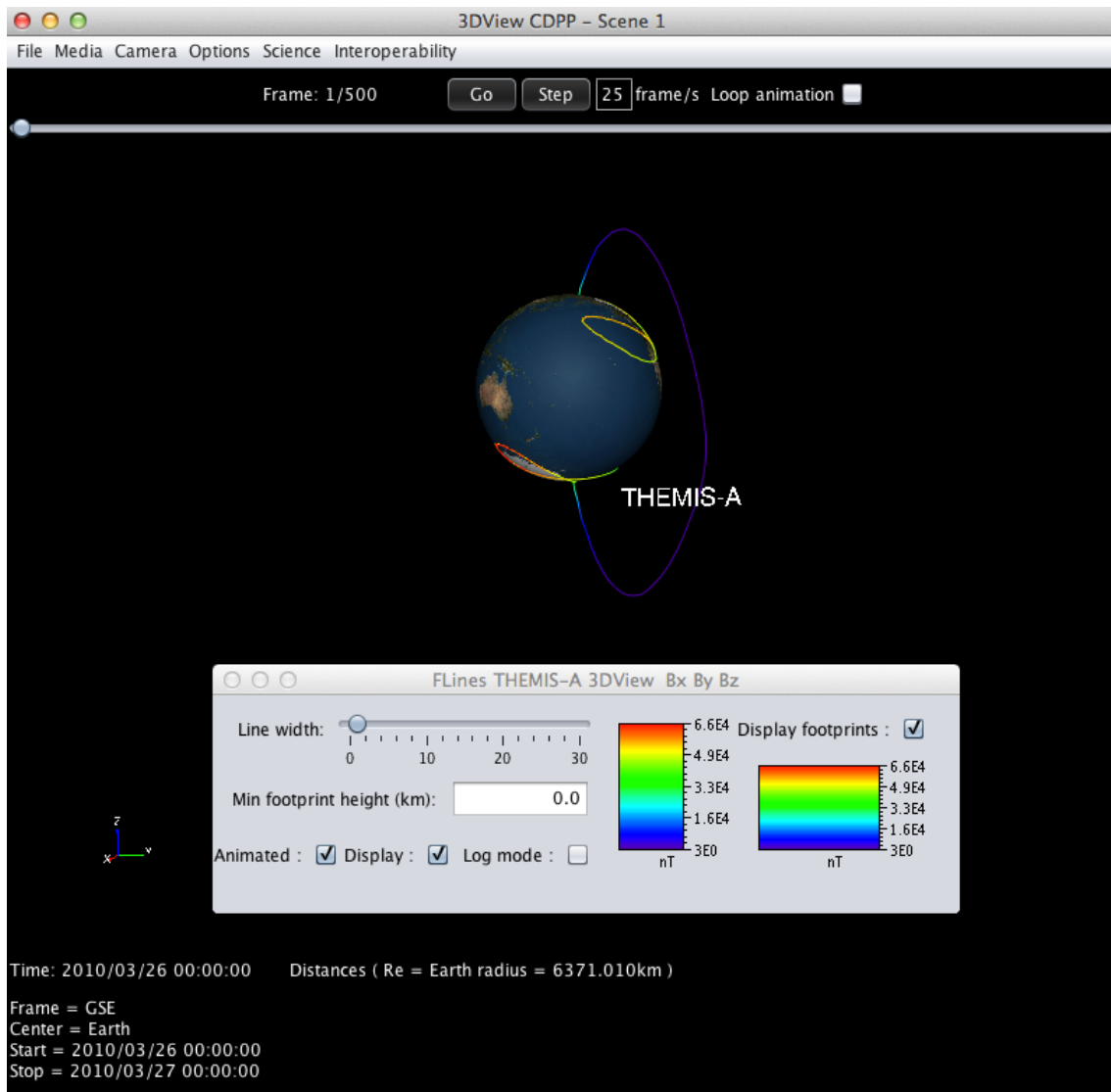


- The following dialog box is displayed in the right panel



3DView Tutorial 2.2

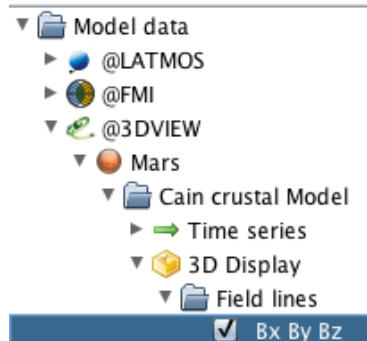
- Select the option named **Get start points from body trajectory** with THEMIS-A and click on **Add selected data to 3Dscene**



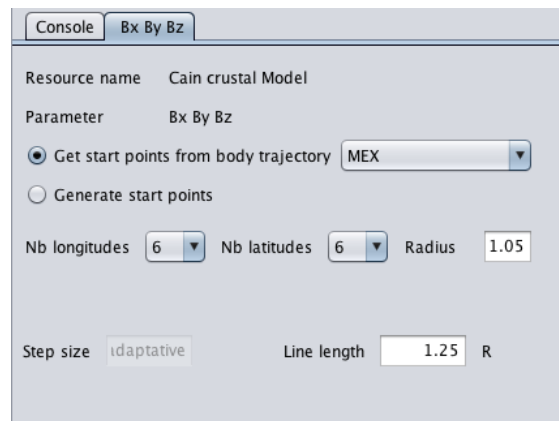
2.16 Display magnetic field lines calculated with Cain Crustal Model

In this example, we use the **Cain Crustal Model**, implemented on the 3DView server.

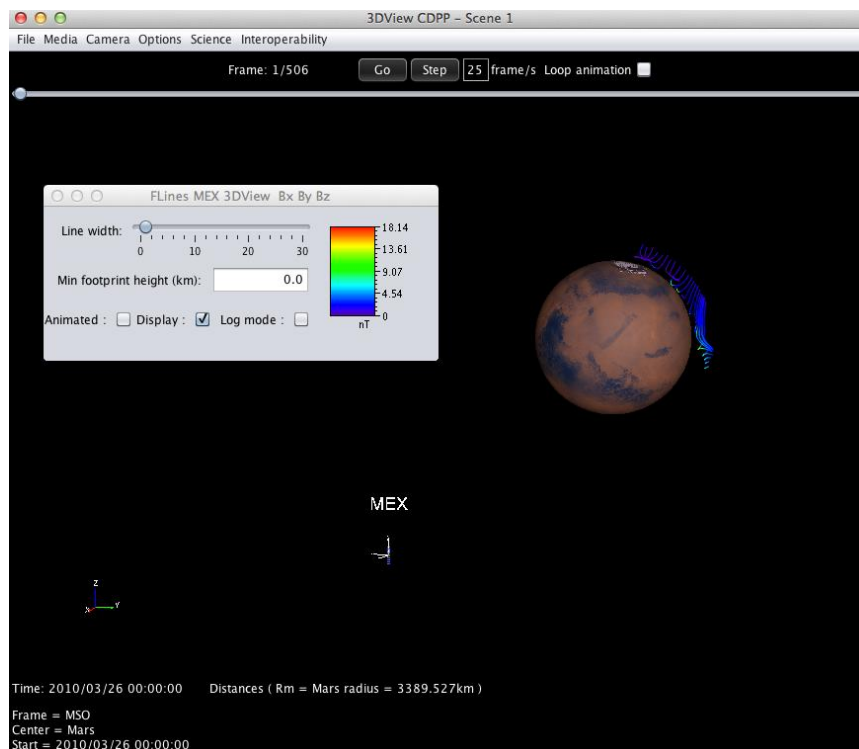
- With the **File/Manage scene** menu, create a scene in MSO coordinates with MEX from 2010-03-26T00:00:00 to 2010-03-26T08:00:00.
- In the **Science/Remote data (IMPEX)** menu, select



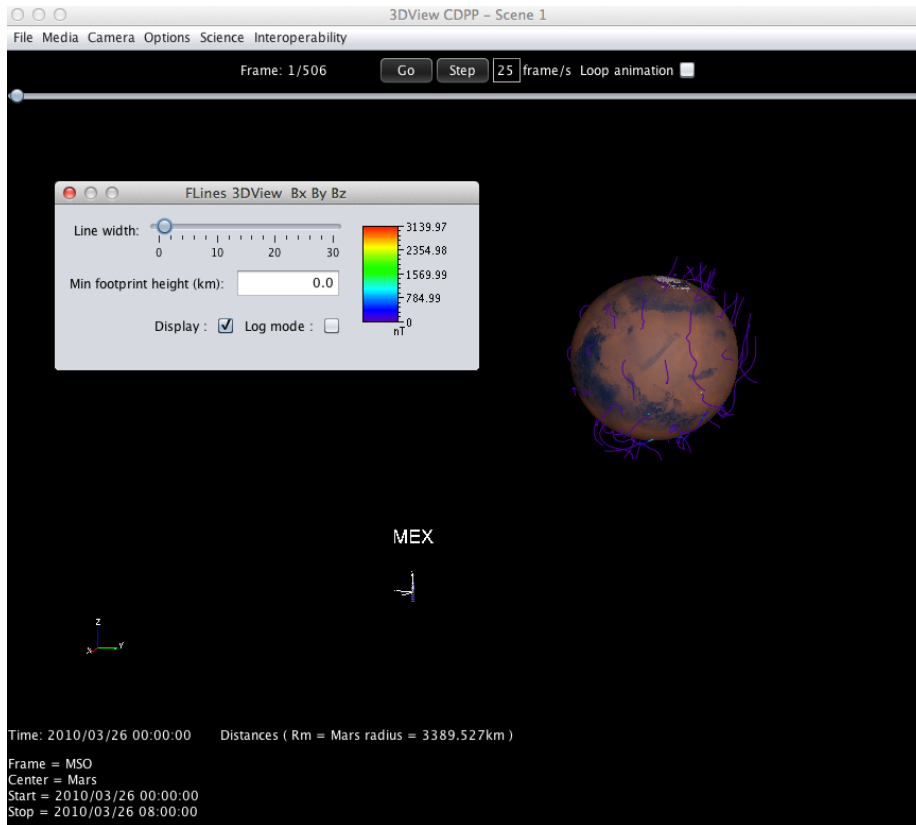
- The following dialog box is displayed in the right panel



- Select the option named **Get start points from body trajectory** with MEX and click on **Add selected data to 3Dscene**.



3DView Tutorial 2.2

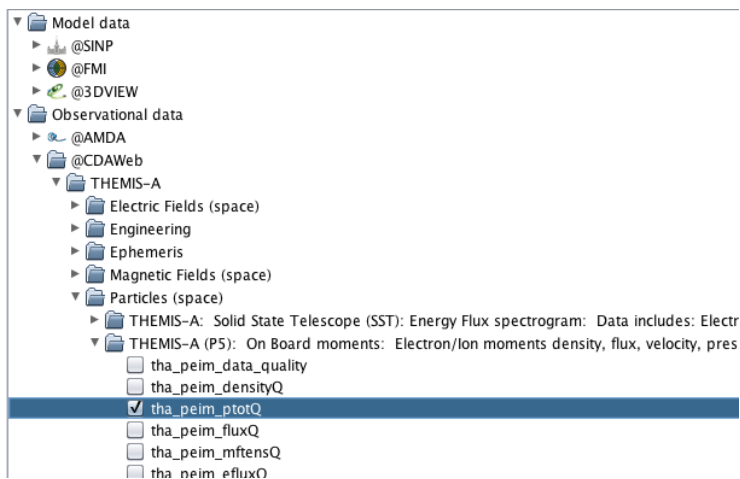


- Select the option named **Generate start points** and click on **Add selected data to 3Dscene**.

2.17 Display observational data from CDAWeb

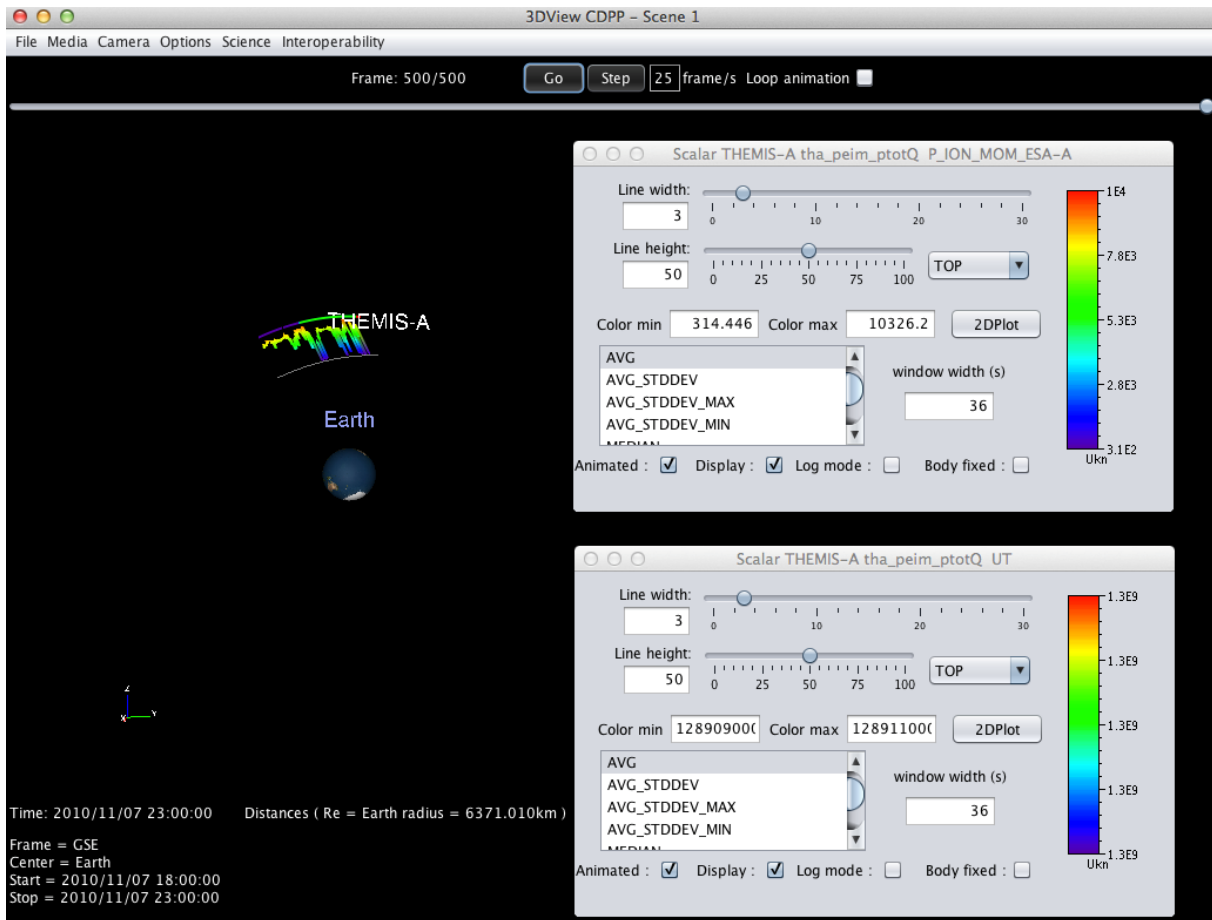
In this example, we show how to display observational data from the CDAWeb.

- With the **File/Manage scene** menu, create a scene in GSE coordinates with THEMIS-A from 2010-11-07T18:00:00 to 2010-11-07T23:00:00.
- In the **Science/Remote data (IMPEX)** menu, select



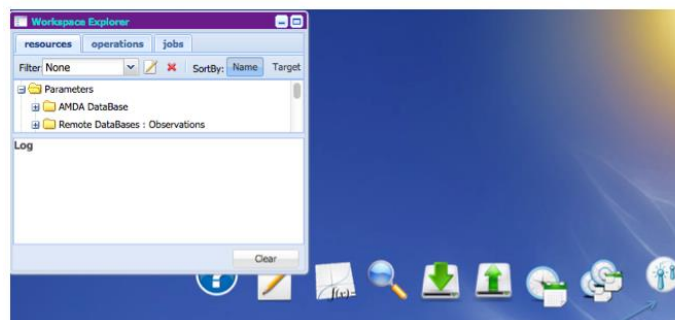
3DView Tutorial 2.2

- Then click on **Add selected data to 3D scene**. Two physical quantities are displayed with their control box.



2.18 Display observational data from AMDA using SAMP

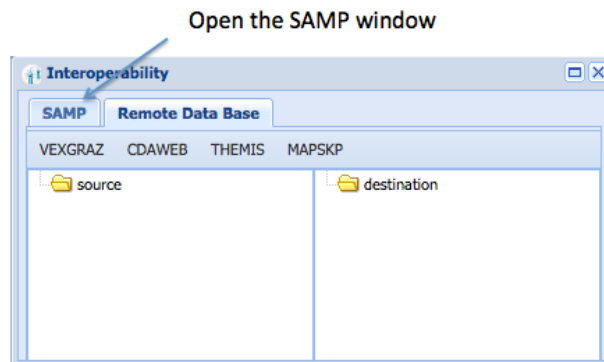
- With the **File/Manage scene** menu, create a scene in GSE coordinates with THEMIS-A from 2010-03-27T00:00:00 to 2010-03-27T07:00:00.
- In a browser, enter <http://amda.cdpp.eu> to start AMDA
- Follow these steps to start a SAMP Hub and open a SAMP connexion
 - Step 1



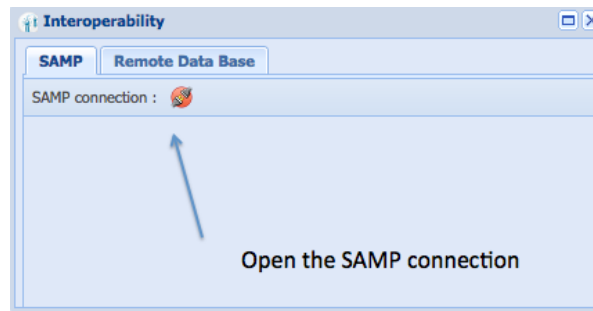
Click [here](#) to open the interoperability window.

3DView Tutorial 2.2

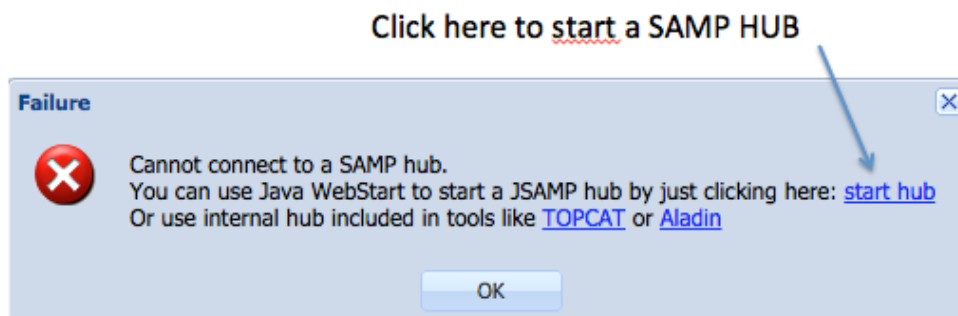
- Step 2



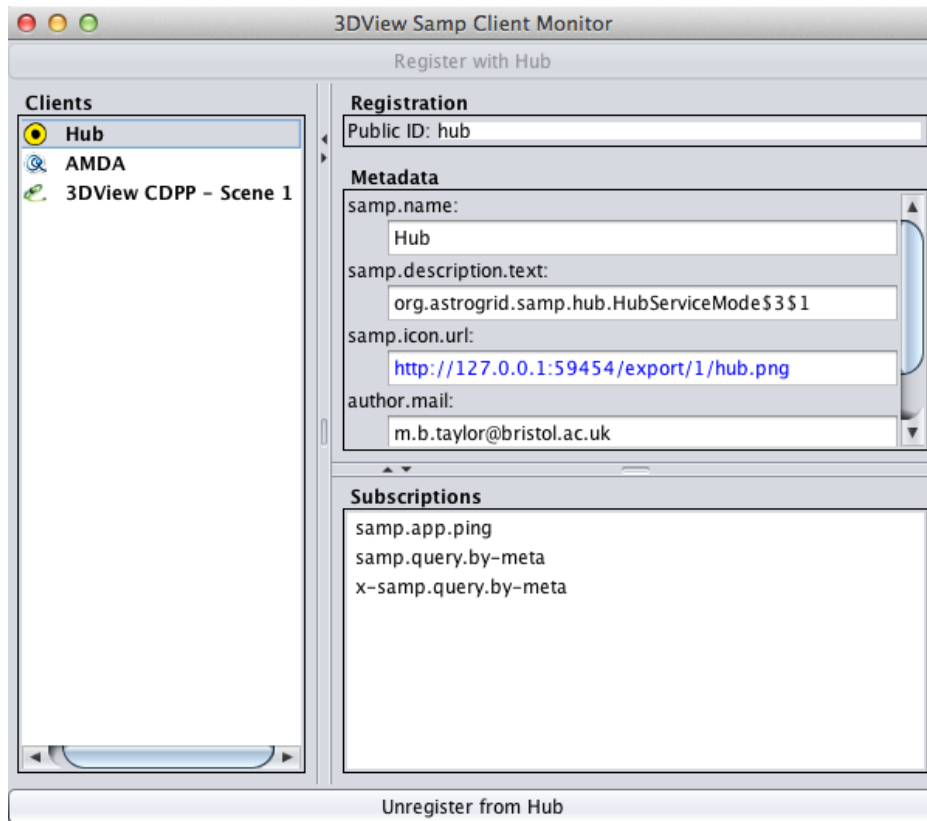
- Step 3



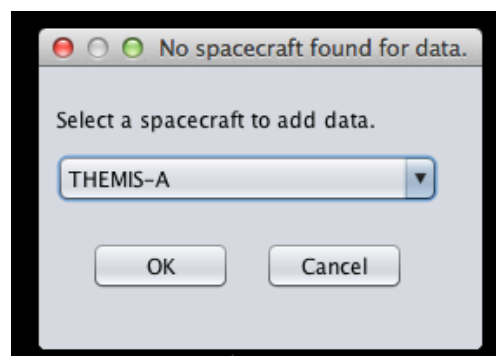
- Step 4



- Back in **3DView**, select **Interoperability/SAMP**, and then click on **Register Hub**. AMDA and 3DView are displayed in the list of connected clients.

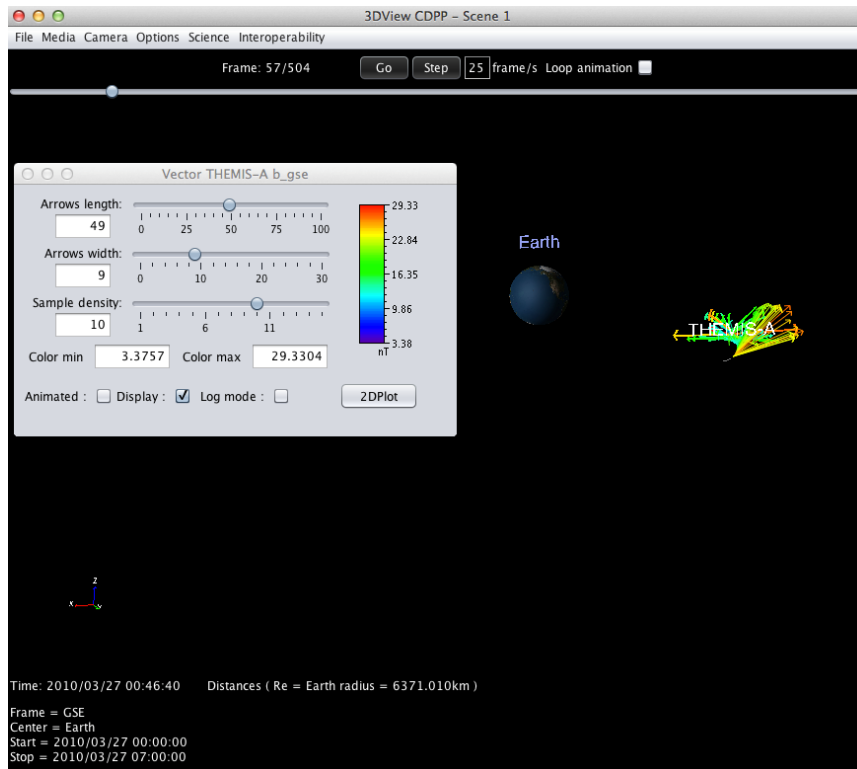


- Back in **AMDA**
 - Open the plot Manager, drag and drop Themis-A/FGM/low/B_gse from the Workspace Explorer
 - Select the period 2010-03-27T01:00:00 2010-03-27T05:00:00
 - Select **VOTable** as file format and click on **Download**
 - In the **Download** window, click on **Send via SAMP to 3DView**
- A **Download** pop-up window is displayed by 3DView. You have to select the spacecraft on which trajectory the exchanged data will be displayed.



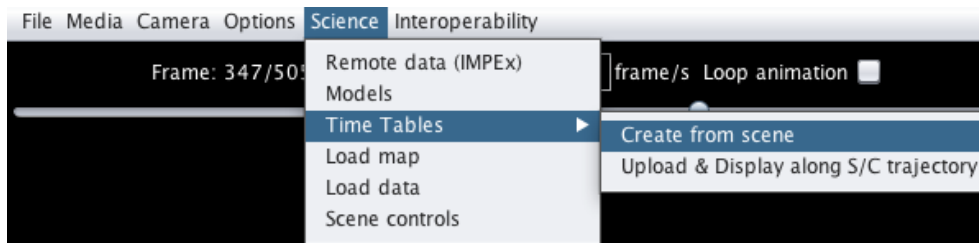
- Data are displayed in the 3D scene, with the associated control box.

3DView Tutorial 2.2

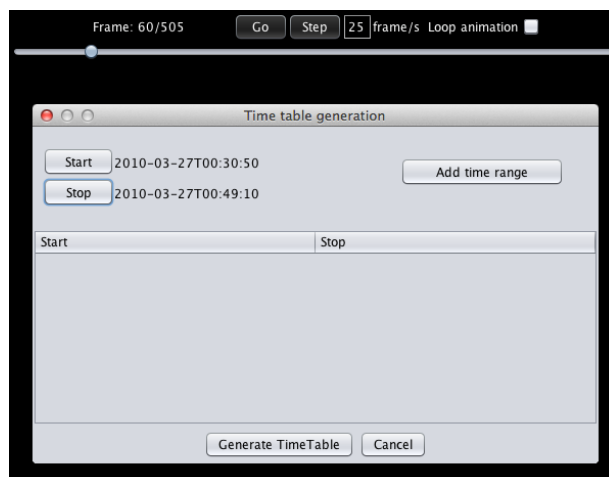


2.19 Create a Time Table from the animation bar

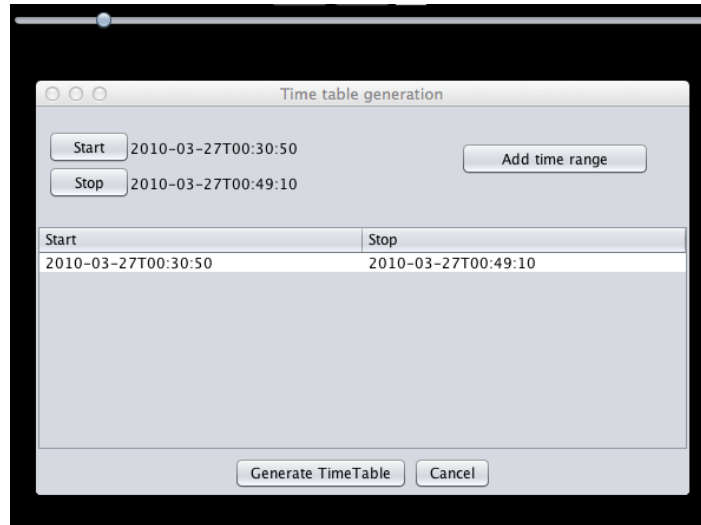
- With the **File/Manage scene** menu, create a scene in GSE coordinates with THEMIS-A from 2010-03-27T00:00:00 to 2010-03-27T07:00:00.
- Then select the following menu



- In the animation bar, select the time with the animation button and create an interval with the *Start* and *Stop* buttons.



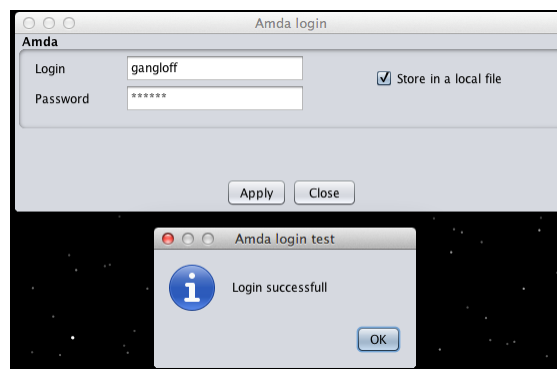
- Click on Add time range to append the selected time interval to the list.



- Repeat this operation for several time intervals, and then click on **Generate Time Table**. The Time Table will be saved in a file with the *xml* extension.

2.20 Access to private Time Tables from AMDA

- With the **File/Manage scene** menu, create a scene in GSE coordinates with THEMIS-A from 2010-03-27T00:00:00 to 2010-03-27T07:00:00.
- Select **Interoperability/AMDA login**. Enter your AMDA user ID, with your password. Select the **Store in a local file** option to save the ID and password. This way, they are saved for further 3DView sessions. Then click on **Apply**.

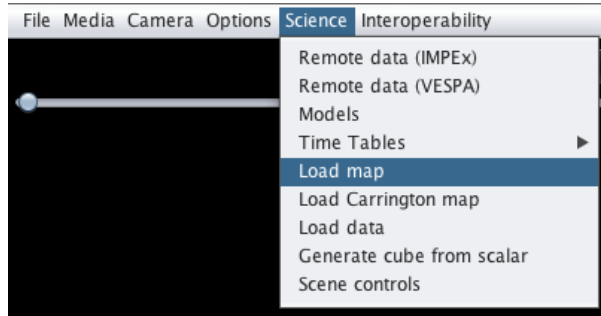


- The **Science/Remote data (IMPEX)** menu now displays the list of user owned Time Tables in the *Timetables/Private* directory.

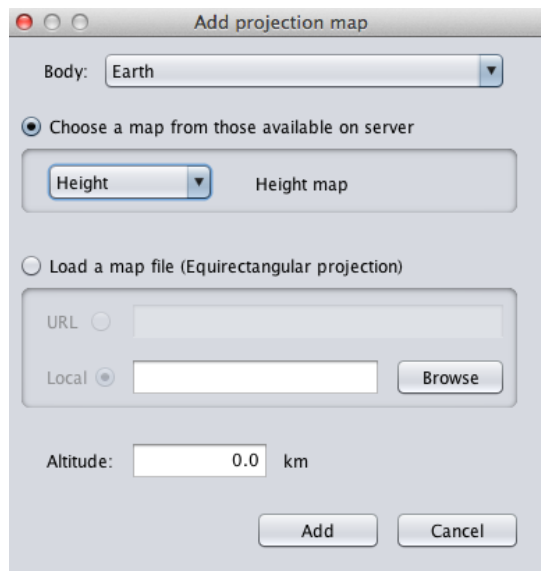
2.21 Add a Map on or above a Central Body

2.21.1 Add a predefined map

- With the **File/Manage scene** menu, create a scene with the EARTH as central body, in 2014.
- Then select



- The following window is displayed. Select **Choose an map from those available on server** and *Height*



- The *Height* map is displayed on the Earth

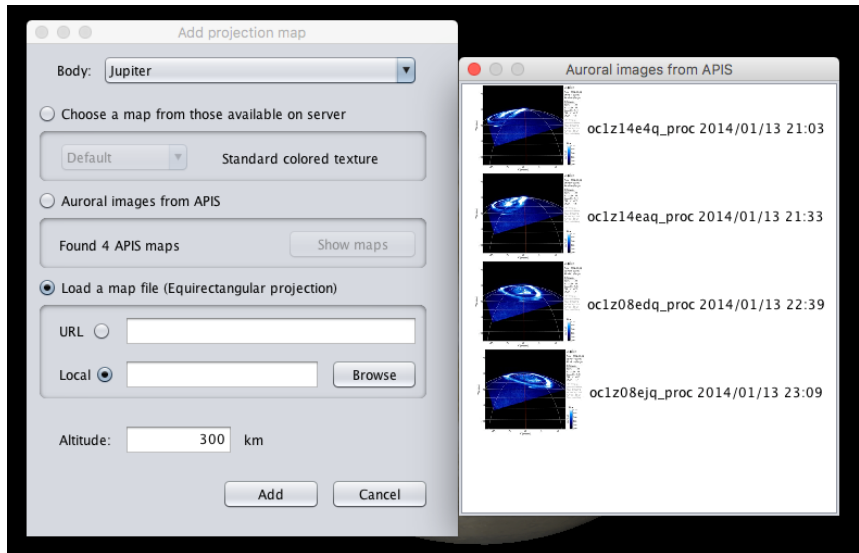


3DView Tutorial 2.2

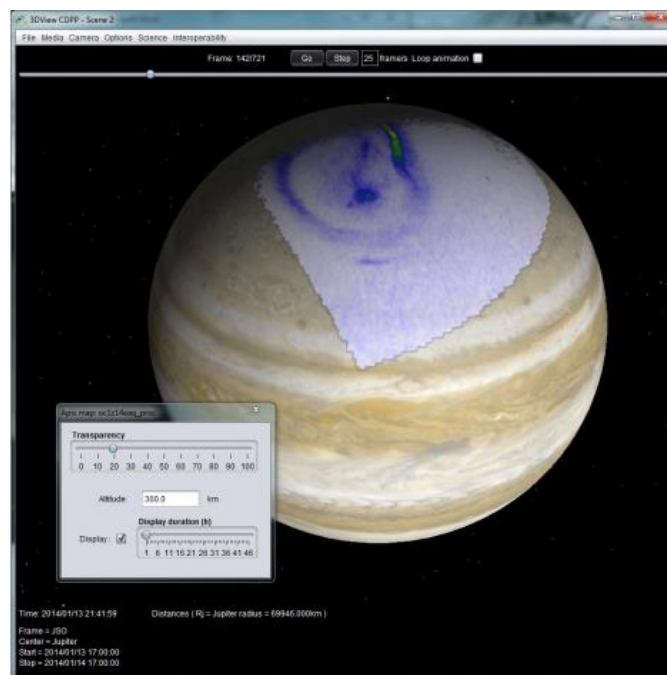
2.21.2 Add a map from APIS

The APIS auroral image database (<http://apis.obspm.fr/>) available through EPN-TAP can be used to add specific maps on planets such as Jupiter or Saturn.

- To be able to find available data on APIS, choose a scene 2014/01/13 19:00:00 to 2014/01/14 01:00:00 with Jupiter center.
- Open the Science/load map menu and select Auroral images from APIS.



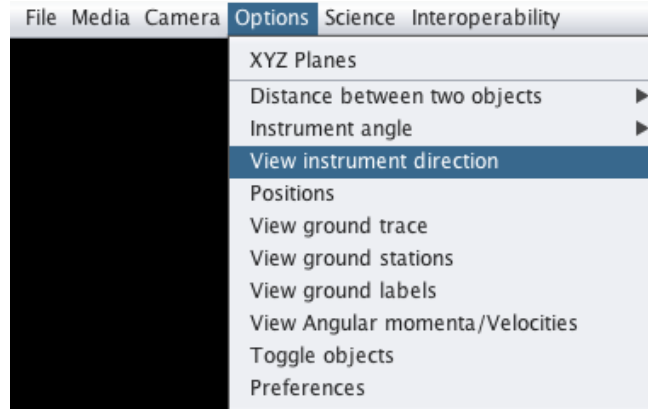
- Clicking the add button loads the maps in the scene and show them according to their timestamp. The image list on the right in Figure 7 allows the user to set scene time by clicking on the desired one.



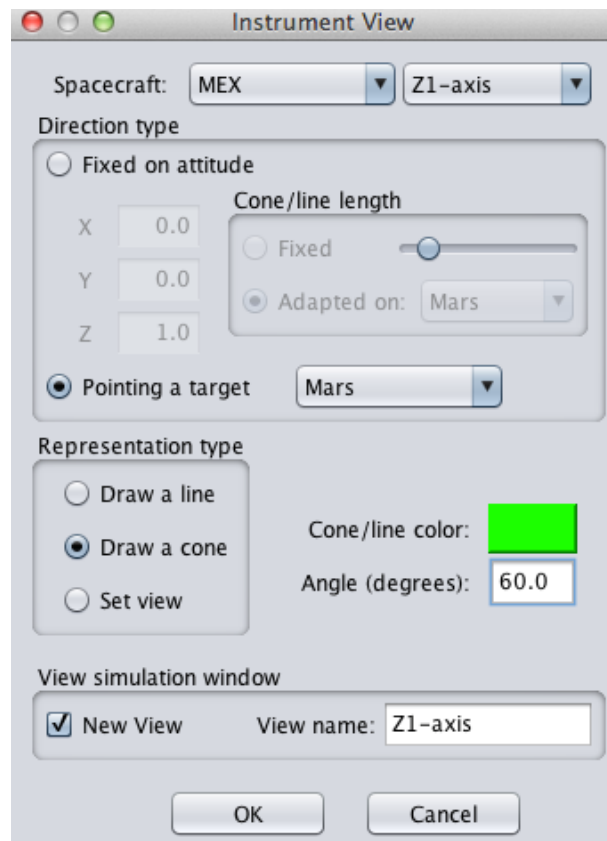
With some graphic cards, at low altitudes, the aurora can be interlaced with planet surface.

2.22 Display a cone view a target in a pop-up window

- With the **File/Manage scene** menu, create a scene with MEX and MSO as coordinate system from 2010-07-15T14:00:00 to 2010-07-16T14:00:00
- Then select

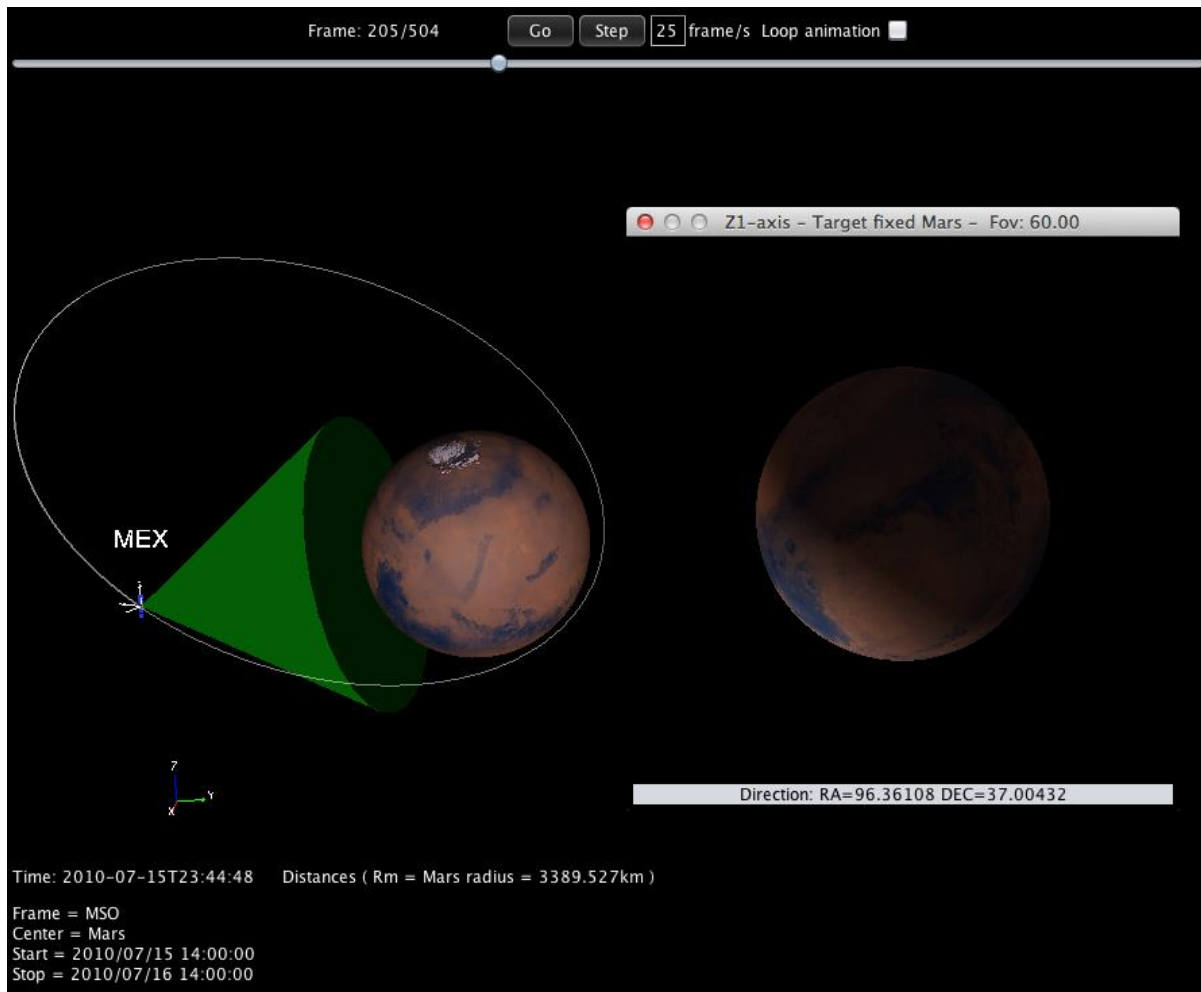


- Select **Pointing a target** option with *Mars*, **New View** in *View Simulation window*, and an angle of 60.0 degrees.



- A Cone is displayed in the main window, and a new window containing a view of Mars (60°) from MEX.

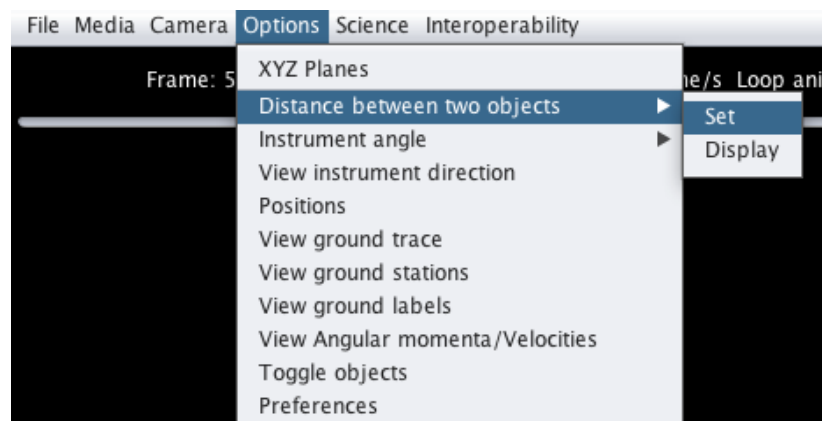
3DView Tutorial 2.2



- Now, if you select *set view* and an angle of 60.0° in the *Instrument view* window, a view of Mars (60°) from MEX is displayed in the main window..

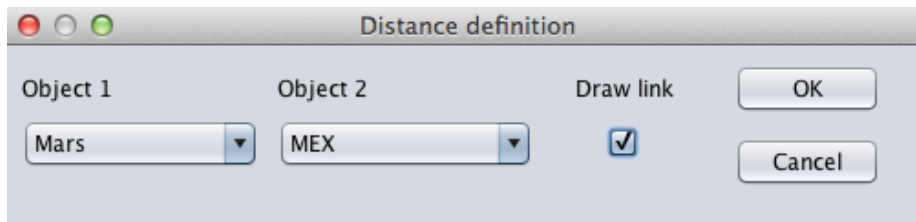
2.23 Display the distance between two bodies

- With the **File/Manage scene** menu, create a scene with MEX and MSO as coordinate system from 2010-07-15T14:00:00 to 2010-07-16T14:00:00. Select *Phobos* and *Deimos* as Natural bodies.
- Then select

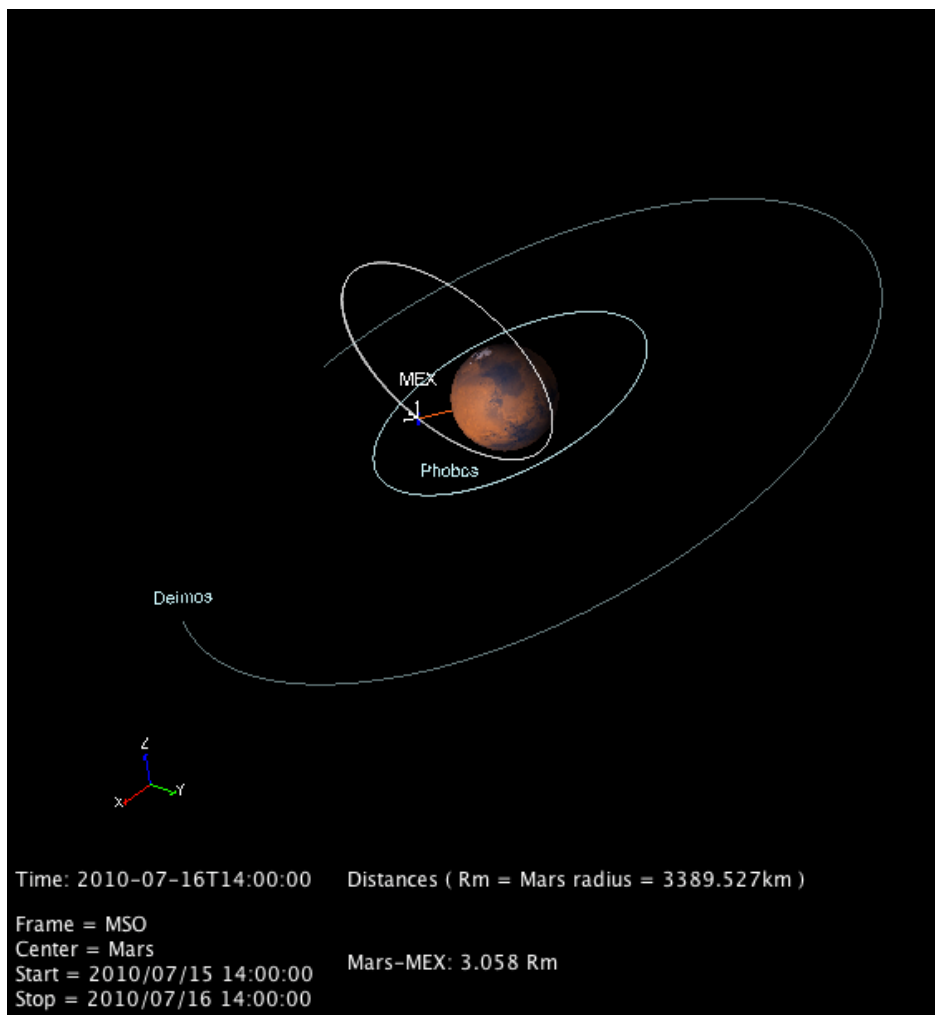


3DView Tutorial 2.2

- This opens a pop-up window. Select Mars as Object#1, MEX as Object#2, and select *Draw link*



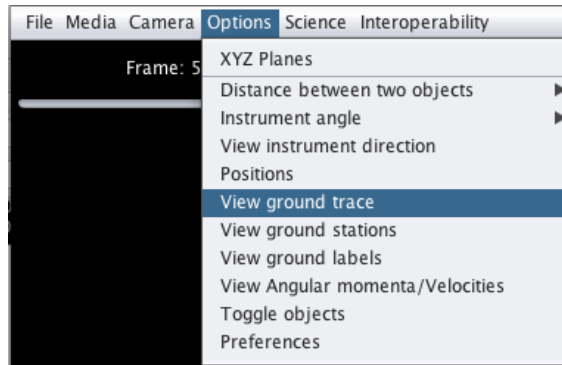
- A link between Mars and MEX is displayed as well as the distance.



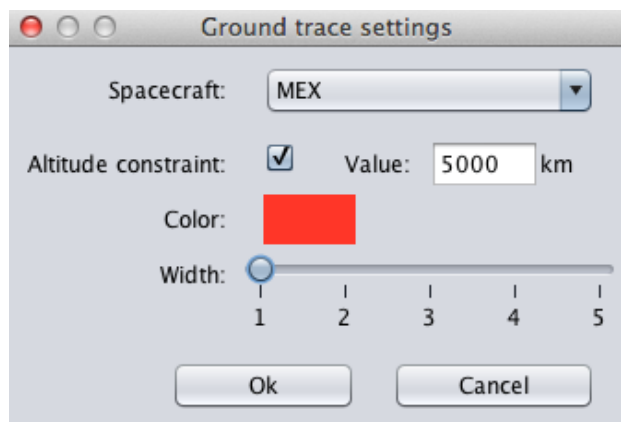
2.24 Display a ground trace

- With the **File/Manage scene** menu, create a scene with MEX and MSO as coordinate system from 2010-07-15T14:00:00 to 2010-07-16T14:00:00. Select *Phobos* and *Deimos* as Natural bodies.
- Then select

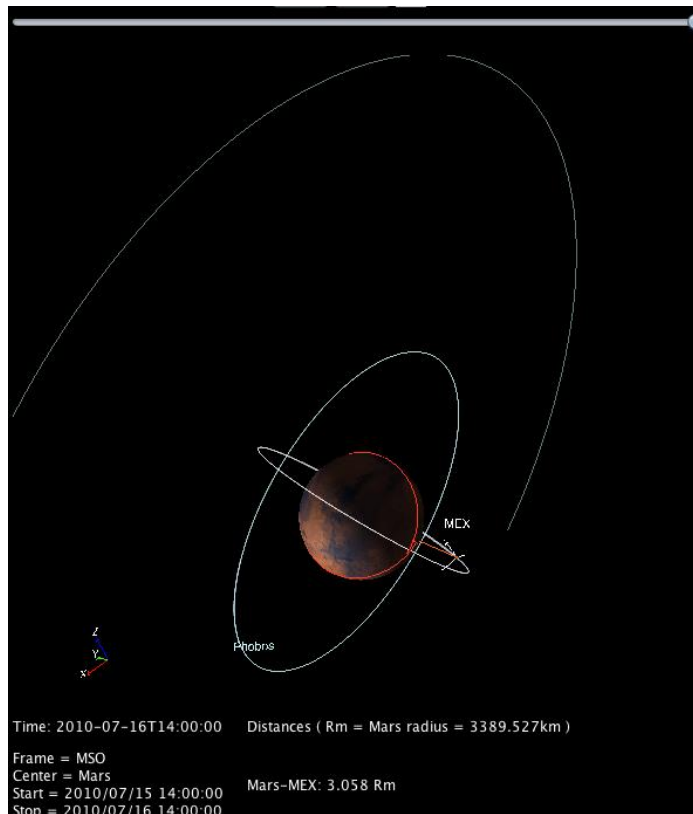
3DView Tutorial 2.2



- Select an altitude constraint of 5000 km

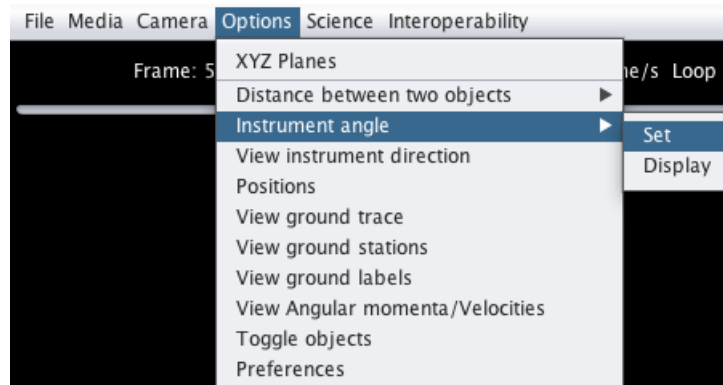


- The ground trace is displayed with the chosen colour.

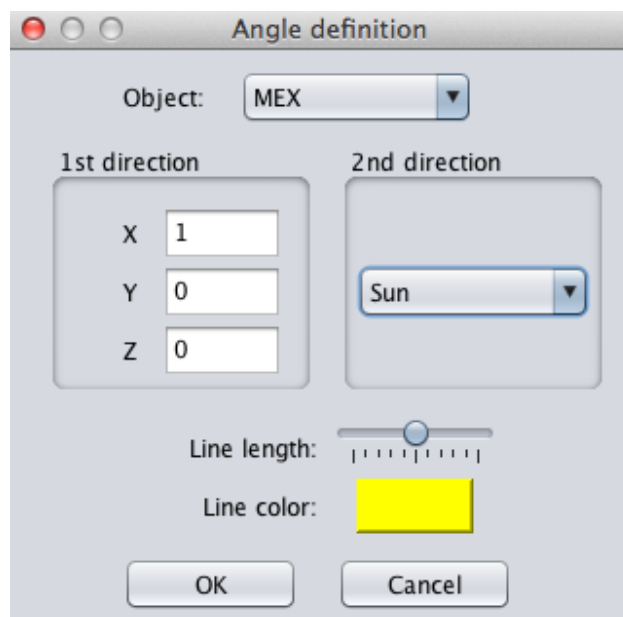


2.25 Display the angle between an instrument and a body

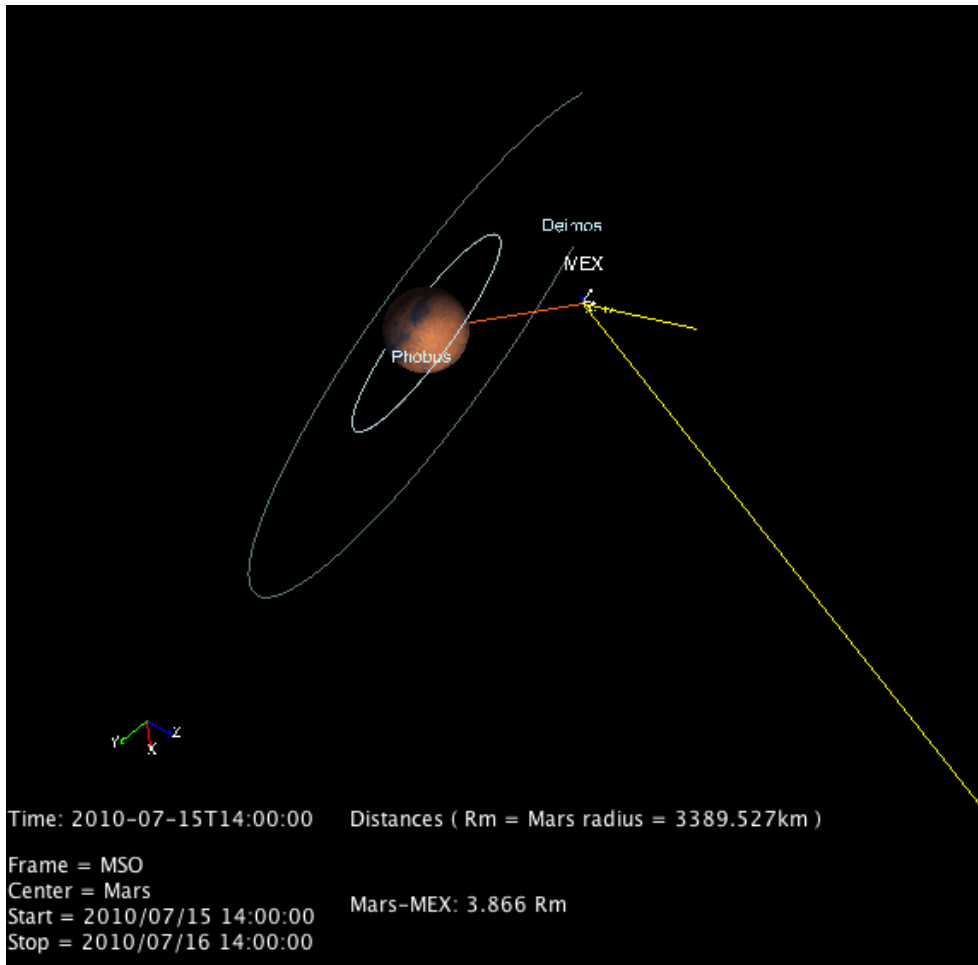
- With the **File/Manage scene** menu, create a scene with MEX and MSO as coordinate system from 2010-07-15T14:00:00 to 2010-07-16T14:00:00. Select *Phobos* and *Deimos* as Natural bodies.
- Then select



- Select X=1 Y=0 Z=0 *Sun* as second direction and yellow as colour

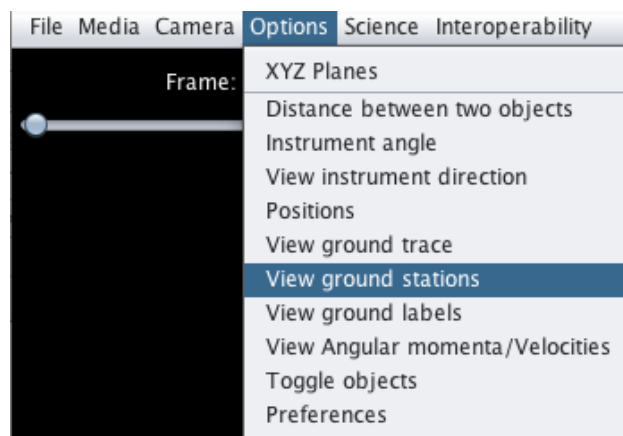


- The angle between MEX and the Sun is displayed in yellow



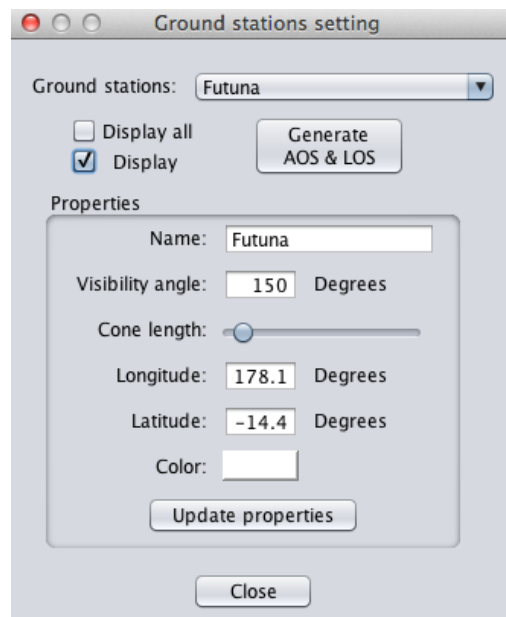
2.26 Display ground stations

- With the **File/Manage scene** menu, create a scene with SVOM and the EARTH as central body from 2013-01-01T14:00:00 to 2013-01-03T14:00:00.
- Then select



- Select *Futuna* as ground station and *Display*

3DView Tutorial 2.2

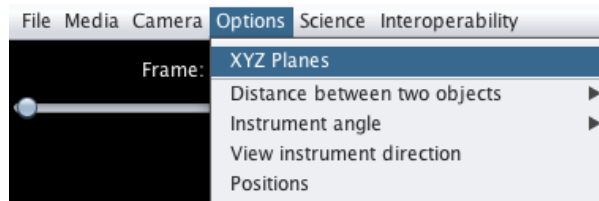


- A cone associated with the Futuna ground station is displayed.

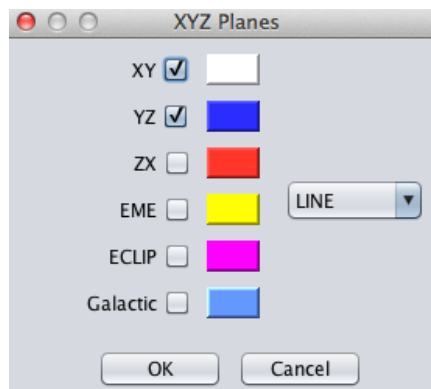


2.27 Display XYZ planes

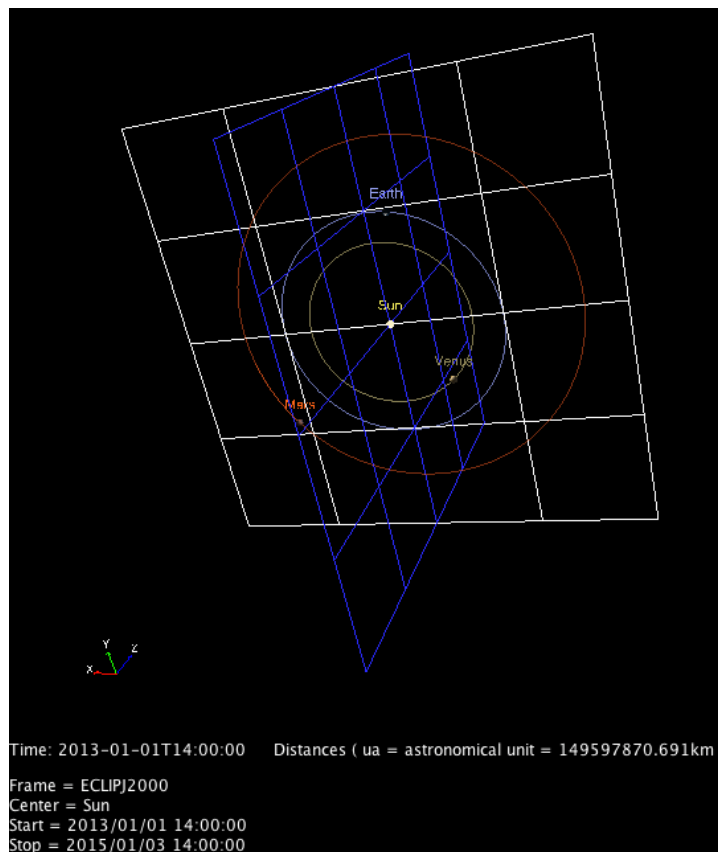
- With the **File/Manage scene** menu, create a scene with the Sun as central body and ECLIPJ2000 as coordinate system from 2013-01-01T14:00:00 to 2015-01-03T14:00:00. Add Venus, the Earth and Mars as Natural bodies.
- Then select



- Then select XY with white colour and YZ.

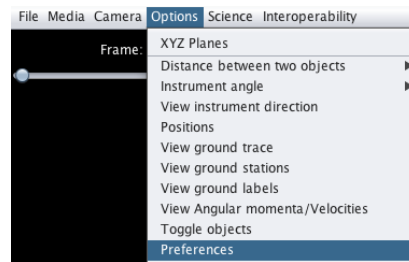


- Both planes are displayed as grids (units=AU). The white grid is aligned on the orbit of the planets



3DView Tutorial 2.2

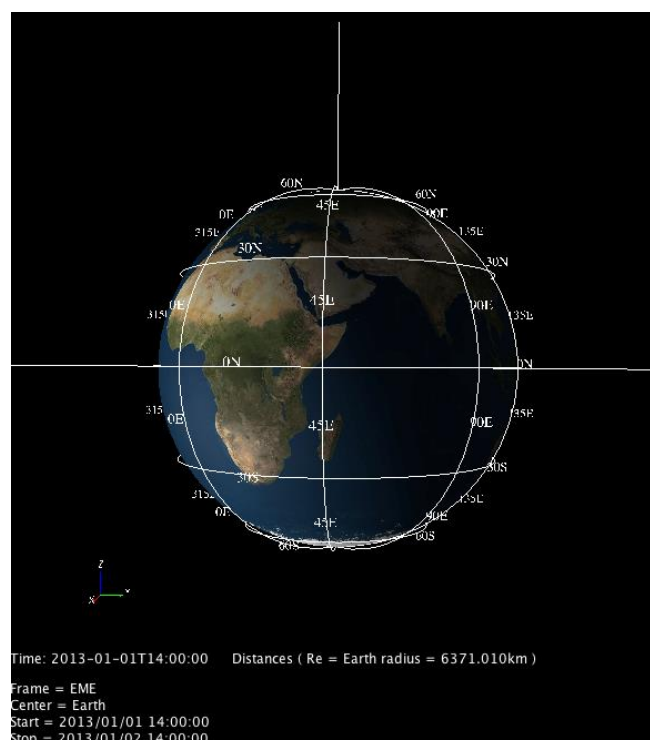
- With the **File/Manage scene** menu, create a scene with the Earth as central body and EME as coordinate system from 2013-01-01T14:00:00 to 2013-01-02T14:00:00, then select



- Select *Display axes* (in Center Body) and set **Long & Lat** to *Precise*



- Axes, longitudes and latitudes are displayed above the Earth



2.28 Search and display data around a Titan fly-by with VESPA

For this use case, we use 3DView and another tool called TopCat¹ to display data searched by 3DView among VESPA services.

We want to search for data provided by VESPA around a Titan flyby by the CASSINI spacecraft described below (source PDS):

Titan Flyby T-117: Measuring Titan's Atmosphere

This is Cassini's 118th flyby of Titan and the third of eleven planned for 2016. This encounter will increase the inclination of Cassini's orbit from 16 degrees to 20.6 degrees. The highest priority science is a grazing atmospheric occultation observed by Radio Science Subsystem (RSS), which will profile the thermal structure of the atmosphere, with ingress and egress latitudes of ~7S and ~30N degrees. The occultation is followed by a short-duration high northern-latitude egress-only bistatic scattering with ground track likely crossing small lakes, covering the region from about (80N, 190W) to about (70N, 240W) degrees, and capturing near-grazing scattering angle decreasing from about 80 to 75 degrees.

On approach, the Composite Infrared Spectrometer (CIRS) will view the sub-Saturn hemisphere of Titan, the Visible and Infrared Mapping Spectrometer (VIMS) will do two mapping observations and the Imaging Science Subsystem (ISS) will search for clouds across Titan's Fensal-Aztlan region.

Sources:

- Cassini Science Team. NASA Jet Propulsion Laboratory
- Cassini Saturn Tour Dates
- Cassini Imaging Central Laboratory for Observations (CICLOPS), "Looking Ahead: Rev232: Jan 22 - Feb 7 2016"



Titan Flyby at a Glance

Date
Feb. 16, 2016

Altitude
633 miles (1,018 km)

Speed (rel. to Titan)
20,132 mph (9.9 km/sec)

Details

[+ Flyby FAQ](#)

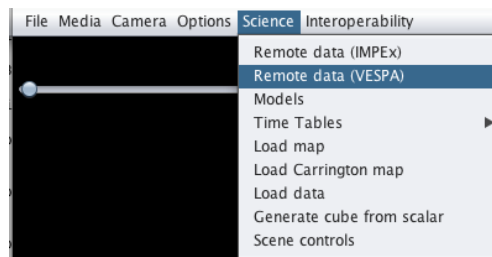
[+ Titan Image Gallery](#)

[+ Browse or Search the Latest Raw Images](#)

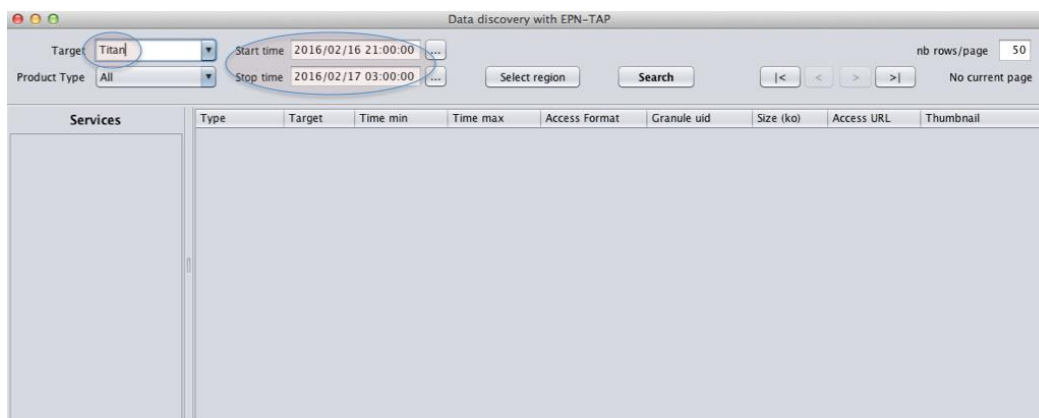
[+ Saturn's Moons](#)

[+ More Titan Information](#)

- With the **File/Manage scene** menu, create a scene with Titan as central body, CASSINI as spacecraft and TIIS as coordinate system from 2016-02-16T21:00:00 to 2016-02-17T03:00:00. Then select the VESPA option



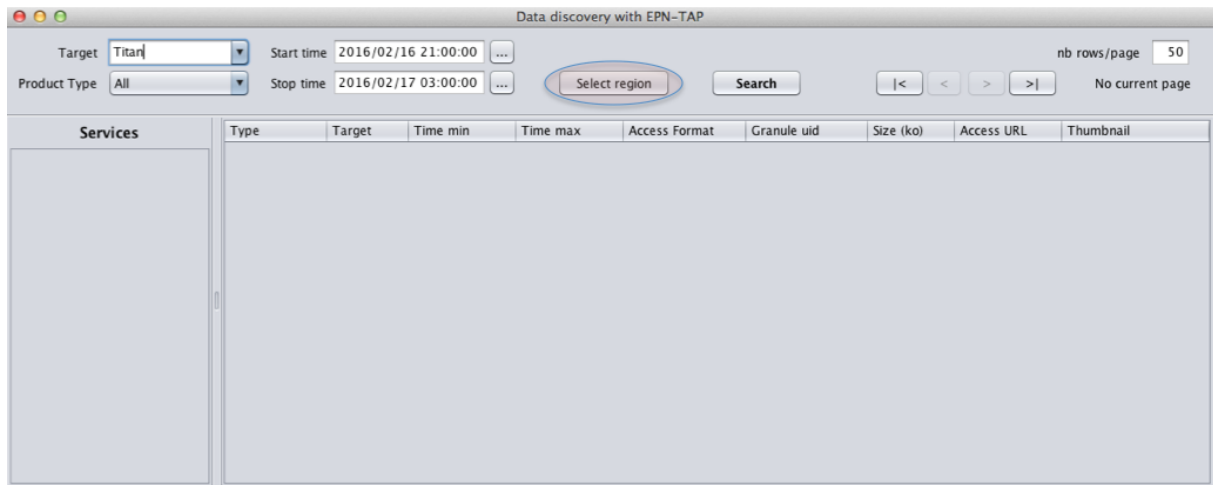
This opens the VESPA pop-up window, with *Target*, *StartTime* and *StopTime* selected from the scene.



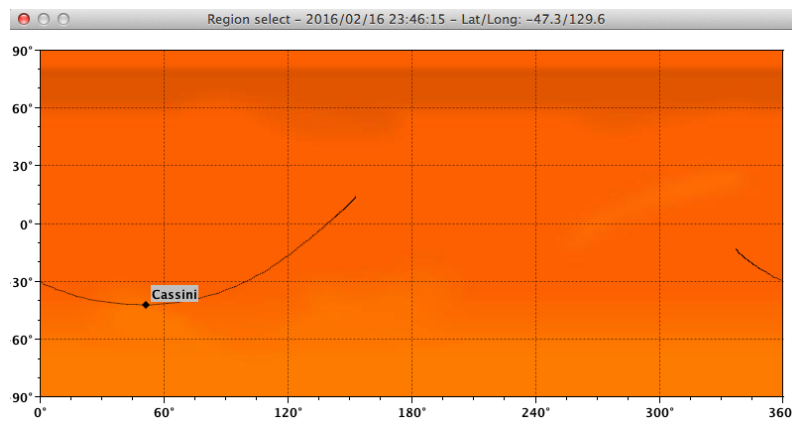
¹ <http://www.star.bris.ac.uk/~mbt/topcat/>

3DView Tutorial 2.2

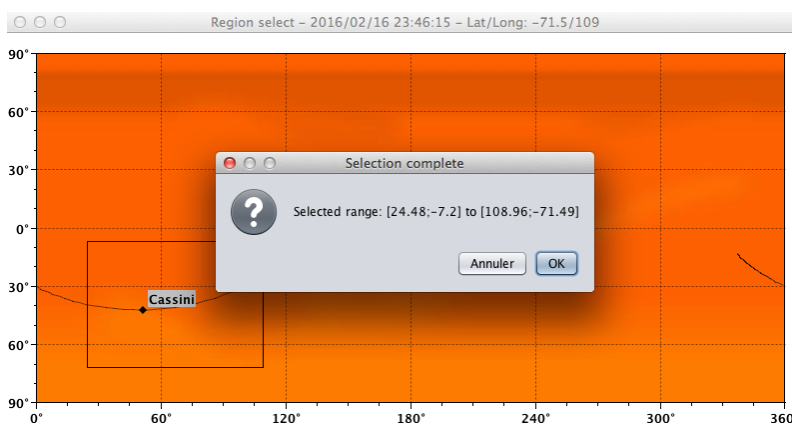
Then launch the animation and stop it at about 23:16, and click on the *Select Region* button to add a new search keyword.



The following pop-up window is opened



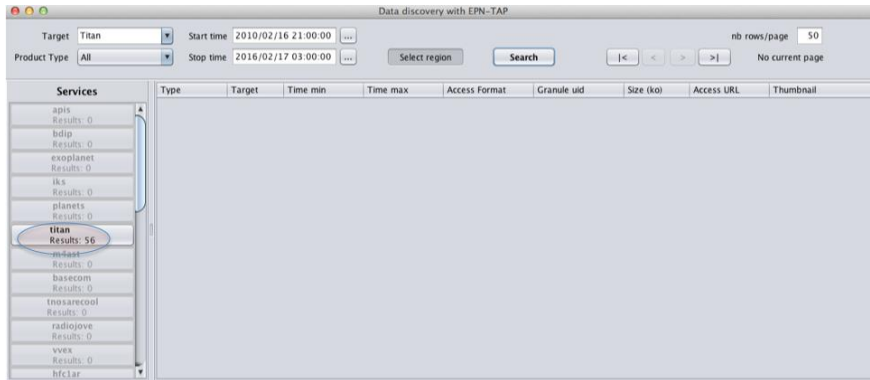
Then select a region



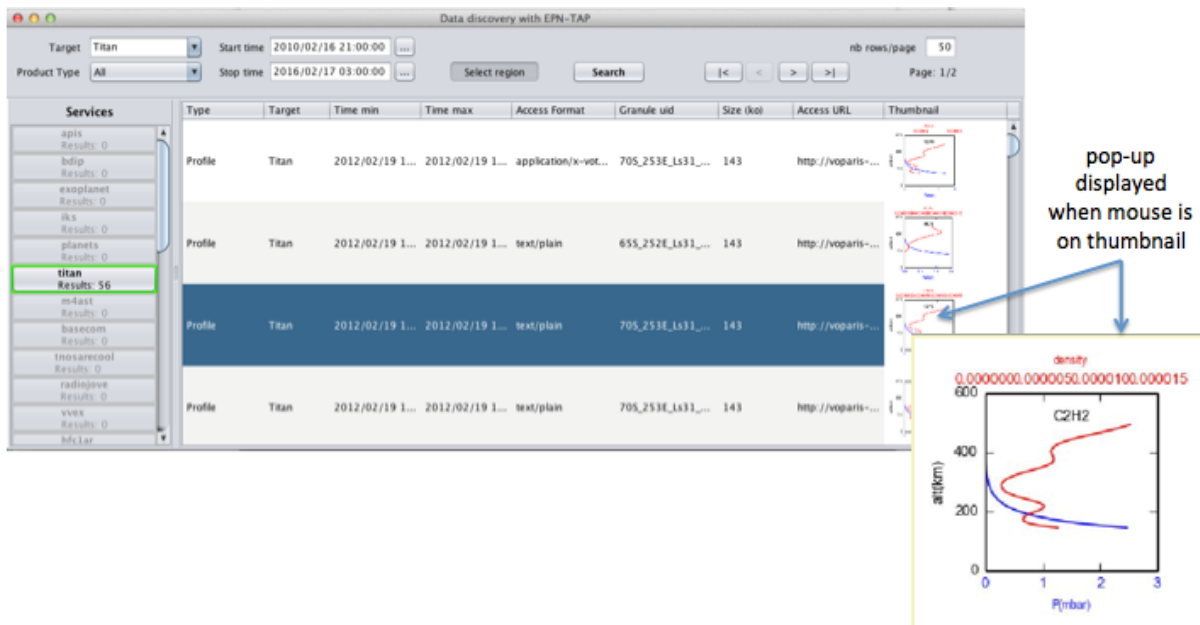
To increase the number of possible responses, change the *Start Date* to 2010-02-16T21:00:00 and click on Search

3DView Tutorial 2.2

The list of services is displayed in the left part of the window. The name of each service is displayed with the corresponding number of results.

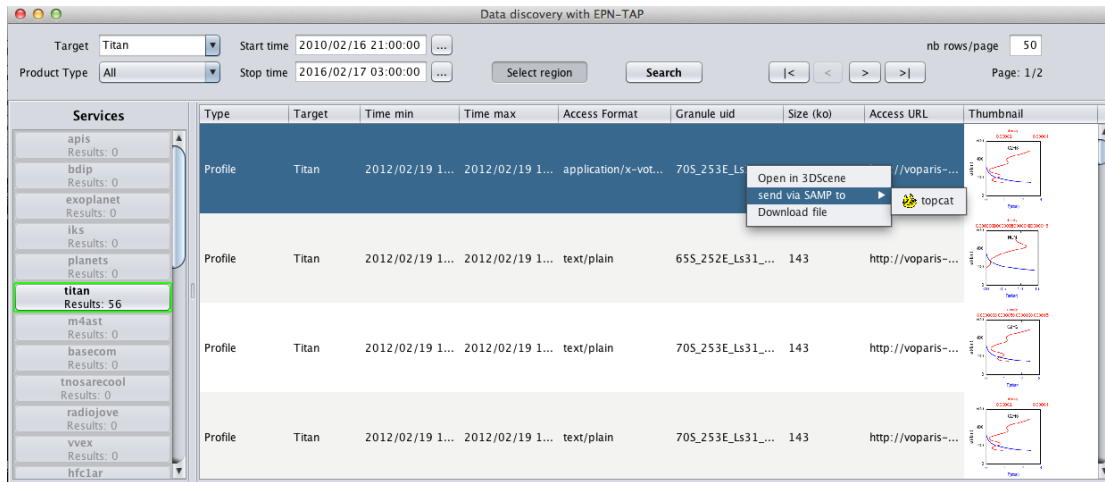


Click on *titan* to display the results of this database.

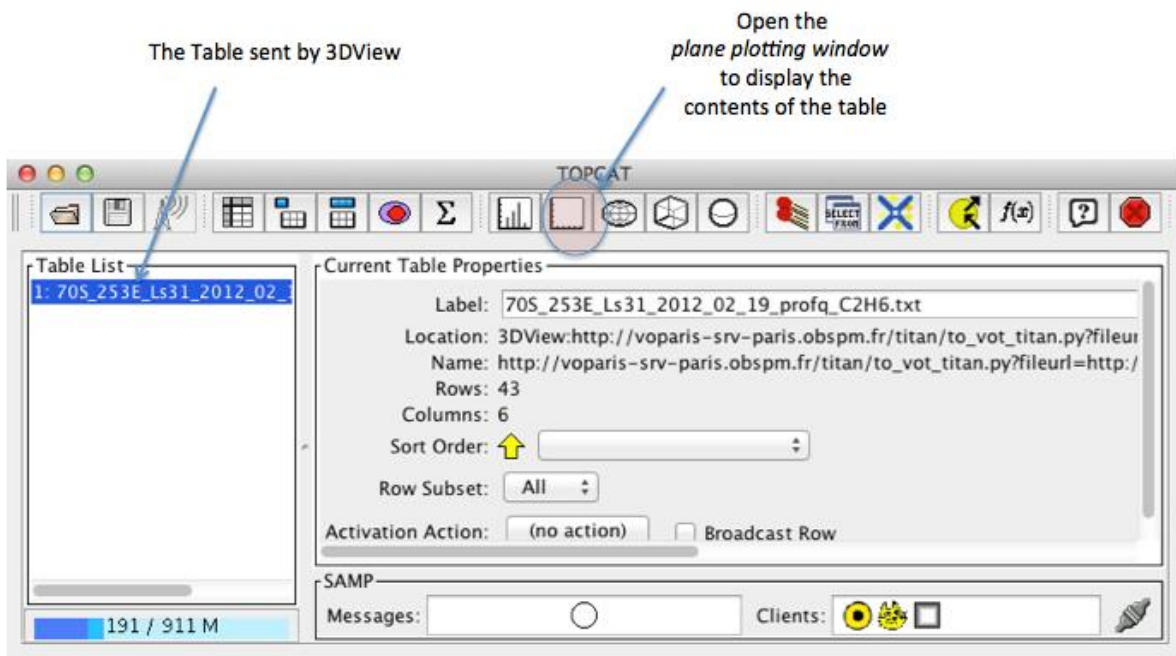


Launch TopCat. This will automatically start the SAMP HUB hosted by TopCat. Right click on a raw displays several options depending on the data format. Select *send via SAMP to topcat*. This option is available for data of mime type equal to application/x-votable+xml only.

3DView Tutorial 2.2

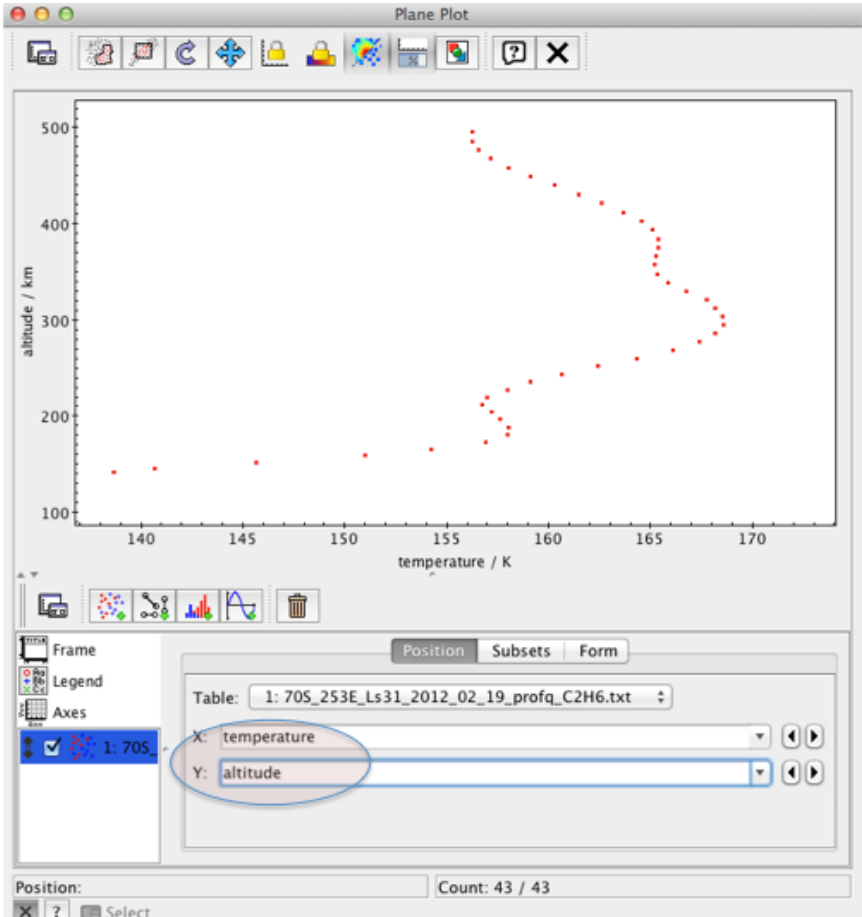


The table is loaded by TopCat, and visible in the Table List after a few seconds.



Select *temperature* on X-axis and *altitude* on Y-axis.

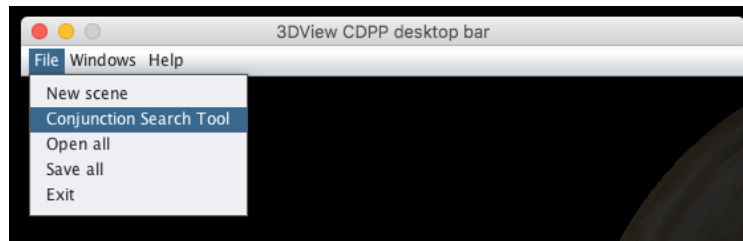
3DView Tutorial 2.2



2.29 EISCAT Svalbard radar – Swarm conjunction in the night side

This use case is related to the Conjunction Search Tool. Its goal is i) to find favourable conjunctions between the ESR and Swarm around magnetic midnight, ii) to exploit one of the conjunctions found.

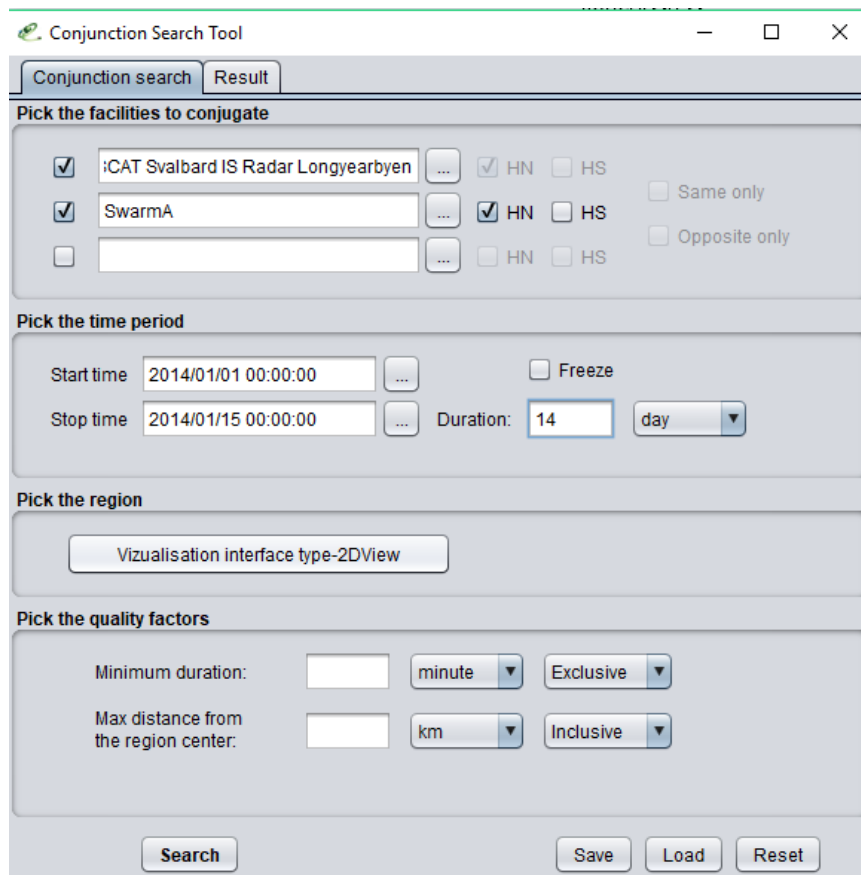
Note: this use case requires, at a later stage, the upload of a Swarm data file in 3D View. The Conjunction Search Tool is accessed through the File Menu of the desktop bar.



Step 1: instruments and time interval selection

Instruments: ESR (Ground -> IS Radars -> EISCAT) and Swarm A (Space -> Polar -> LEO -> Swarm) Hemisphere: HN

Time interval: 2014/01/01 00:00:00 - 2014/01/15 00:00:00 (only 2 weeks for a faster run)



3DView Tutorial 2.2

Note that the time interval (Start time and stop time) will automatically adjust to the common operation time of the selected instruments. To avoid this, the “Freeze” box can be ticked.

Step 2: conjunction region

Click the [Visualization interface type-2DView](#) button. In polar view and MLT coordinate system, we set the region of conjunction as a circle centred on the ESR latitude (~75 MLAT) and at 0 MLT. Radius of the circle: 1000 km (for the time being, it is recommended not to choose too small radii).

The screenshot displays the CST 2D View interface. The main window is titled "CST 2D View - 2017/07/11 08:51:27 - long/lat: 20.7/1.3". It features two polar plots, one labeled "NORTH" and one labeled "SOUTH". Both plots show a central blue circle representing the conjunction region, surrounded by concentric dashed circles representing different latitudes (15°, 30°, 45°, 60°, 75°). The plots are overlaid on a grid of dashed lines representing magnetic local time (MLT) from 00 to 18. The configuration panel on the right includes the following settings:

- View type: Polar
- Coord sys: MLT
- View limits: |Lat| min 0°, |Lat| max 90°, Mlt min 0 h, Mlt max 24 h
- Pick predefined zone: (empty dropdown)
- Modify/create zone: Zone type: circle
- Center: |Lat| 75°, Mlt 0 h
- Radius: 1000 km
- Buttons: Save, Load, Reset, OK, Cancel

Click OK; Then you receive the following message : Region correctly picked !

Step 3: run and results

Here we launch the run without specifying any quality criteria (not yet quite implemented). Click the **Search** button. After a while (typically 20s), the CST returns 42 conjunctions in the *Results* tab.

Id	Time	Flag	Duratio...	Distanc...	Facil...	Sel...
1	2014/01/01 20:06:59 - 2014/01/01 20...	high	3	0	2	<input checked="" type="checkbox"/>
2	2014/01/01 21:42:00 - 2014/01/01 21...	high	3	0	2	<input checked="" type="checkbox"/>
3	2014/01/01 23:16:59 - 2014/01/01 23...	high	3	0	2	<input checked="" type="checkbox"/>
4	2014/01/02 19:44:59 - 2014/01/02 19...	high	4	0	2	<input checked="" type="checkbox"/>
5	2014/01/02 21:20:00 - 2014/01/02 21...	high	4	0	2	<input checked="" type="checkbox"/>
6	2014/01/02 22:54:59 - 2014/01/02 22...	high	4	0	2	<input checked="" type="checkbox"/>
7	2014/01/03 19:23:59 - 2014/01/03 19...	high	3	0	2	<input checked="" type="checkbox"/>
8	2014/01/03 20:59:00 - 2014/01/03 21...	high	3	0	2	<input checked="" type="checkbox"/>
9	2014/01/03 22:33:59 - 2014/01/03 22...	high	3	0	2	<input checked="" type="checkbox"/>
10	2014/01/04 20:37:00 - 2014/01/04 20...	high	3	0	2	<input checked="" type="checkbox"/>
11	2014/01/04 22:11:59 - 2014/01/04 22...	high	4	0	2	<input checked="" type="checkbox"/>
12	2014/01/04 23:48:00 - 2014/01/04 23...	high	3	0	2	<input checked="" type="checkbox"/>
13	2014/01/05 20:15:59 - 2014/01/05 20...	high	3	0	2	<input checked="" type="checkbox"/>
14	2014/01/05 21:51:00 - 2014/01/05 21...	high	3	0	2	<input checked="" type="checkbox"/>
15	2014/01/05 23:26:00 - 2014/01/05 23...	high	3	0	2	<input checked="" type="checkbox"/>
16	2014/01/06 19:53:59 - 2014/01/06 19...	high	3	0	2	<input checked="" type="checkbox"/>
17	2014/01/06 21:29:00 - 2014/01/06 21...	high	3	0	2	<input checked="" type="checkbox"/>
18	2014/01/06 23:04:59 - 2014/01/06 23...	high	3	0	2	<input checked="" type="checkbox"/>
19	2014/01/07 19:32:59 - 2014/01/07 19...	high	3	0	2	<input checked="" type="checkbox"/>
20	2014/01/07 21:08:00 - 2014/01/07 21...	high	3	0	2	<input checked="" type="checkbox"/>
21	2014/01/07 22:42:59 - 2014/01/07 22...	high	3	0	2	<input checked="" type="checkbox"/>
22	2014/01/08 19:10:59 - 2014/01/08 19...	high	3	0	2	<input checked="" type="checkbox"/>
23	2014/01/08 20:46:00 - 2014/01/08 20...	high	3	0	2	<input checked="" type="checkbox"/>
24	2014/01/08 22:20:59 - 2014/01/08 22...	high	3	0	2	<input checked="" type="checkbox"/>
25	2014/01/09 20:25:00 - 2014/01/09 20...	high	3	0	2	<input checked="" type="checkbox"/>
26	2014/01/09 21:59:59 - 2014/01/09 22...	high	3	0	2	<input checked="" type="checkbox"/>
27	2014/01/09 23:35:00 - 2014/01/09 23...	high	3	0	2	<input checked="" type="checkbox"/>
28	2014/01/10 20:03:00 - 2014/01/10 20...	high	3	0	2	<input checked="" type="checkbox"/>

Let us choose the conjunction on January 8, between 20:46 à 20:49 (conjunction #23). By passing the mouse over the corresponding line, a picture of the conjunction appears.

3DView Tutorial 2.2

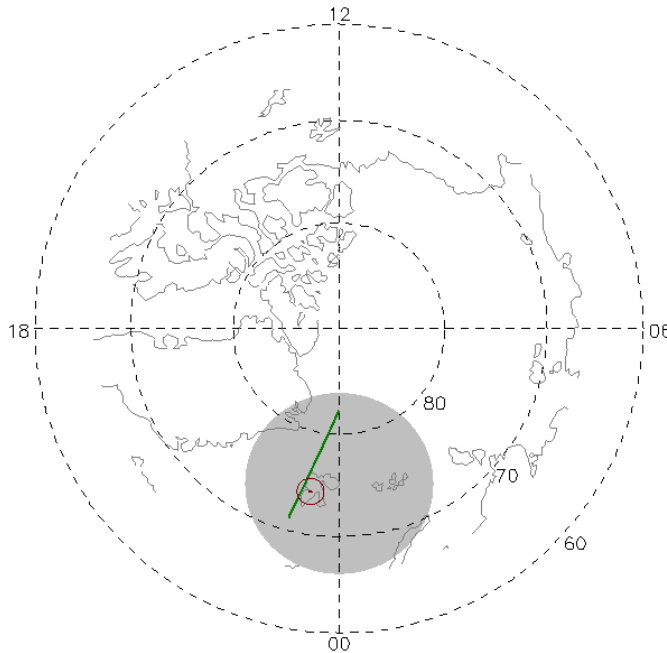
Conjunction Search Tool
— □ ×

Conjunction search Result

Select All/None

Id	Time	Flag	Duration...	Distance...	Facili...	Sel...
1	2014/01/01 20:05:59 - 2014/01/01 20:10:00	high	4	0	2	✓
2	2014/01/01 21:41:00 - 2014/01/01 21:45:00	high	4	0	2	✓
3	2014/01/01 23:16:59 - 2014/01/01 23:19:59	high	3	0	2	✓
4	2014/01/02 19:44:59 - 2014/01/02 19:48:00	high	3	0	2	✓
5	2014/01/02 21:20:00 - 2014/01/02 21:23:59	high	4	0	2	✓
6	2014/01/02 22:54:59 - 2014/01/02 23:00:00	high	5	0	2	✓
7	2014/01/03 19:23:59 - 2014/01/03 19:28:00	high	4	0	2	✓
8	2014/01/03 20:58:00 - 2014/01/03 21:03:00	high	5	0	2	✓
9	2014/01/03 22:33:59 - 2014/01/03 22:38:00	high	4	0	2	✓
10	2014/01/04 20:37:00 - 2014/01/04 20:42:00	high	5	0	2	✓
11	2014/01/04 22:11:00 - 2014/01/04 22:16:00	high	5	0	2	✓
12	2014/01/04 23:47:00 - 2014/01/04 23:52:00	high	5	0	2	✓
13	2014/01/05 20:15:00 - 2014/01/05 20:20:00	high	5	0	2	✓
14	2014/01/05 21:51:00 - 2014/01/05 21:56:00	high	5	0	2	✓
15	2014/01/05 23:26:00 - 2014/01/05 23:31:00	high	5	0	2	✓
16	2014/01/06 19:53:00 - 2014/01/06 19:58:00	high	5	0	2	✓
17	2014/01/06 21:29:00 - 2014/01/06 21:34:00	high	5	0	2	✓
18	2014/01/06 23:03:00 - 2014/01/06 23:08:00	high	5	0	2	✓
19	2014/01/07 19:32:00 - 2014/01/07 19:37:00	high	5	0	2	✓
20	2014/01/07 21:08:00 - 2014/01/07 21:13:00	high	5	0	2	✓
21	2014/01/07 22:42:00 - 2014/01/07 22:47:00	high	5	0	2	✓
22	2014/01/08 19:10:00 - 2014/01/08 19:15:00	high	5	0	2	✓
23	2014/01/08 20:46:00 - 2014/01/08 20:51:00	high	5	0	2	✓
24	2014/01/08 22:20:00 - 2014/01/08 22:25:00	high	5	0	2	✓
25	2014/01/09 20:25:00 - 2014/01/09 20:30:00	high	5	0	2	✓
26	2014/01/09 21:59:00 - 2014/01/09 22:04:00	high	5	0	2	✓
27	2014/01/09 23:35:00 - 2014/01/09 23:40:00	high	5	0	2	✓
28	2014/01/10 20:03:00 - 2014/01/10 20:08:00	high	5	0	2	✓
29	2014/01/10 21:37:00 - 2014/01/10 21:42:00	high	5	0	2	✓
30	2014/01/10 23:13:00 - 2014/01/10 23:18:00	high	5	0	2	✓
31	2014/01/11 19:41:00 - 2014/01/11 19:46:00	high	5	0	2	✓
32	2014/01/11 21:17:00 - 2014/01/11 21:22:00	high	5	0	2	✓
33	2014/01/11 22:52:00 - 2014/01/11 22:57:00	high	5	0	2	✓
34	2014/01/12 19:19:00 - 2014/01/12 19:24:00	high	5	0	2	✓
35	2014/01/12 20:55:00 - 2014/01/12 21:00:00	high	5	0	2	✓
36	2014/01/12 22:30:00 - 2014/01/12 22:35:00	high	5	0	2	✓
37	2014/01/13 20:34:00 - 2014/01/13 20:39:00	high	5	0	2	✓
38	2014/01/13 22:08:00 - 2014/01/13 22:13:00	high	5	0	2	✓
39	2014/01/13 23:44:00 - 2014/01/13 23:49:00	high	5	0	2	✓
40	2014/01/14 20:12:00 - 2014/01/14 20:17:00	high	5	0	2	✓
41	2014/01/14 21:46:00 - 2014/01/14 21:51:00	high	5	0	2	✓
42	2014/01/14 23:22:00 - 2014/01/14 23:27:00	high	5	0	2	✓

2014-01-08T20:46:00/2014-01-08T20:48:59



Involved experiment:

1. EISCAT Svalbard IS Radar Longyearbyen
2. SwarmA

Conjunction type:
HN1/HN2

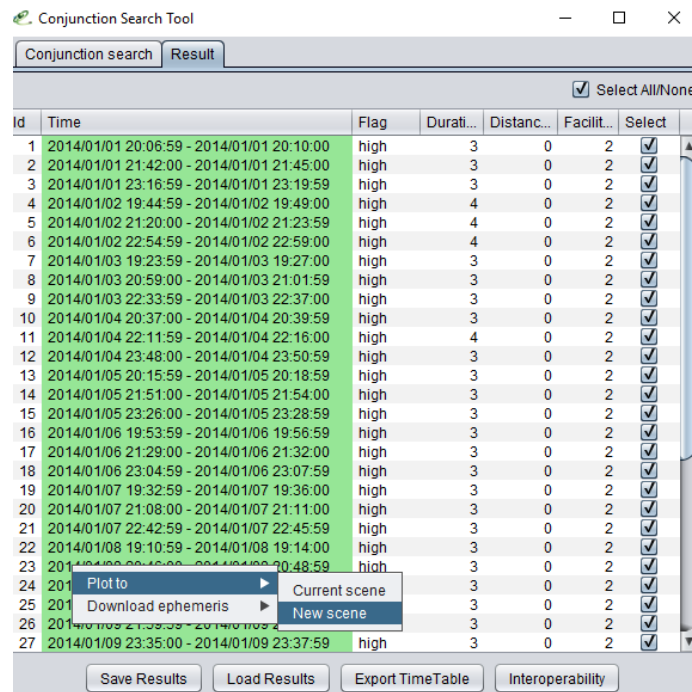
Zone of conjunction:
null

Duration: 3.0 min

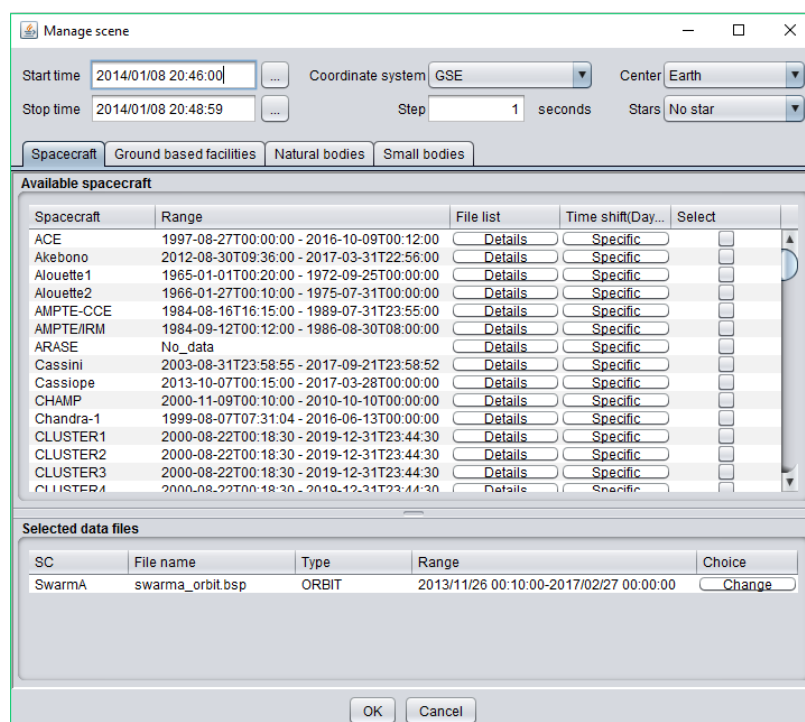
Distance from the center: 0.0 km

Step 4: visualisation of the conjunction

One can then send all the necessary information (time intervals and instruments involved in the conjunction) to 3D View by right clicking on the conjunction #23 and choosing *Plot to new scene*. The option *Plot to current scene* uses an already existing 3DView scene.

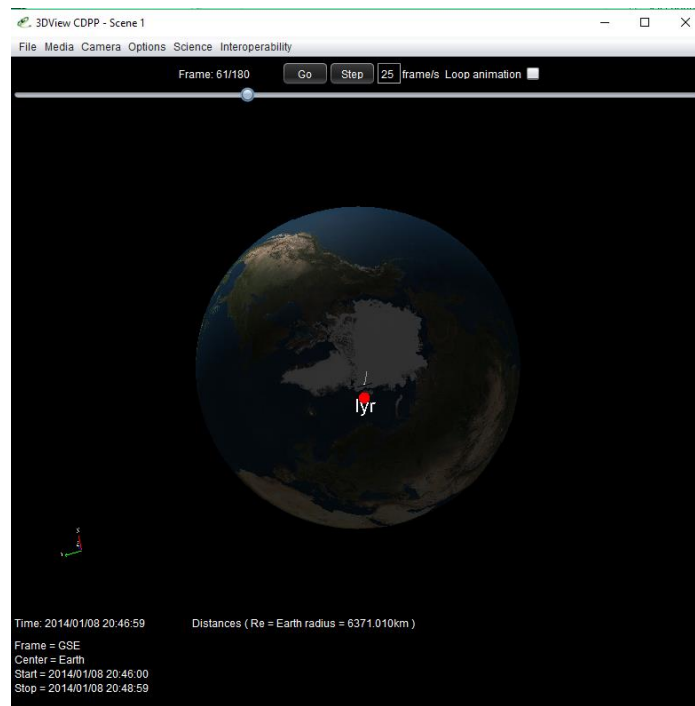


The *Manage scene* of 3D View then opens. The time interval corresponding to the conjunction #23 is pre-filled; *Swarm A* in the *Spacecraft* and *ESR* in *Ground based facilities* are selected.

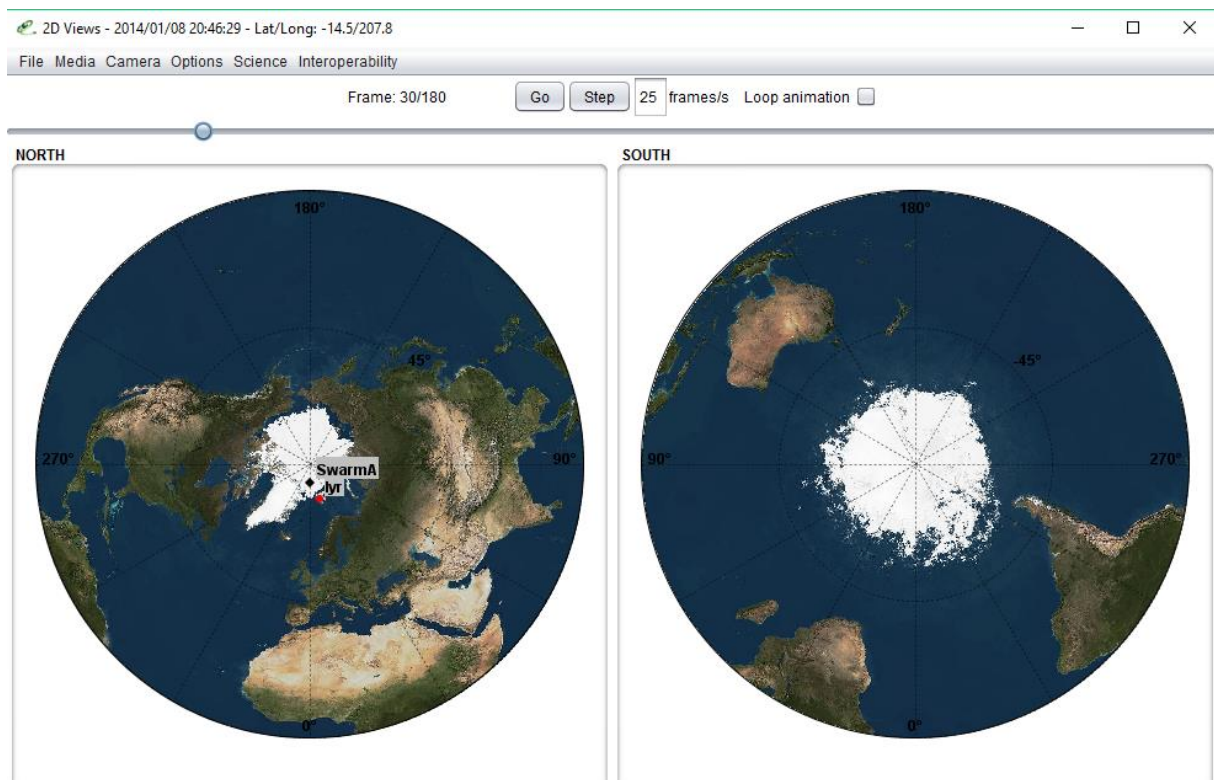


3DView Tutorial 2.2

One can then visualise the conjunction in 3D:



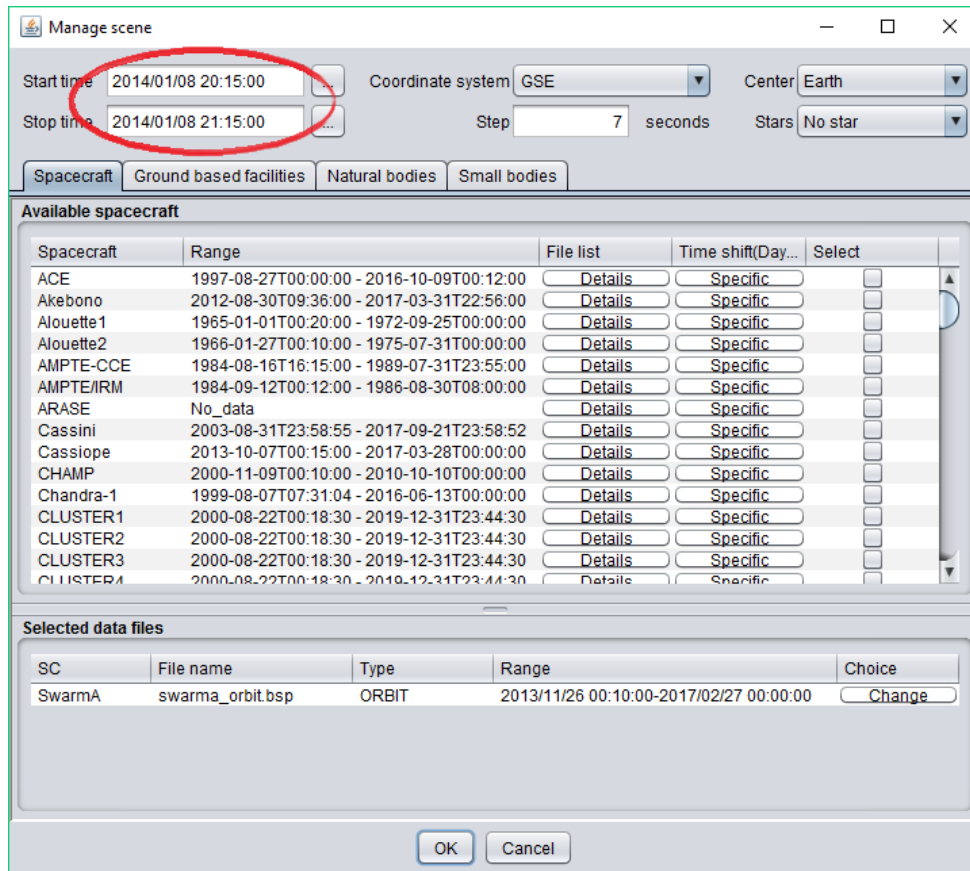
Or in 2D (*Camera* tab then *2DView*):



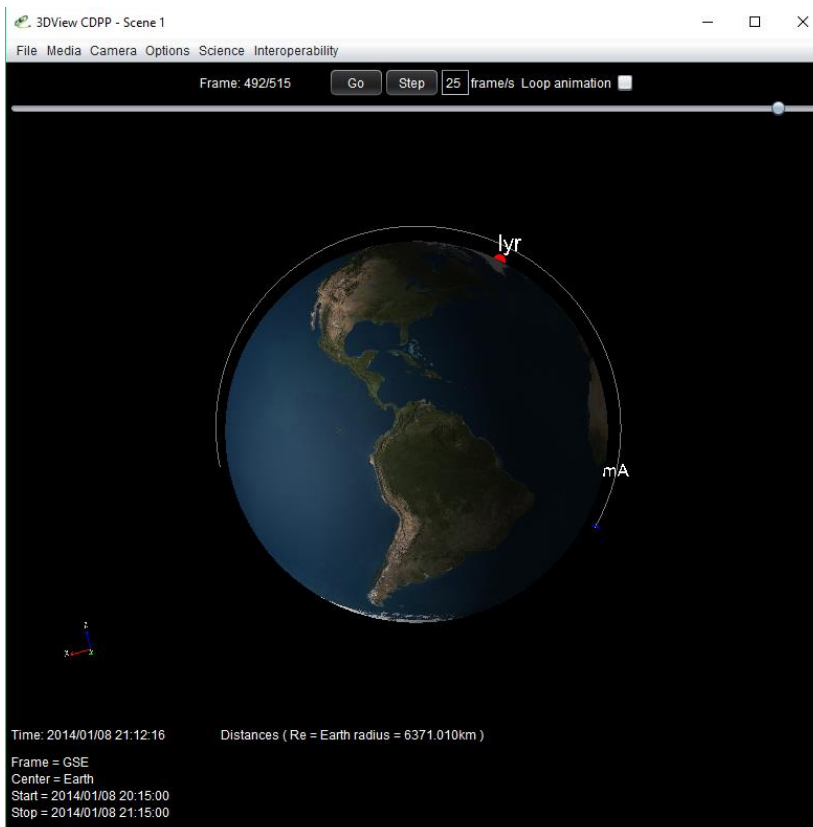
3DView Tutorial 2.2

Step 5: exploitation of the conjunction

Let us add some data to the scene to exploit scientifically our conjunction. To the end, we extend a little the time interval to 20:15 – 21:15 in the *Manage scene* window.

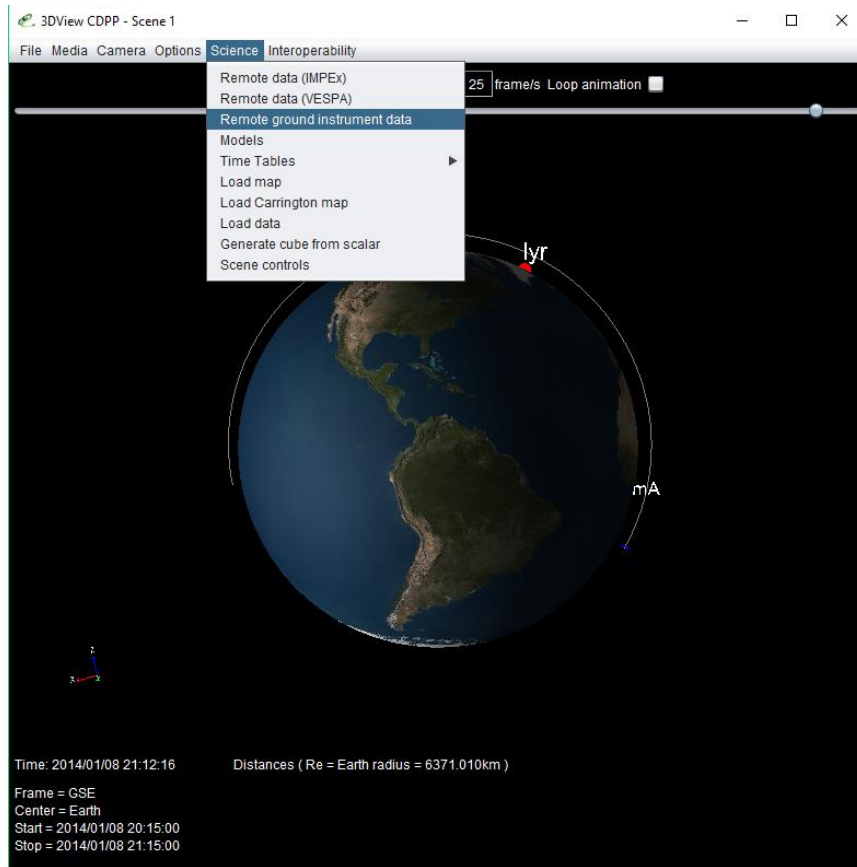


We now have about 2/3 of Swarm A orbit.

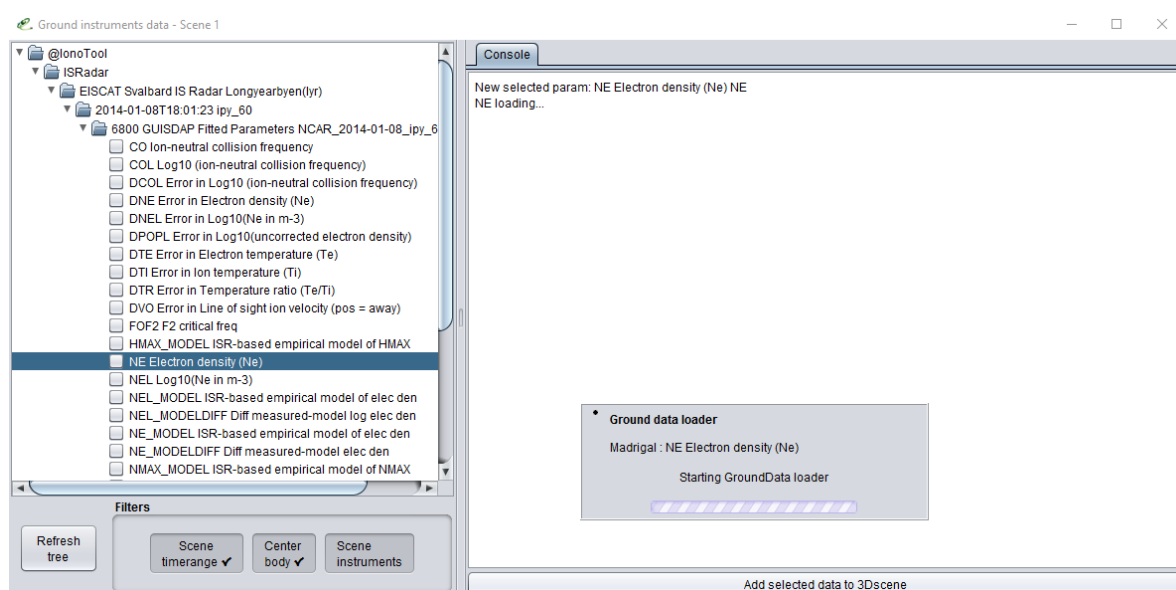


3DView Tutorial 2.2

To add ESR data to the view, in *Science* tab, one has to select *Remote ground instruments data*:

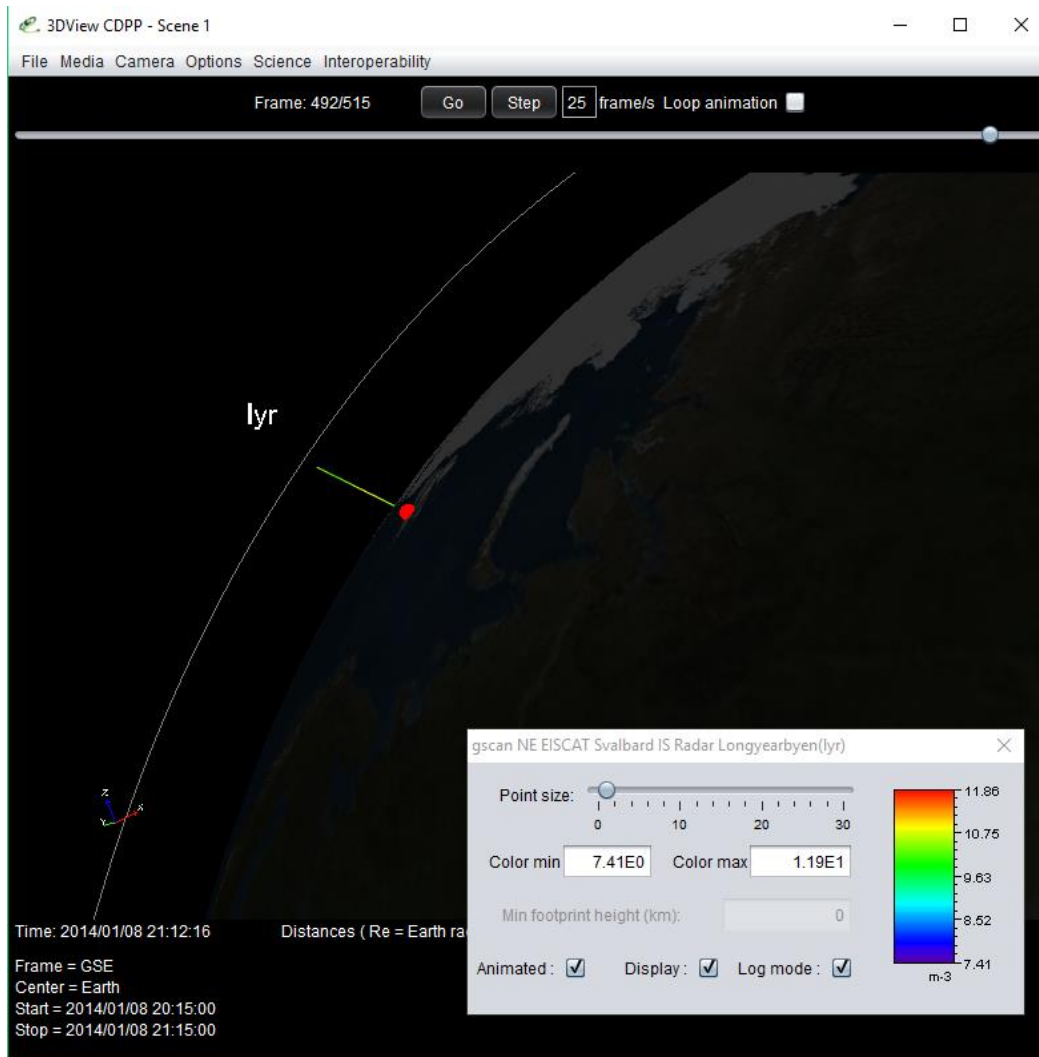


In the *@Ionotool* data tree, only ISRadars should appear, as it is the only instrument category selected in *Manage scene*. Let us click on it and then appears *EISCAT Svalbard IS Radar Longyearbyen*, the only selected ground based instrument. Clicking on it makes 3D View connect to the Madrigal database, which returns a file containing the available parameters for the day. Let us choose Ne, the electron density and send Ne to the scene by clicking on *Add selected data to 3D scene*.



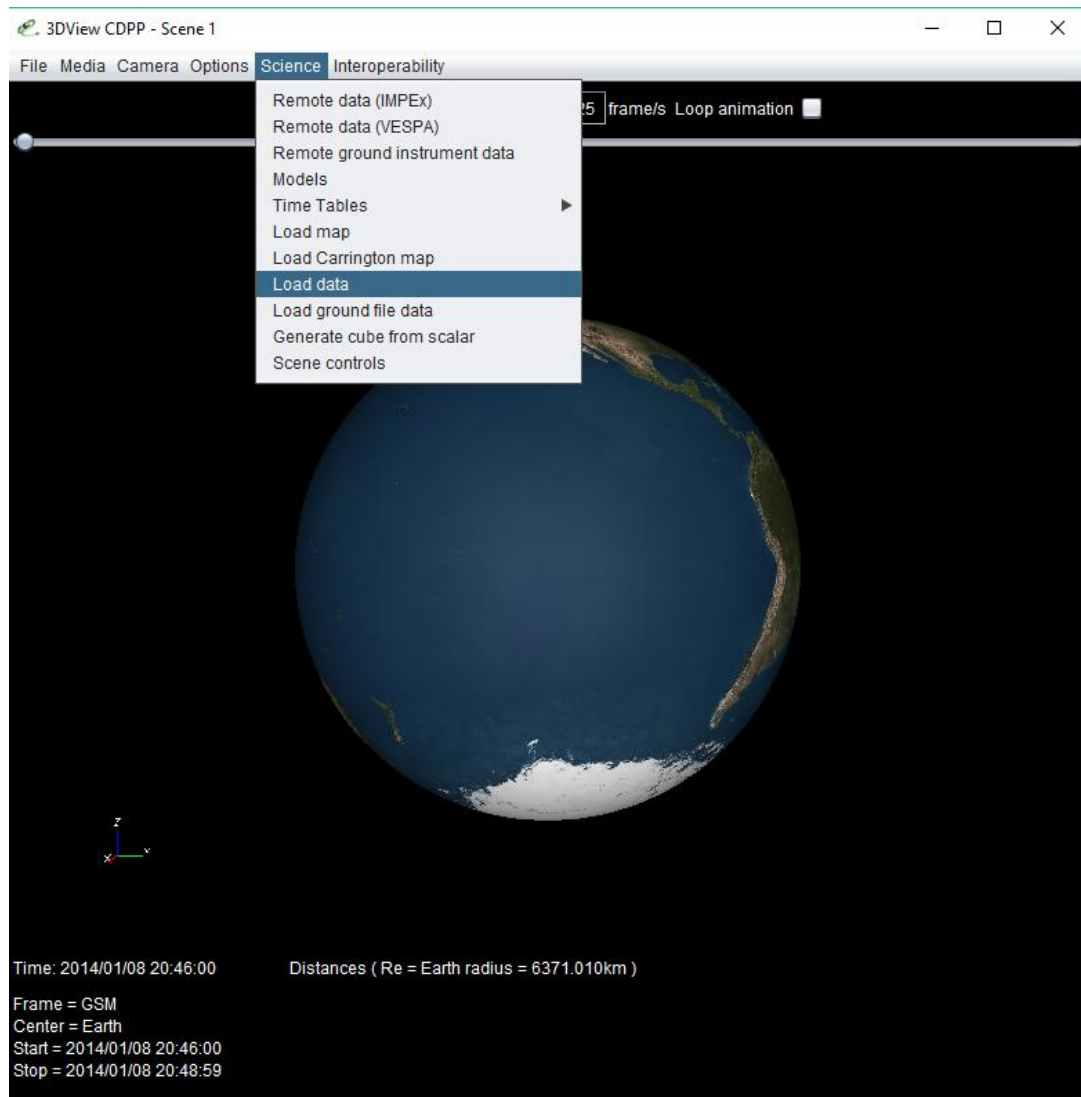
3DView Tutorial 2.2

We get, on the 3D view, a coloured line that represents colour-coded Ne values along the radar beam.



Let us now add a Swarm data file. The attached file is from the Langmuir probe on Swarm A. We can upload it in *Science* and *Load data*

3DView Tutorial 2.2

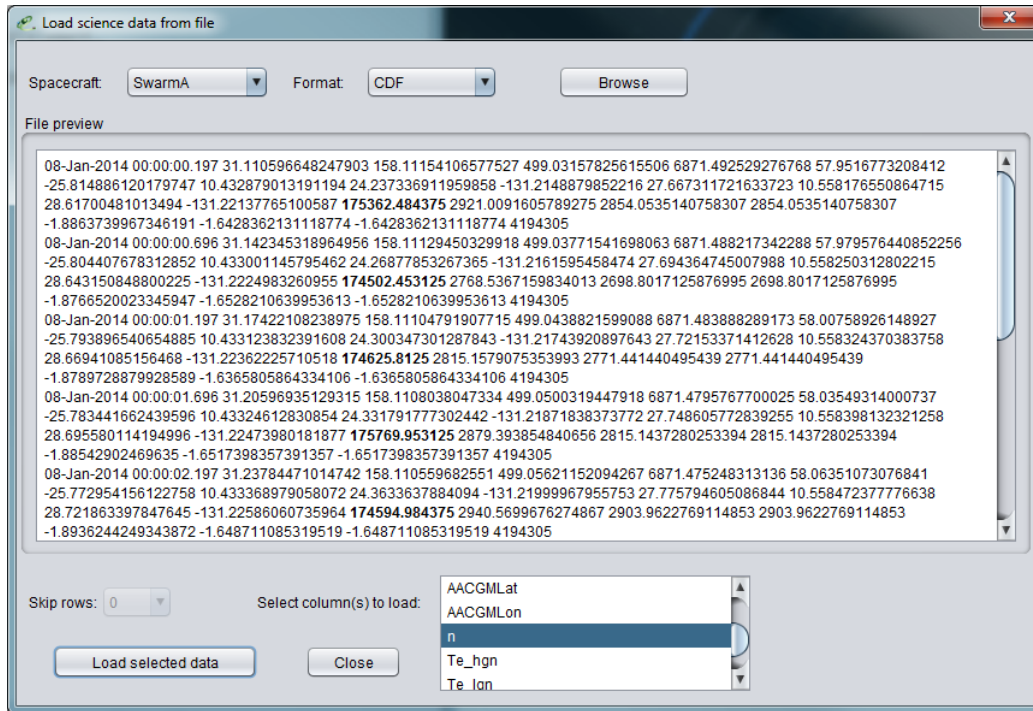


We select the file format (here .cdf) and choose one of the physical parameters contained in the file. Let us choose the electron density n .

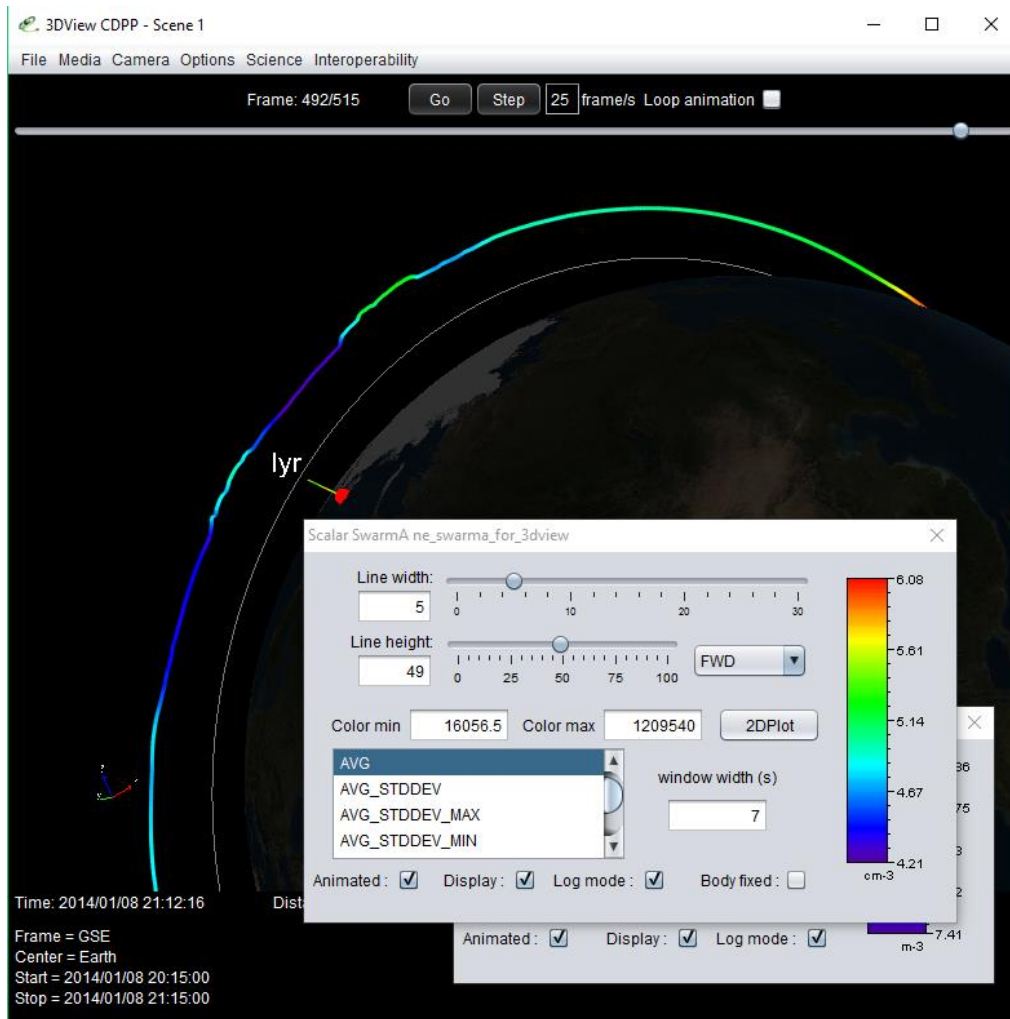
This data file can be downloaded from:

<https://nuage.irap.omp.eu/index.php/s/2L00mv4F3nsU6bq>

3DView Tutorial 2.2

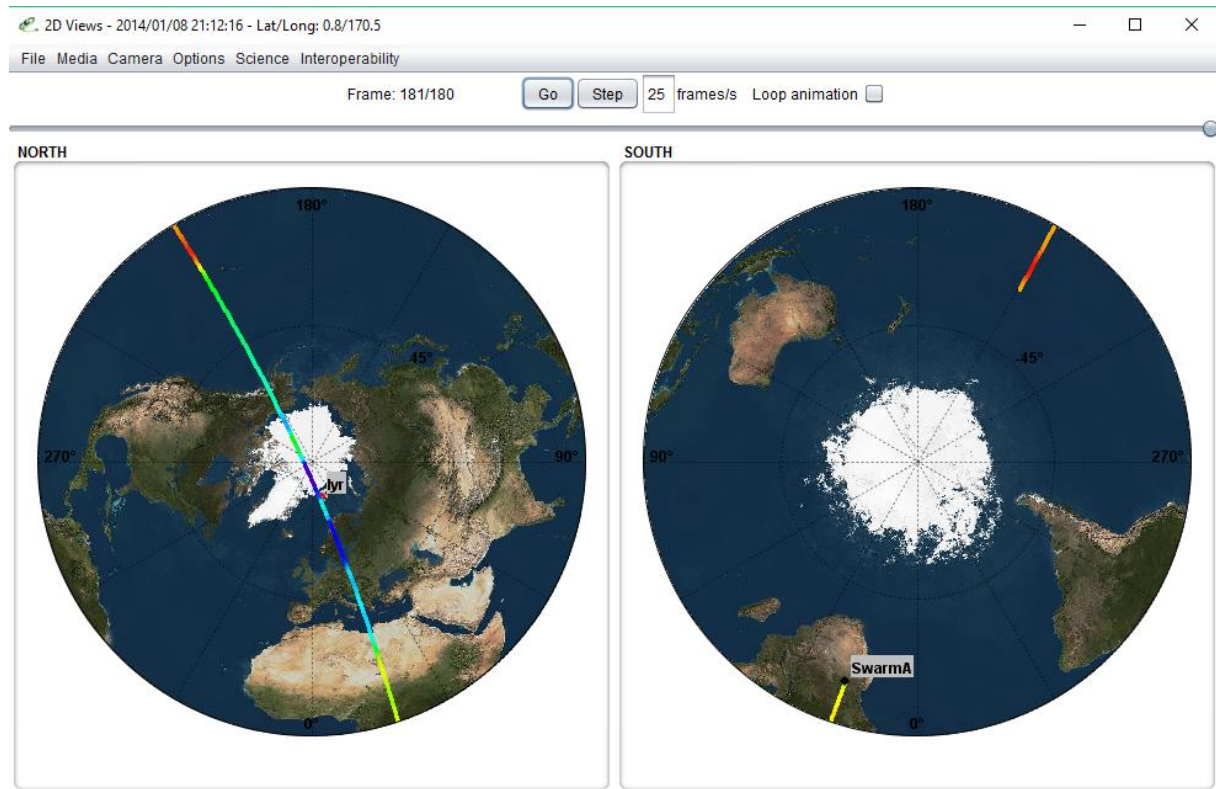


The electron density is added along Swarm A orbit:



3DView Tutorial 2.2

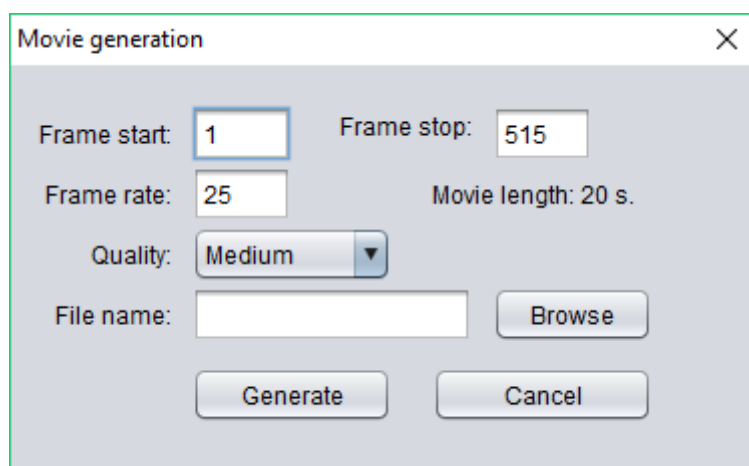
This can be viewed in 2D (*Camera* and *2DView*):



Step 6: generating a figure or a movie

For the need of a publication or a presentation, one may want to generate a picture or a movie of the scene. To these ends, in the *Media* tab, one has the choice.

Generate movie



Please be aware that the movie will actually start where you are in the view. If you want a movie from start time to end time, then you need to position the time cursor at the beginning of the time interval or set *Frame start* at 1 in the *Movie generation* window.