

IUGONET

Inter-university Upper atmosphere Global Observation NETwork

Instructions for data analysis software:

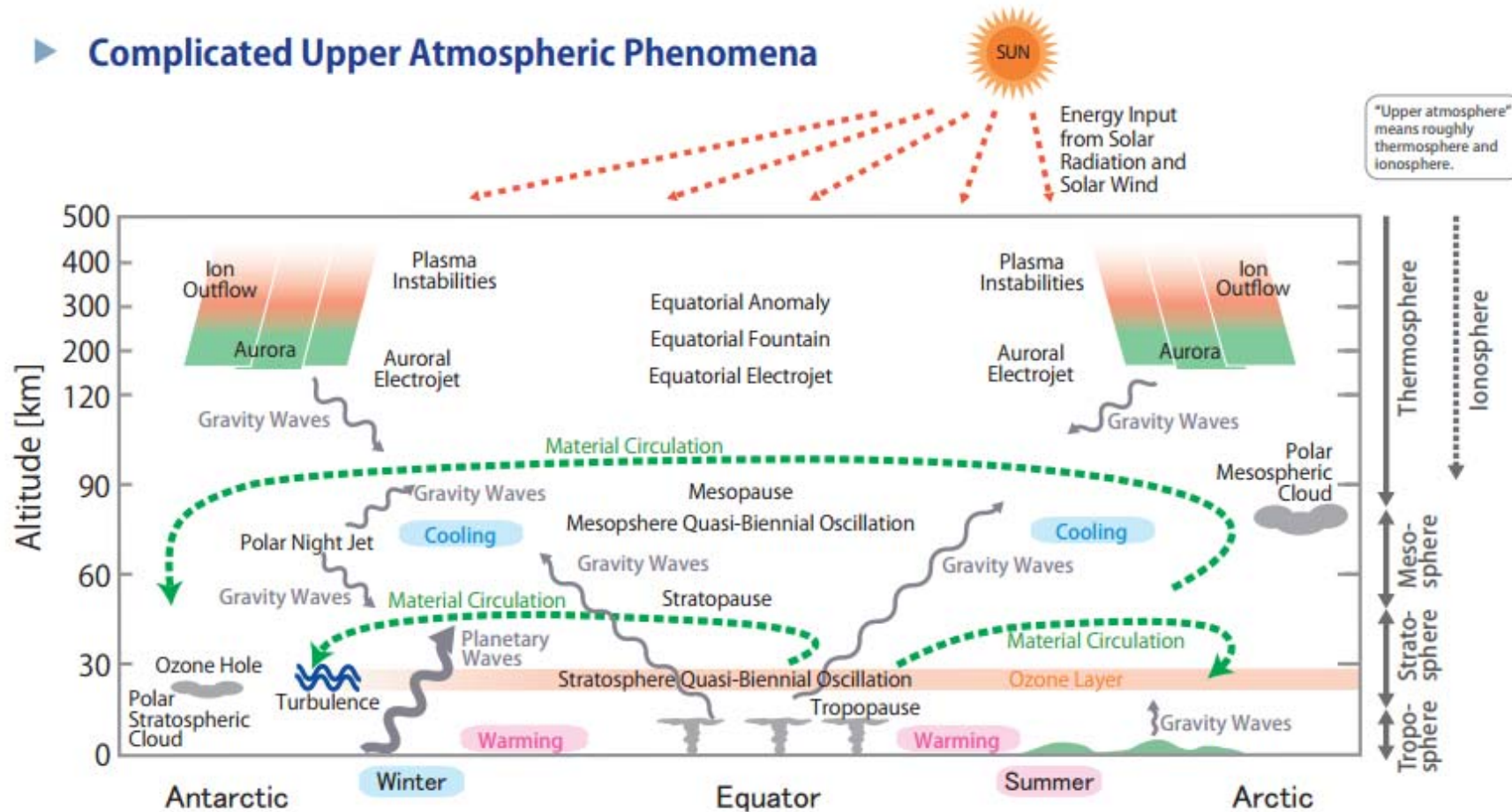
- *Preparation*
- *The IUGONET project and its products for space weather study*
- *Installation*
- *How to Use SPEDAS, part1*
- *How to Use SPEDAS, part2*

*Published by IUGONET Project Team, Sep. 2017.
<http://www.iugonet.org/?lang=en>*

This hands-on have 4 topics

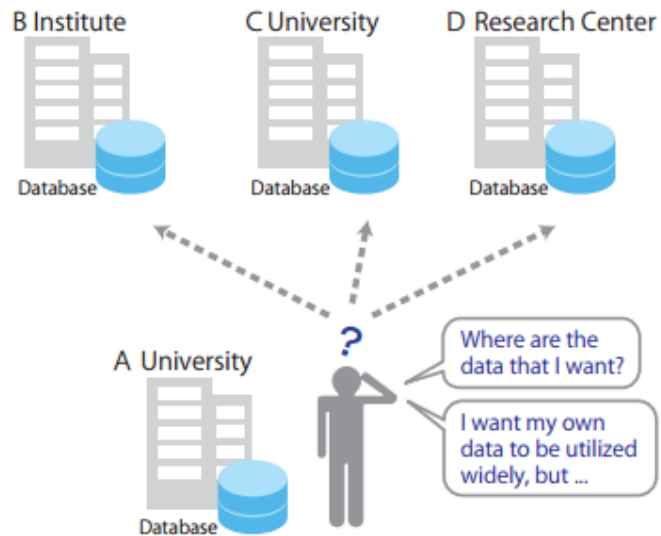
1. Introduction to the IUGONET project
2. Data Analysis by using SPEDAS GUI tool
break
3. Data Analysis by using web tool (IUGONET Type-A) and SPEDAS CUI tool.
4. Application of IUGONET tools to analysis of Syowa and Iceland data.

► Complicated Upper Atmospheric Phenomena



1. Affected by various phenomena from the earth surface to the space
2. Many physical parameters
3. Various variations including solar activity are overlapped

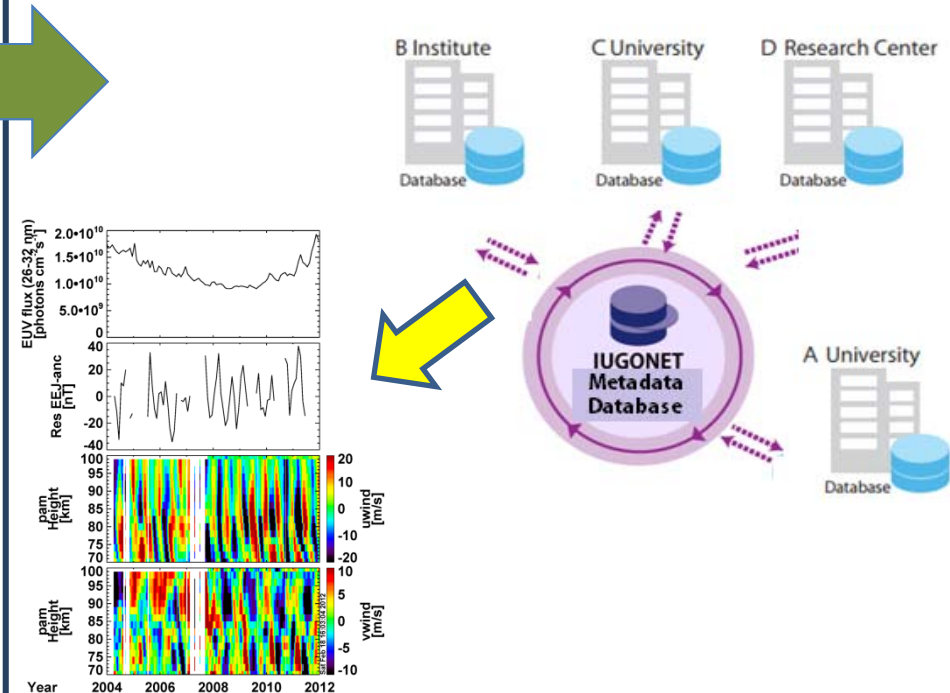
Problem



Observational data should be quality controlled and managed by the specialists who know the observations. **For users....It was not easy to reach a necessary information, since databases are distributed in various universities and institutes.**

Solution

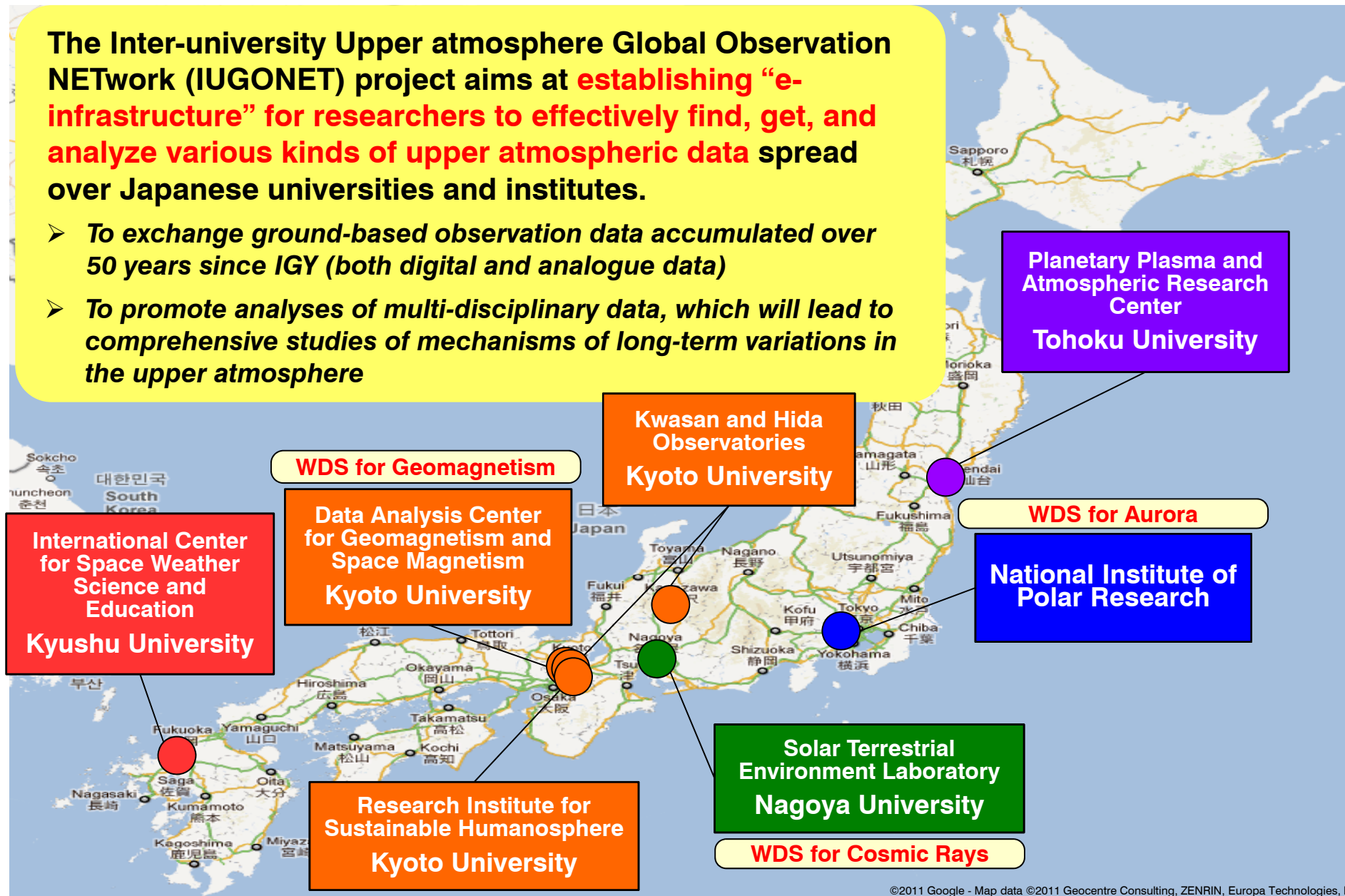
IUGONET provides a new research platform that enables metadata extracted from ground-based observation data to be shared. In addition, IUGONET developed analysis software to access and analyze data in an integrated fashion.



Overview of the project

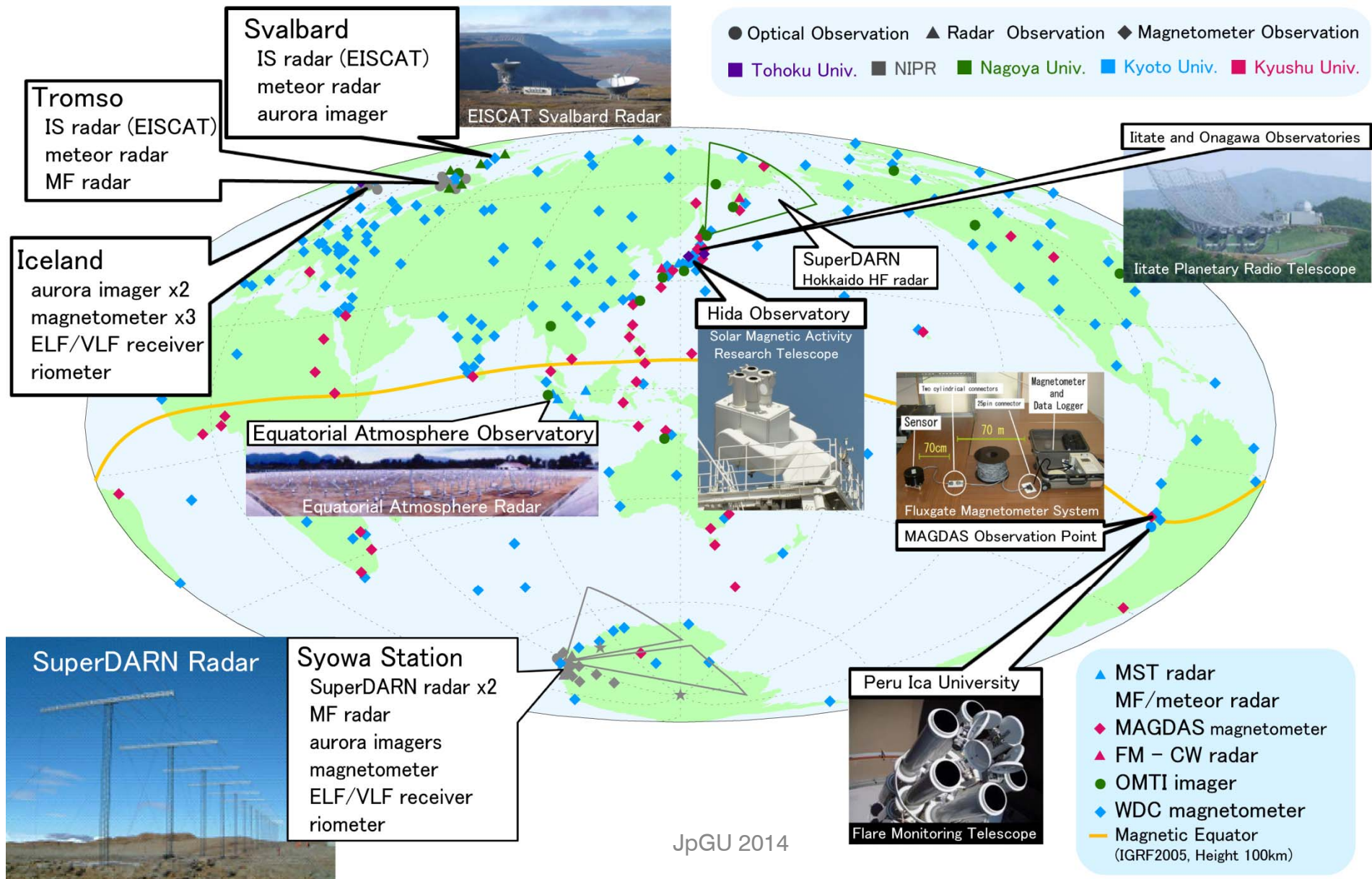
The Inter-university Upper atmosphere Global Observation NETwork (IUGONET) project aims at **establishing “e-infrastructure” for researchers to effectively find, get, and analyze various kinds of upper atmospheric data spread over Japanese universities and institutes.**

- *To exchange ground-based observation data accumulated over 50 years since IGY (both digital and analogue data)*
- *To promote analyses of multi-disciplinary data, which will lead to comprehensive studies of mechanisms of long-term variations in the upper atmosphere*



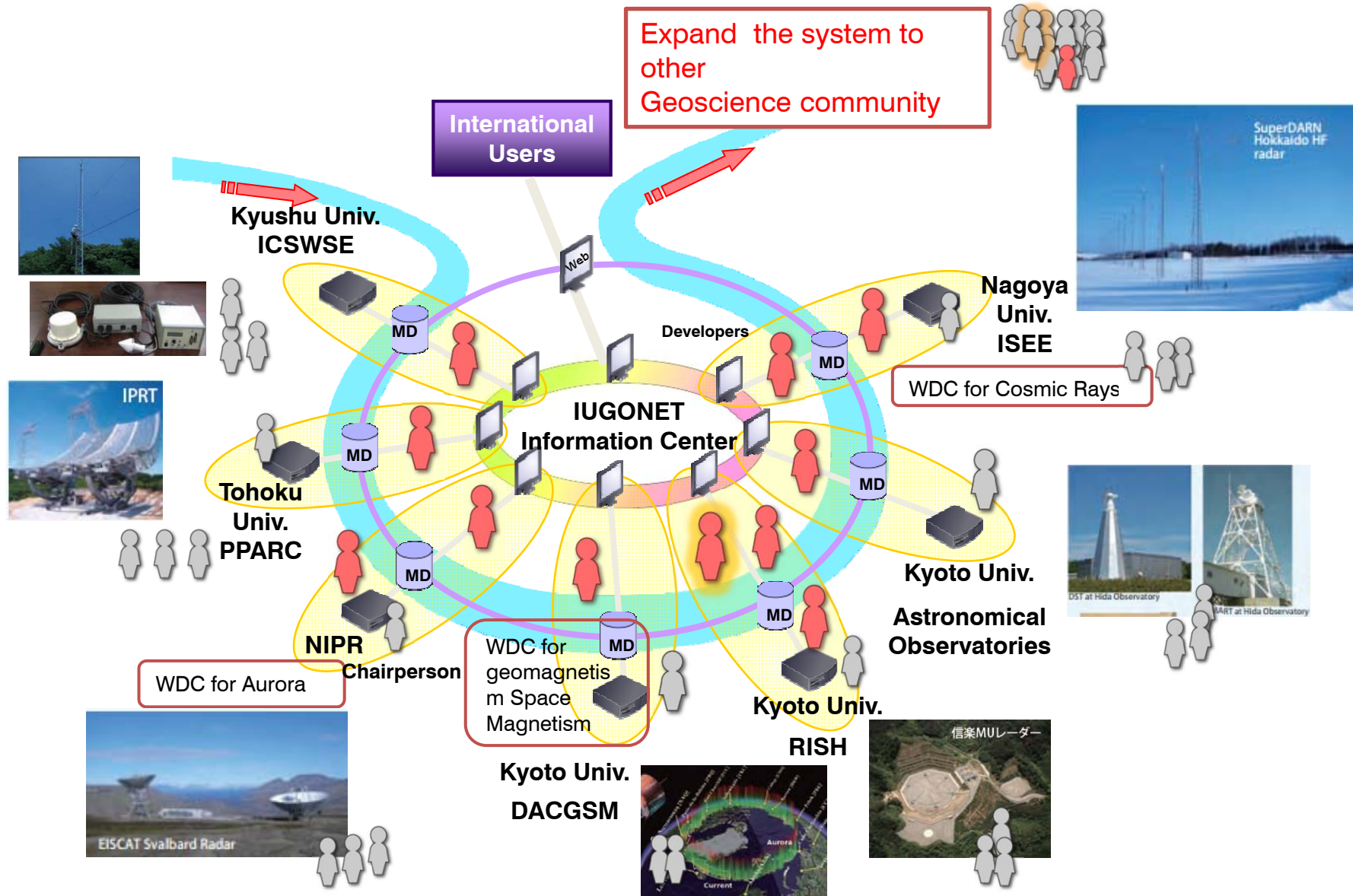


Ground Observations for Upper Atmosphere





Schematics of the project

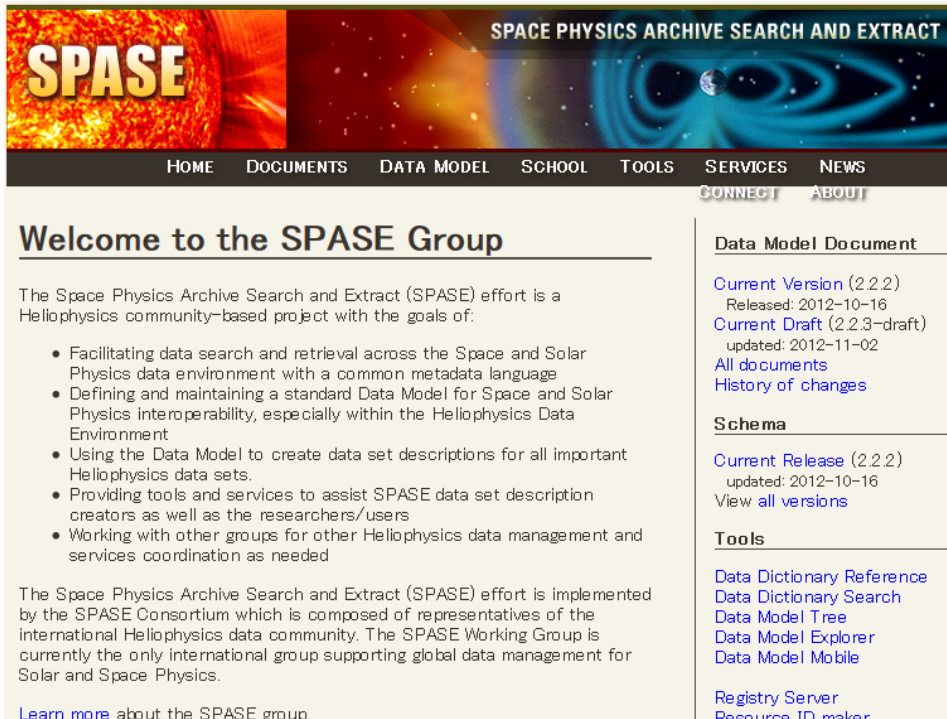




IUGONET Metadata Format/Structure

IUGONET metadata format = SPASE + modifications

(<http://www.spase->



The screenshot shows the SPASE website homepage. The header features the SPASE logo and the text "SPACE PHYSICS ARCHIVE SEARCH AND EXTRACT". Below the header is a navigation menu with links for HOME, DOCUMENTS, DATA MODEL, SCHOOL, TOOLS, SERVICES, NEWS, CONNECT, and ABOUT. The main content area is titled "Welcome to the SPASE Group" and contains a paragraph about the SPASE effort, a list of goals, and a paragraph about the SPASE Consortium. A sidebar on the right contains links for "Data Model Document", "Schema", and "Tools".

What's SPASE?

metadata format developed by international consortium to comprehensively describe research resources regarding heliospheric and magnetospheric satellite observations

- closely related to STP and upper atmosphere researches (→ easy to use as a base format)
- new metadata elements & words appendable (→ customizable according to our data)
- widely-used in VxOs (→ possible metadata exchange in the future)

IUGONET's modifications

- additional words to represent non-digital archives
- additional words to represent heliospheric coordinates
- new metadata elements to describe observation location & range



IUGONET Metadata Database

IUGONET Web Service
UDAS web Available! | Rules of the Road | About Type-A

IUGONET DataSet

| Instrument/Project | Observed Region | ERG Campaign | | |
|---------------------|------------------|-----------------|-----------------------|------------------|
| Satellite: | | | | |
| AKEBOING | CHAMP | COSMIC | | |
| Ground-Based: | | | | |
| SMART (Telescope) | DST (Telescope) | FMT (Telescope) | Refractor (Telescope) | Muon (Telescope) |
| Geomagnetic Indices | WDC Geomag_Kyoto | MAGDAS/CPMN | MM210 | |
| Induction | Magnetometer | SuperDARN | EISCAT | Imager |
| PWING/PsA | OMTI | Lidar | Ionosonde | Riometer |
| VLF/ELF | MU Radar | EA Radar | MF Radar | MW Radar |
| X-Band Radar | GPS Receiver | AWS | BL/LT/WP Radar | Radioisonde |
| | Others | | | |

Keyword: To: Set Detail

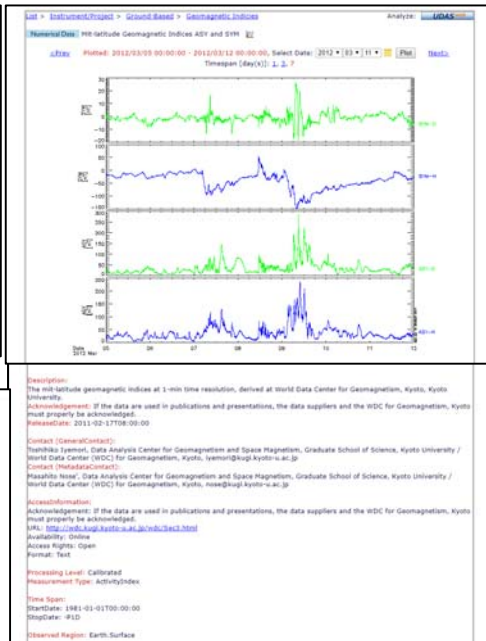
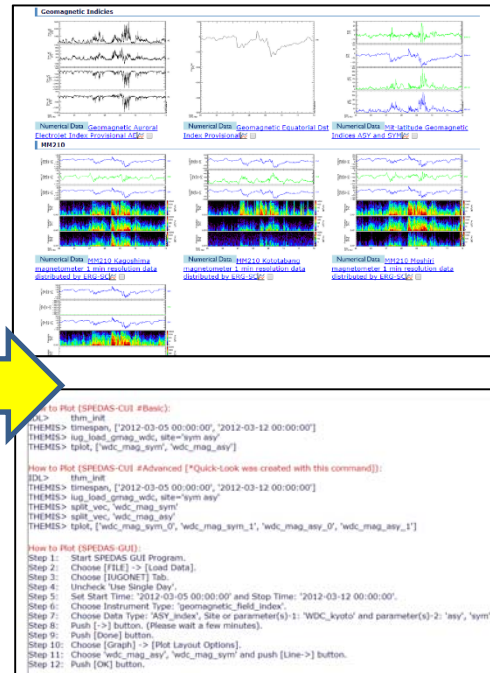
Information

The first campaign of the ERG (Arase) - ground coordinated observations in March - April, 2017.

ERG (Arase) and Ground-Based Campaign in March - April 2017

The Arase (ERG) satellite was launched at 20:00 (JST) on December 20, 2016 from Uchinoura Space Center, JAXA with an ellipse orbit (perigee: 330 km, apogee: 33,200 km, and period: 580 min). All the instruments of the Arase satellite has been recently operated and measure DC electric and magnetic fields variations, plasma waves and energetic particles in the inner magnetosphere. In the first campaign observation, we operate various kinds of ground-based instruments such as the EISCAT radar, all-sky camera, EMCCD camera, induction magnetometer, riometer and related instruments near the footprint of the orbit of the Arase satellite in order to clarify the generation and loss mechanisms of high-energetic particles in Geospace and magnetosphere-ionosphere-thermosphere coupling process during geomagnetic storms and substorms.

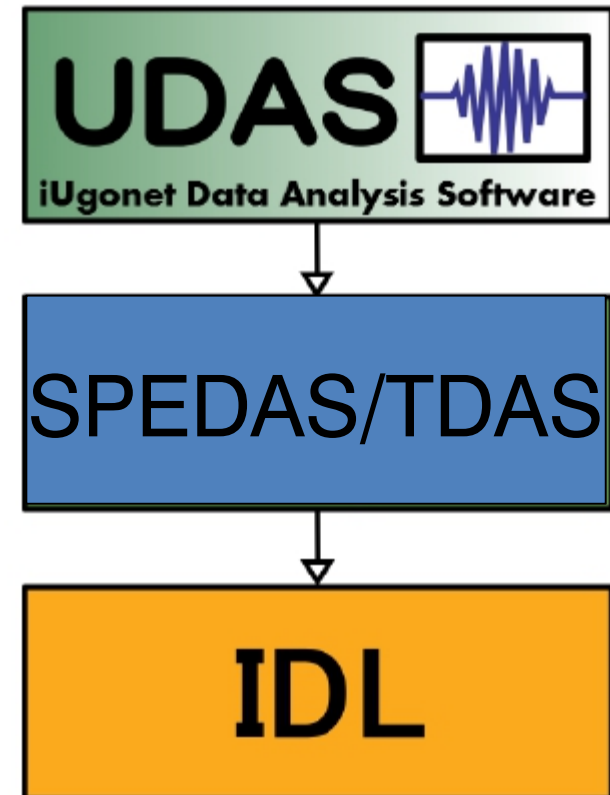
Detailed information of this campaign: <https://ergsc.isee.nagoya-u.ac.jp/mv/index.php/CampaignObs/Campaign2017>



<http://search.iugonet.org/>

- IUGONET MDB (called IUGONET Type-A) is capable of cross-searching observational data distributed across the IUGONET institutions.
- IUGONET Type-A brings a remarkable advancement in accessibility to the observational data and accelerate the interdisciplinary study.
- IUGONET Type-A provides a one-stop web services such as searching data, finding interesting events, interactively plotting the data, and leading users to more detailed analysis.

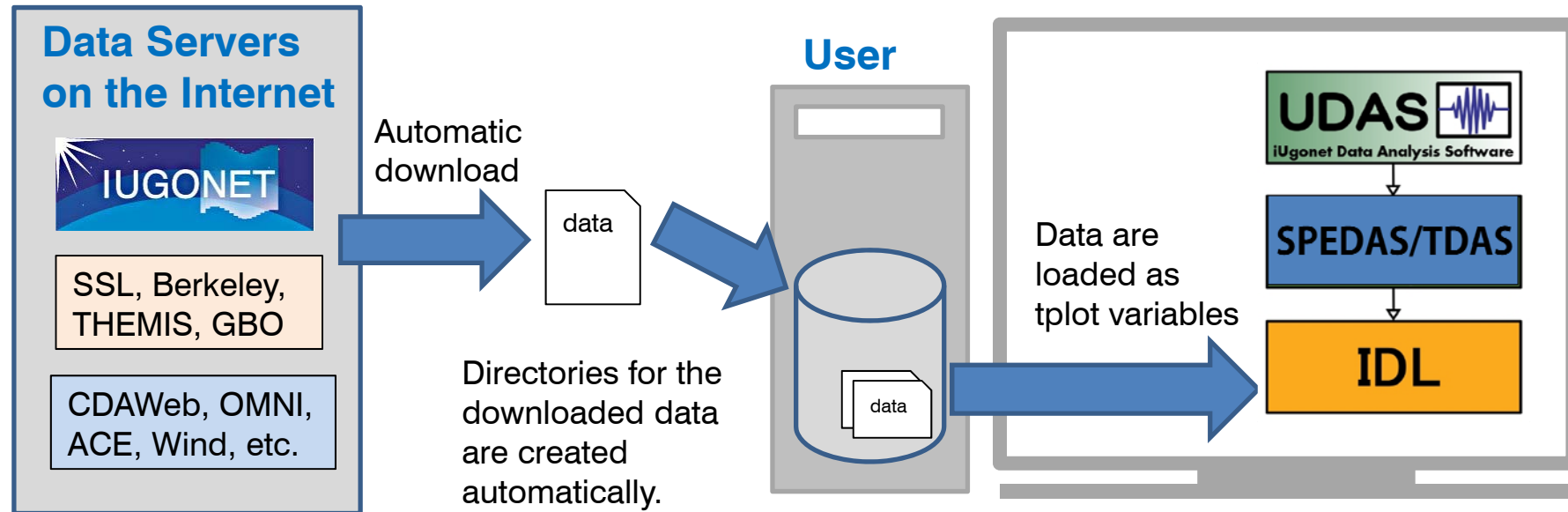
- The IUGONET Data Analysis Software (UDAS) is the plug-in software for Space Physics Environment Data Analysis System (SPEDAS), formerly known as THEMIS Data Analysis Software suite (TDAS)
- The IUGONET data (e.g., geomagnetic data, aurora data, radar data, and so forth) and many satellite mission data (THEMIS, GOES, WIND, and ACE) can be handled.
- It is possible to use many routines to visualize and analyze time series data.
- It accesses the IUGONET data through the Internet, and then the data are automatically downloaded onto the user's computer



Relationship
between UDAS,
SPEDAS, and IDL



Outline of Loading/Plotting Data Using SPEDAS



Data can be easily plotted, for example, by only three basis commands with the SPEDAS-CUI tool.

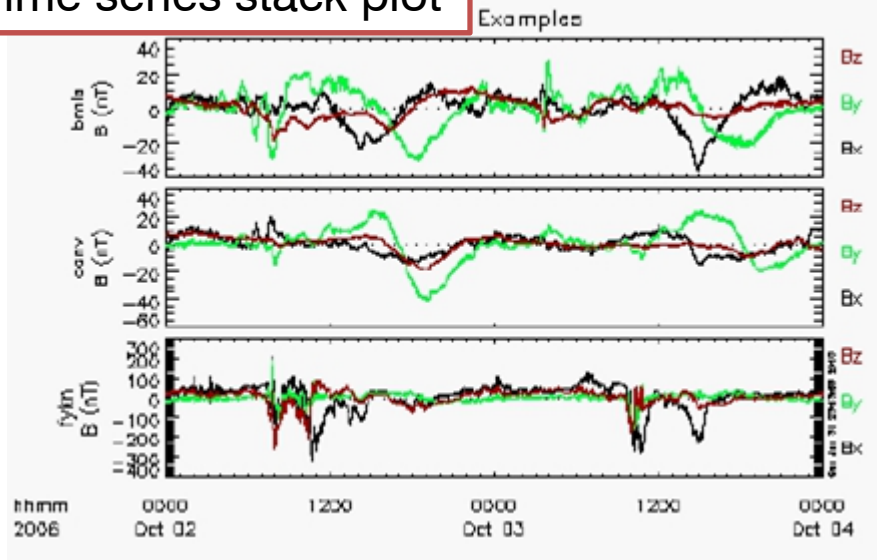
- | | |
|-------------------------|------------------------|
| 1. Set a time period | timespan, 'yyyy-mm-dd' |
| 2. Load *** data | iug_load_*** |
| 3. Plot the loaded data | tplot, +++ |

If using the GUI tool, only a few simple clicks of your mouse are required to make the same plot as that created by the above command with the CUI tool

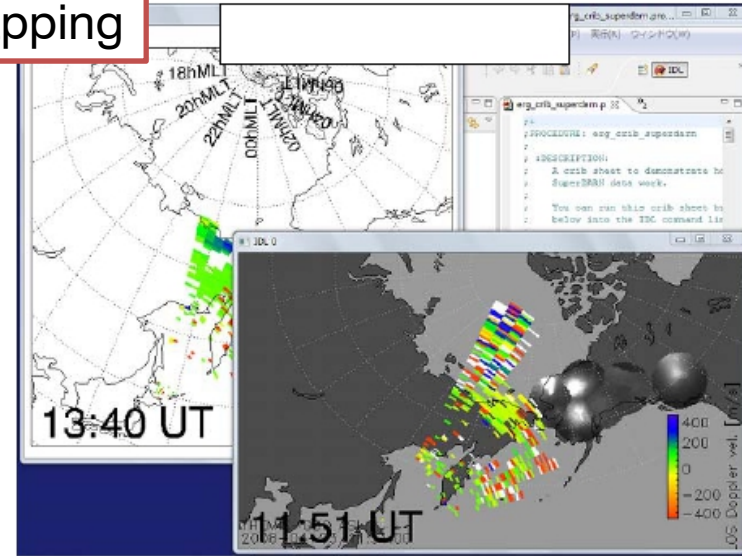


Examples of SPEDAS visualization

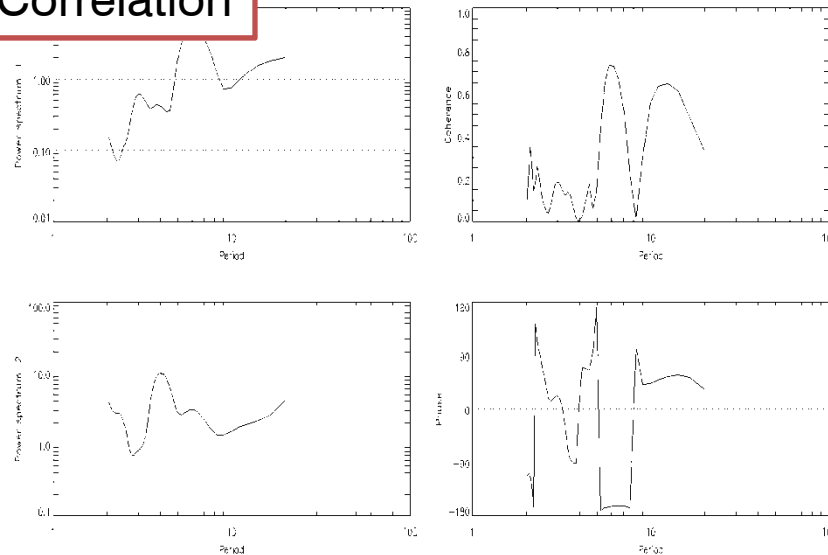
Time series stack plot



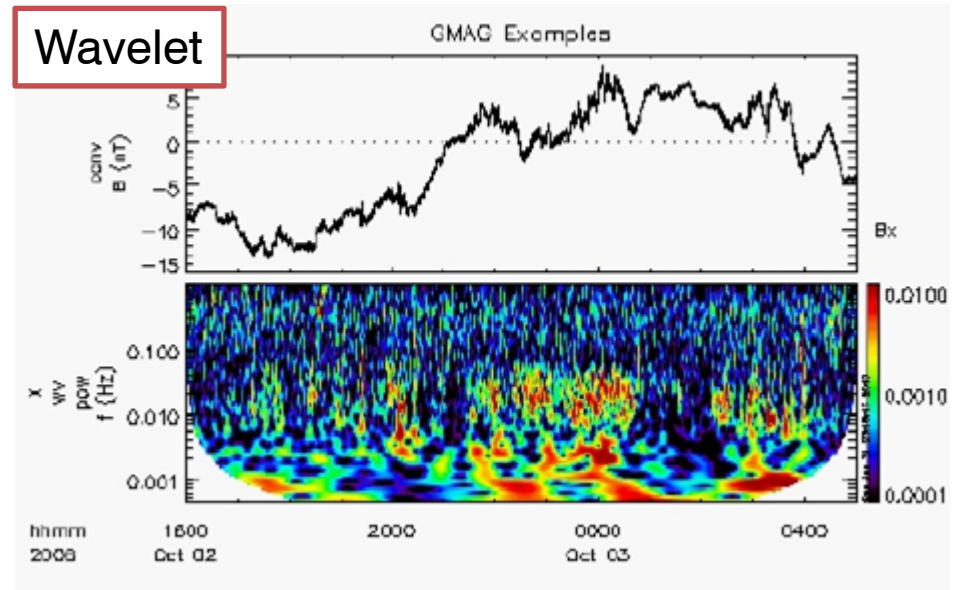
Mapping



Correlation



Wavelet



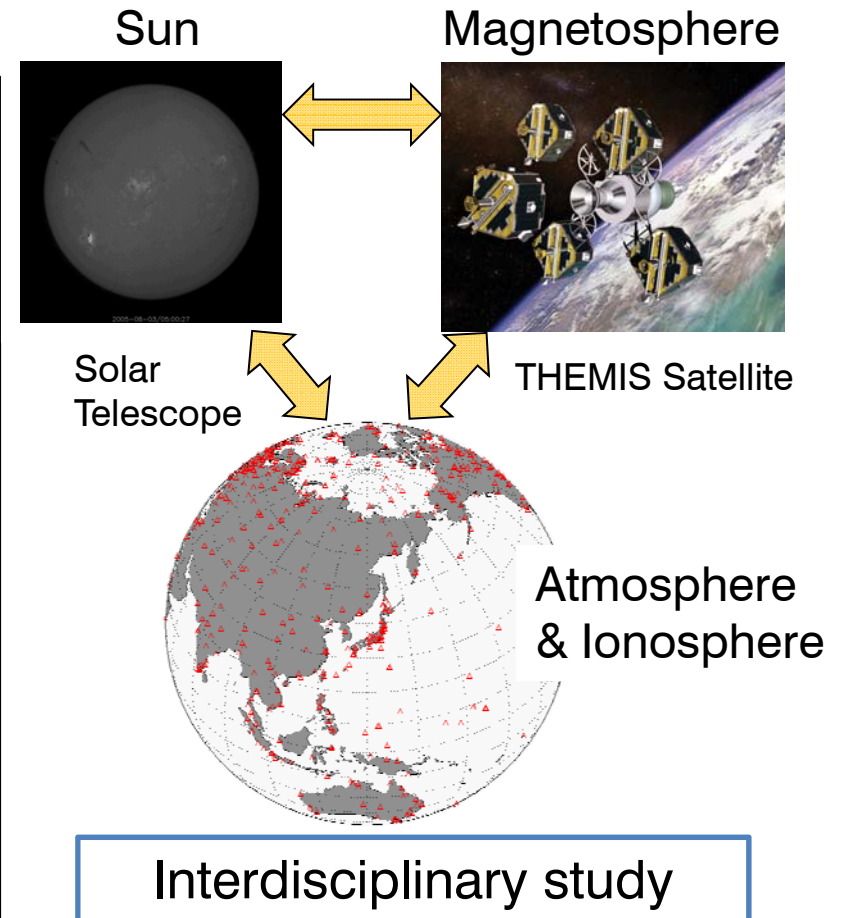


Contributions for Space weather study

Data supported by SPEDAS

| Satellite data | | | | | |
|------------------|------|------|-----------|------------|---------------------------------|
| Stereo | SOHO | Wind | ACE | IMP-8 | VAP Satellite EFW RBSPICE |
| THEMIS Satellite | GOES | LANL | NASA OMNI | ERG | |

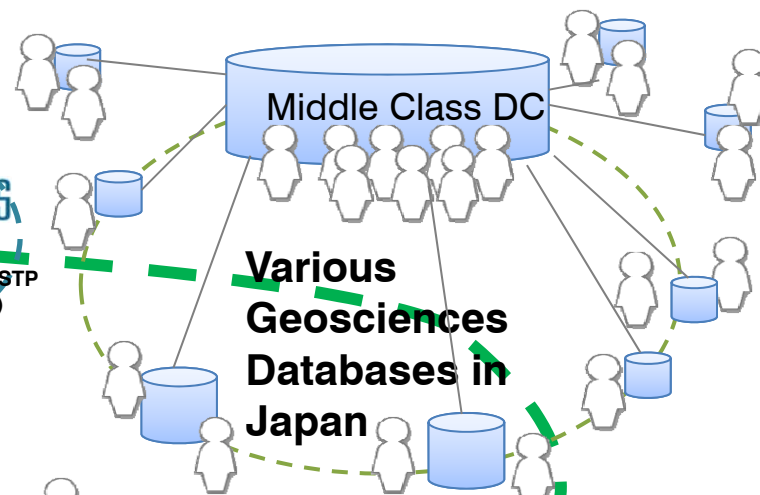
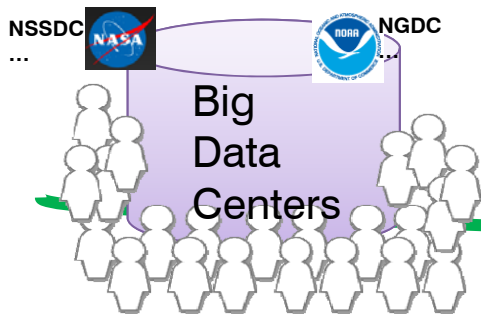
| Ground-based observational data | | |
|---------------------------------|---------------|---|
| THEMIS Geomag. | THEMIS Camera | <div style="border: 2px solid red; padding: 5px;"> <p style="text-align: center;">IUGONET, ERG</p> <p>Solar Telescope, Solar and planetary radio telescope, Ionosphere radar (SuperDARN, EISCAT, etc.), Atmosphere radar (MU, EAR, etc.), Meteorological observation data, Geomag. network (WDC, MAGDAS, 210MM, Antarctica-Iceland, etc.)</p> </div> |
| CARISMA Geomag. | GIMA Geomag. | |
| Greenland Geomag. | MACCS Geomag. | |
| USGS Geomag. | | |



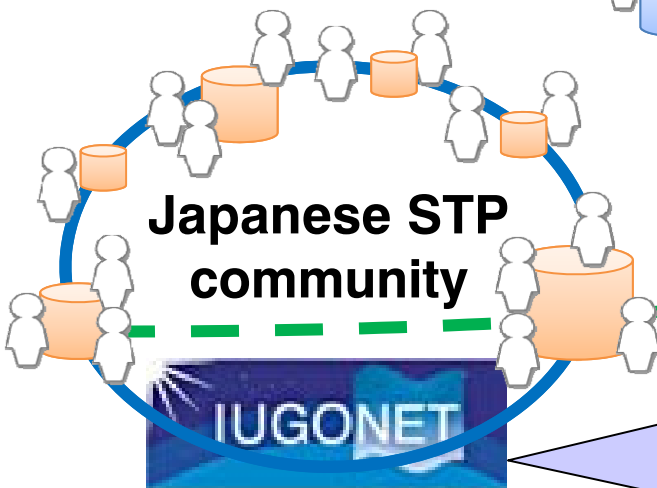
- ✓ Many missions have provided plugins for SPEDAS.
- ✓ IUGONET has also provided a plugin for SPEDAS, which includes many routines for loading various ground-based observation data.
- ✓ SPEDAS is suitable for Space Weather study.



Summary and Future Vision



ICSU - WDS
 ICSU - CODATA
 (International Framework)



IUGONET is a basis of a network datacenter

-> Functioning like a big data center efficiently

IUGONET includes three WDC members

- NIPR(Aurora)
- Kyoto Univ.(Geomagnetism)
- STEL(Cosmic Ray) In progress



Hand on of SPEDAS

Prepare **64 bit Operating System.**

1. Access the following URL

<http://themis.ssl.berkeley.edu/software.shtml>

2. Download **SPEDAS 3.1** zip file for your operating system(Win or Mac), and then unzip it to your desktop.

3. **Executable files (SPEDAS 3.1, October 2018).** These zip files contain executable files that can be run directly without installing anything else. They include a Virtual Machine (VM) version of IDL and they open the SPEDAS GUI but they do not include a command line tool, nor the TDAS or SPEDAS IDL source code. They also include Geopack.

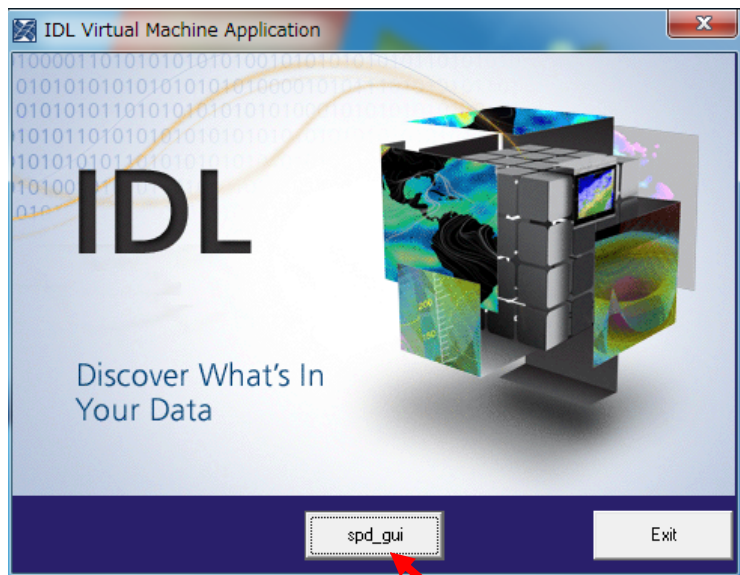
IDL 8.5.1

- [TDAS 11.1 + SPEDAS 3.1, Windows 64bit executable with IDL 8.5.1, CDF 3.6.3.1, Geopack 10.5 \(~55 MB\)](#)
- [TDAS 11.1 + SPEDAS 3.1, MacOS 64bit executable with IDL 8.5.1, CDF 3.6.3.1, Geopack 10.5 \(~70 MB\)](#)
- [TDAS 11.1 + SPEDAS 3.1, Linux 64bit executable with IDL 8.5.1, CDF 3.6.3.1, Geopack 10.5 \(~70 MB\)](#)
- [TDAS 11.1 + SPEDAS 3.1, Linux 64bit executable with IDL 8.5.1, CDF 3.6.3.1, Geopack 7.6 \(~70 MB\)](#)

- [1] Unzip the zipped SPEDAS file.
- [2] Double-click the executable file named 'spedas' in the directory 'spedas_v_3/spd_gui'.

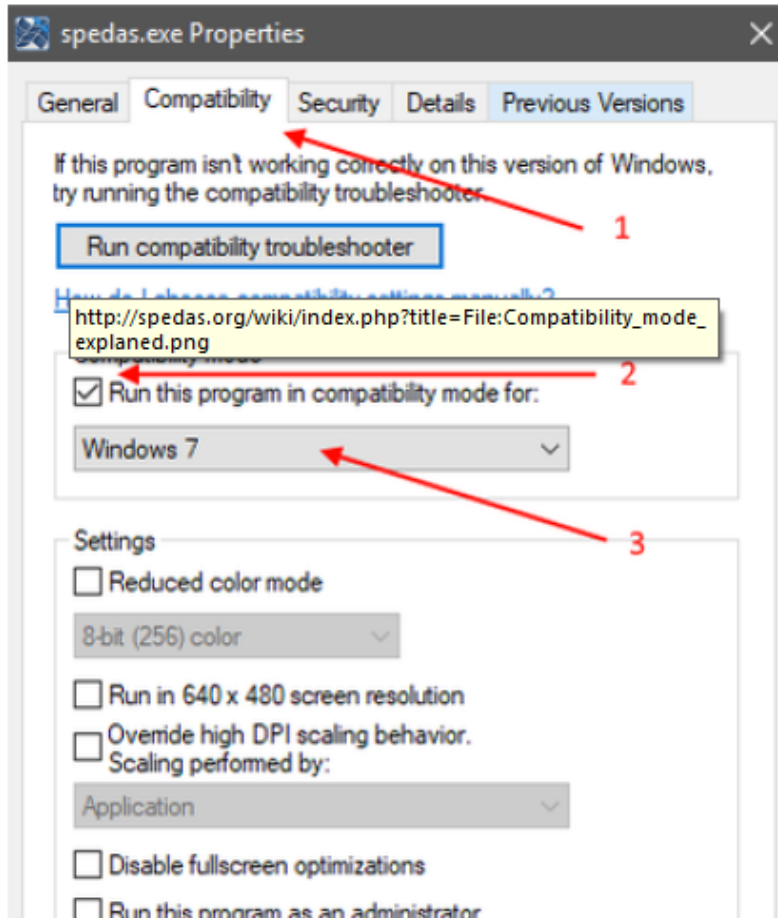
| 名前 | 更新日時 |
|-----------------------------|------------------|
| idl85 | 2017/08/11 8:09 |
| colors1.tbl | 2013/04/16 14:52 |
| gmag_stations.txt | 2015/11/03 14:35 |
| grammar.sav | 2014/02/20 10:34 |
| idl.ico | 2017/07/14 11:34 |
| parse_tables.sav | 2014/02/20 10:34 |
| PutRsp.dat | 2014/06/27 14:13 |
| spd_gui.sav | 2017/07/14 11:34 |
| spd_gui_running_history.txt | 2017/08/12 5:55 |
| spedas.exe | 2017/07/14 11:34 |
| spedas.ini | 2017/07/14 11:34 |
| spin_harmonic_template.dat | 2013/04/16 14:52 |
| splash.bmp | 2017/07/14 11:34 |

Double-click the executable file named 'spedas'



Click the icon 'spd_gui'.

- [3] IDL Virtual Machine window opens on your PC, so please **click the 'spd_gui' button.**



If you encountered any graphics problem on **Windows 10**, try launching IDL in "Windows 7 Compatibility Mode".

To do that:

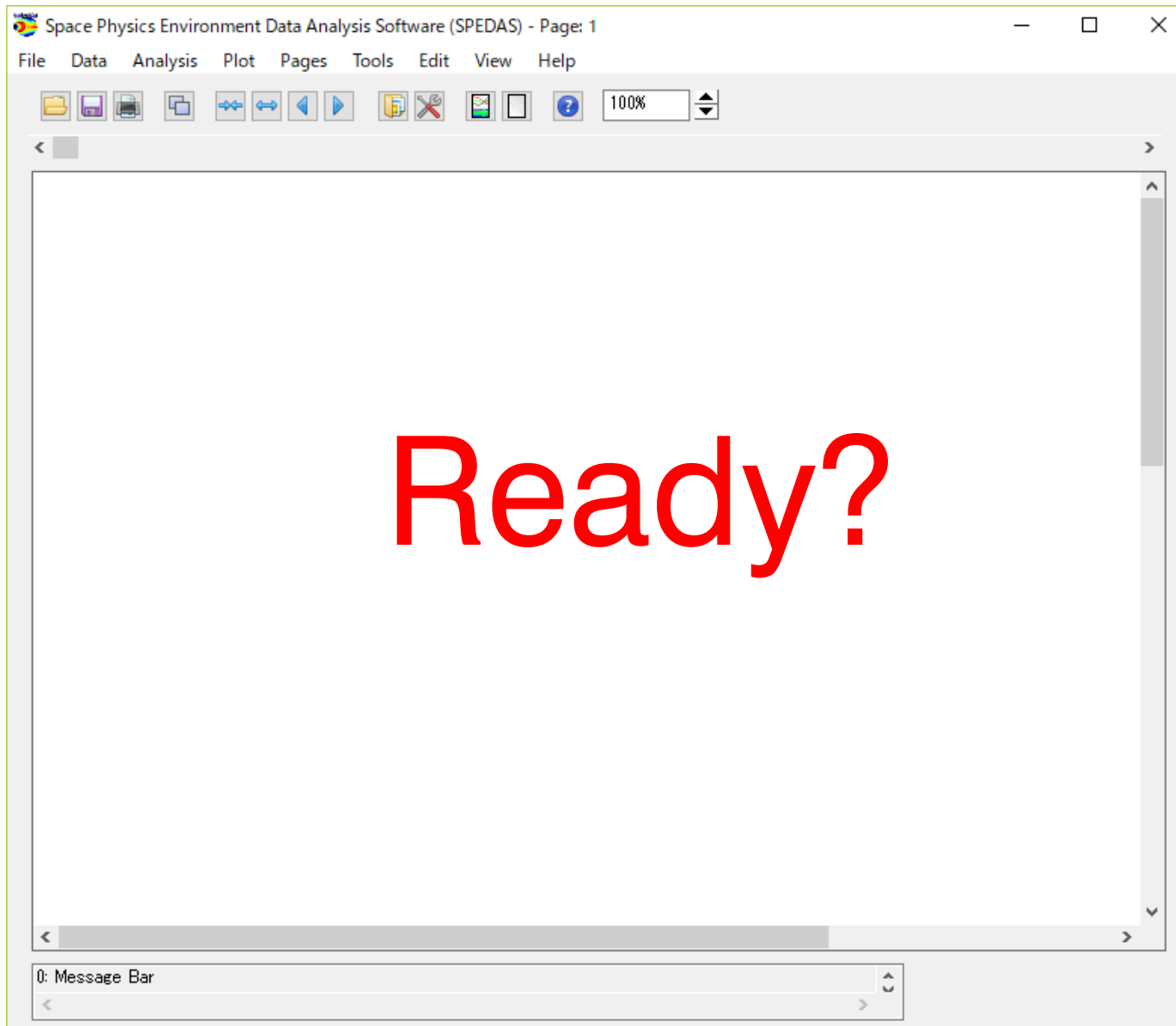
0. Right click on the IDL or SPEDAS executable file and select "Properties".

1. **Select "Compatibility" tab**
2. **Check "Run the program in compatibility mode for:"**
3. **Select "Windows 7".**

Click ok the apply the changes.

Restart the program and then try your plot over again.

Start IDL-VM(GUI) tool

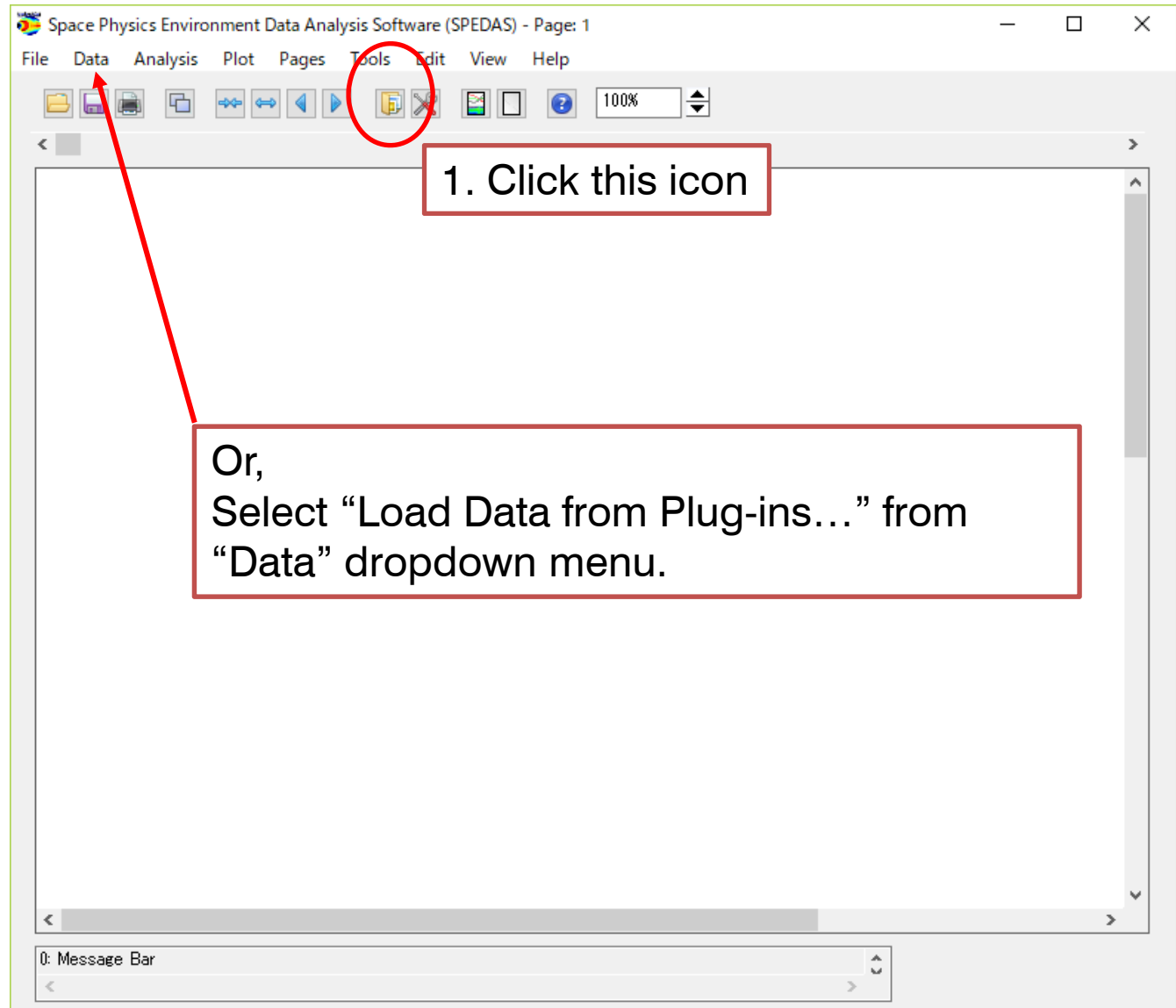




How to Use SPEDAS part1

- Load data
- Plot data
- Save figure, data, and your work

Lesson:
Load Dst index





GUI Basic Operation

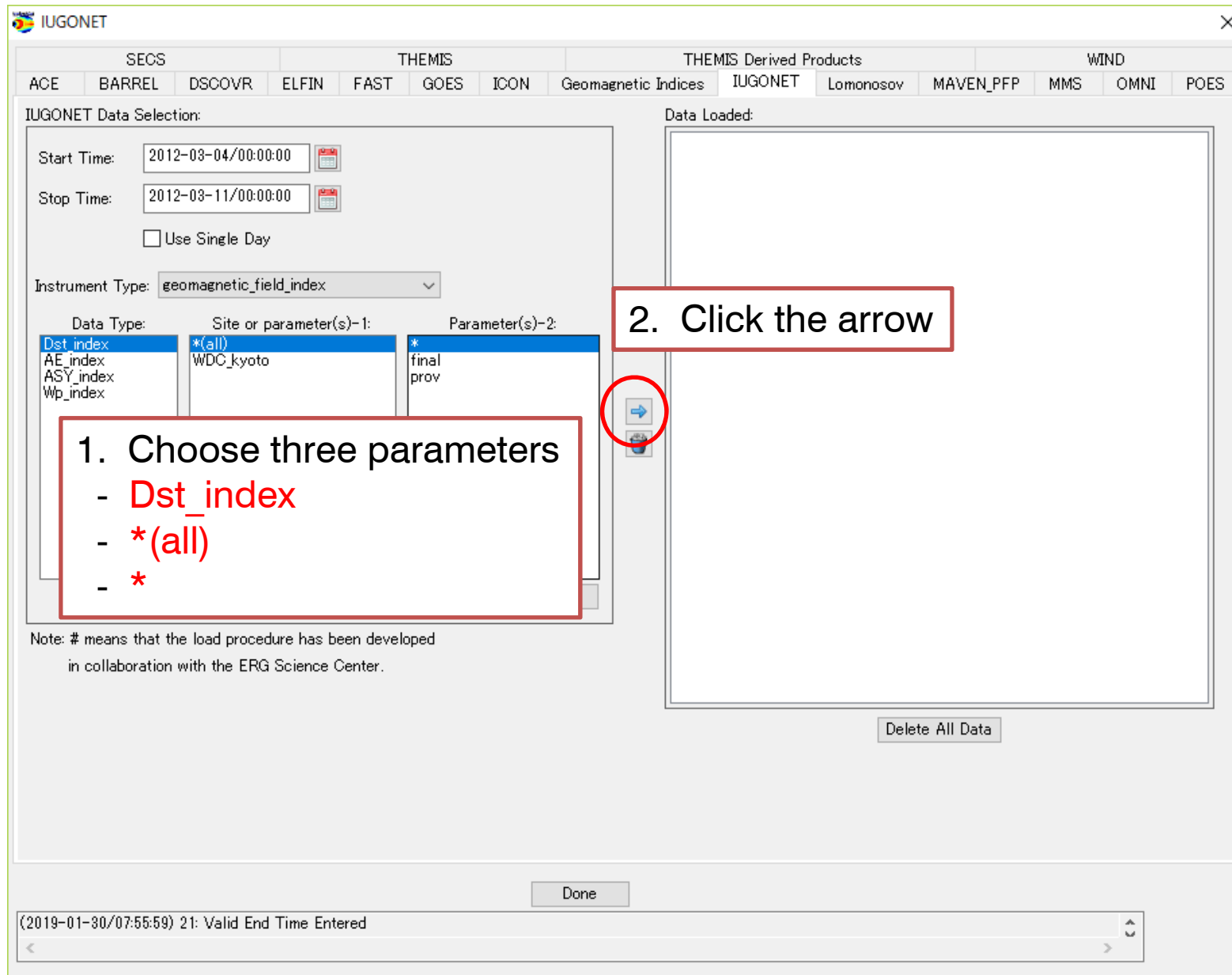
The screenshot shows the IUGONET GUI with several key elements and instructions:

- 1. Click IUGONET Tab:** The 'IUGONET' tab is circled in red in the top navigation bar.
- 2. Uncheck "Use Single Day":** A red box highlights the 'Single Day' checkbox, which is unchecked.
- 3. Set Date and Time:** A large red box contains the following text:
Start Time: 2012-03-04/00:00:00
Stop Time: 2012-03-11/00:00:00
- 4. Change Instrument Type:** A red box highlights the 'Instrument Type' dropdown menu, which is set to 'geomagnetic_field_index'.

The GUI also displays a table of data types and parameters:

| Data Type | Site or parameter(s)-1 | Parameter(s)-2 |
|-----------|------------------------|----------------|
| Dst_index | *(all) | * final |
| AE_index | WDC_kyoto | prov |
| ASY_index | | |
| Wp_index | | |

Buttons for 'Clear Site or Parameters-1' and 'Clear Parameters-2' are located below the table. A 'Delete All Data' button is at the bottom right. A status bar at the bottom shows '(2019-01-30/07:55:59) 21: Valid End Time Entered'.



The screenshot shows the IUGONET GUI with the following elements:

- Navigation Tabs:** SECS, THEMIS, THEMIS Derived Products, WIND. Sub-tabs include ACE, BARREL, DSCOVR, ELFIN, FAST, GOES, ICON, Geomagnetic Indices, IUGONET, Lomonosov, MAVEN_PFP, MMS, OMNI, POES.
- IUGONET Data Selection:**
 - Start Time: 2012-03-04/00:00:00
 - Stop Time: 2012-03-11/00:00:00
 - Use Single Day
 - Instrument Type: geomagnetic_field_index
 - Data Type: Dst_index, AE_index, ASY_index, Wp_index
 - Site or parameter(s)-1: *(all), WDC_kyoto
 - Parameter(s)-2: *, final, prov
- Data Loaded:** An empty box for displaying selected data.
- Buttons:** Done, Delete All Data.
- Status Bar:** (2019-01-30/07:55:59) 21: Valid End Time Entered

Instructions:

1. Choose three parameters
 - Dst_index
 - *(all)
 - *
2. Click the arrow

IUGONET Data Selection:

Start Time: 2012-03-04/00:00:00

Stop Time: 2012-03-11/00:00:00

Use Single Day

Instrument Type: geomagnet

Data Type: Dst_index, AE_index, ASY_index, Wp_index

Site: *(all), WDC_J

Clear

Note: # means that the load p in collaboration with the

Rules of Data Use:

The DST data are provided by the World Data Center for Geomagnetism, Kyoto, and are not for redistribution (<http://wdc.kugi.kyoto-u.ac.jp/>). Furthermore, we thank the geomagnetic observatories (Kakioka [JMA], Honolulu and San Juan [USGS], Hermanus [RSA], Alibag [IIG]), NiCT, INTERMAGNET, and many others for their cooperation to make the Dst index available. The distribution of DST data has been partly supported by the IUGONET (Inter-university Upper atmosphere Global Observation NETWORK) project (<http://www.iugonet.org/>) funded by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan.

OK キャンセル

1. Click "OK"

Display of Data Use Policy

Done

(2019-01-30/07:55:59) 21: Valid End Time Entered

The screenshot shows the IUGONET GUI interface. At the top, there are tabs for different data sources: SECS, THEMIS, THEMIS Derived Products, and WIND. Under THEMIS Derived Products, the 'IUGONET' tab is selected. The main window is divided into two main sections: 'IUGONET Data Selection' on the left and 'Data Loaded' on the right.

IUGONET Data Selection:

- Start Time: 2012-03-04/00:00:00
- Stop Time: 2012-03-11/00:00:00
- Use Single Day
- Instrument Type: geomagnetic_field_index
- Data Type: geomagnetic_field_index
- Site or parameter(s)-1: *(all), WDC_kyoto
- Parameter(s)-2: final, prov

Data Loaded:

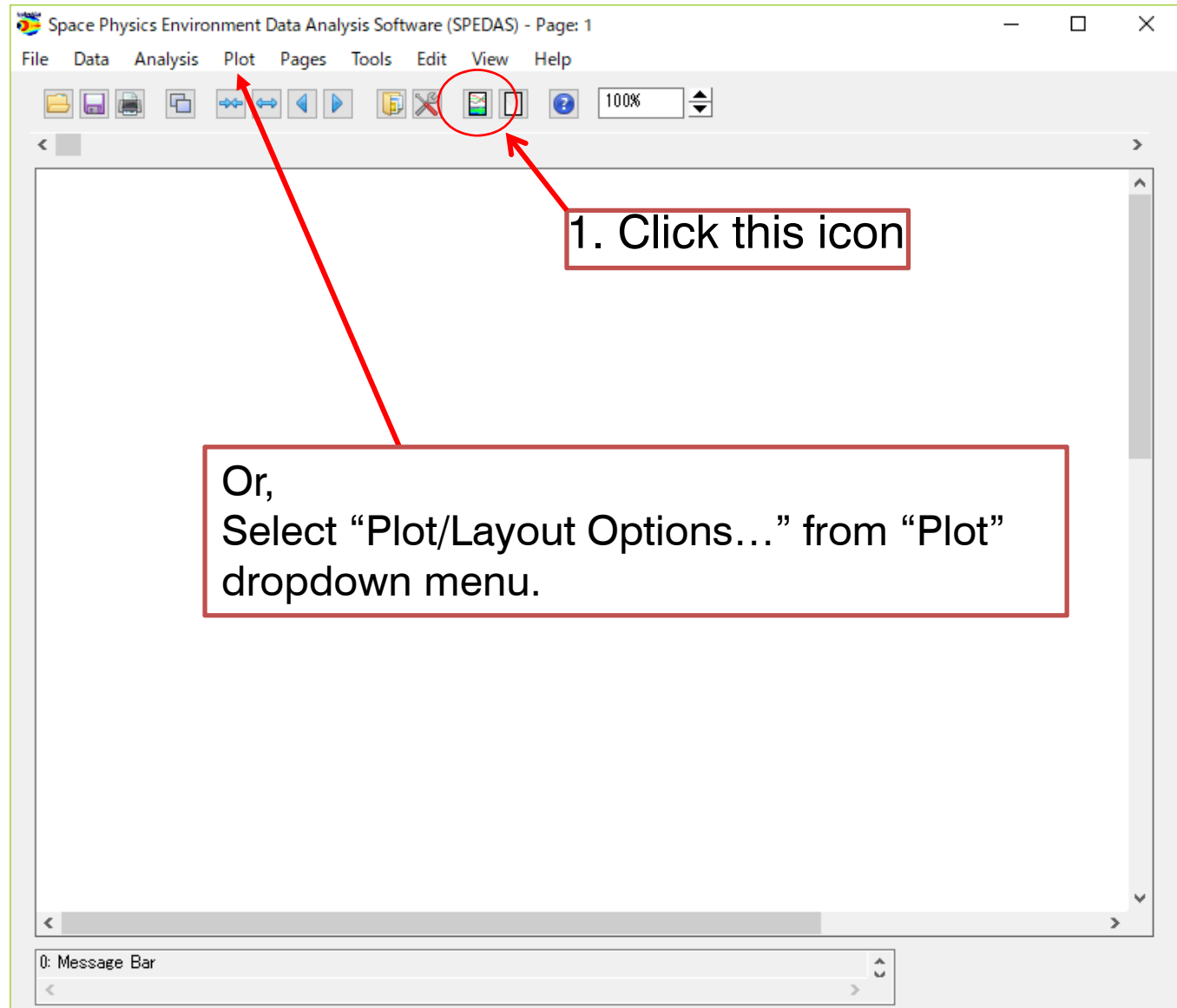
- IUGONET
 - geomagnetic_field_index
 - dst
 - wdc_mag_dst_prov [2012-03-04/00:30:00 to 2012-03-10/00:00:00]

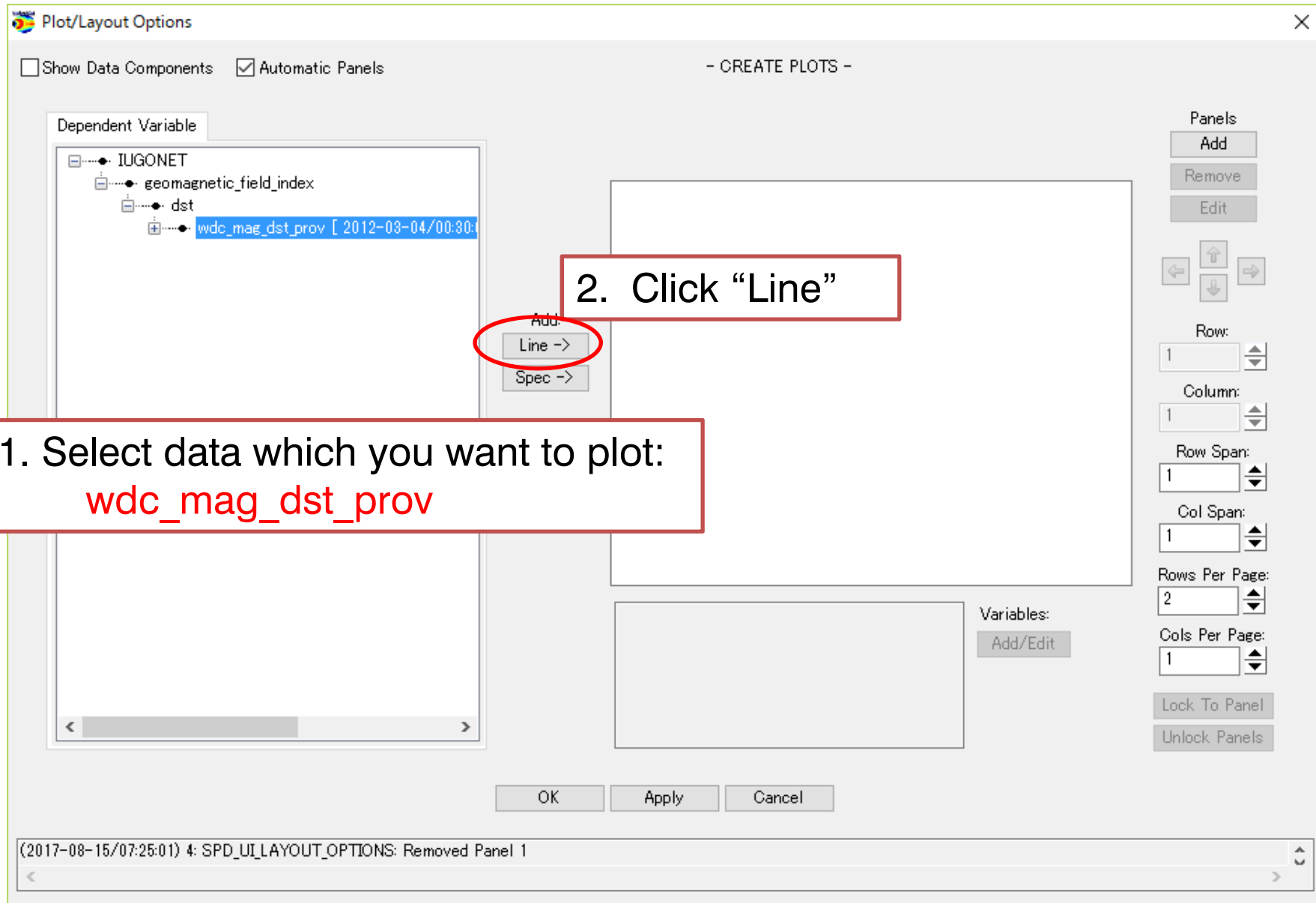
A red box highlights the 'dst' folder and its contents in the 'Data Loaded' section. Another red box highlights the 'Done' button at the bottom of the window. A status bar at the bottom left shows the message: '(2019-01-30/08:03:41) 22: IUGONET Data Loaded Successfully'.

1. Data was loaded successfully!

2. Click "Done"

Lesson:
Plot data





Plot/Layout Options

Show Data Components Automatic Panels

- CREATE PLOTS -

Dependent Variable

- IUGONET
 - geomagnetic_field_index
 - dst
 - wdc_mag_dst_prov [2012-03-04/00:30:00]**

Add:

Line ->

Spec ->

2. Click "Line"

1. Select data which you want to plot:
wdc_mag_dst_prov

Panels

Add

Remove

Edit

Row: 1

Column: 1

Row Span: 1

Col Span: 1

Rows Per Page: 2

Cols Per Page: 1

Lock To Panel

Unlock Panels

Variables:

Add/Edit

OK Apply Cancel

(2017-08-15/07:25:01) 4: SPD_UI_LAYOUT_OPTIONS: Removed Panel 1

Plot/Layout Options X

Show Data Components Automatic Panels - CREATE PLOTS -

Dependent Variable

- IUGONET
 - geomagnetic_field_index
 - dst
 - wdc_mag_dst_prov [2012-03-04/00:30:00]

Panel 1 (1, 1) -
- wdc_mag_dst_prov time -vs- wdc_mag_dst_prov data

1. Selected variable name is added to this box

Panels

Add

Remove

Edit

← ↑ →

↓

Row: 1

Column: 1

Row Span: 1

Col Span: 1

Rows Per Page: 2

Cols Per Page: 1

Lock To Panel

Unlock Panels

Add:

Line ->

Spec ->

Variables: Add/Edit

OK

Apply

Cancel

(2017-08-15/07:22:04) 3: Add Finished.

2. Click OK

GUI Basic Operation

PanelX(Y,Z)
X: panel serial number
Y: row index of the panel
Z: column index of the panel

You can add, remove, and edit panels with these buttons.

You can move panels and change the number of panels per page.

Lock to panel:
Lock panel axes to currently selected panel.

Plot/Layout Options

Show Data Components Automatic Panels

Dependent Variable

- IUGONET
 - geomagnetic_field_index
 - dst
 - wdc_mag_dst_prov [2012-03-04/00:30:00]

Add:
Line ->
Spec ->

(L) Panel 1 (1, 1) -
- wdc_mag_dst_prov time -vs- wdc_mag_dst_prov data

Variables:
Add/Edit

Row: 1
Column: 1
Row Span: 1
Col Span: 1
Rows Per Page: 2
Cols Per Page: 1

Lock To Panel
Unlock Panels

OK Apply Cancel

(2017-08-15/07:22:04) 3: Add Finished.



GUI Basic Operation

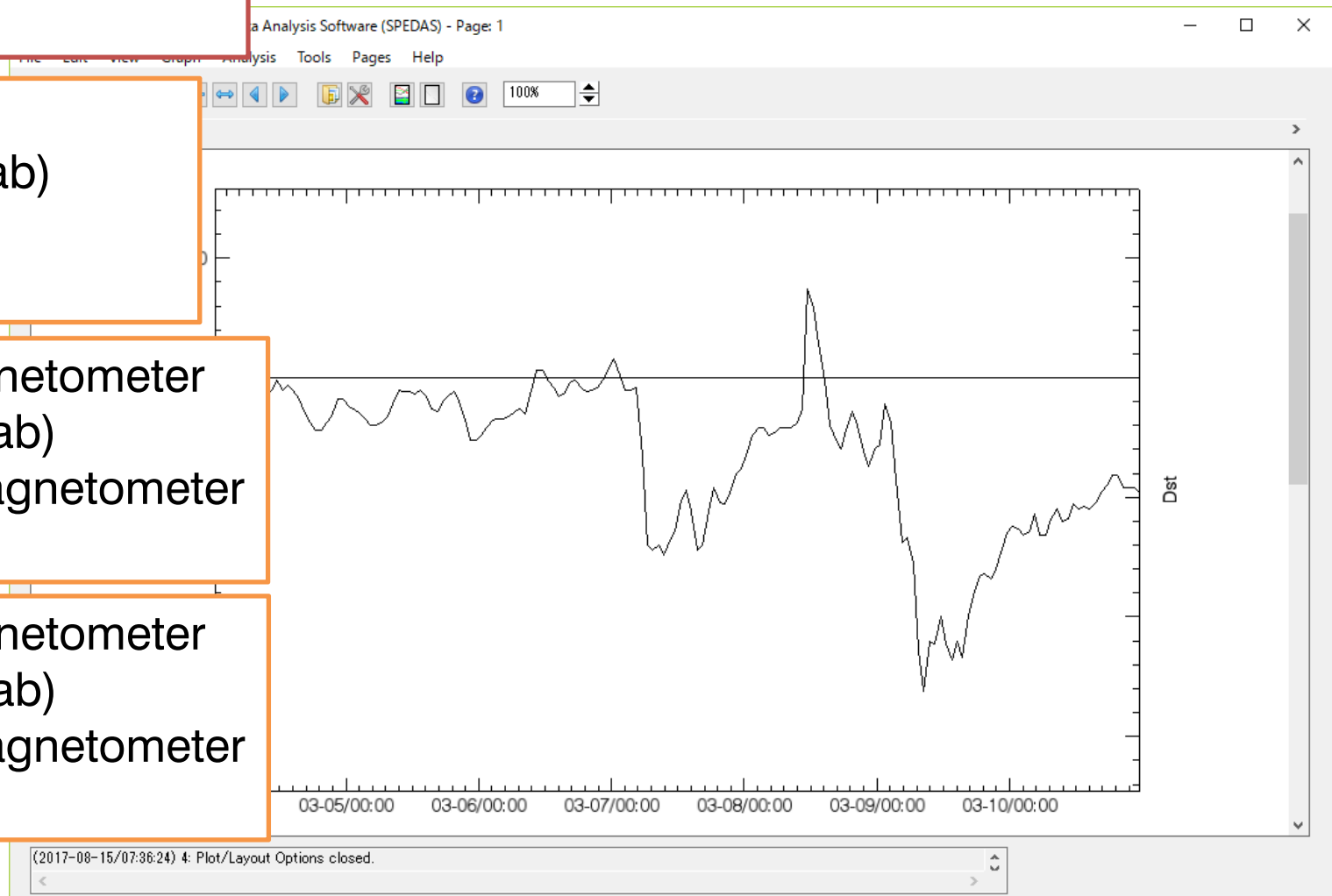
Try:

Load other three
data

AE index
(in IUGONET tab)
Instrument:
magnetometer

MAGDAS magnetometer
(in IUGONET tab)
Instrument: magnetometer
Station: HER

MAGDAS magnetometer
(in IUGONET tab)
Instrument: magnetometer
Station: ASB





GUI Basic Operation

Answer

1. Select **IUGONET** tab

2. Select **magnetic_field_index**

3. Select **AE_index, *(all), ***

4. Click arrow

5. Data is loaded

Note: # means that the load procedure has been developed in collaboration with the ERG Science Center.

Done

(2017-08-15/07:41:44) 2: IUGONET Data Loaded Successfully



GUI Basic Operation

Answer

1. Select **geomagnetic_field_fluxgate**

2. Select **magdas#**, **asb** & **her**, *

3. Click arrow

4. Data is loaded

5. Click Done

The screenshot shows the IUGONET Data Selection interface. The 'Instrument Type' is set to 'geomagnetic_field_fluxgate'. The 'Data Type' list includes 'magdas#', '210mm#', 'STEL#', 'WDC kyoto', and 'NIPR#'. The 'Site or parameter(s)-1' list includes '*(all)', 'ama', 'asb', 'daw', 'her', 'hln', 'hob', 'kuj', 'laq', and 'mcq'. The 'Parameter' list includes '*'. A red arrow points to the right-pointing arrow button. The 'Data Loaded' pane shows a tree view with 'geomagnetic_field_fluxgate' selected. The 'Done' button is circled in red. A status bar at the bottom shows '(2017-08-17/16:40:28) 28: IUGONET Data Loaded Successfully'.

IUGONET

ACE BARREL ELFIN Lomo FAST GOES Geomagnetic Indices IUGONET MAVEN_PFP MMS OMNI POES THEMIS THEMIS Derived Products WIND

IUGONET Data Selection:

Start Time: 2012-03-04/00:00:00

Stop Time: 2012-03-11/00:00:00

Instrument Type: geomagnetic_field_fluxgate

| Data Type: | Site or parameter(s)-1: | Par |
|------------|-------------------------|-----|
| magdas# | *(all) | * |
| 210mm# | ama | |
| STEL# | asb | |
| WDC kyoto | daw | |
| NIPR# | her | |
| | hln | |
| | hob | |
| | kuj | |
| | laq | |
| | mcq | |

Clear Site or Parameters-1 Clear Parameters-2

Note: # means that the load procedure has been developed in collaboration with the ERG Science Center.

Data Loaded:

- IUGONET
 - geomagnetic_field_index
 - dst
 - wdc_mag_dst_prov [2012-03-04/00:30:00 to 2012-03-10/00:00:00]
 - ae
 - wdc_mag_ae_prov_1min [2012-03-04/00:00:30 to 2012-03-10/00:00:00]
 - geomagnetic_field_fluxgate
 - asb
 - magdas_mag_asb_1sec_f [2012-03-04/00:00:00 to 2012-03-10/00:00:00]
 - magdas_mag_asb_1sec_hdz [2012-03-04/00:00:00 to 2012-03-10/00:00:00]
 - her
 - magdas_mag_her_1sec_f [2012-03-04/00:00:00 to 2012-03-10/00:00:00]
 - magdas_mag_her_1sec_hdz [2012-03-04/00:00:00 to 2012-03-10/00:00:00]

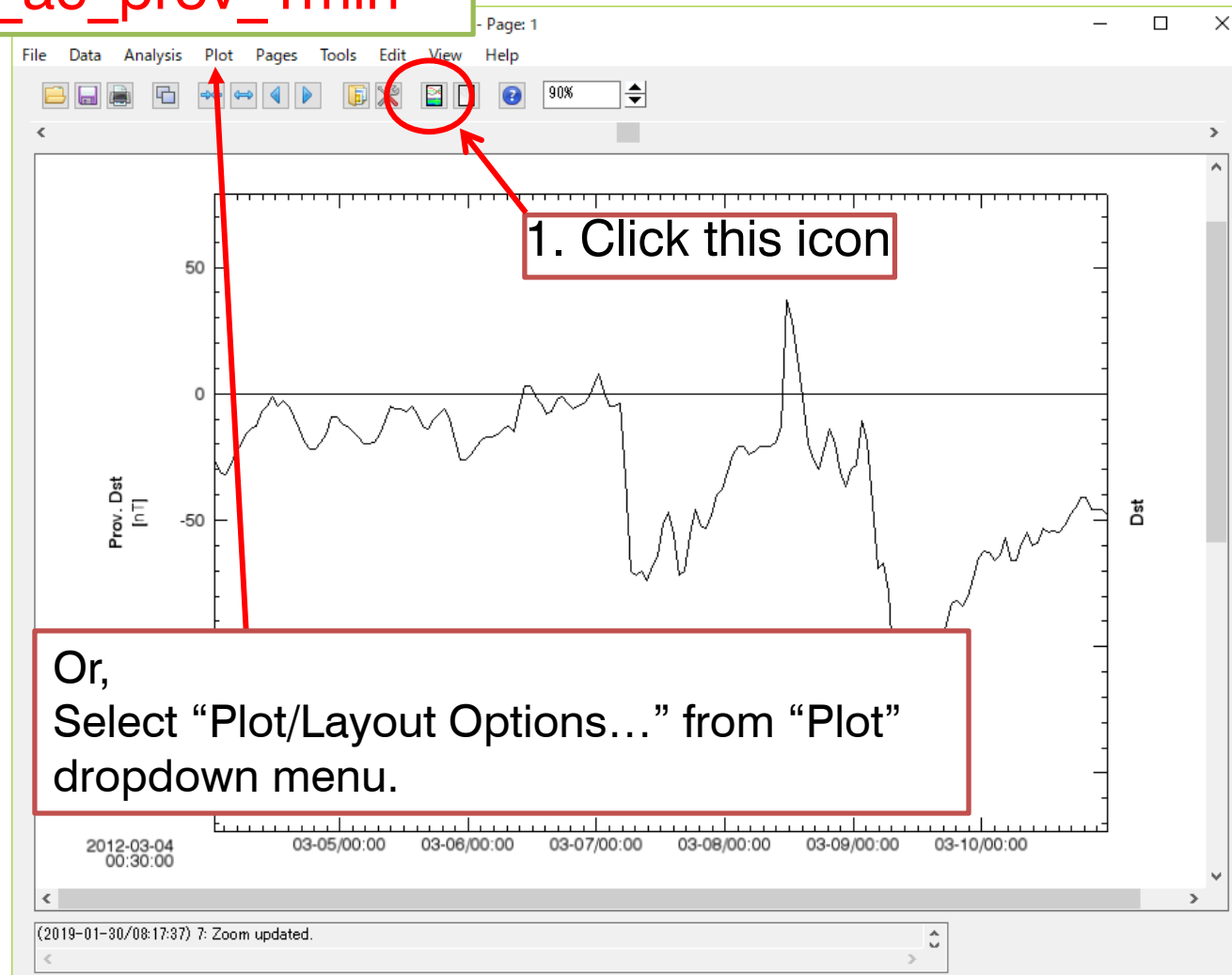
Delete All Data

Done

(2017-08-17/16:40:28) 28: IUGONET Data Loaded Successfully

Lesson:
Add Plot

wdc_mag_ae_prov_1min



1. Click Add

2. Select `wdc_mag_ae_prov_1min`

3. Click "Line"

4. Data are added

5. Click OK

Plot/Layout Options

Show Data Components Automatic Panels

- CREATE PLOTS -

Dependent Variable

- IUGONET
 - geomagnetic_field_index
 - dst
 - wdc_mag_dst_prov [2012-03-04/00:30:00 to 201
 - ae
 - wdc_mag_ae_prov_1min [2012-03-04/00:00:00 to 201**
 - geomagnetic_field_fluxgate
 - asb
 - magdas_mag_asb_1sec_f [2012-03-04/00:00:00 to 201
 - magdas_mag_asb_1sec_hdz [2012-03-04/00:00:00 to 201
 - her
 - magdas_mag_her_1sec_f [2012-03-04/00:00:00 to 201
 - magdas_mag_her_1sec_hdz [2012-03-04/00:00:00 to 201

Line ->

Spec ->

Variables: Add/Edit

Row: 2

Column: 1

Row Span: 1

Col Span: 1

Rows Per Page: 2

Cols Per Page: 1

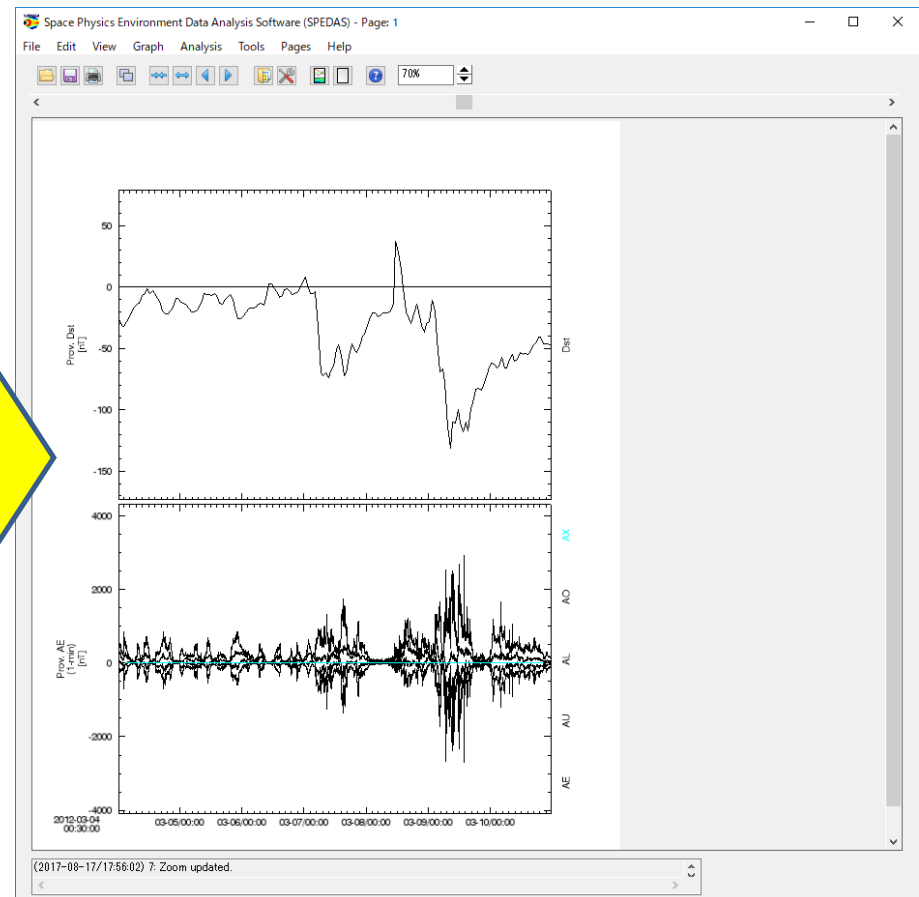
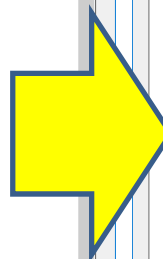
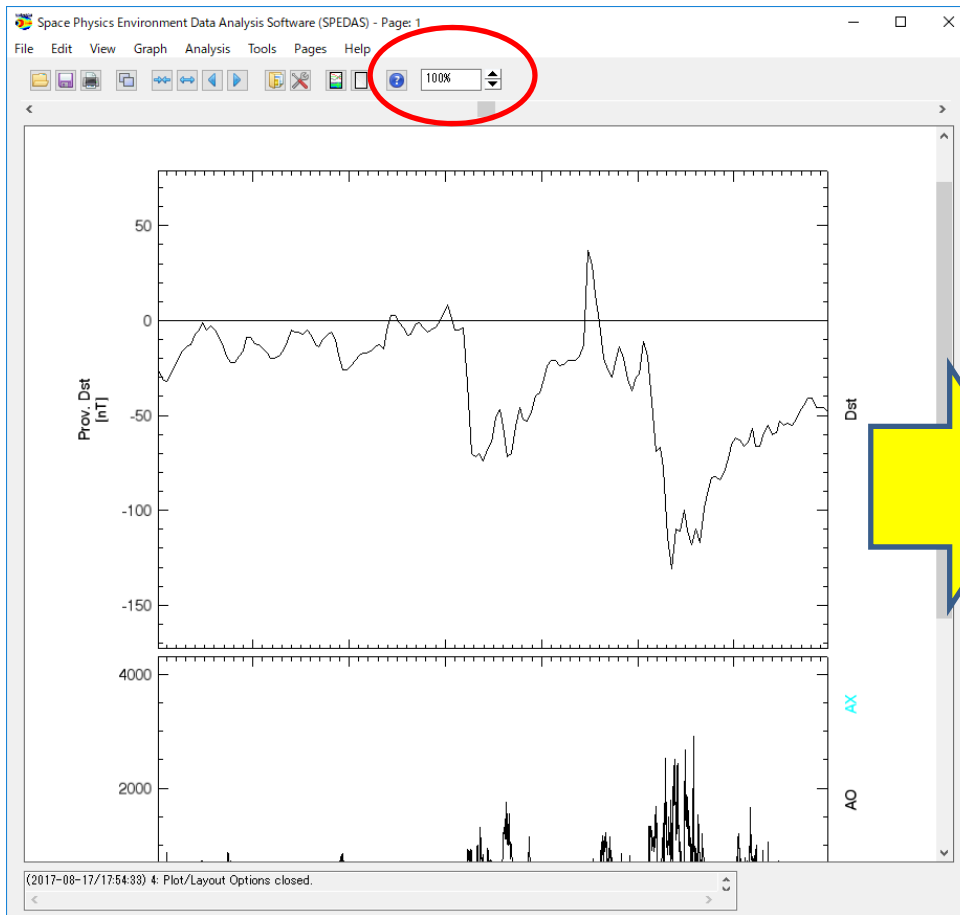
Lock To Panel

Unlock Panels

OK Apply Cancel

(2017-08-17/17:22:52) 6: Add Finished.

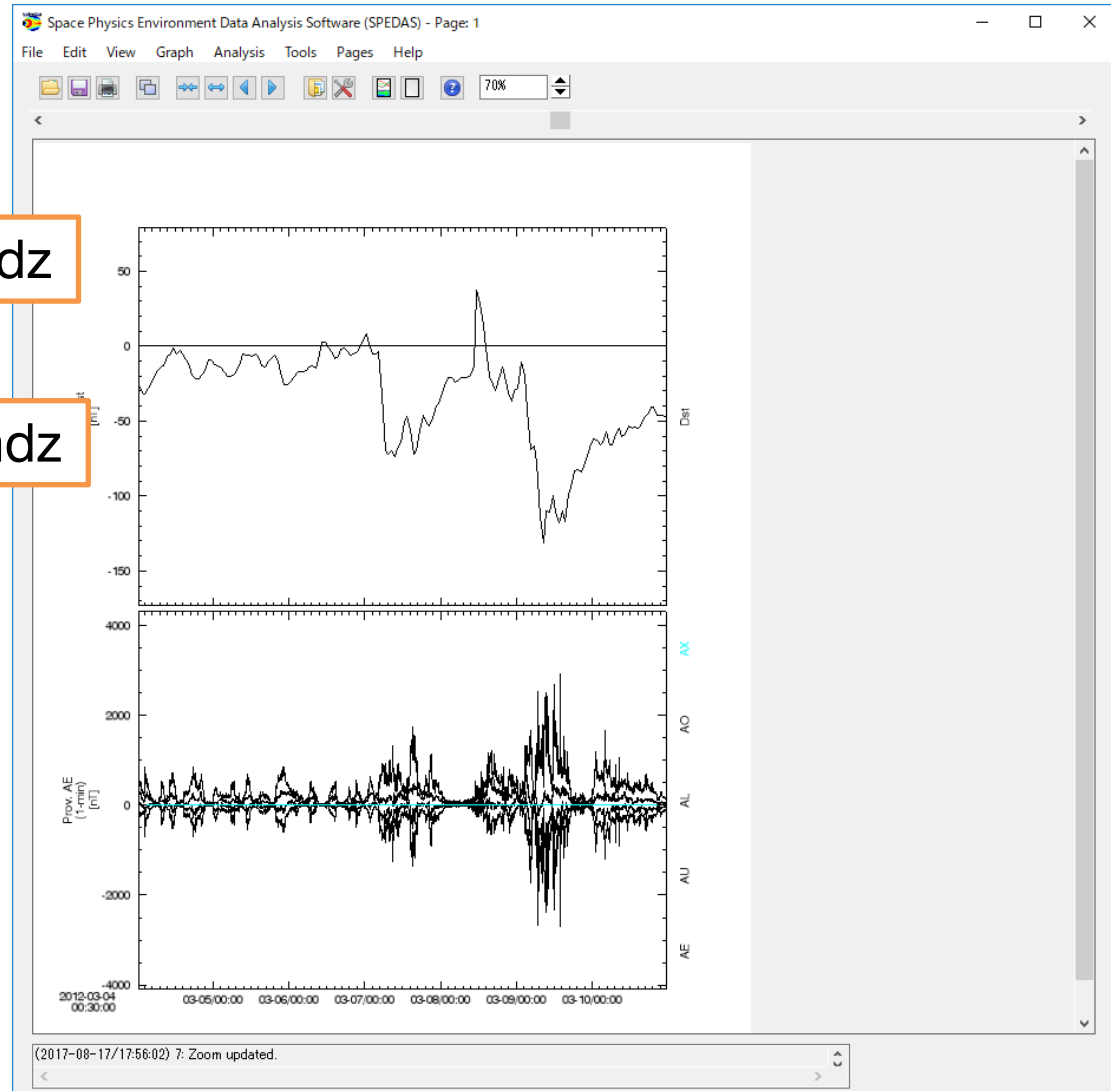
1. Click black triangles



Try:
Plot other two data

magdas_mag_her_1sec_hdz

magdas_mag_asb_1sec_hdz



Answer

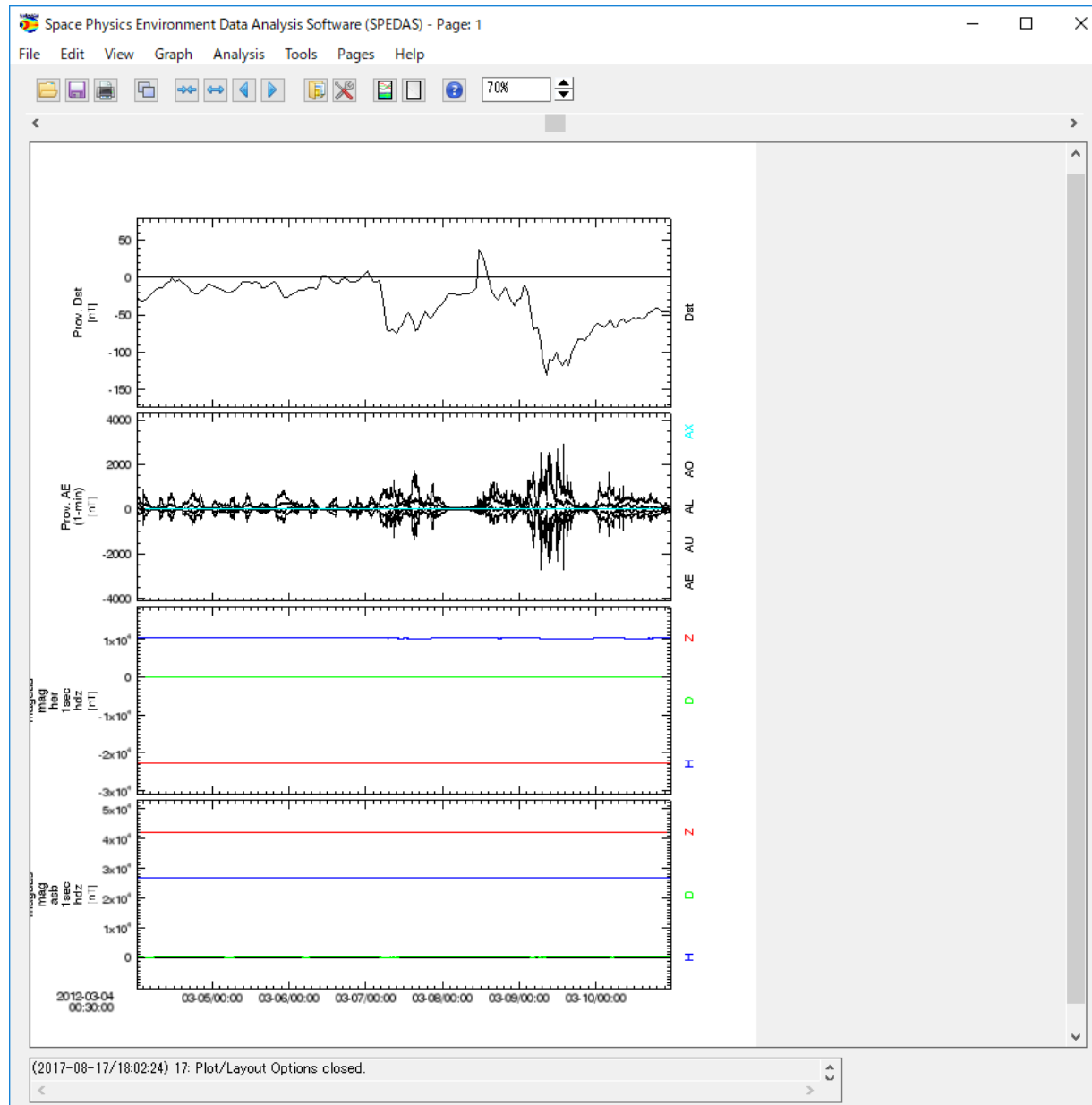
The screenshot shows the 'Options' dialog box in the IUGONET software. The window title is 'Options' and it has a close button (X) in the top right corner. The main area is titled '- CREATE PLOTS -'. There are two checkboxes at the top: 'Show Data Components' (unchecked) and 'Automatic Panels' (checked). On the left, a tree view shows the 'Dependent Variable' hierarchy. The variable 'magdas_mag_her_1sec_hdz' is selected and highlighted in blue. A red box with the text '1. Select magdas_mag_her_1sec_hdz' points to this selection. In the center, there are three buttons: 'Add', 'Line ->', and 'Spec ->'. The 'Line ->' button is circled in red, with a red box containing the text '2. Click Line'. On the right, a list of plot panels is shown. The third panel, 'Panel 3 (3, 1)', contains the variable 'magdas_mag_her_1sec_hdz' and is highlighted in blue. A red box with the text '3. Data are added' points to this panel. Below the panels list, there are controls for 'Row', 'Column', 'Row Span', and 'Col Span', each with a numeric input field and a spinner. At the bottom right, there are buttons for 'Lock To Panel' and 'Unlock Panels'. At the bottom center, there are 'OK', 'Apply', and 'Cancel' buttons. A status bar at the bottom left shows the message '(2017-08-17/18:01:17) 5: Add Finished.'

Answer

The screenshot shows the 'CREATE PLOTS' dialog box in the IUGONET software. The interface includes a tree view of dependent variables on the left, a central panel configuration area, and a right-hand control panel. Four red boxes with white text provide numbered instructions:

- 1. Select `magdas_mag_asb_1sec_hdz`**: A red box highlights the variable `magdas_mag_asb_1sec_hdz` in the tree view.
- 2. Click Line**: A red box highlights the 'Line ->' button in the 'Add:' section.
- 3. Data are added**: A red box highlights the variable `magdas_mag_asb_1sec_hdz` in the panel configuration list.
- 4. Click OK**: A red box highlights the 'OK' button at the bottom of the dialog.

Additional UI elements include checkboxes for 'Show Data Components' and 'Automatic Panels', a 'Variables: Add/Edit' button, and a status bar at the bottom showing '(2017-08-17/18:01:56) 8: Add Finished.'



Lesson: Save plot as figure

1. Select
File – Save Page As Image File...

Space Physics Environment Data Analysis Software (SPEDAS) - Page: 1

File Data Analysis Plot Pages Tools Edit View Help

- Open SPEDAS GUI Document... Ctrl+O
- Save SPEDAS GUI Document... Ctrl+S
- Save SPEDAS GUI Document As...
- GUI Plot Options Template >
- Save Page As Image File...**
- Print Page... Ctrl+P
- Print Setup...
- Configuration Settings...
- Exit Ctrl+Q

2. Select save folder

Save SPEDAS Image As

« spdidas_v_2 » spd_gui »

整理 新しいフォルダー

- 講習会資料 (英)
- OneDrive
- PC
- ダウンロード
- デスクトップ
- ドキュメント
- ピクチャ
- ビデオ
- ミュージック

idl85 splash.bmp

2. Input file name and select format (by extension)

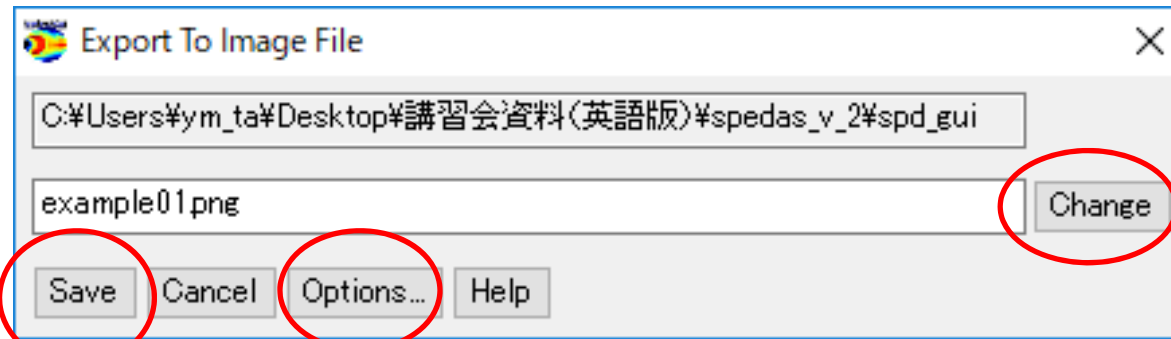
ファイル名(N) []

ファイルの種類(T) *.png;*.eps;*.bmp;*.gif;*.jpg;*.jp2;*.pic;*.emf

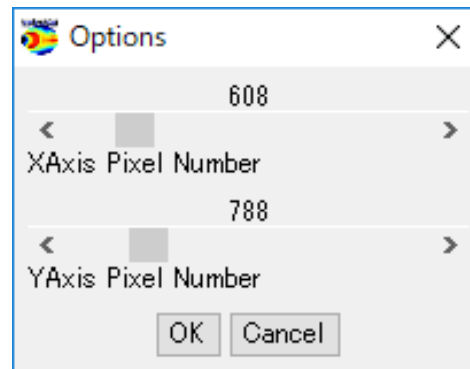
保存(S) キャンセル

3. Click "save"

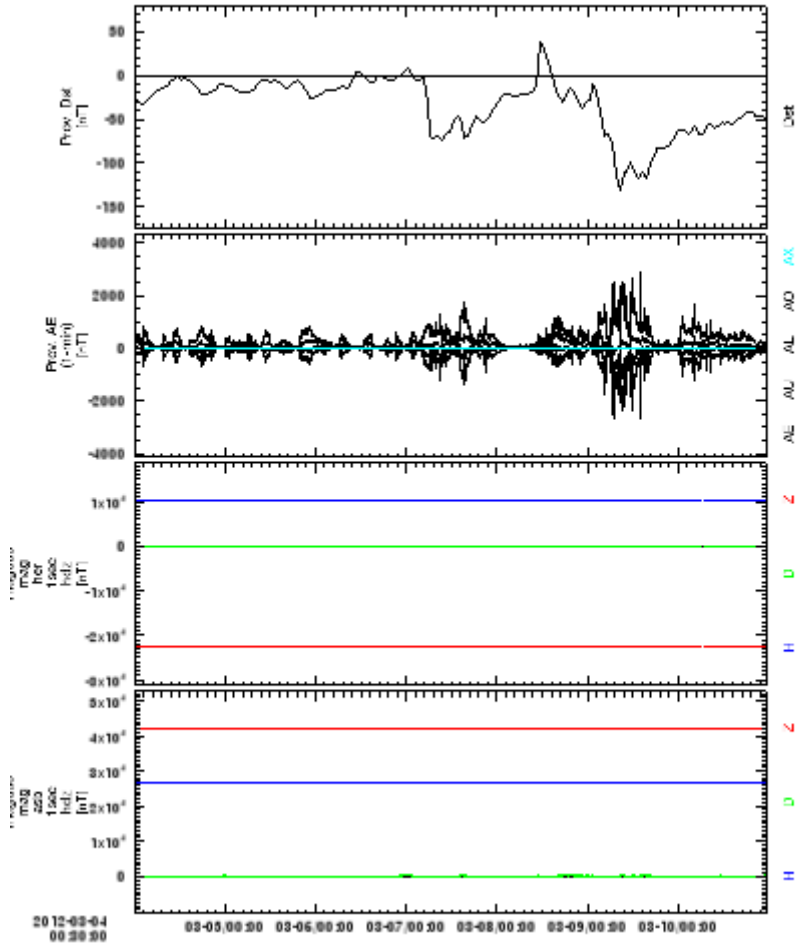
Confirmation



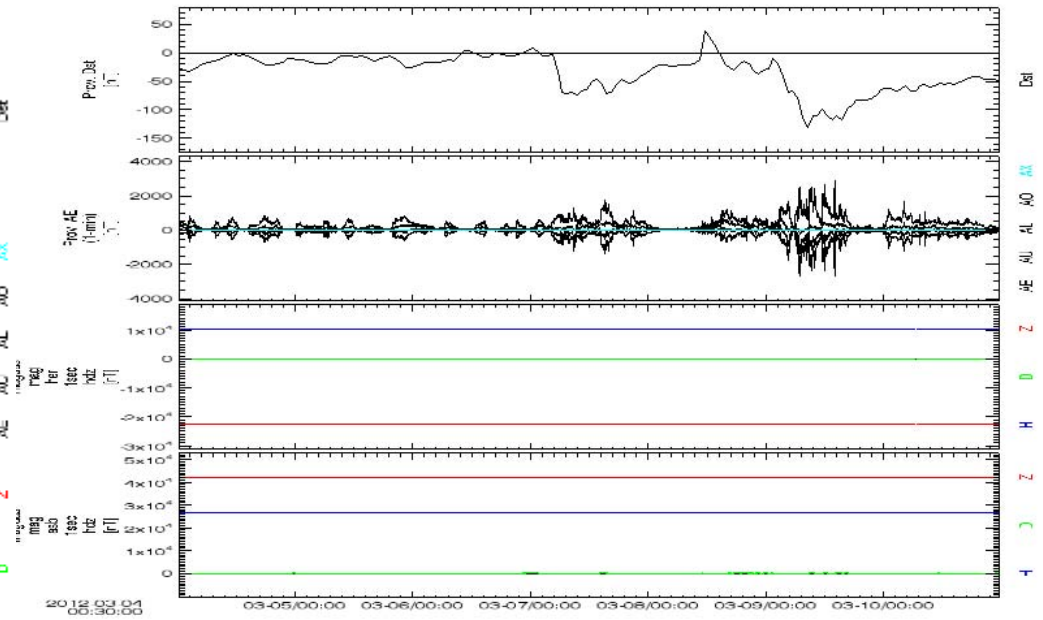
Back to previous



Click "Save"



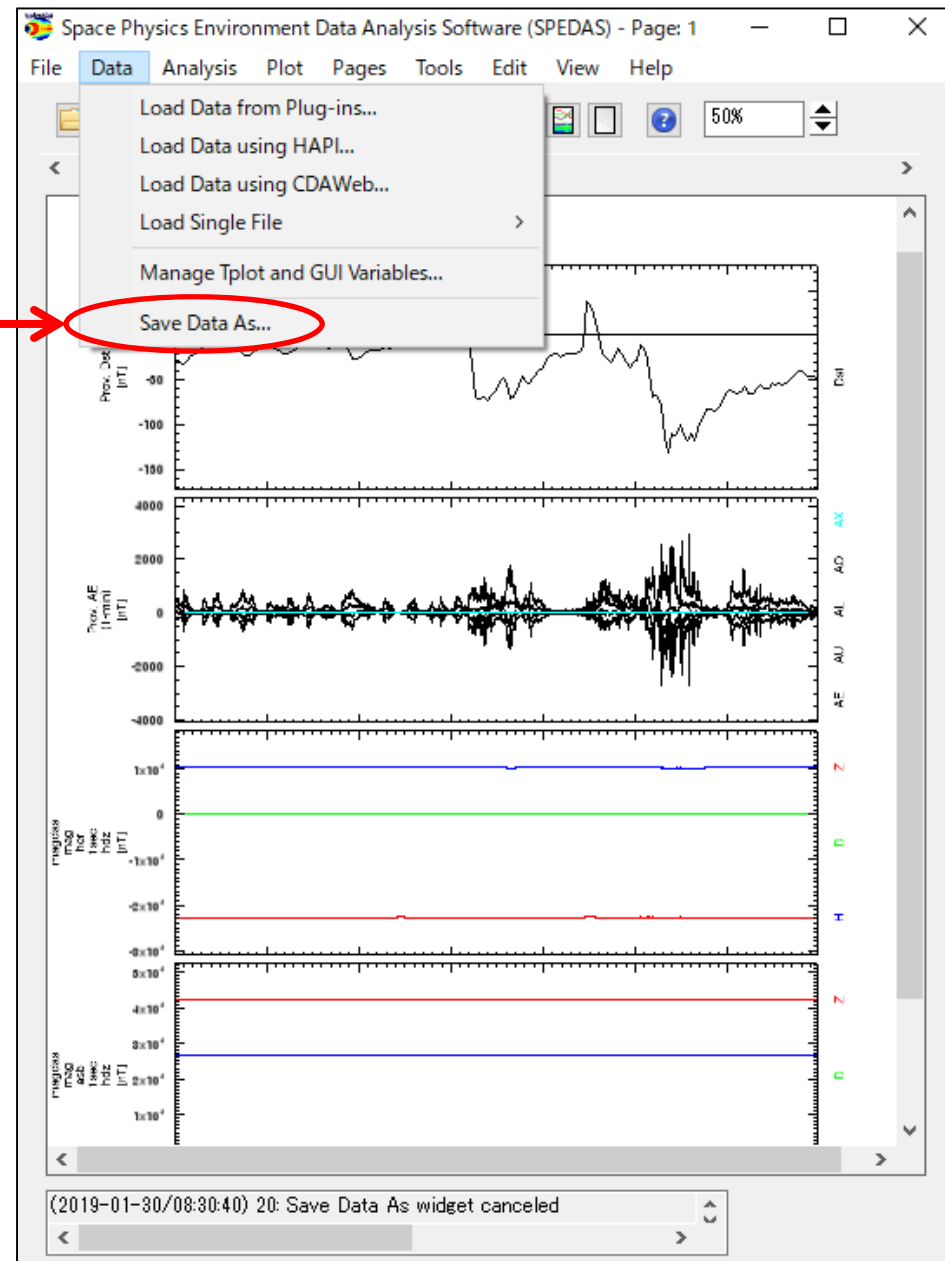
X pixel 428, Y pixel 554



X pixel 856, Y pixel 554
(65%)

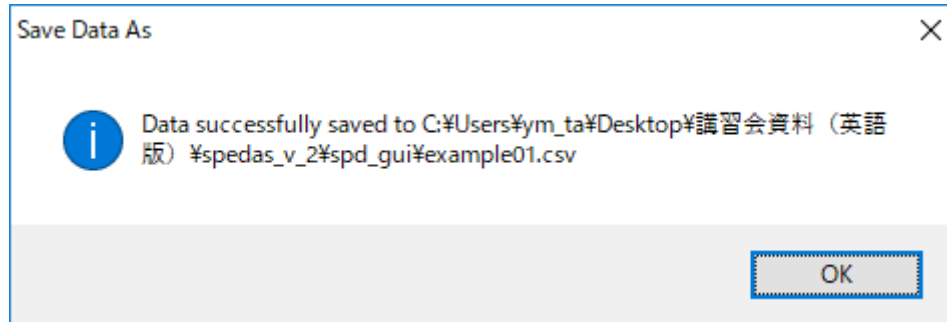
Lesson:
Save data as ascii

1. Select
Data – Save Data As

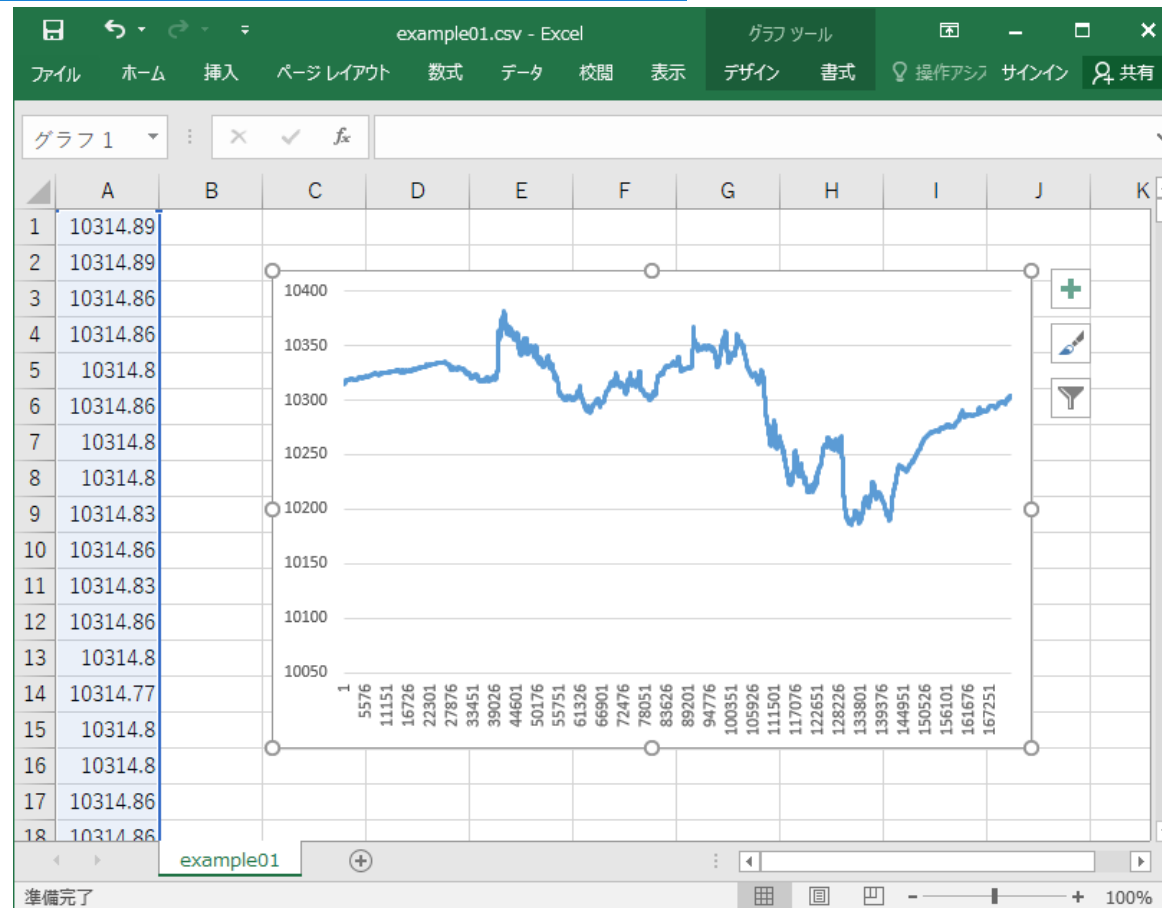


The image shows a 'Save Data As' dialog box with the following components and instructions:

- 1. Select data which you want to save**
A tree view on the left shows a folder structure under 'IUGONET'. The file 'magdas_mag_her_1sec_hdz_x' is selected and highlighted in blue.
- 2. check this box**
The 'Restrict Time Range:' checkbox is checked.
- 3. Select time interval**
The 'Start Time' is set to '2012-03-08/00:00:00' and the 'End Time' is set to '2012-03-09/23:59:59'. Both time fields are highlighted with red boxes.
- 4. check this box**
The 'Save as ASCII data file' checkbox is checked.
- 5. Click Save**
The 'Save' button at the bottom right is highlighted with a red box.
- 6. Select save folder**
A separate window shows a file explorer with the path 'spedas_v_2 > spd_gui' selected in the address bar.
- 7. Input file name (data is saved in csv format)**
The 'ファイル名(N):' field in the dialog box is highlighted with a red box.
- 8. Click "save"**
The '保存(S)' button in the file explorer window is highlighted with a red box.

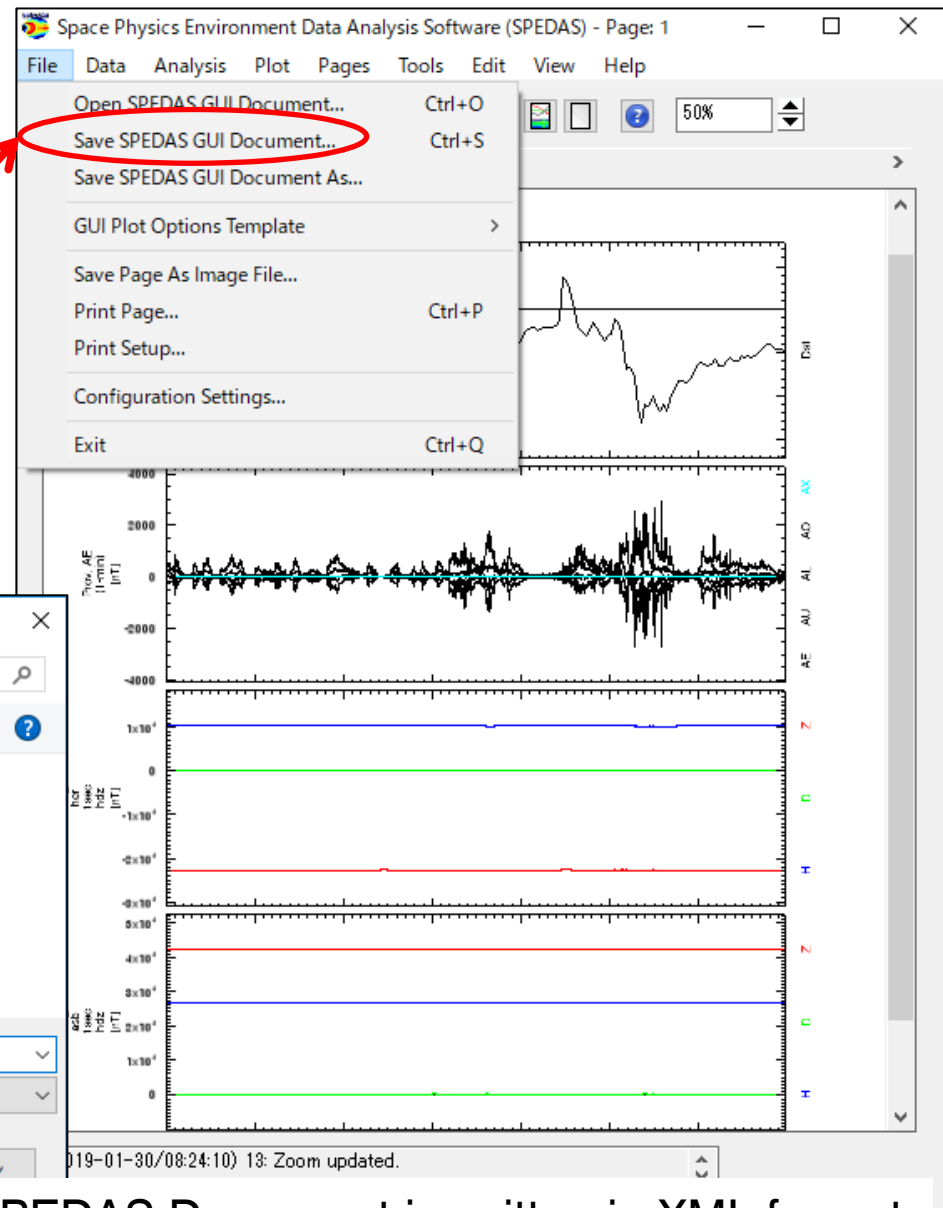


An ascii data file was successfully saved!!!



Lesson:
Dump your workspace

1. Select
File – Save SPEDAS Document



2. Select save folder

3. Input file name

4. Click "save"

※ SPEDAS Document is written in XML format

Coffee Break...



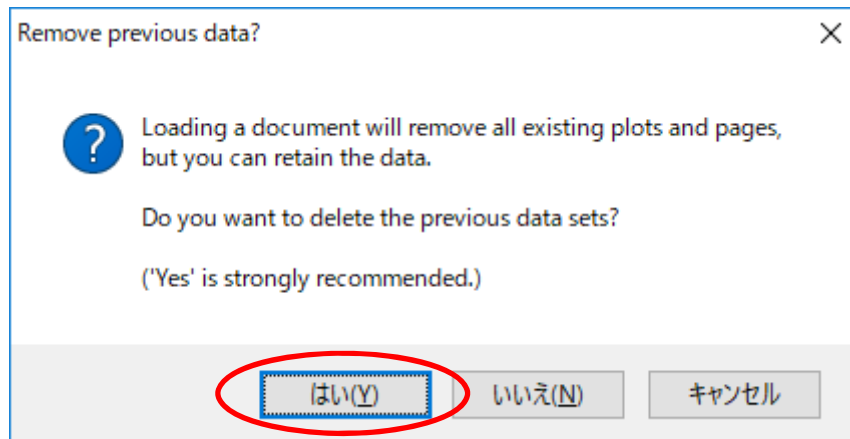
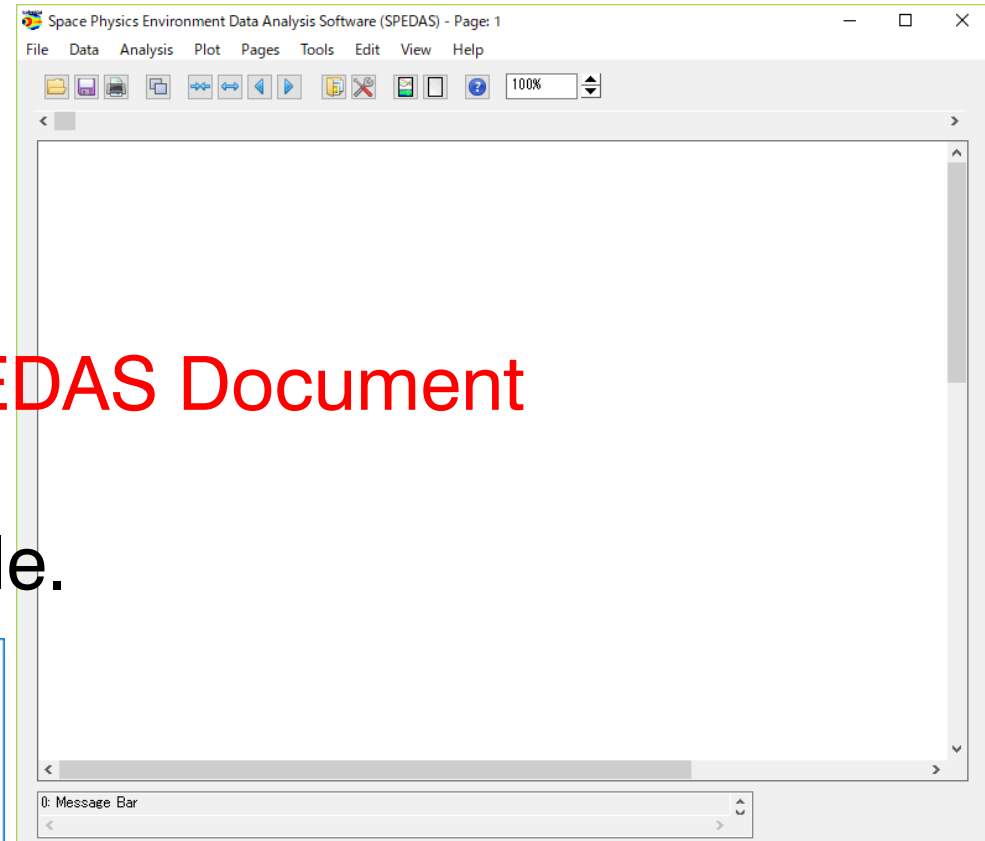
How to Use SPEDAS part2

- Restore your work
- Manage axis
- Process and data

Lesson:

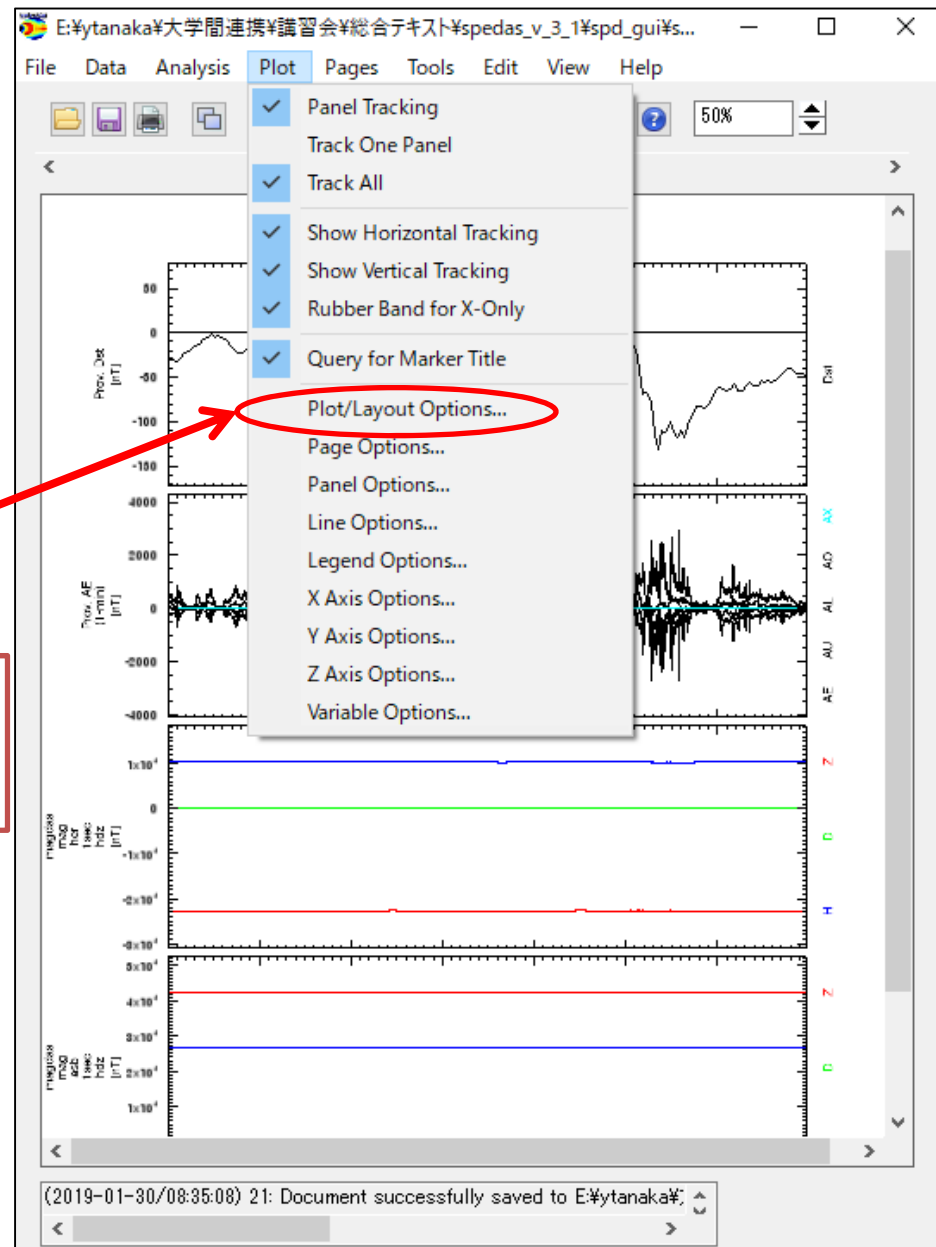
Restore part1 workspace

1. Exit SPEDAS
2. Run SPEDAS again
3. Select **File- Open SPEDAS Document**
4. Click “**Yes**”
5. Select the saved tgd file.



Lesson:
Remove plot

1. Select
Plot – Plot/Layout Options



1. Select

`wdc_mag_ae_prov_1min_time -vs- wdc_mag_ae_prov_1min_4`
in the right-hand panel.

2. Click "Remove"

- wdc_mag_dst_prov [2012-03-04/00:30:00 to 2012-03-04/00:30:00
- ae
 - wdc_mag_ae_prov_1min [2012-03-04/00:00:30 to 2012-03-04/00:00:30**
- geomagnetic_field_fluxgate
- asb
 - magdas_mag_asb_1sec_f [2012-03-04/00:00:00 to 2012-03-04/00:00:00
 - magdas_mag_asb_1sec_hdz [2012-03-04/00:00:00 to 2012-03-04/00:00:00
- her
 - magdas_mag_her_1sec_f [2012-03-04/00:00:00 to 2012-03-04/00:00:00
 - magdas_mag_her_1sec_hdz [2012-03-04/00:00:00 to 2012-03-04/00:00:00

Add:
Line ->
Spec ->

Panel 2 (2, 1) -

- wdc_mag_ae_prov_1min_time -vs- wdc_mag_ae_prov_1min_0
- wdc_mag_ae_prov_1min_time -vs- wdc_mag_ae_prov_1min_1
- wdc_mag_ae_prov_1min_time -vs- wdc_mag_ae_prov_1min_2
- wdc_mag_ae_prov_1min_time -vs- wdc_mag_ae_prov_1min_3
- wdc_mag_ae_prov_1min_time -vs- wdc_mag_ae_prov_1min_4**

Panel 3 (3, 1) -

- magdas_mag_her_1sec_hdz_time -vs- magdas_mag_her_1sec_hdz_x
- magdas_mag_her_1sec_hdz_time -vs- magdas_mag_her_1sec_hdz_y
- magdas_mag_her_1sec_hdz_time -vs- magdas_mag_her_1sec_hdz_z

Panel 4 (4, 1) -

- magdas_mag_asb_1sec_hdz_time -vs- magdas_mag_asb_1sec_hdz_x
- magdas_mag_asb_1sec_hdz_time -vs- magdas_mag_asb_1sec_hdz_y
- magdas_mag_asb_1sec_hdz_time -vs- magdas_mag_asb_1sec_hdz_z

Panels

Add

Remove

Edit

← ↑ → ↓

Row: 2

Column: 1

Row Span: 1

Col Span: 1

Rows Per Page: 4

Cols Per Page: 1

Lock To Panel

Unlock Panels

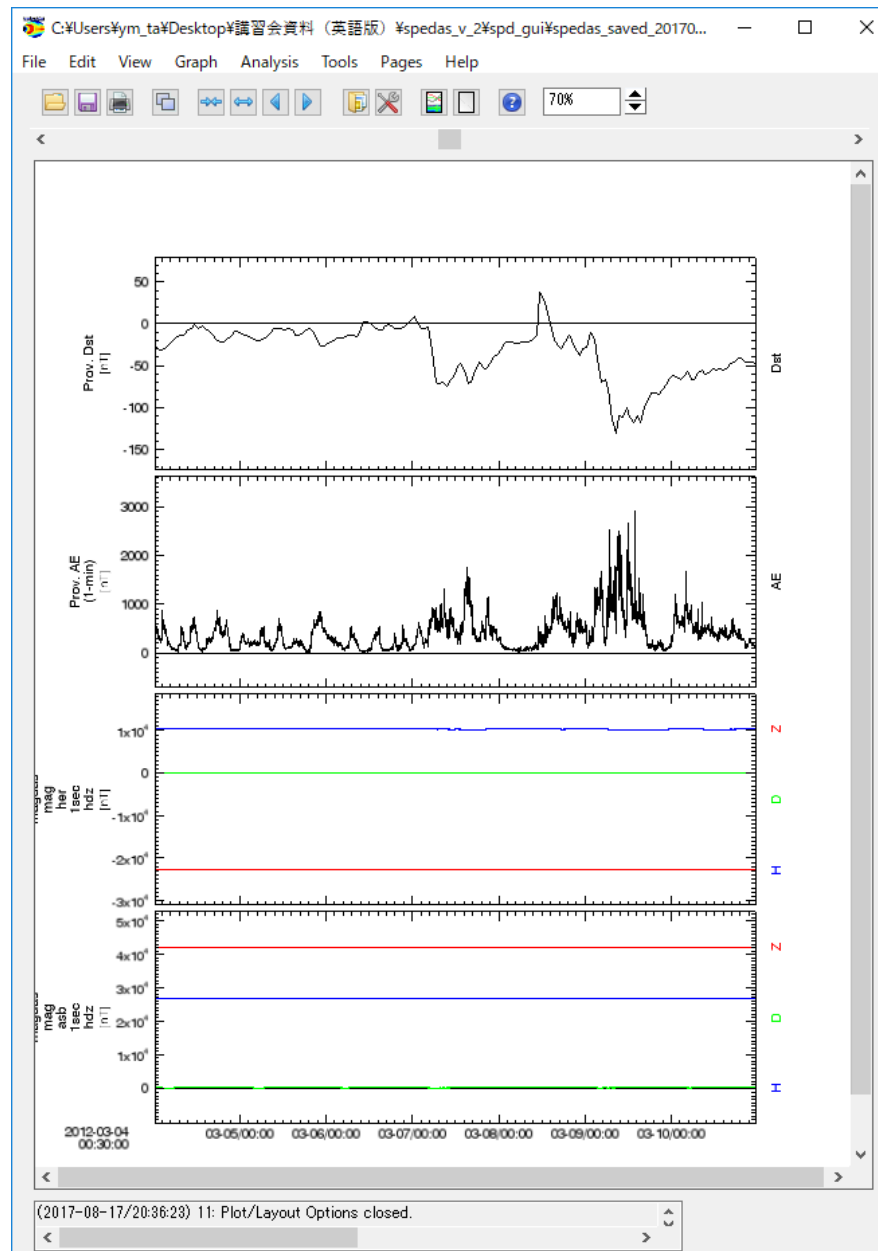
3. Remove

`wdc_mag_ae_prov_1min_time -vs- wdc_mag_ae_prov_1min_3`
`wdc_mag_ae_prov_1min_time -vs- wdc_mag_ae_prov_1min_2`
`wdc_mag_ae_prov_1min_time -vs- wdc_mag_ae_prov_1min_1`
in the same way

OK Apply Cancel

4. Click OK

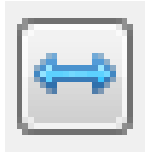
Result



Lesson:
Change X range (time scale)
of the plot (1)



Reduces X range
by major tick
marker



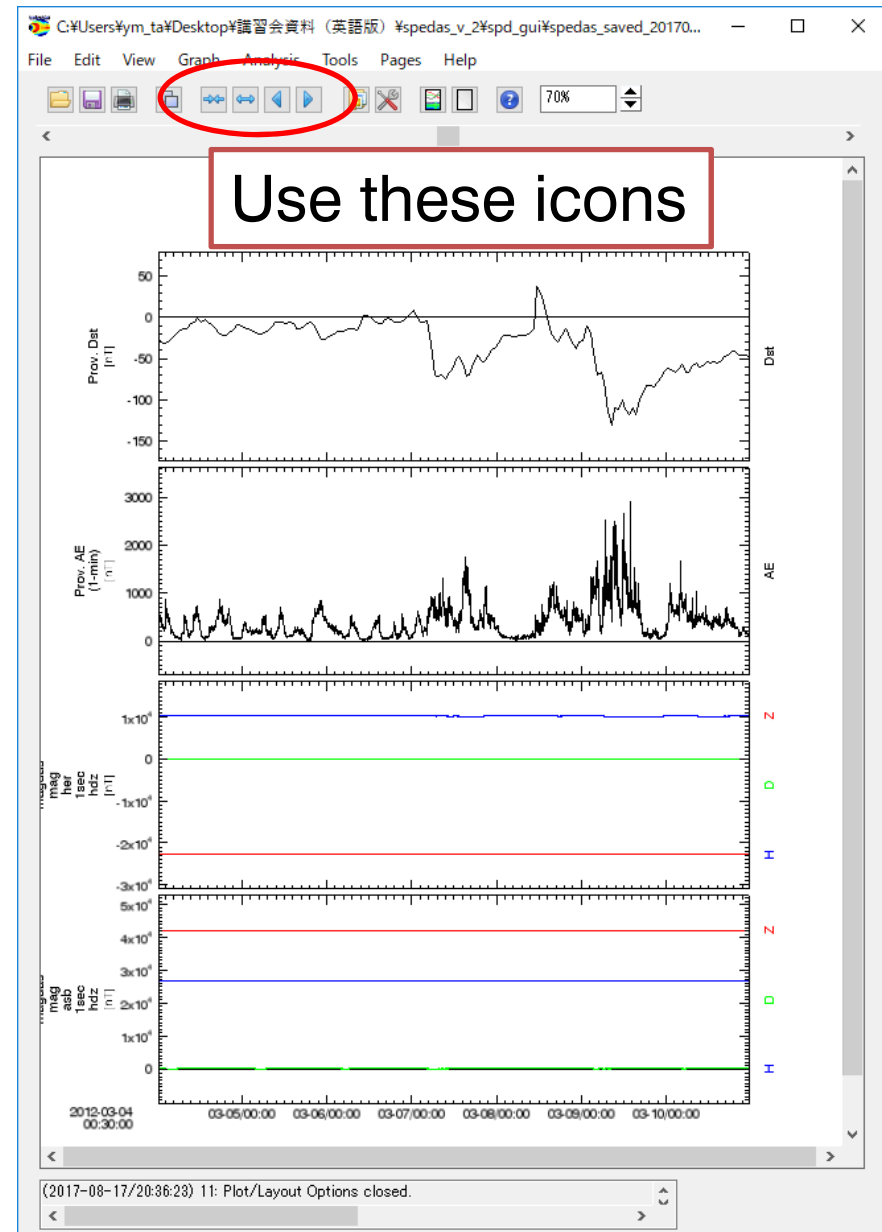
Expands X range
by major tick
marker



Shift left X range
by major tick
marker

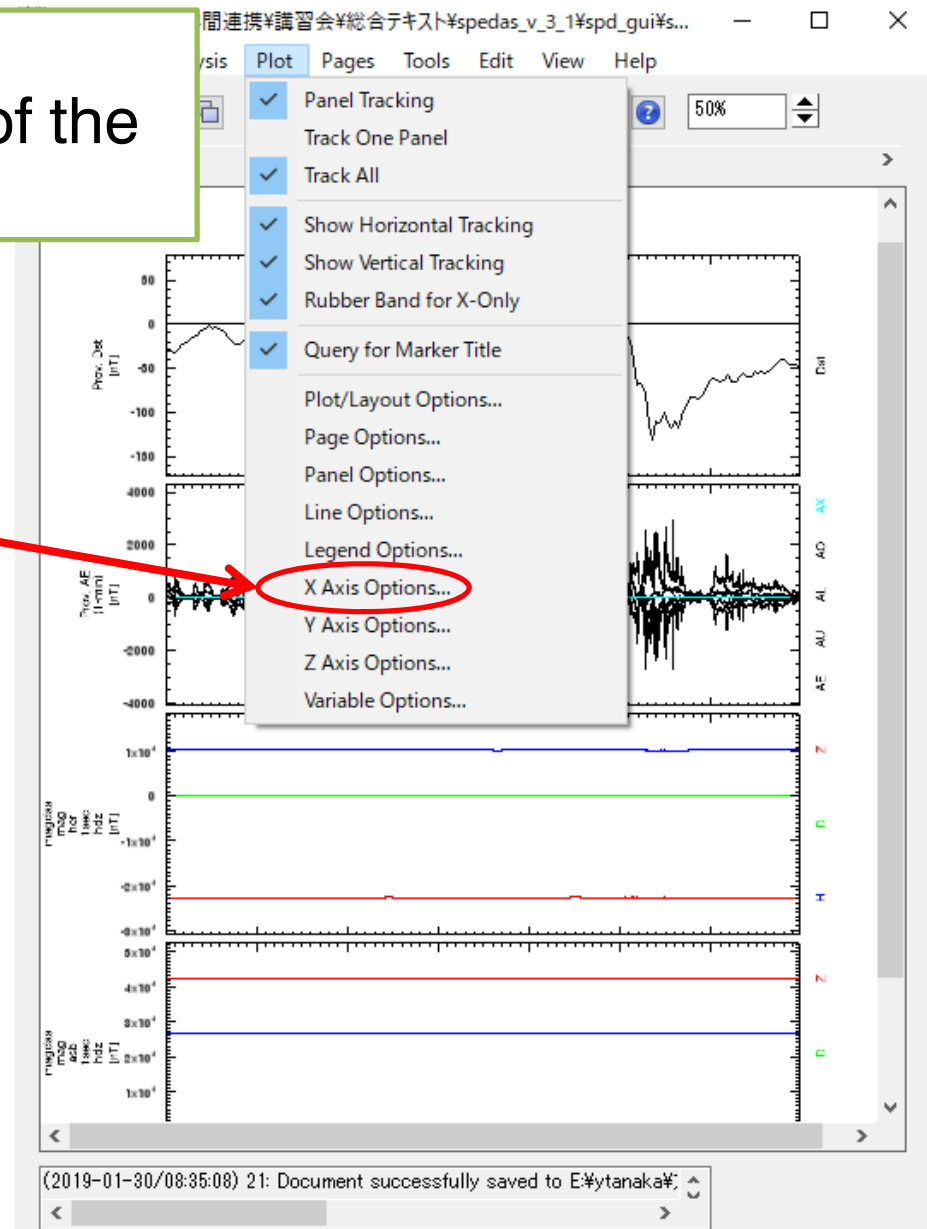


Shift right X range
by major tick
marker



Lesson:
Change X range (time scale) of the plot (2)

1. Select
Plot – X Axis Options

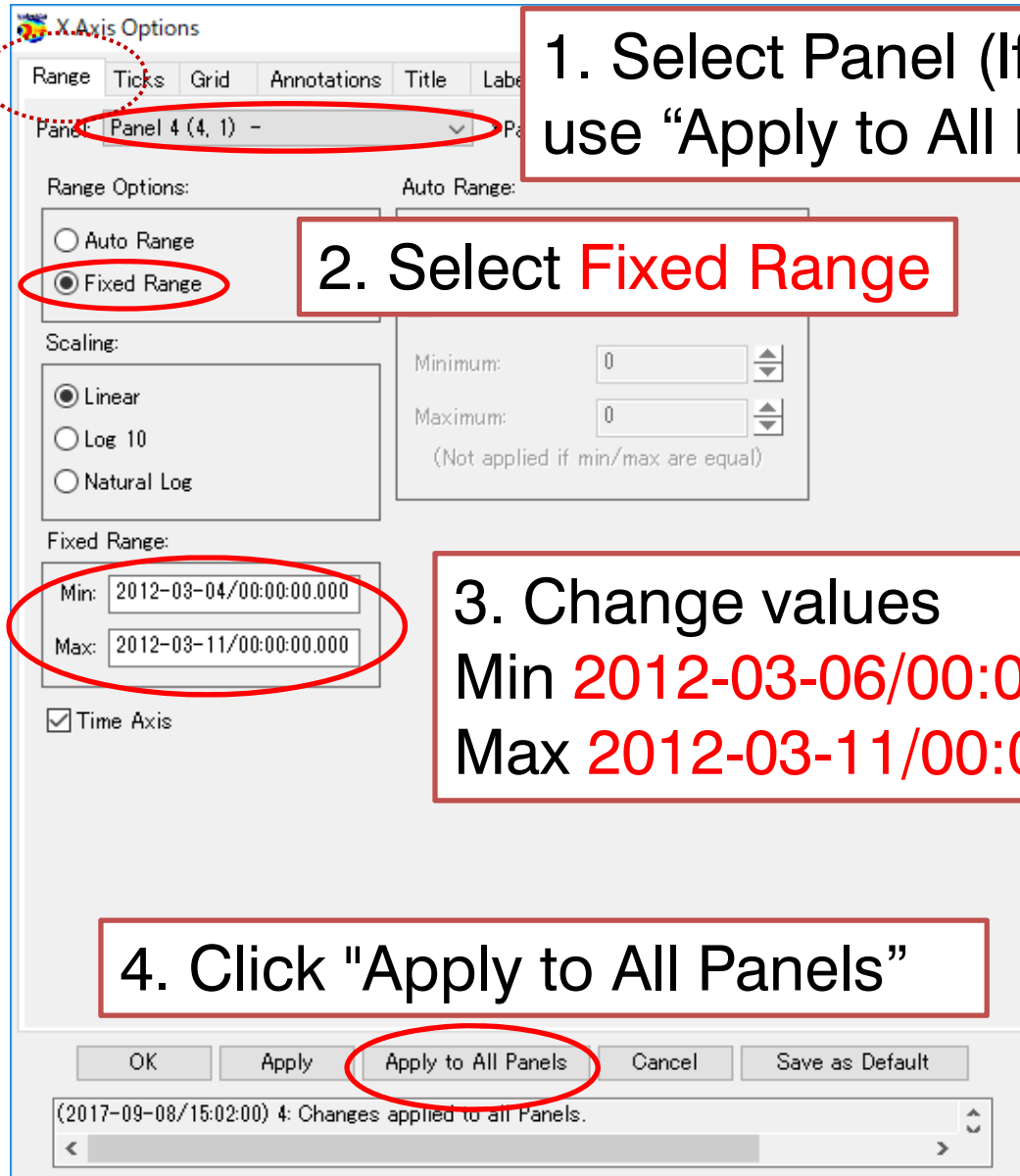


The screenshot shows the IUGONET software interface with the 'Plot' menu open. The menu items are:

- Panel Tracking
- Track One Panel
- Track All
- Show Horizontal Tracking
- Show Vertical Tracking
- Rubber Band for X-Only
- Query for Marker Title
- Plot/Layout Options...
- Page Options...
- Panel Options...
- Line Options...
- Legend Options...
- X Axis Options...** (circled in red)
- Y Axis Options...
- Z Axis Options...
- Variable Options...

The background shows several plots. The top plot is 'Proc. Det' (mV) vs time. The middle plot is 'Proc. AE' (mV) vs time. The bottom plot is 'magnitude' vs 'Hz' on a log scale. A red arrow points from the text box to the 'X Axis Options...' menu item.

At the bottom of the window, a status bar displays: (2019-01-30/08:35:08) 21: Document successfully saved to E:\ytanaka\...



1. Select Panel (If panel is locked, use "Apply to All Panels".)

2. Select **Fixed Range**

3. Change values

Min **2012-03-06/00:00:00.000**

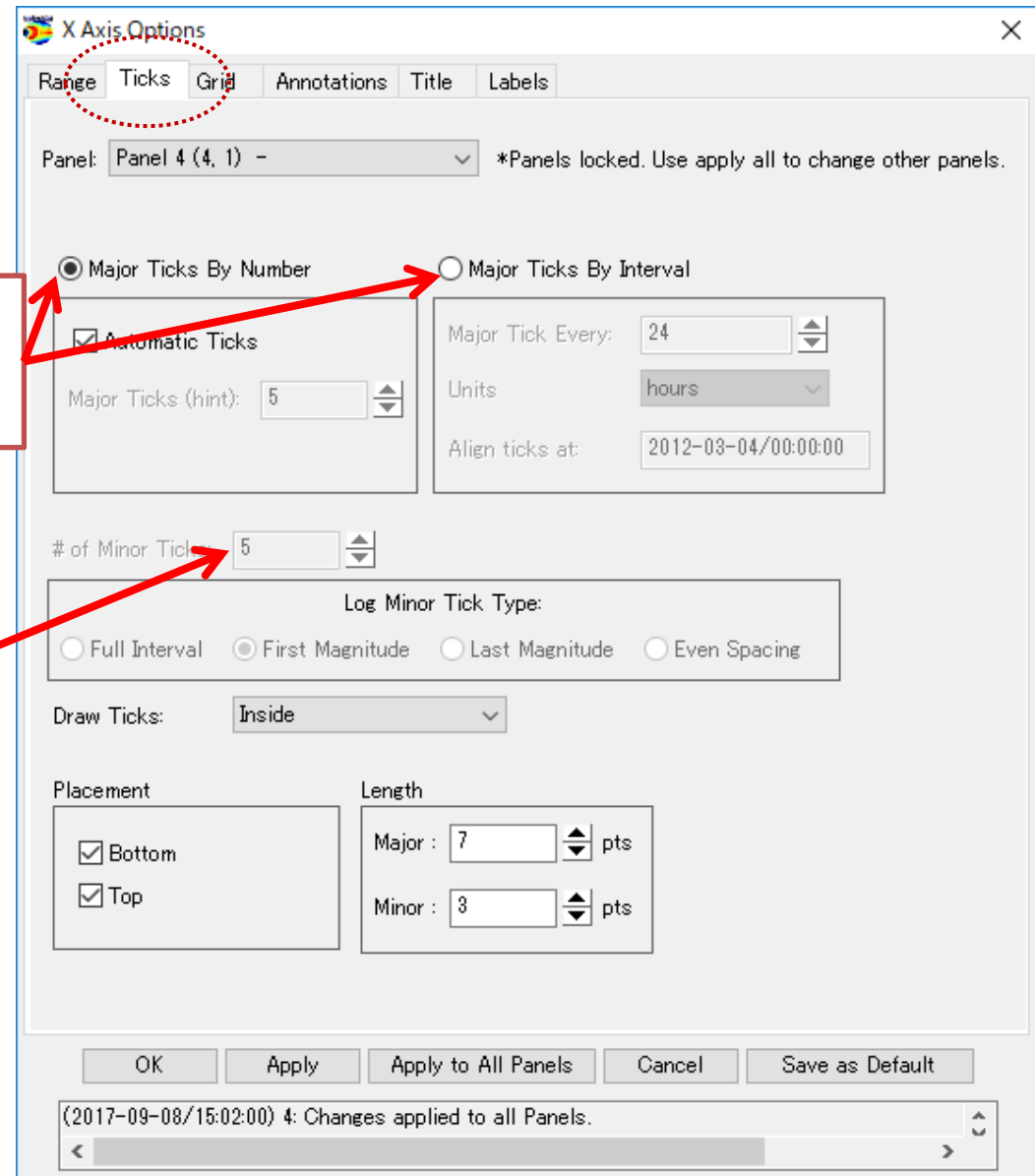
Max **2012-03-11/00:00:00.000**

4. Click "Apply to All Panels"

Lesson: Customize Ticks.

1. Select Major Ticks By Number or Interval.

2. Input the number into # (Number or Interval) of Minor Ticks

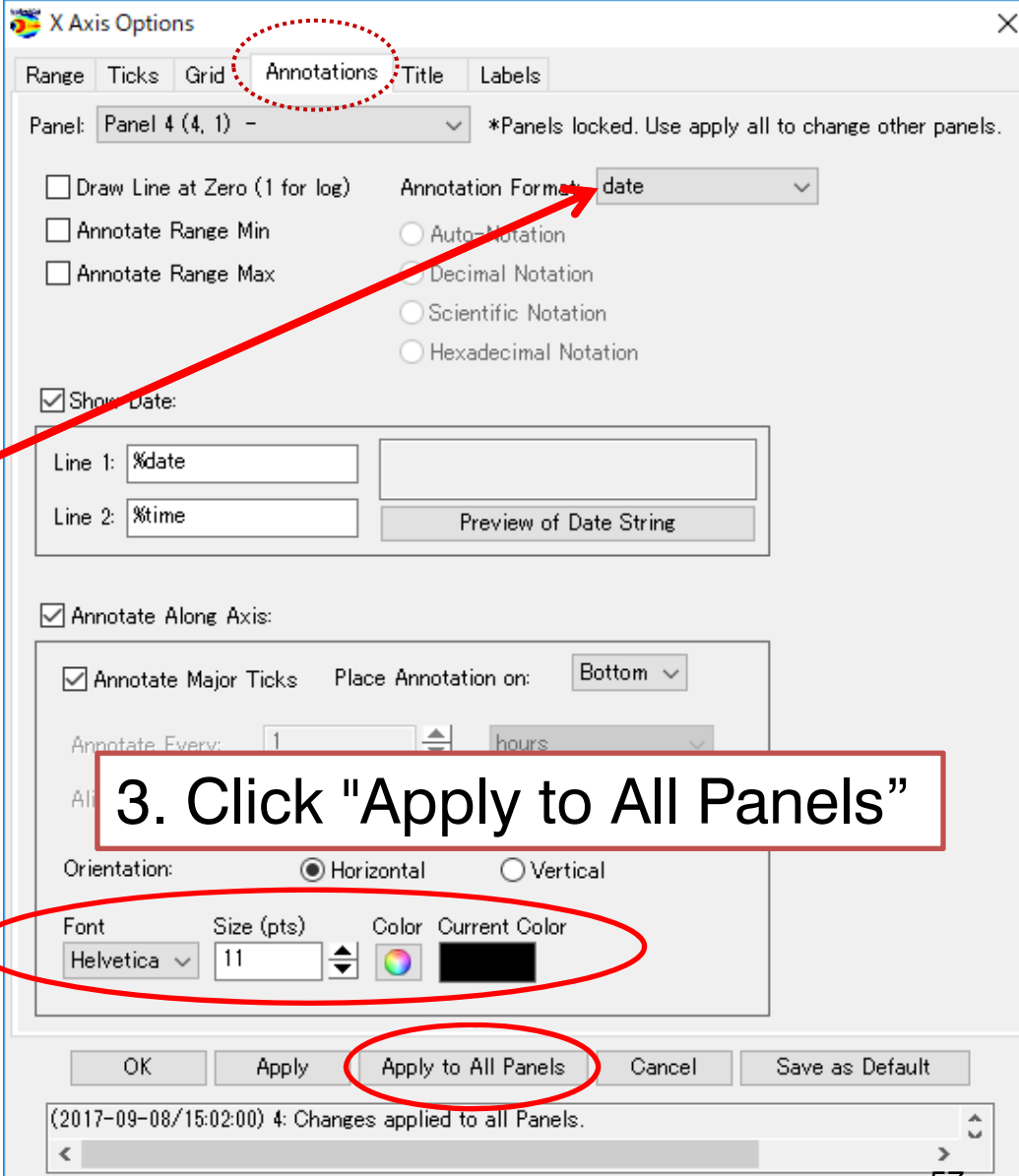


The screenshot shows the 'X Axis Options' dialog box with the 'Ticks' tab selected. The 'Range' tab is circled in red. The 'Panel' dropdown is set to 'Panel 4 (4, 1)'. The 'Major Ticks By Number' radio button is selected, and the 'Automatic Ticks' checkbox is checked. The 'Major Ticks (hint)' is set to 5. The 'Major Ticks By Interval' radio button is also visible. The '# of Minor Ticks' is set to 5. The 'Log Minor Tick Type' section has 'First Magnitude' selected. The 'Draw Ticks' dropdown is set to 'Inside'. The 'Placement' section has 'Bottom' and 'Top' checked. The 'Length' section has 'Major' set to 7 pts and 'Minor' set to 3 pts. The dialog box has buttons for 'OK', 'Apply', 'Apply to All Panels', 'Cancel', and 'Save as Default'. A status bar at the bottom shows '(2017-09-08/15:02:00) 4: Changes applied to all Panels.'

Lesson: Change Annotations

1. Select your favorite format in the pull-down menu of Annotation Format.

2. If you want to change the character font, size, and color, select your favorite format in the pull-down menu here.



The screenshot shows the 'X Axis Options' dialog box with the 'Annotations' tab selected. The 'Annotations' tab is circled in red. A red arrow points from the first instruction box to the 'Annotation Format' dropdown menu, which is currently set to 'date'. Another red arrow points from the second instruction box to the font settings section, which includes a font family dropdown (set to 'Helvetica'), a size spinner (set to '11'), and a color selection area. A third red arrow points from the third instruction box to the 'Apply to All Panels' button, which is also circled in red. The dialog box includes various options for drawing lines, annotating range min/max, showing dates, and annotating along the axis.

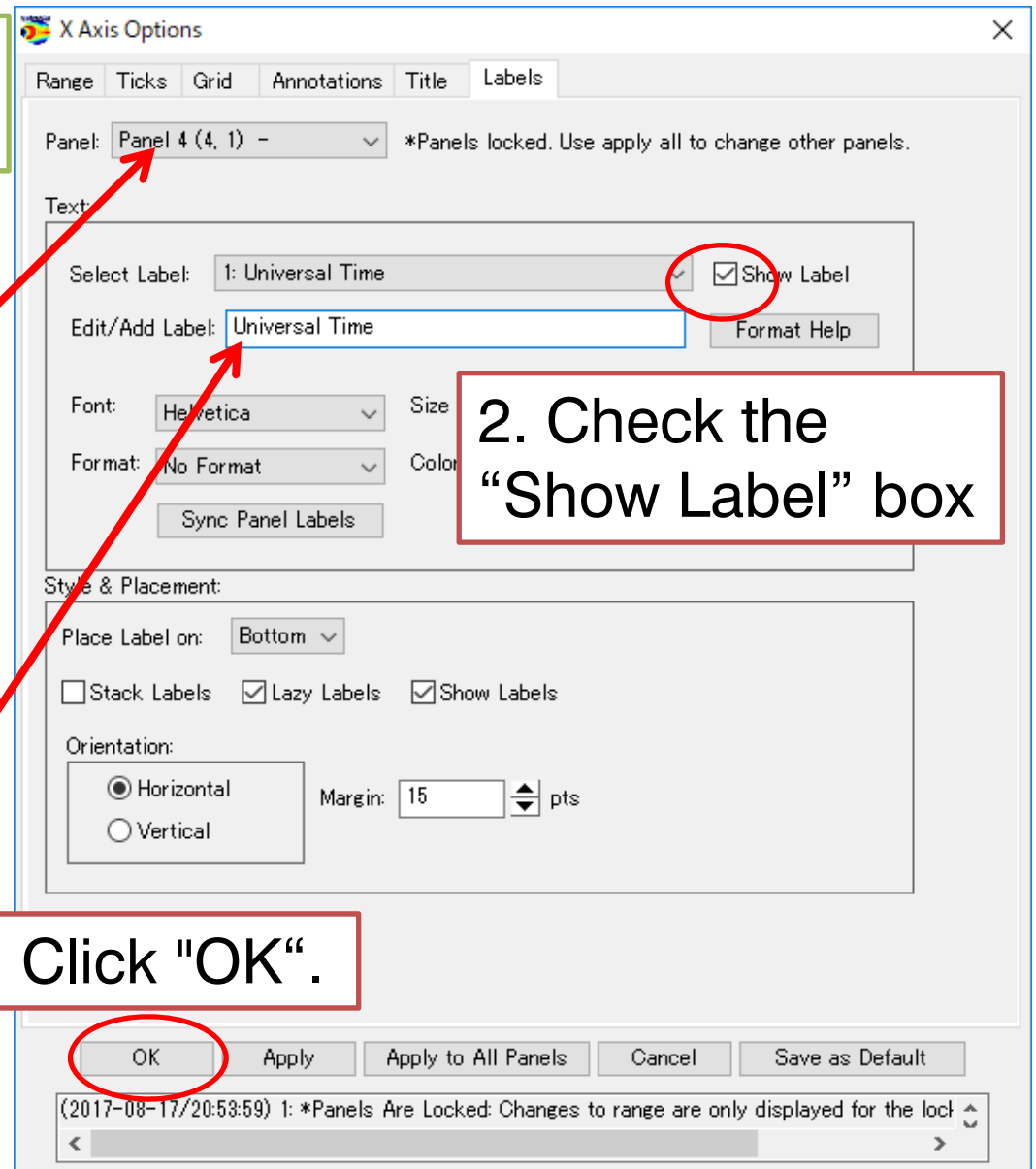
3. Click "Apply to All Panels"

Lesson: Customize Labels (of X axis)

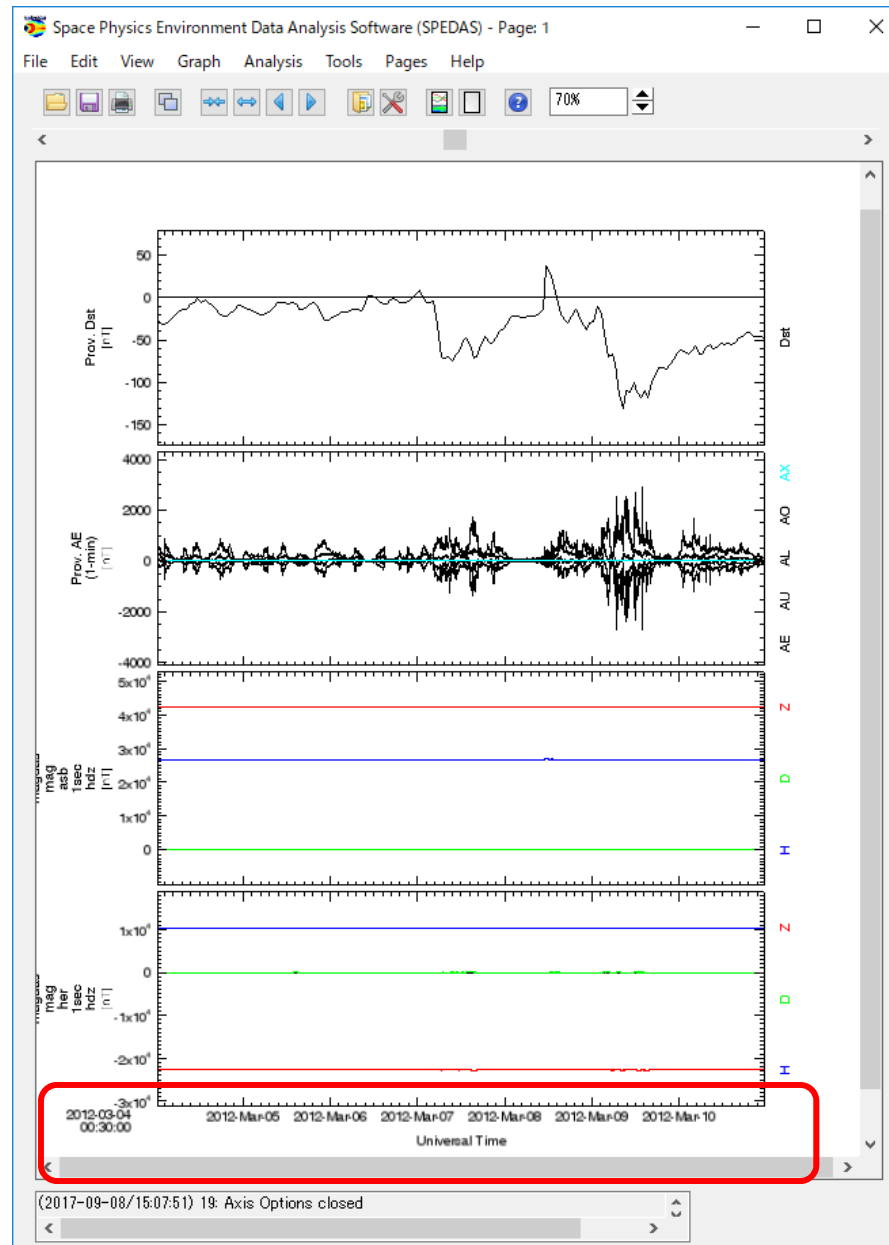
1. Select Panel 4
(bottom panel)

3. Type "Universal
Time " on the Edit/Add
Label

4. Click "OK".

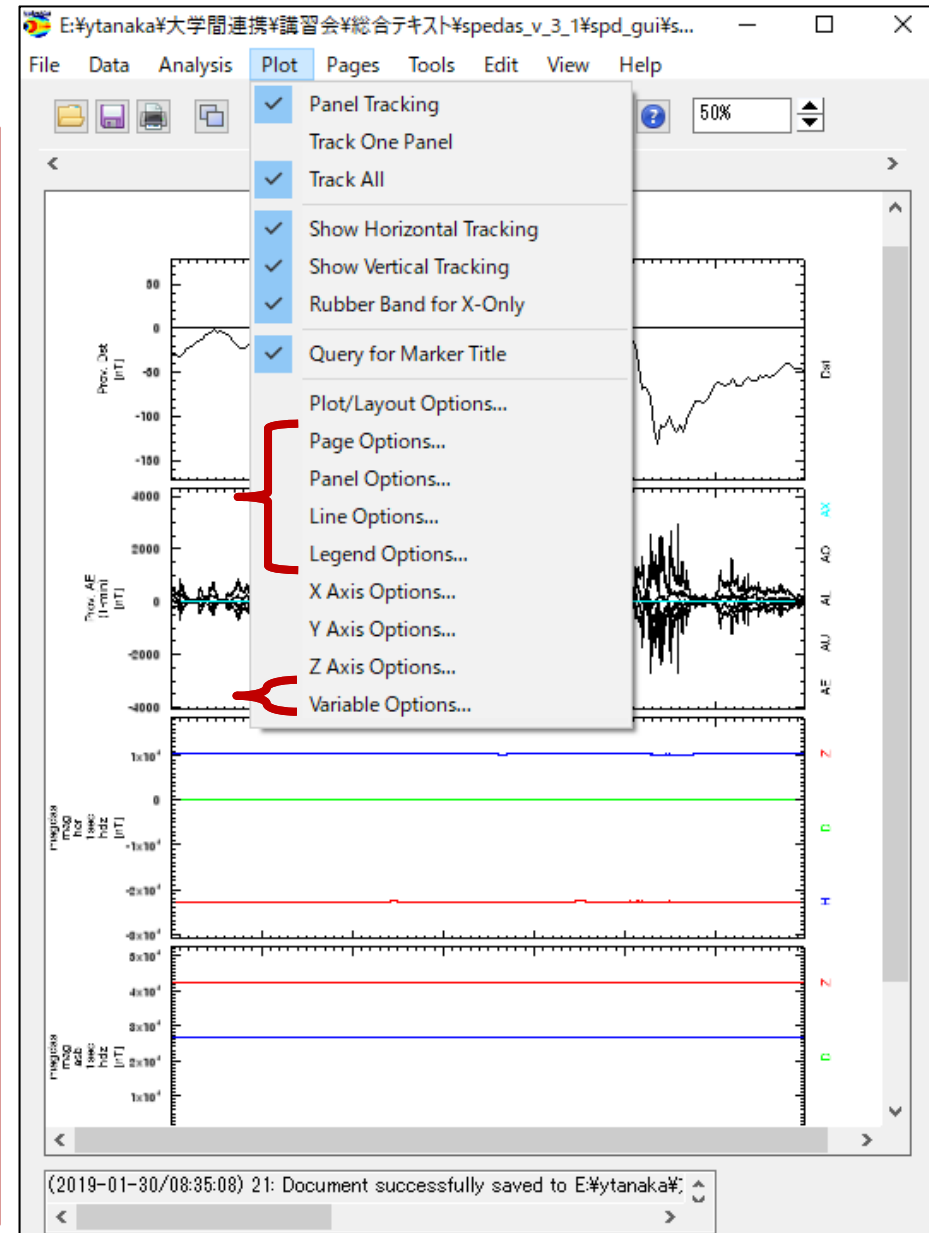


Result



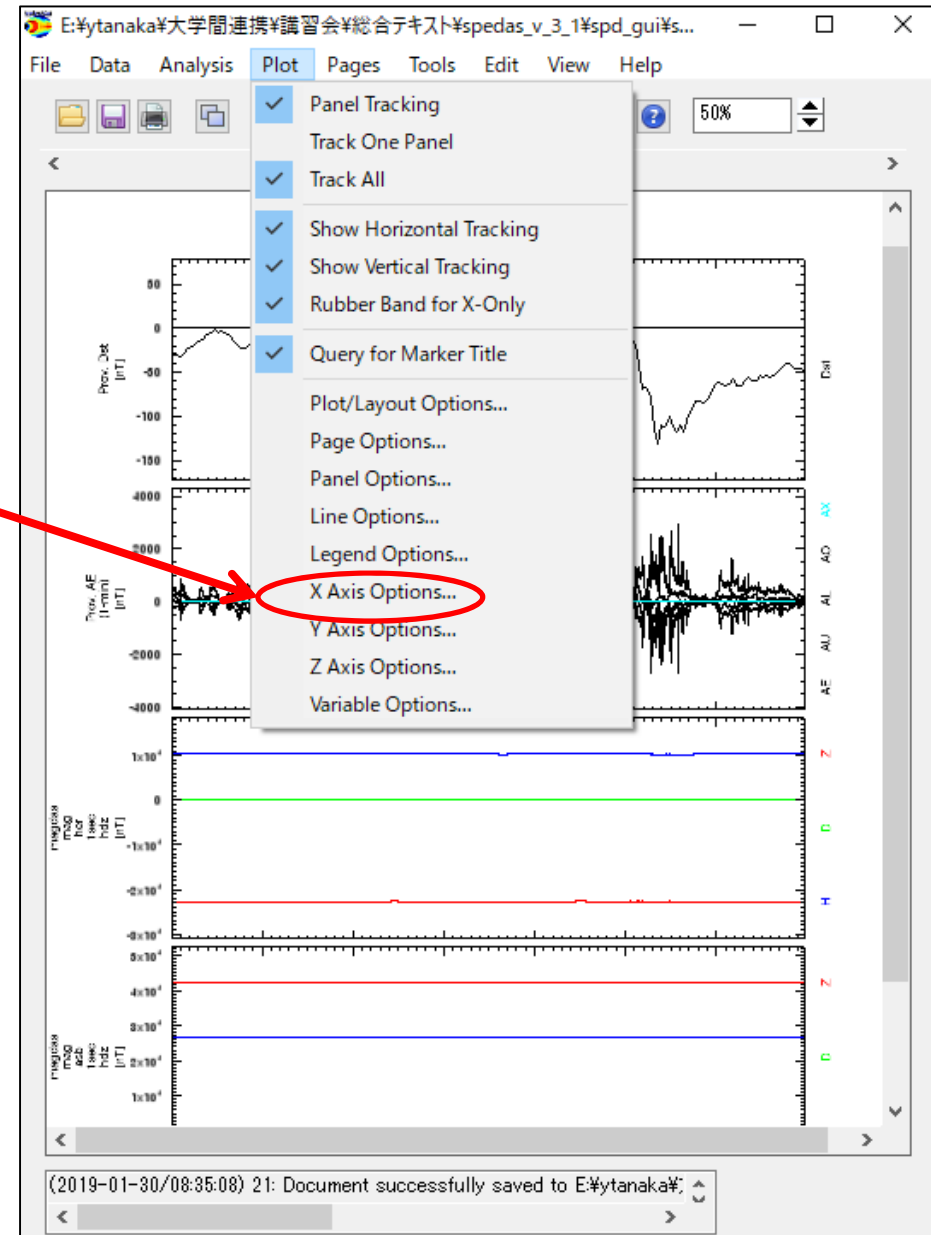
Other options.

- **Page Options...**
Customize the text and layout of the page.
- **Panel Options...**
Customize the title and color of each panel.
- **Line Options...**
Customize the line and symbol of each plot panel.
- **Legend Options...**
Customize the legend which appears when you put the mouse cursor on the plot.
- **Variable Options...**
Display the values of the selected parameters under the time label.



Lesson:
Reset X range (time scale)

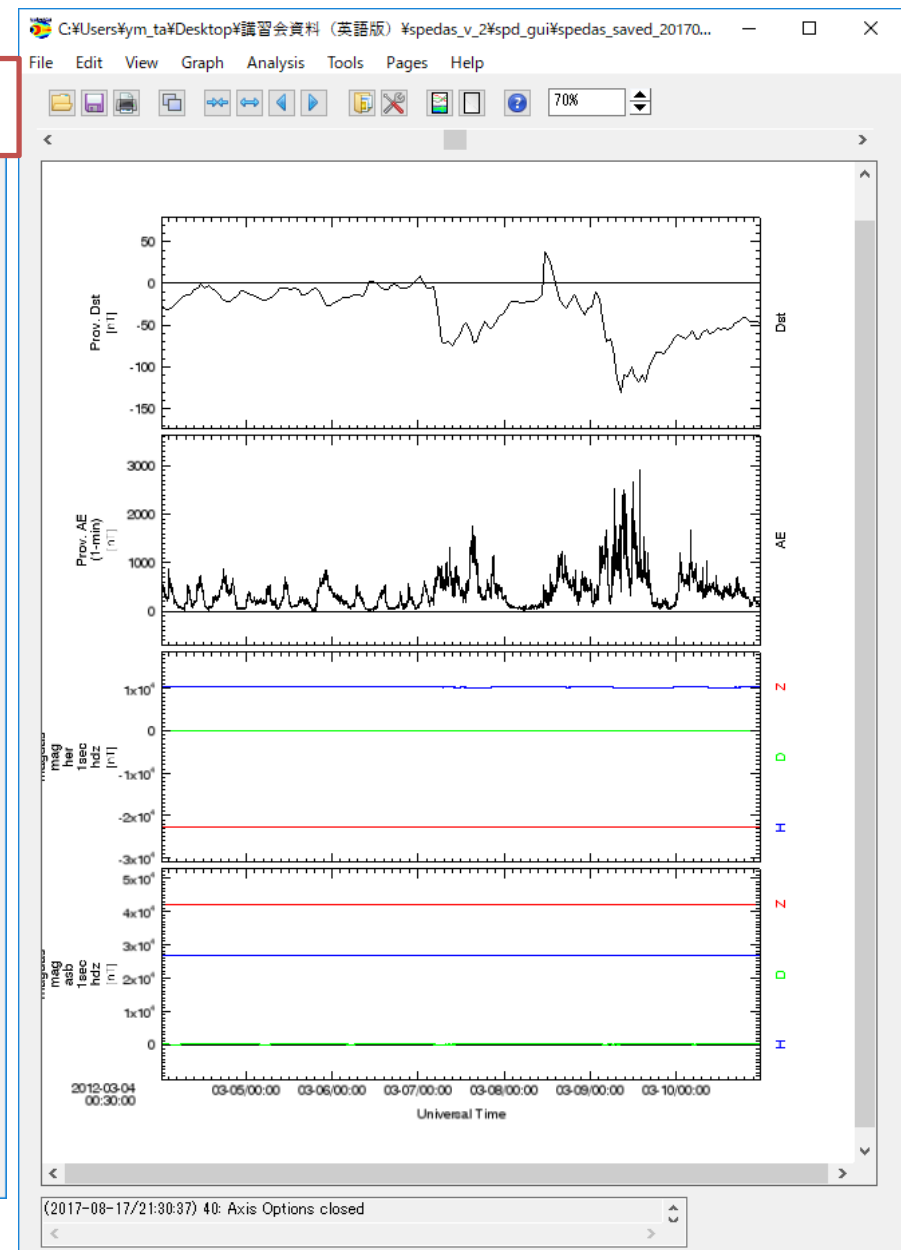
1. Select **X Axis Options**



1. Select (L) Panel 1 (1, 1) -

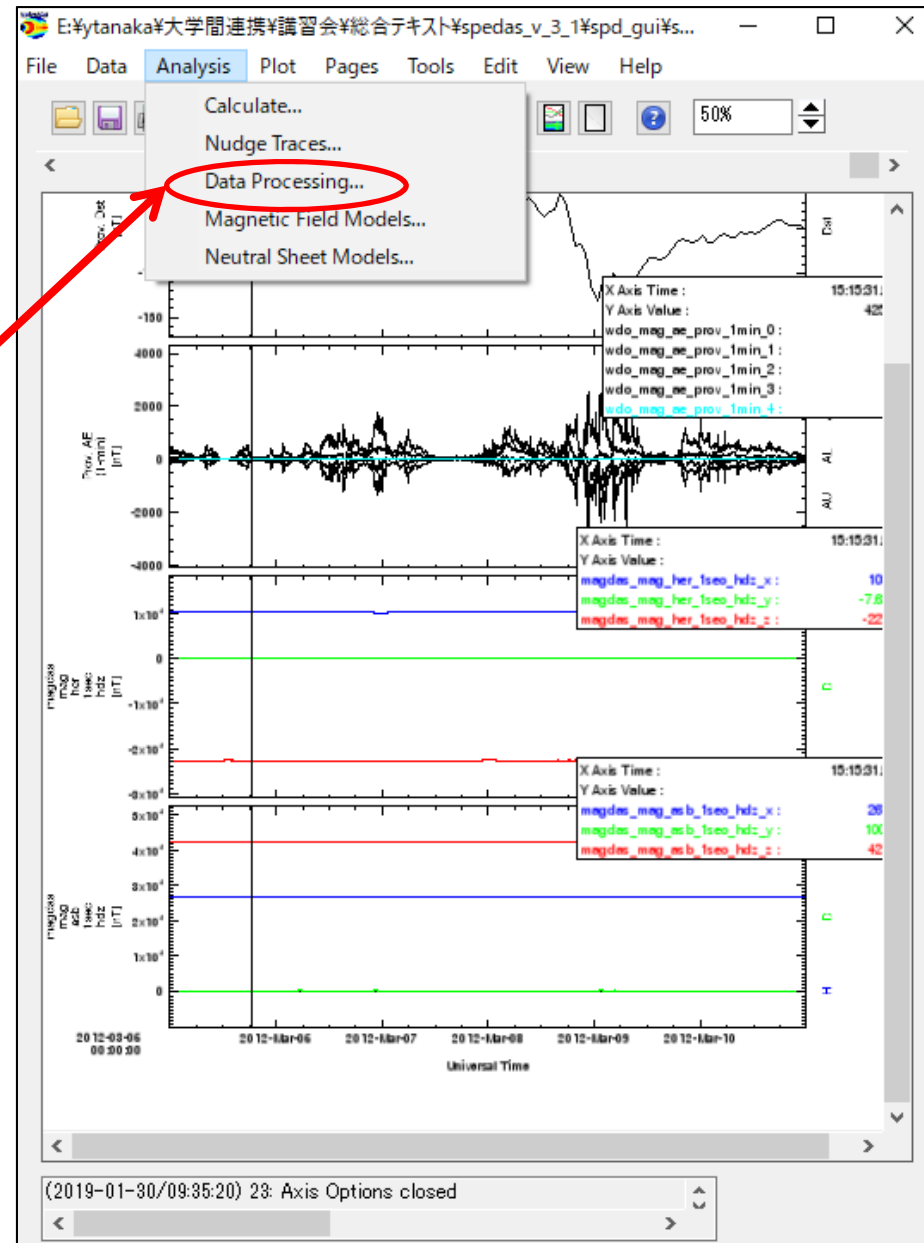
2. Select Auto Range

3. Click "OK"



Lesson:
Processing- subtract average

1. Select
Analysis – Data Processing



The screenshot shows the 'Data Processing' window with a tree view of 'Loaded Data' on the left and a list of 'Active Data' on the right. The 'Active Data' list contains two entries: 'magdas_mag_asb_1sec_hdz' and 'magdas_mag_her_1sec_hdz', both with a date range of '2012-03-04/00:00:00 to 201...'. A red box highlights the 'Active Data' list with the text '3. Active Data are added'. A red arrow points from the 'Active Data' list to the 'Subtract Average' button in the right-hand menu, which is also circled in red. A red box with the text '4. Click Subtract Average' is positioned above the arrow. Another red box with the text '2. Click right arrow' is positioned over the right arrow button in the 'Loaded Data' tree. A large red box at the bottom left contains the text '1. Select data you want to process' followed by 'magdas_mag_asb_1sec_hdz' and 'magdas_mag_her_1sec_hdz' in red. At the bottom of the window, a status bar shows '(2017-08-17/21:40:49) 13: Variables set to active: magdas_mag_asb_1sec_hdz,magdas_mag_her_1sec_hdz'.

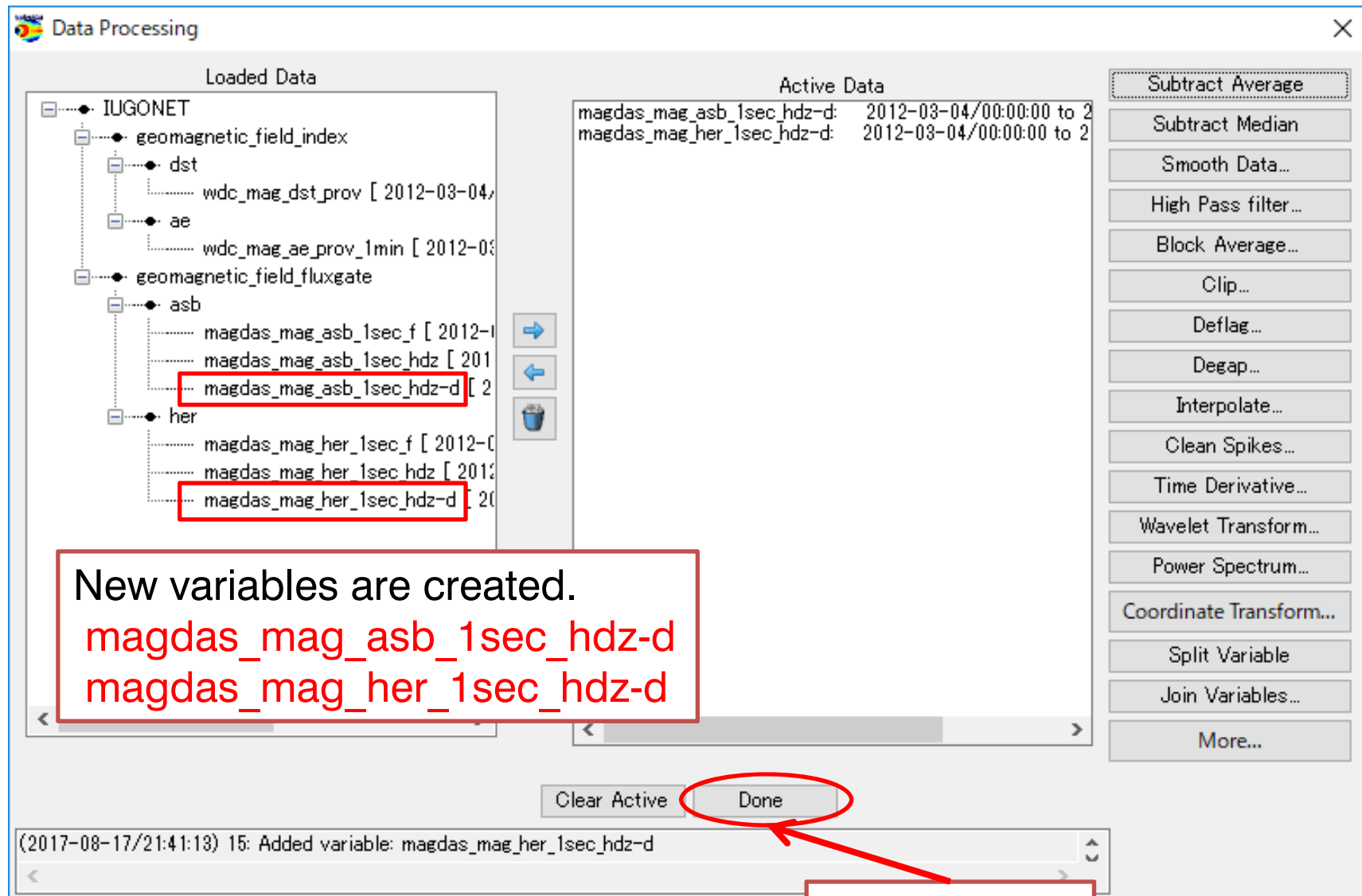
4. Click Subtract Average

3. Active Data are added

2. Click right arrow

1. Select data you want to process
magdas_mag_asb_1sec_hdz
magdas_mag_her_1sec_hdz

(2017-08-17/21:40:49) 13: Variables set to active: magdas_mag_asb_1sec_hdz,magdas_mag_her_1sec_hdz



The screenshot shows the IUGONET Data Processing GUI. On the left, a tree view under 'Loaded Data' shows a hierarchy: IUGONET > geomagnetic_field_index > dst > wdc_mag_dst_prov [2012-03-04, ...] > ae > wdc_mag_ae_prov_1min [2012-03-04, ...] > geomagnetic_field_fluxgate > asb > magdas_mag_asb_1sec_f [2012-03-04, ...], magdas_mag_asb_1sec_hdz [2012-03-04, ...], magdas_mag_asb_1sec_hdz-d [2012-03-04, ...], and her > magdas_mag_her_1sec_f [2012-03-04, ...], magdas_mag_her_1sec_hdz [2012-03-04, ...], and magdas_mag_her_1sec_hdz-d [2012-03-04, ...]. The 'asb' and 'her' folders are expanded. The 'magdas_mag_asb_1sec_hdz-d' and 'magdas_mag_her_1sec_hdz-d' variables are highlighted with red boxes. In the center, the 'Active Data' panel lists 'magdas_mag_asb_1sec_hdz-d: 2012-03-04/00:00:00 to 2012-03-04/00:00:00' and 'magdas_mag_her_1sec_hdz-d: 2012-03-04/00:00:00 to 2012-03-04/00:00:00'. On the right, a vertical toolbar contains buttons for 'Subtract Average', 'Subtract Median', 'Smooth Data...', 'High Pass filter...', 'Block Average...', 'Clip...', 'Deflag...', 'Degap...', 'Interpolate...', 'Clean Spikes...', 'Time Derivative...', 'Wavelet Transform...', 'Power Spectrum...', 'Coordinate Transform...', 'Split Variable', 'Join Variables...', and 'More...'. At the bottom, there are 'Clear Active' and 'Done' buttons. A red circle highlights the 'Done' button, with a red arrow pointing to it from a text box below. A status bar at the bottom left shows the message: '(2017-08-17/21:41:13) 15: Added variable: magdas_mag_her_1sec_hdz-d'.

New variables are created.

magdas_mag_asb_1sec_hdz-d
magdas_mag_her_1sec_hdz-d

1. Click Done

Open "Plot/Layout Options"

Show Data Components Automatic Panels

Dependent Variable

- IUGONET
 - geomagnetic_field_index
 - dst
 - wdc_mag_dst_prov [2012-03-04/00:30:00 to 2012-03-04/00:30:00]
 - ae
 - wdc_mag_ae_prov_1min [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - geomagnetic_field_fluxgate
 - asb
 - magdas_mag_asb_1sec_f [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - magdas_mag_asb_1sec_hdz [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - magdas_mag_asb_1sec_hdz-d [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - her
 - magdas_mag_her_1sec_f [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - magdas_mag_her_1sec_hdz [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - magdas_mag_her_1sec_hdz-d [2012-03-04/00:00:00 to 2012-03-04/00:00:00]

Line -> Spec ->

1. Remove Panel 3 and 4

2. Select magdas_mag_her_1sec_hdz-d

3. Click line

4. Data are added

5. Then, add the other variable, magdas_mag_asb_1sec_hdz-d to panel in the same way.

6. Click OK

Panel 1 (1, 1) -
- wdc_mag_dst_prov_time -vs- wdc_mag_dst_prov_data
Panel 2 (2, 1) -
- wdc_mag_ae_prov_1min_time -vs- wdc_mag_ae_prov_1min_0
Panel 3 (3, 1) -
- magdas_mag_her_1sec_hdz-d time -vs- magdas_mag_her_1sec_hdz-d
- magdas_mag_her_1sec_hdz-d time -vs- magdas_mag_her_1sec_hdz-d
- magdas_mag_her_1sec_hdz-d time -vs- magdas_mag_her_1sec_hdz-d

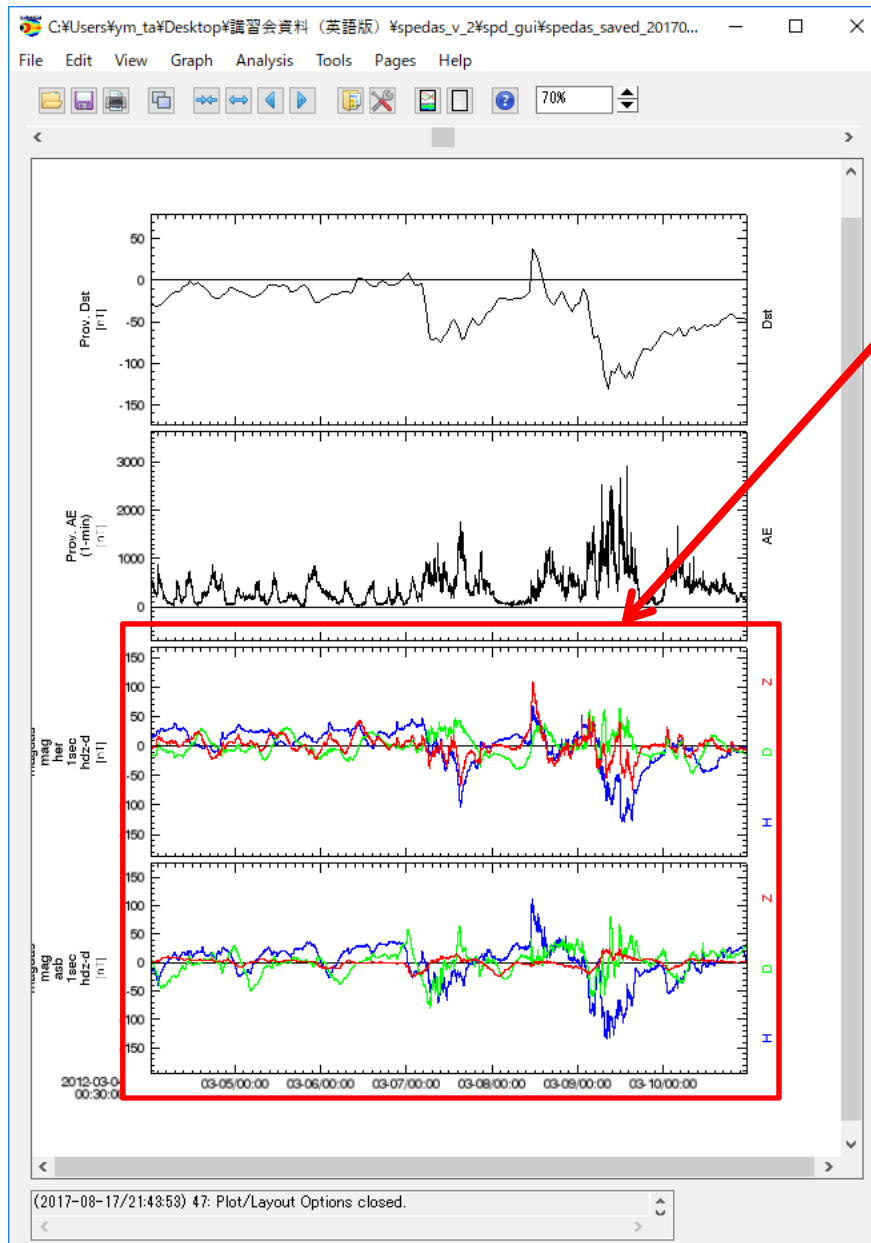
Remove

Row: 3
Column: 1
Row Span: 1

Lock To Panel
Unlock Panels

OK Apply Cancel

(2017-08-17/21:51:14) 5: Add Finished.

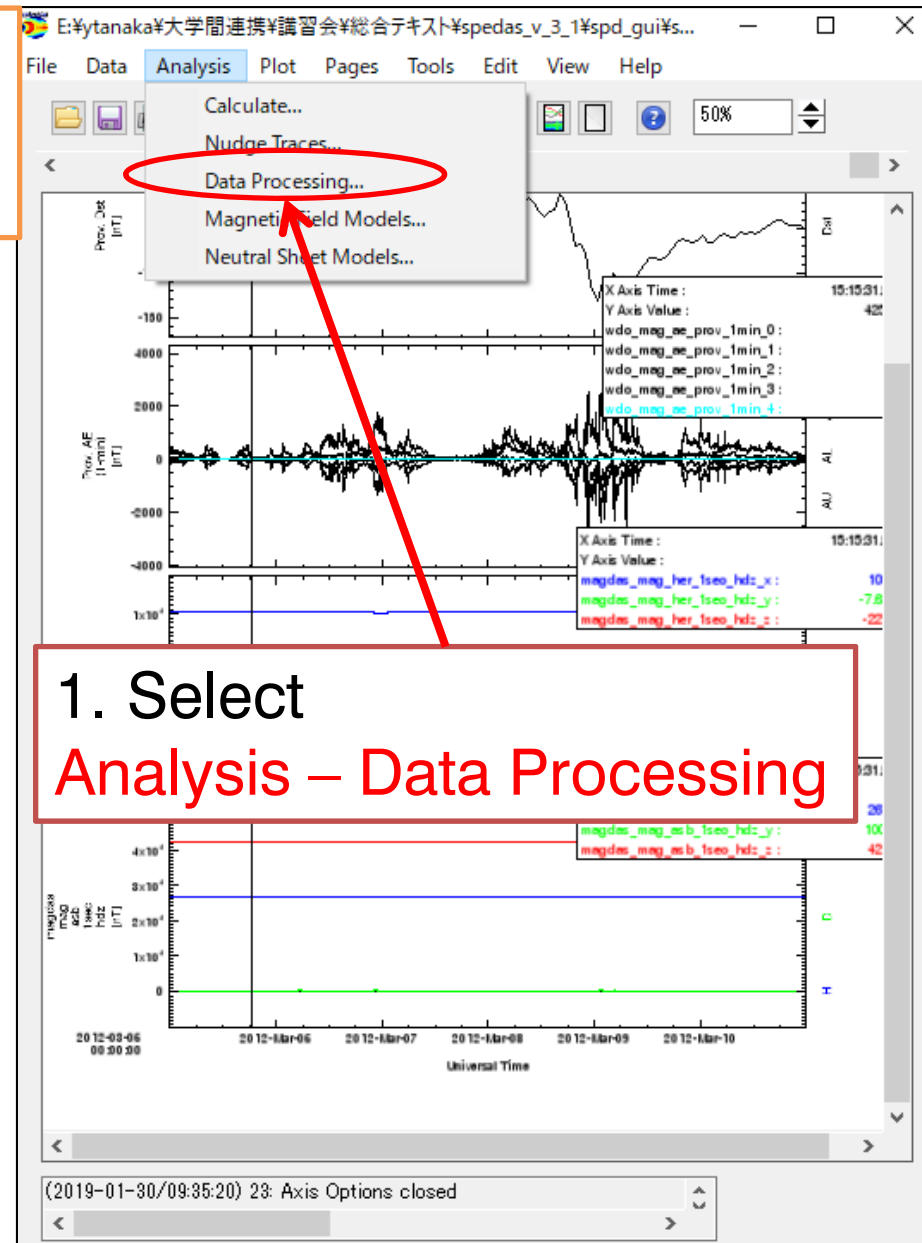


Subtracted average!

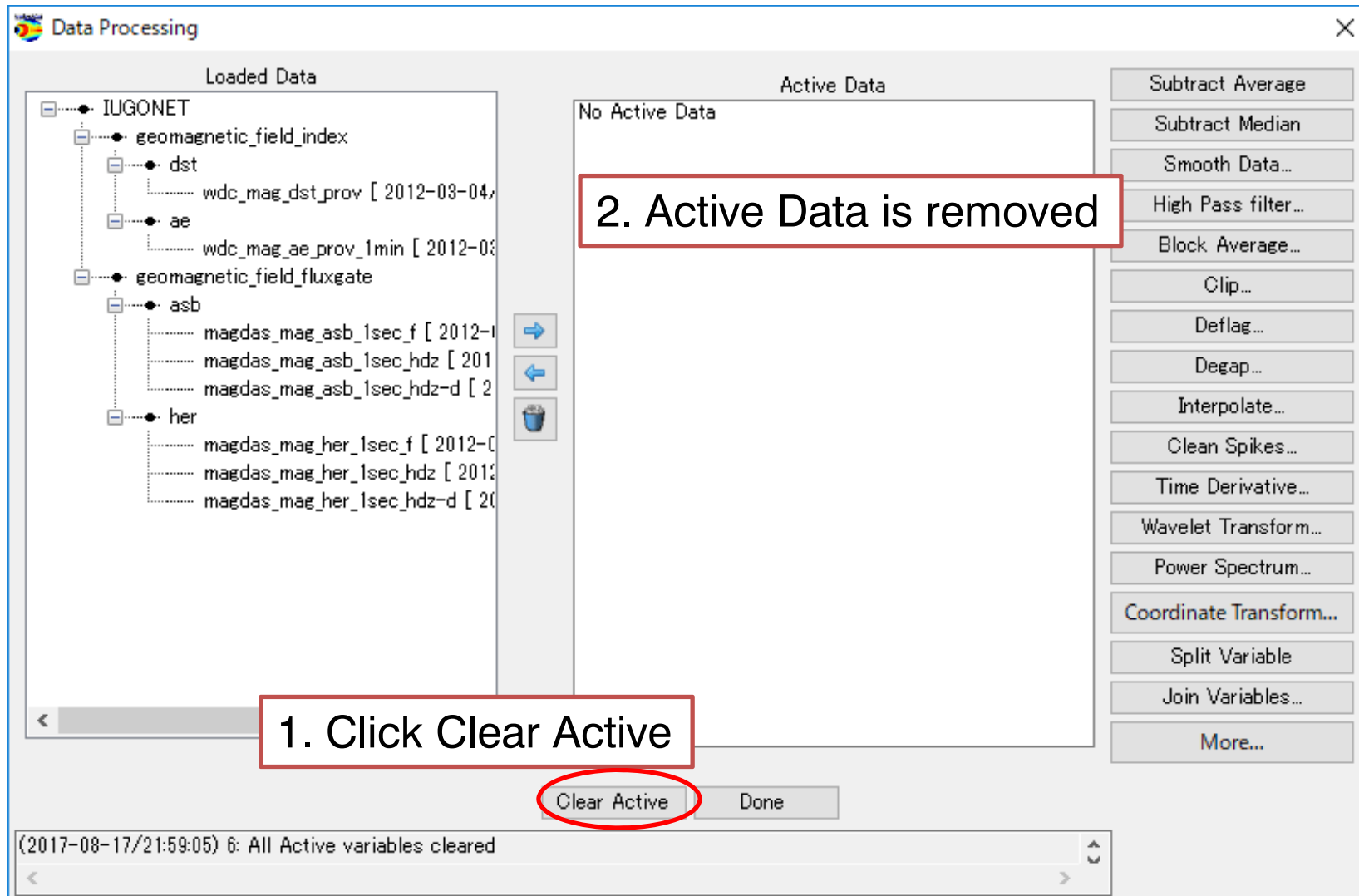
Try:
Plot Power Spectrum of
`magdas_mag_her_1sec_hdz_x`

Hint1: Use “**Data Processing**”
for calculating (if you will get
an option dialog, use default
value)

Hint2: Use “**Spec**” for plotting



1. Select
Analysis – Data Processing



The screenshot shows the IUGONET Data Processing GUI. The interface is divided into several sections:

- Loaded Data:** A tree view on the left showing the data structure under the 'IUGONET' root. It includes categories like 'geomagnetic_field_index', 'dst', 'ae', 'geomagnetic_field_fluxgate', 'asb', and 'her', each with associated data files and time ranges.
- Active Data:** A central panel currently displaying 'No Active Data'. A red box highlights this area with the text '2. Active Data is removed'.
- Buttons:** A vertical column of buttons is located between the 'Loaded Data' and 'Active Data' panels, including 'Clear Active' (circled in red), 'Done', and several data processing options like 'Subtract Average', 'Smooth Data...', etc.
- Status Bar:** At the bottom, a status bar shows the message '(2017-08-17/21:59:05) 6: All Active variables cleared'. A red box highlights the 'Clear Active' button with the text '1. Click Clear Active'.

The screenshot shows the IUGONET Data Processing GUI. The 'Loaded Data' tree on the left contains a folder named 'IUGONET' with sub-items: 'geomagnetic_field_index', 'dst', 'ae', 'geomag', 'asb', and 'her'. The 'Active Data' window shows 'magdas_mag_her_1sec_hdz: 2012-03-04/00:00:00 to 201'. A 'Power Spectra Options' dialog box is open, showing settings for 'Dynamic' (checked), 'Suffix: _dpwrspc', 'Window Size: 256', 'Window Shift: 128', 'Start Time: 2007-03-23/00:00:00', 'Stop Time: 2007-03-24/00:00:00', 'Bins: 3', and 'Remove NaNs From Input?' (checked). The 'Power Spectrum...' button in the main GUI is circled in red, and the 'OK' button in the dialog is also circled in red. A status bar at the bottom shows '(2017-08-17/21:59:58) 9: Power Spectrum operation canceled'.

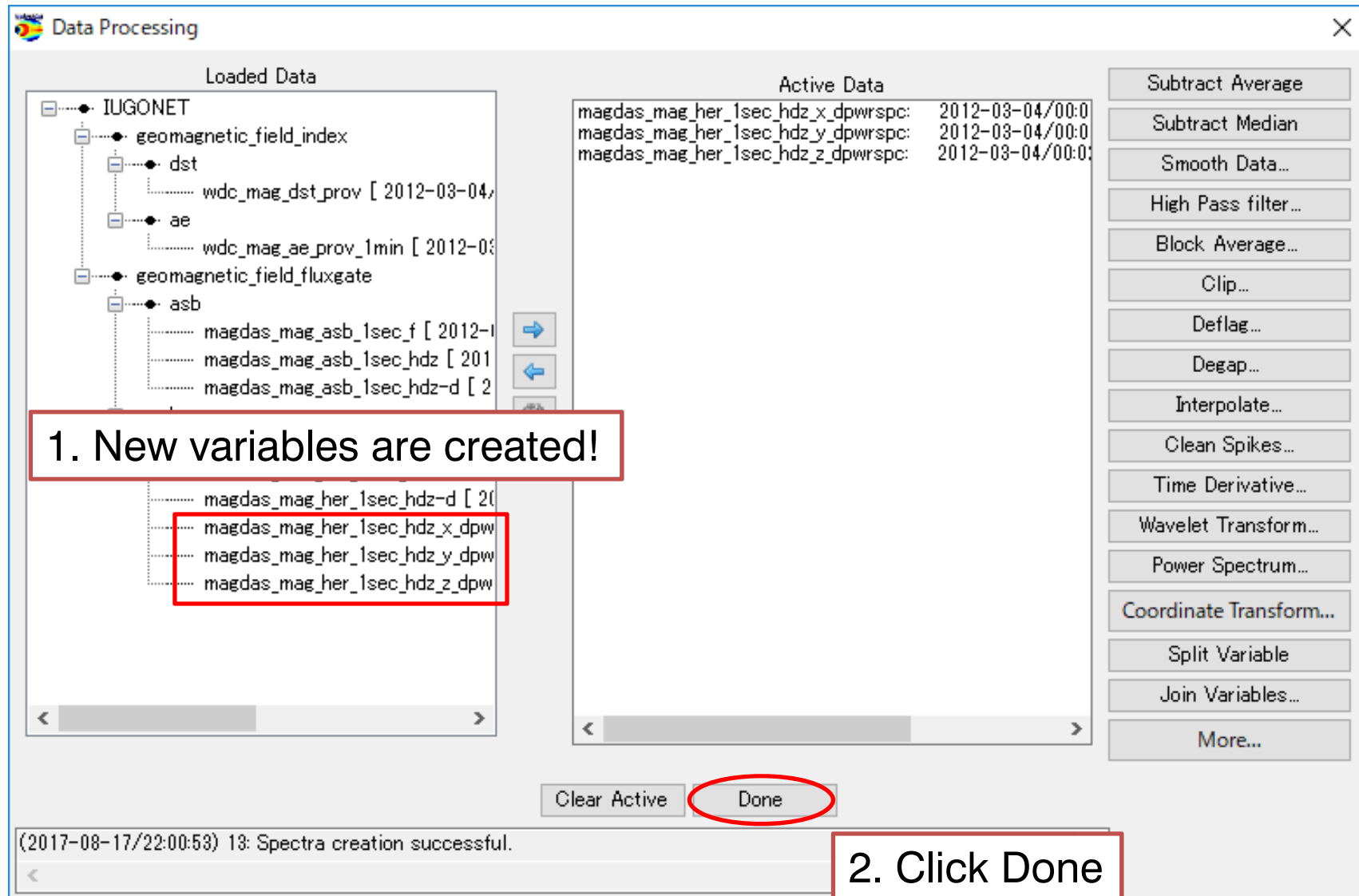
1. Select data
magdas_mag_her_1sec_hdz

2. Click right arrow

3. Active Data are added

4. Click Power Spectrum

5. Click OK



The screenshot shows the IUGONET Data Processing GUI. On the left, a tree view under 'Loaded Data' shows a hierarchy: IUGONET > geomagnetic_field_index > dst > wdc_mag_dst_prov [2012-03-04, ...] > ae > wdc_mag_ae_prov_1min [2012-03-04, ...] > geomagnetic_field_fluxgate > asb > magdas_mag_asb_1sec_f [2012-03-04, ...], magdas_mag_asb_1sec_hdz [2012-03-04, ...], and magdas_mag_asb_1sec_hdz-d [2012-03-04, ...]. A red box highlights the text '1. New variables are created!' and another red box highlights the newly created variables: magdas_mag_her_1sec_hdz-d [2012-03-04, ...], magdas_mag_her_1sec_hdz_x_dpwrspc [2012-03-04, ...], magdas_mag_her_1sec_hdz_y_dpwrspc [2012-03-04, ...], and magdas_mag_her_1sec_hdz_z_dpwrspc [2012-03-04, ...]. On the right, the 'Active Data' panel lists these three variables. A 'Done' button is circled in red. A vertical toolbar on the right contains buttons for 'Subtract Average', 'Subtract Median', 'Smooth Data...', 'High Pass filter...', 'Block Average...', 'Clip...', 'Deflag...', 'Degap...', 'Interpolate...', 'Clean Spikes...', 'Time Derivative...', 'Wavelet Transform...', 'Power Spectrum...', 'Coordinate Transform...', 'Split Variable', 'Join Variables...', and 'More...'. At the bottom, a 'Clear Active' button and a 'Done' button are visible. A status bar at the bottom left shows '(2017-08-17/22:00:53) 13: Spectra creation successful.'

1. New variables are created!

2. Click Done

Open "Plot/Layout Options"

1. Select
magdas_mag_her_1sec_hdz_x_dpwrspc

2. Click Spec

3. Data are added

4. Click OK

Dependent Variable

- IUGONET
 - geomagnetic_field_index
 - dst
 - wdc_mag_dst_prov [2012-03-04/00:30:00 to 2012-03-04/00:30:00]
 - ae
 - wdc_mag_ae_prov_1min [2012-03-04/00:00:30 to 2012-03-04/00:00:30]
 - geomagnetic_field_fluxgate
 - asb
 - magdas_mag_asb_1sec_f [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - magdas_mag_asb_1sec_hdz [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - magdas_mag_asb_1sec_hdz-d [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - her
 - magdas_mag_her_1sec_f [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - magdas_mag_her_1sec_hdz [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - magdas_mag_her_1sec_hdz-d [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - magdas_mag_her_1sec_hdz_x_dpwrspc [2012-03-04/00:00:00 to 2012-03-04/00:00:00]**
 - magdas_mag_her_1sec_hdz_y_dpwrspc [2012-03-04/00:00:00 to 2012-03-04/00:00:00]
 - magdas_mag_her_1sec_hdz_z_dpwrspc [2012-03-04/00:00:00 to 2012-03-04/00:00:00]

- CREATE PLOTS -

Spec ->

Panel 1 (1, 1) -
- wdc_mag_dst_prov_time -vs- wdc_mag_dst_prov_data

Panel 2 (2, 1) -
- wdc_mag_ae_prov_1min_time -vs- wdc_mag_ae_prov_1min_0

Panel 3 (3, 1) -
- magdas_mag_her_1sec_hdz-d time -vs- magdas_mag_her_1sec_hdz-d

Panel 4 (4, 1) -
- magdas_mag_asb_1sec_hdz-d time -vs- magdas_mag_asb_1sec_hdz-d

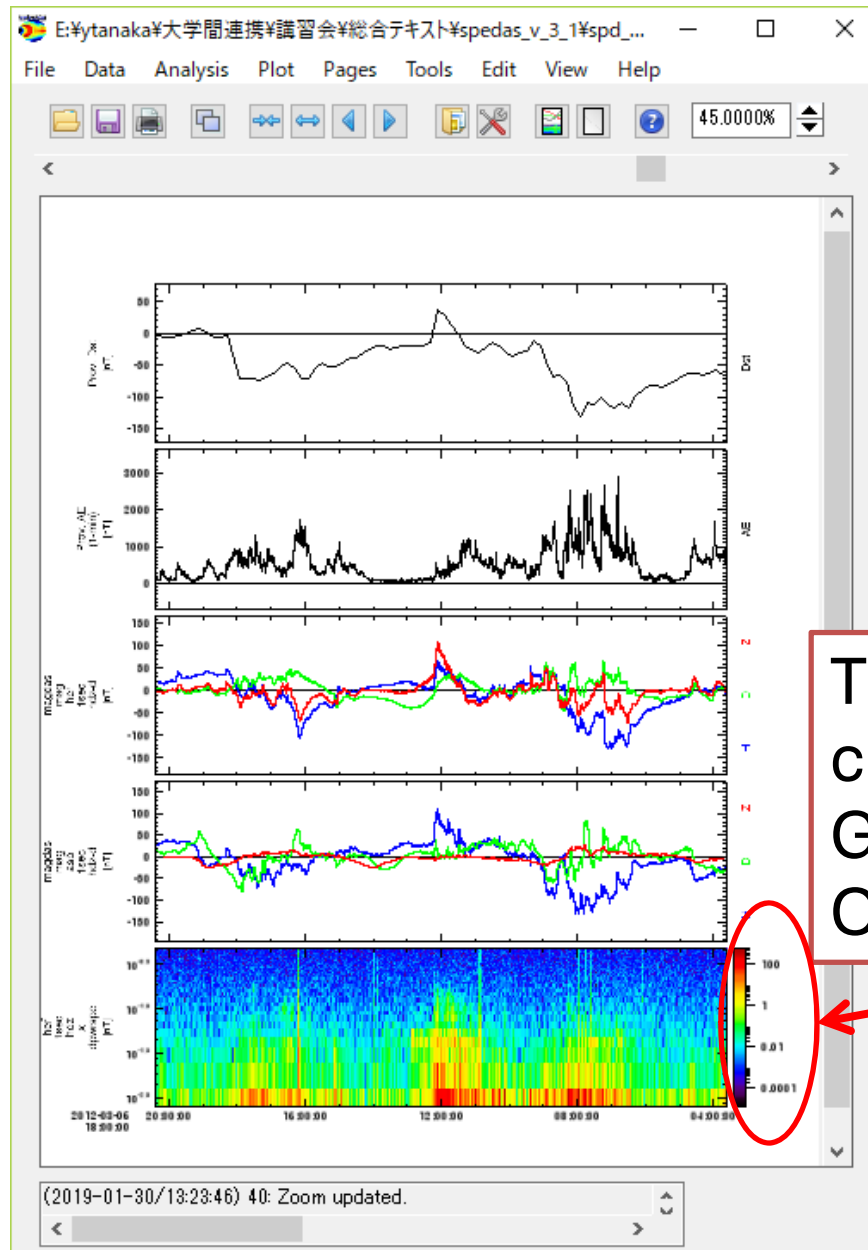
Panel 5 (5, 1) -
- **magdas_mag_her_1sec_hdz_x_dpwrspc time -vs- magdas_mag_her_1sec_hdz-d**

Variables:
Add/Edit

OK Apply Cancel

(2017-08-17/22:01:31) 3: Add Finished.

Result

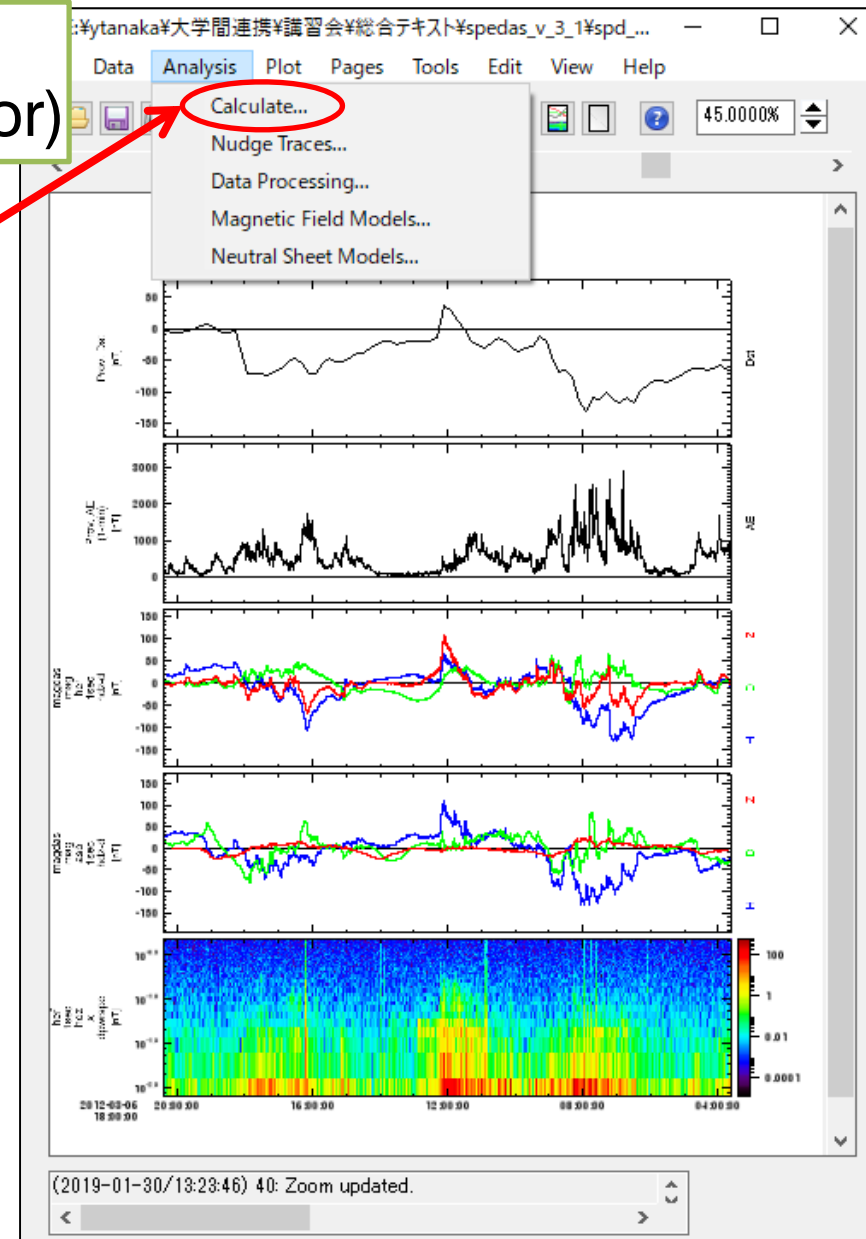


This color bar can be customized in Graph - Z Axis Options.

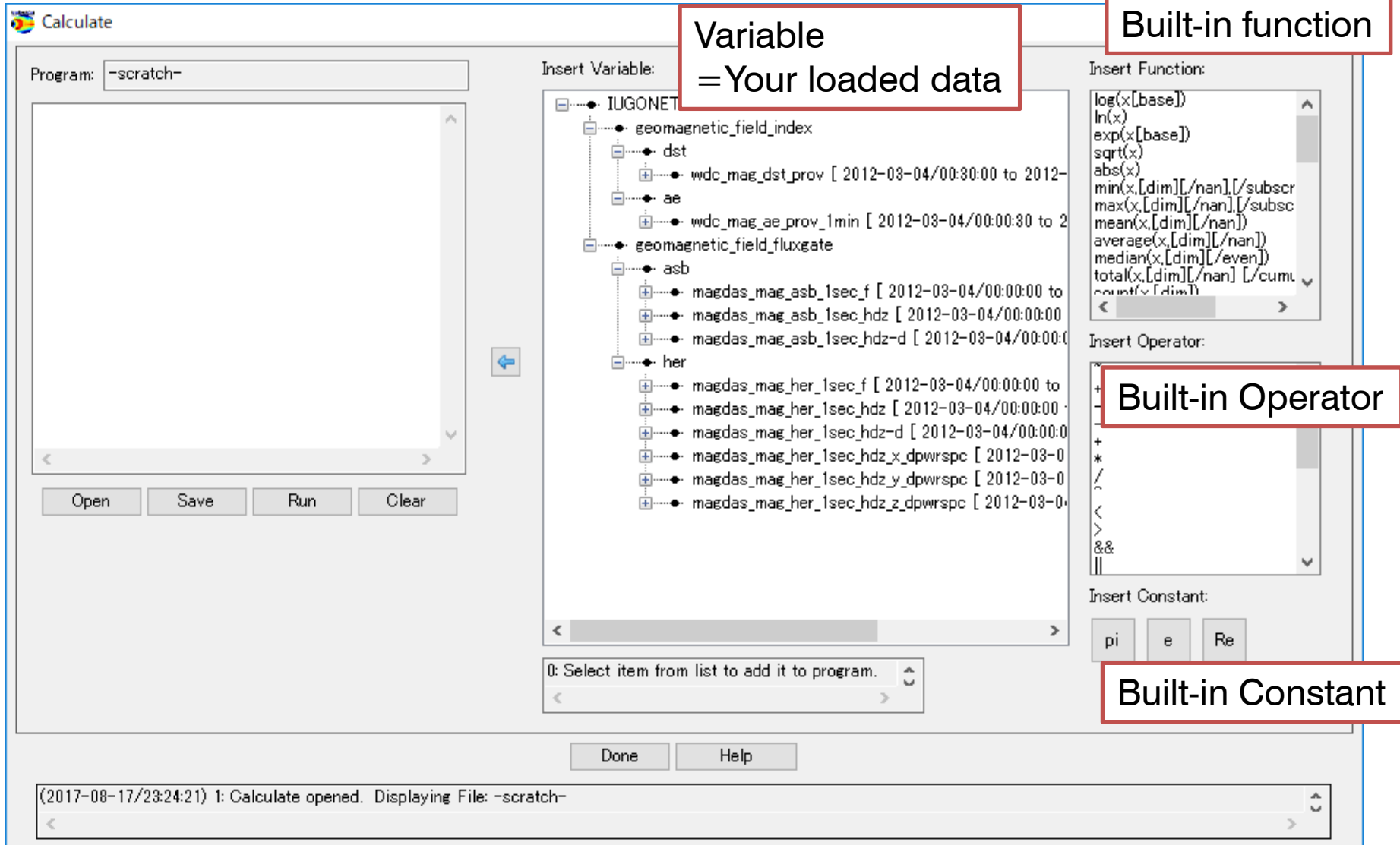
(2019-01-30/13:28:46) 40: Zoom updated.

Lesson:
Use Calculate (Equation editor)

1. Select
Analysis – Calculate...



Equation Editor for SPEDAS

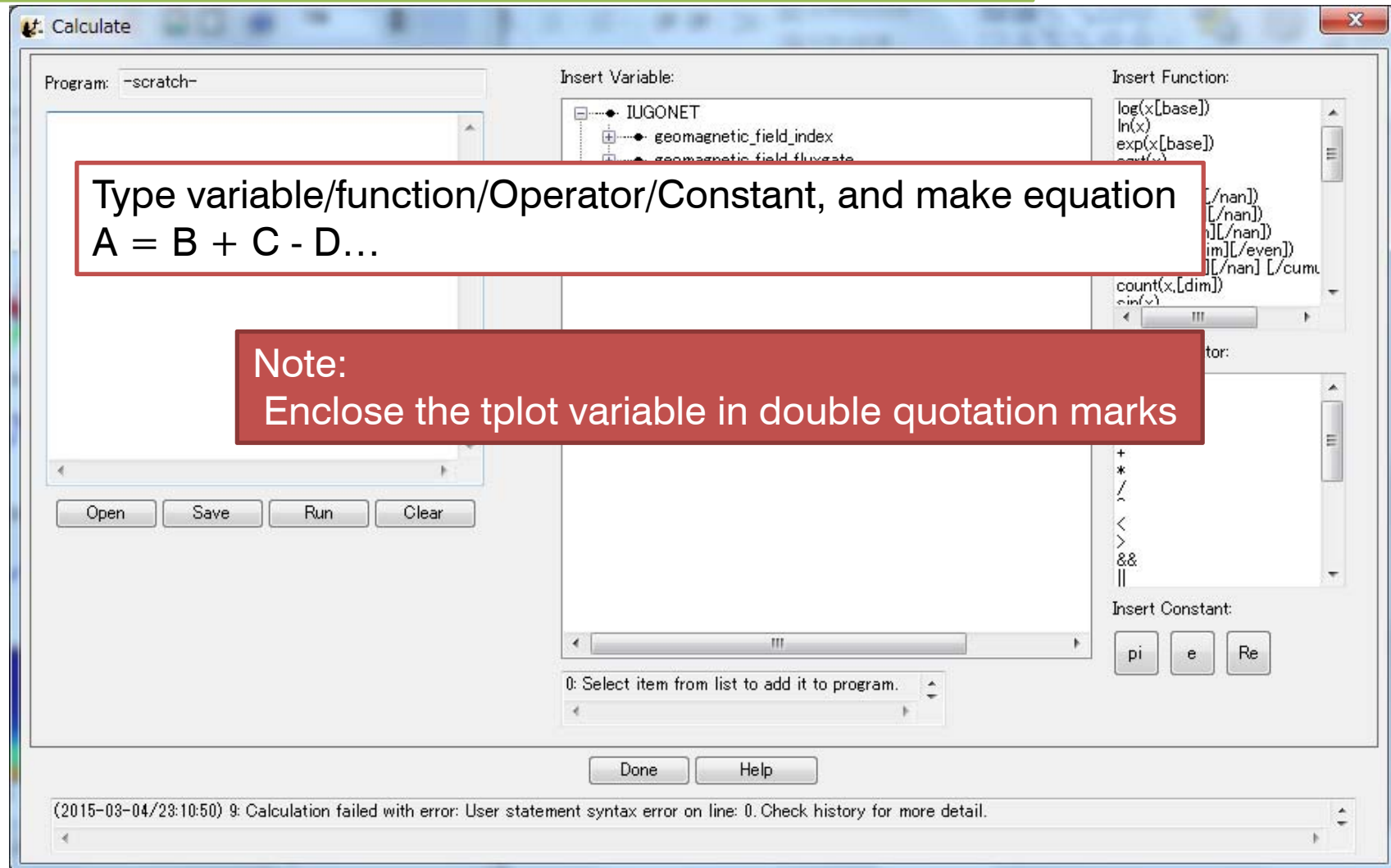


The screenshot shows the IUGONET Equation Editor for SPEDAS GUI. The interface includes a 'Program' field with '-scratch-' selected, an 'Insert Variable' tree, an 'Insert Function' list, an 'Insert Operator' list, and an 'Insert Constant' section. A status bar at the bottom displays the message: '(2017-08-17/23:24:21) 1: Calculate opened. Displaying File: -scratch-'. Red boxes with white text provide annotations for key features:

- Variable = Your loaded data**: Points to the 'Insert Variable' tree.
- Built-in function**: Points to the 'Insert Function' list.
- Built-in Operator**: Points to the 'Insert Operator' list.
- Built-in Constant**: Points to the 'Insert Constant' section.

Lesson:

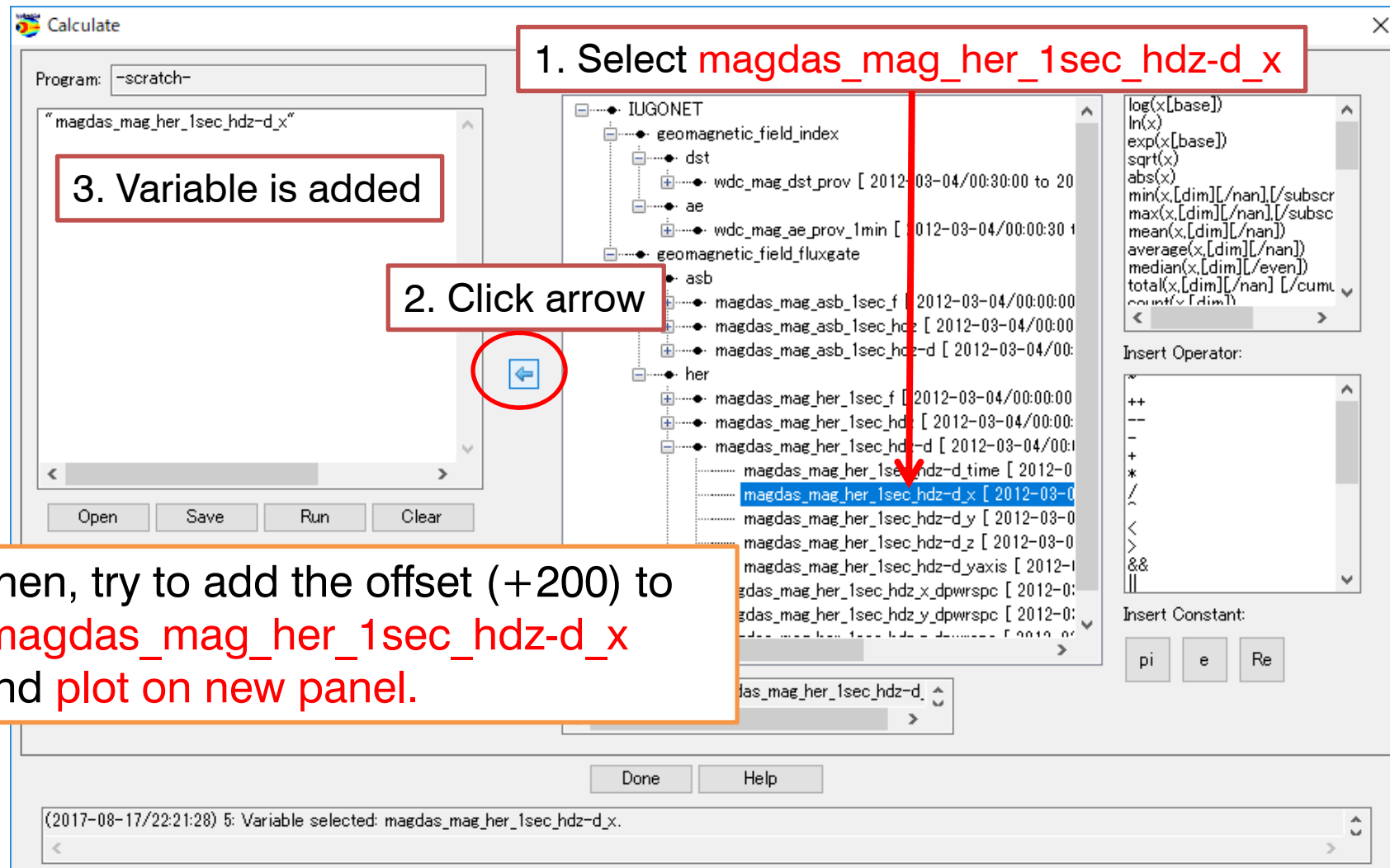
Make an equation using the loaded variables.



The screenshot shows the 'Calculate' window in IUGONET. The 'Program' field contains '-scratch-'. The 'Insert Variable' list includes 'IUGONET', 'geomagnetic_field_index', and 'geomagnetic_field_fluxgate'. The 'Insert Function' list includes 'log(x,[base])', 'ln(x)', 'exp(x,[base])', 'cos(x)', 'sin(x)', 'tan(x)', 'cot(x)', 'sec(x)', 'csc(x)', 'sqrt(x)', 'abs(x)', 'ceil(x)', 'floor(x)', 'round(x)', 'int(x)', 'diff(x)', 'count(x,[dim])', 'min(x)', 'max(x)'. The 'Insert Constant' list includes 'pi', 'e', 'Re'. The 'Operator' list includes '+', '*', '/', '<', '>', '&&', '||'. The 'Program' field is empty. The 'Run' button is highlighted. A red box contains the text: 'Type variable/function/Operator/Constant, and make equation A = B + C - D...'. A red box contains the text: 'Note: Enclose the tplot variable in double quotation marks'. The status bar at the bottom shows: '(2015-03-04/23:10:50) 9: Calculation failed with error: User statement syntax error on line: 0. Check history for more detail.'

Lesson:

Make an equation using the loaded variables.



The screenshot shows the IUGONET Calculate window with the following elements:

- Program:** -scratch-
- Equation Editor:** Contains the variable `magdas_mag_her_1sec_hdz-d_x`.
- Variable List:** A tree view of variables under the IUGONET folder. The variable `magdas_mag_her_1sec_hdz-d_x` is highlighted in blue.
- Operator List:** A list of mathematical functions and operators such as `log(x[base])`, `ln(x)`, `exp(x[base])`, `sqrt(x)`, `abs(x)`, `min(x,[dim][,/nan][,/subscr]`, `max(x,[dim][,/nan][,/subscr]`, `mean(x,[dim][,/nan])`, `average(x,[dim][,/nan])`, `median(x,[dim][,/even])`, `total(x,[dim][,/nan][,/cum]`, and `count(x,[dim])`.
- Insert Operator:** A list of basic operators: `++`, `--`, `-`, `+`, `*`, `/`, `^`, `<`, `>`, `&&`, and `||`.
- Insert Constant:** Buttons for `pi`, `e`, and `Re`.
- Buttons:** Open, Save, Run, Clear, Done, and Help.
- Status Bar:** (2017-08-17/22:21:28) 5: Variable selected: magdas_mag_her_1sec_hdz-d_x.

Three red boxes with arrows indicate the following steps:

1. Select `magdas_mag_her_1sec_hdz-d_x`
2. Click arrow
3. Variable is added

An orange box at the bottom contains the text: "Then, try to add the offset (+200) to `magdas_mag_her_1sec_hdz-d_x` and plot on new panel."

Answer

Note: one line, never return

"magdas_mag_her_1sec_hdz-d_x_ofst" = "magdas_mag_her_1sec_hdz-d_x" + 200

z-d_x_ofst" = "magdas_mag_her_1sec_hdz-d_x" + 200

1. Click Run

2. A new variable is created

3. Click done

(2017-08-17/22:53:49) 14: Calculation complete

Open "Plot/Layout Options"

The screenshot shows the 'CREATE PLOTS' dialog box in the IUGONET software. The interface includes a tree view of dependent variables on the left, a list of panels in the center, and a right-hand panel configuration area. Annotations in red boxes and text boxes provide step-by-step instructions:

- 1. Select Panel 3 and Remove it**: A red box highlights the 'Remove' button in the right-hand panel configuration area.
- 2. Select magdas_mag_her_1sec_hdz-d_y and magdas_mag_her_1sec_hdz-d_x_ofst**: A red box highlights the selected variables in the 'Dependent Variable' tree on the left.
- 3. Click Line**: A red box highlights the 'Line ->' button in the 'Dependent Variable' tree.
- 4. Data are added**: A red box highlights the selected variables in the panel list on the right.

At the bottom of the dialog, there are 'OK', 'Apply', and 'Cancel' buttons. A status bar at the very bottom shows the message: '(2017-08-17/22:54:53) 4: Add Finished.'

Open "Plot/Layout Options"

The screenshot shows the "Plot/Layout Options" dialog box with the following elements:

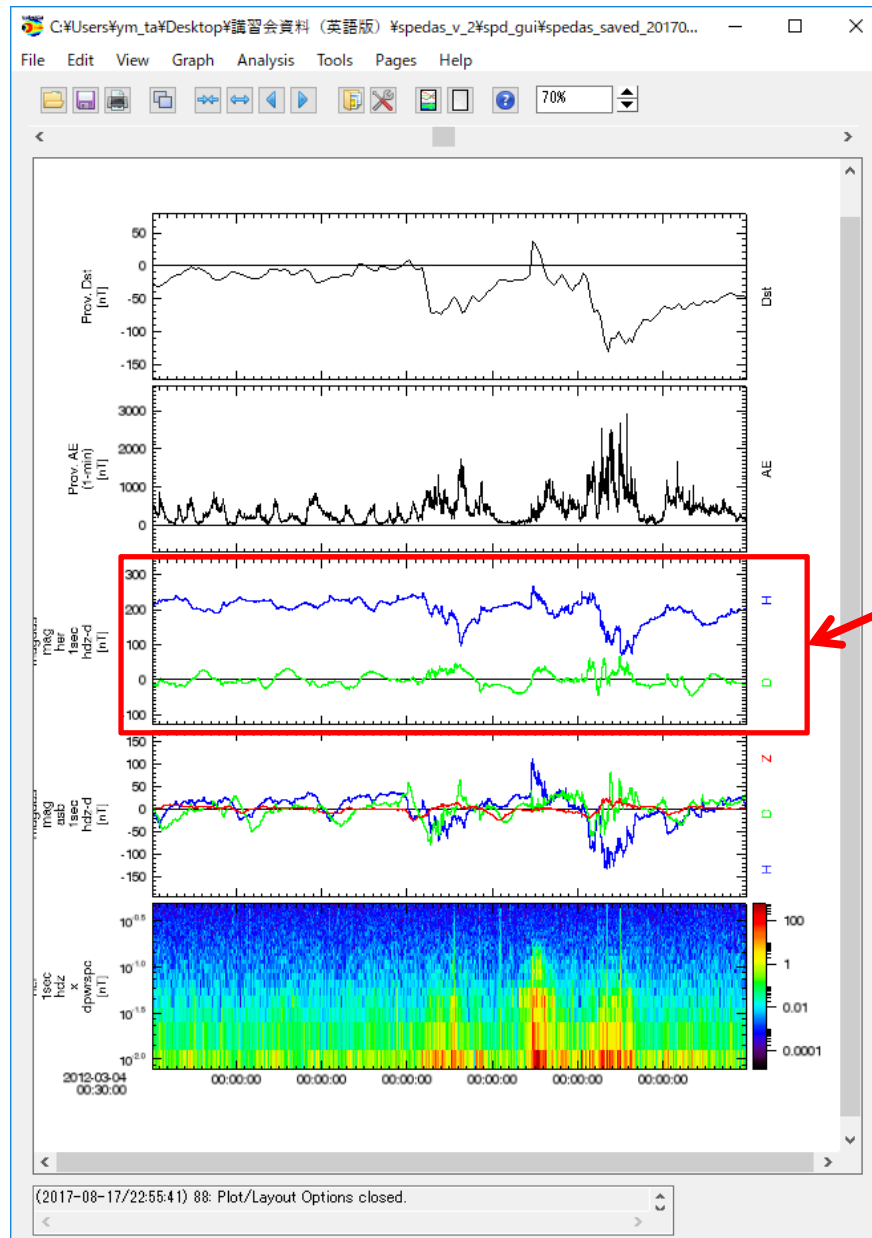
- Dependent Variable:** A tree view showing the IUGONET data structure. The variable `magdas_mag_her_1sec_hdz-d_y` is selected.
- CREATE PLOTS:** A list of panels. Panel 6 (3, 1) is selected and highlighted in blue. A red box and arrow point to the "Row" field in the panel configuration, which is set to 3.
- Configuration:** The "Row" field is set to 3, "Column" to 1, and "Rows Per Page" to 5. These fields are circled in red.
- Buttons:** The "OK" button is circled in red.
- Status Bar:** A message at the bottom reads: "(2017-08-17/22:55:16) 7: SPD_UI_LAYOUT_OPTIONS: Row set to 3." A red box and arrow point to the "OK" button.

1. Change the value of Row to 3

2. Panel 6 is changed to (3, 1)

3. Click OK

Result

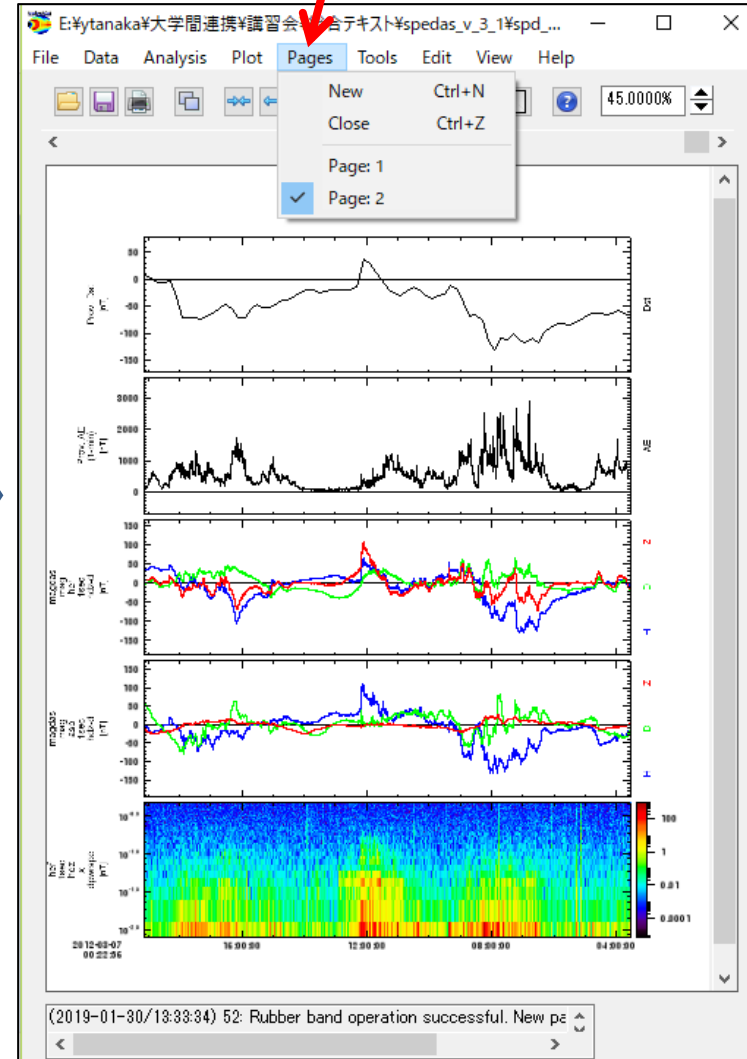
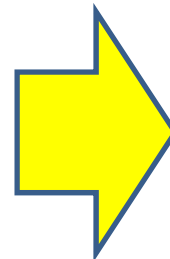
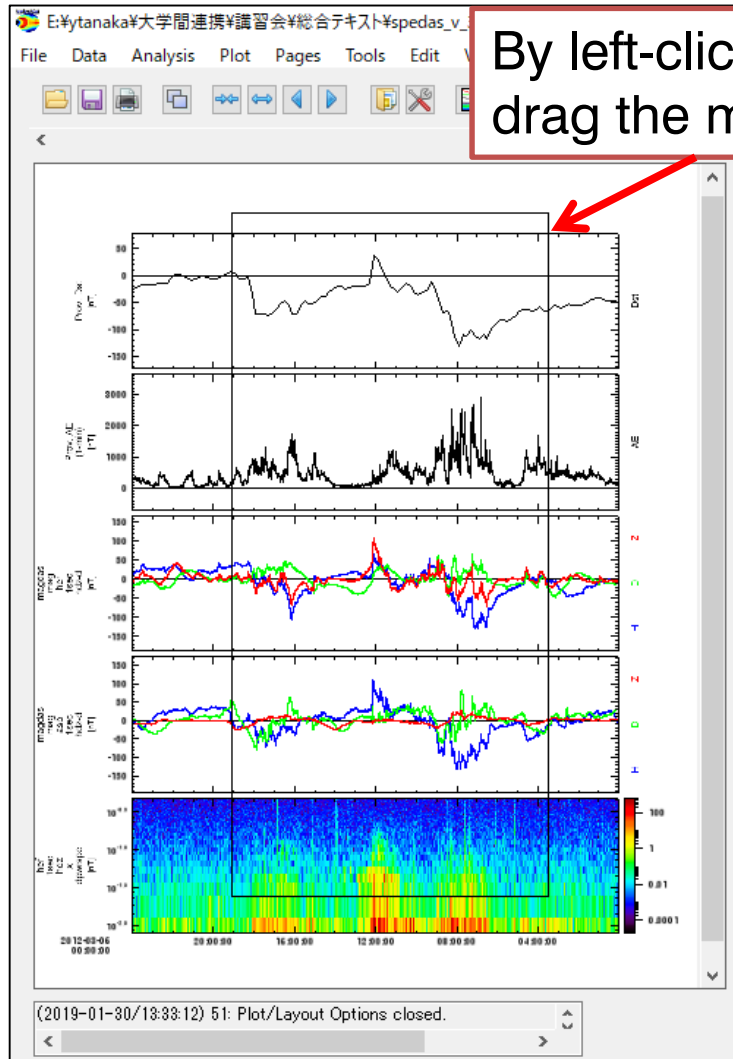


Offset (+200nT) was added to the H comp.

Try:
Expand the plot using the mouse.

A new page opens

By left-click and drag the mouse





How to Use SPEDAS part3

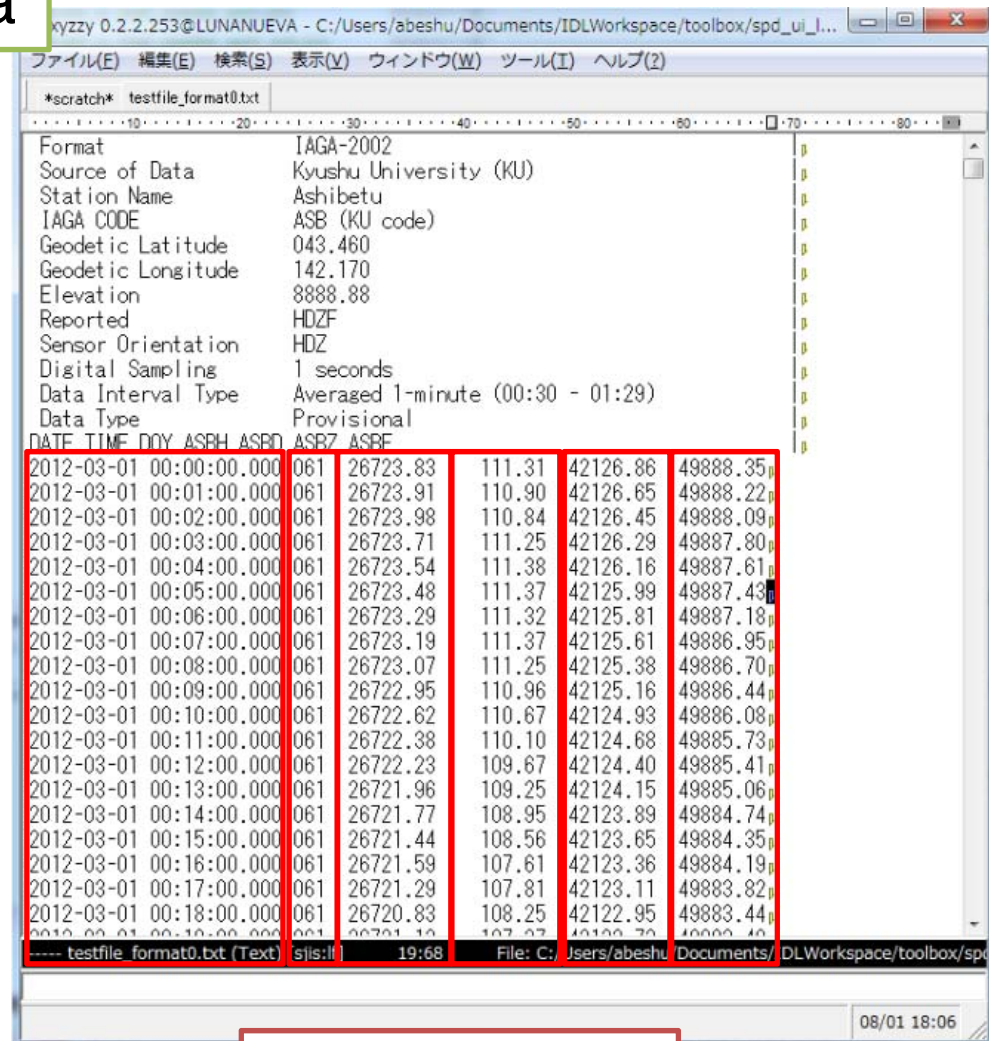
Additional data loading

Lesson:
Load Additional ASCII Data

Sample1: magnetometer data

HEADER(13 lines)

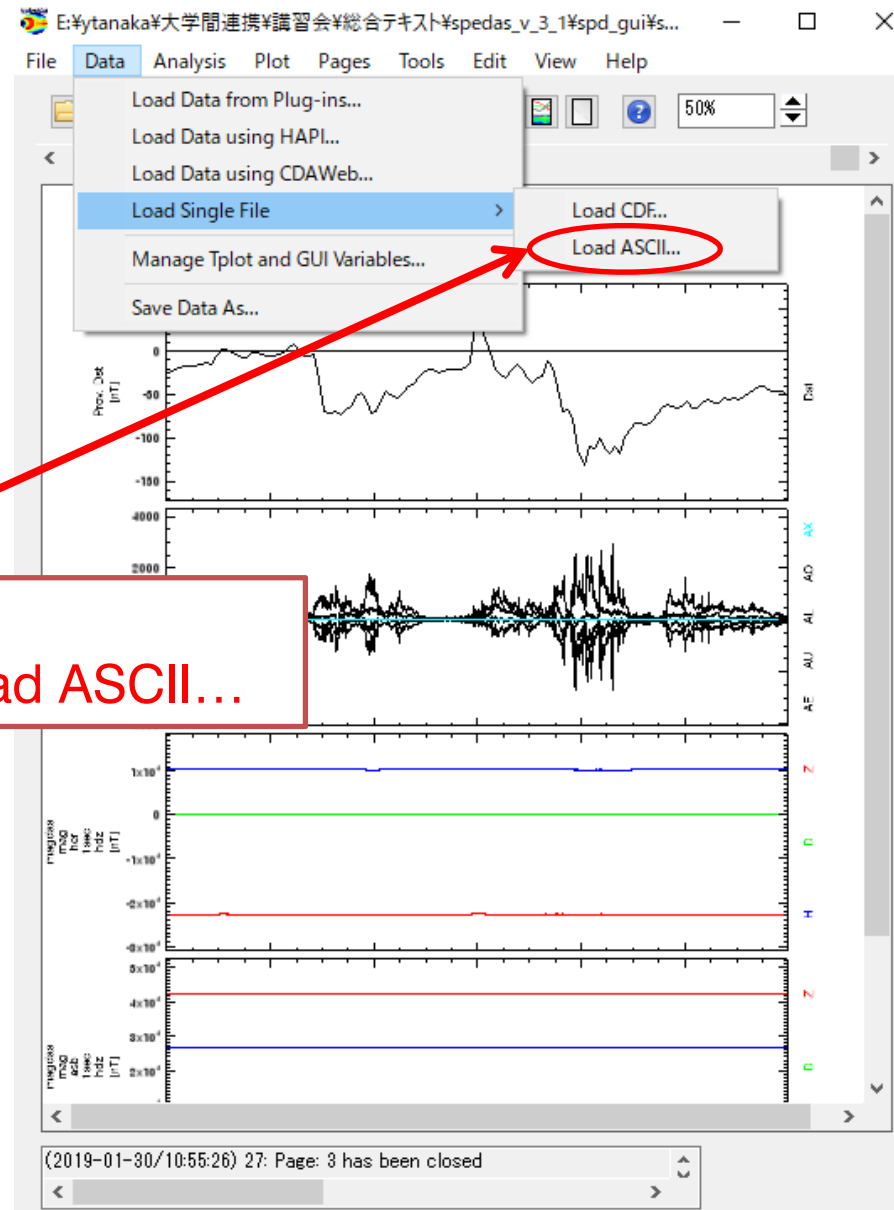
Data(86400lines)



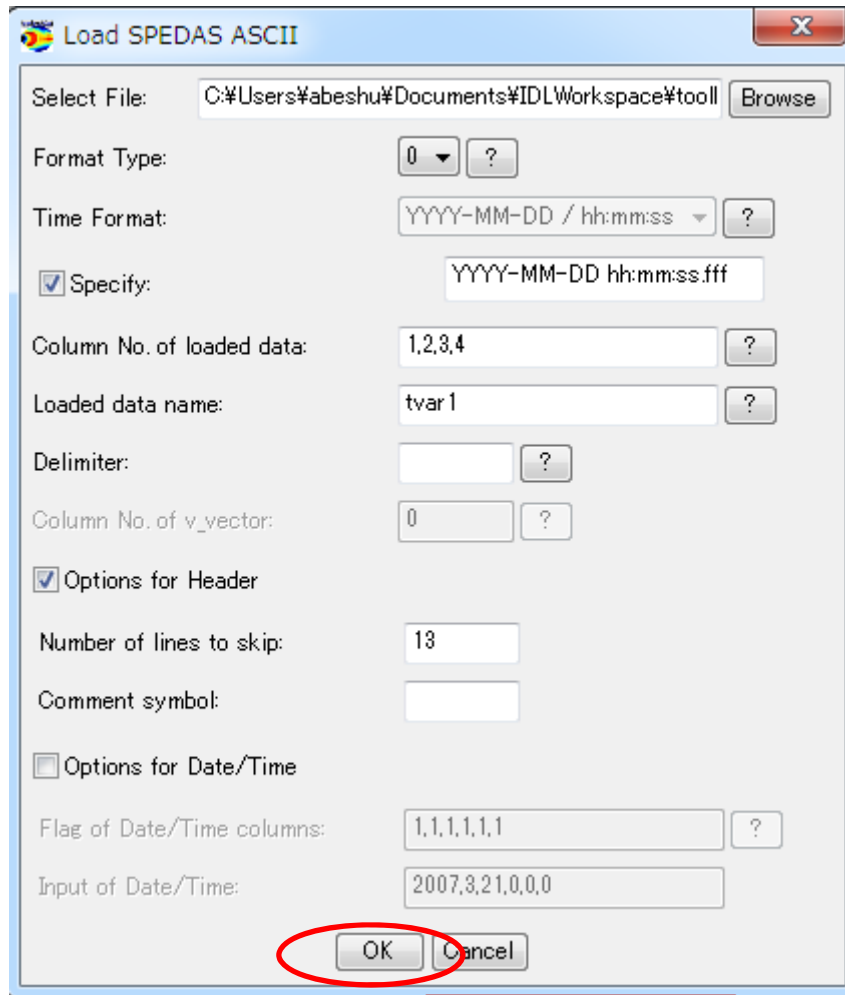
| DATE | TIME | DOY | ASRH | ASR7 | ASRF |
|------------|--------------|-----|----------|--------|----------|
| 2012-03-01 | 00:00:00.000 | 061 | 26723.83 | 111.31 | 42126.86 |
| 2012-03-01 | 00:01:00.000 | 061 | 26723.91 | 110.90 | 42126.65 |
| 2012-03-01 | 00:02:00.000 | 061 | 26723.98 | 110.84 | 42126.45 |
| 2012-03-01 | 00:03:00.000 | 061 | 26723.71 | 111.25 | 42126.29 |
| 2012-03-01 | 00:04:00.000 | 061 | 26723.54 | 111.38 | 42126.16 |
| 2012-03-01 | 00:05:00.000 | 061 | 26723.48 | 111.37 | 42125.99 |
| 2012-03-01 | 00:06:00.000 | 061 | 26723.29 | 111.32 | 42125.81 |
| 2012-03-01 | 00:07:00.000 | 061 | 26723.19 | 111.37 | 42125.61 |
| 2012-03-01 | 00:08:00.000 | 061 | 26723.07 | 111.25 | 42125.38 |
| 2012-03-01 | 00:09:00.000 | 061 | 26722.95 | 110.96 | 42125.16 |
| 2012-03-01 | 00:10:00.000 | 061 | 26722.62 | 110.67 | 42124.93 |
| 2012-03-01 | 00:11:00.000 | 061 | 26722.38 | 110.10 | 42124.68 |
| 2012-03-01 | 00:12:00.000 | 061 | 26722.23 | 109.67 | 42124.40 |
| 2012-03-01 | 00:13:00.000 | 061 | 26721.96 | 109.25 | 42124.15 |
| 2012-03-01 | 00:14:00.000 | 061 | 26721.77 | 108.95 | 42123.89 |
| 2012-03-01 | 00:15:00.000 | 061 | 26721.44 | 108.56 | 42123.65 |
| 2012-03-01 | 00:16:00.000 | 061 | 26721.59 | 107.61 | 42123.36 |
| 2012-03-01 | 00:17:00.000 | 061 | 26721.29 | 107.81 | 42123.11 |
| 2012-03-01 | 00:18:00.000 | 061 | 26720.83 | 108.25 | 42122.95 |

See [Data/testfile_format0.txt](#)

Data(6 columns)



1. Select
Data – Load Single File – Load ASCII...



Load SPEDAS ASCII

Select File: C:\Users#abeshu\Documents\IDLWorkspace\tool\ Browse

Format Type: 0 ?

Time Format: YYYY-MM-DD / hh:mm:ss ?

Specify: YYYY-MM-DD hh:mm:ss.fff

Column No. of loaded data: 1,2,3,4 ?

Loaded data name: tvar1 ?

Delimiter: ?

Column No. of v_vector: 0 ?

Options for Header

Number of lines to skip: 13

Comment symbol:

Options for Date/Time

Flag of Date/Time columns: 1,1,1,1,1 ?

Input of Date/Time: 2007,3,21,0,0,0

OK Cancel

1. Click "Browse", and select **'testfile_format0.txt'**.

2. Format Type: Select **0**

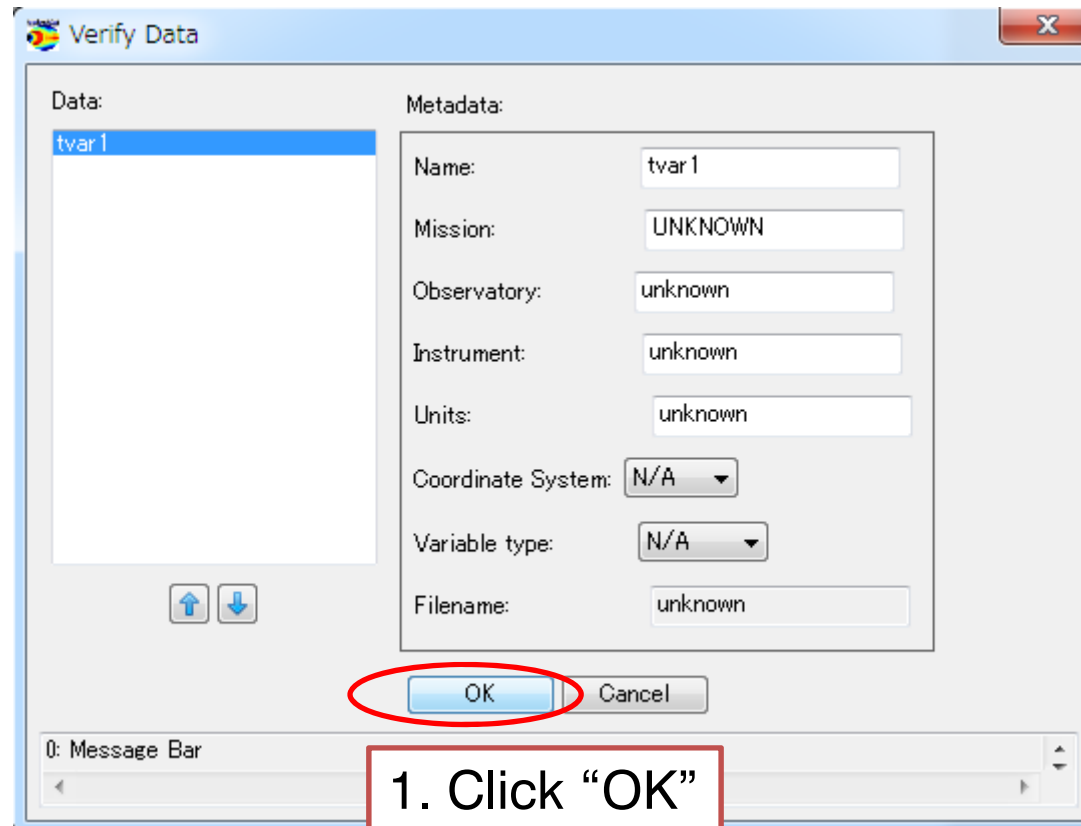
3. Time Format: Check **Specify**, and put **'YYYY-MM-DD hh:mm:ss.fff'**

4. Column No. of loaded data: put **'1,2,3,4'**

Note: Column number starts from 0.

5. Options for Header: Check **the box**, and put **'13'** to Number of lines of skip.

6. Click OK

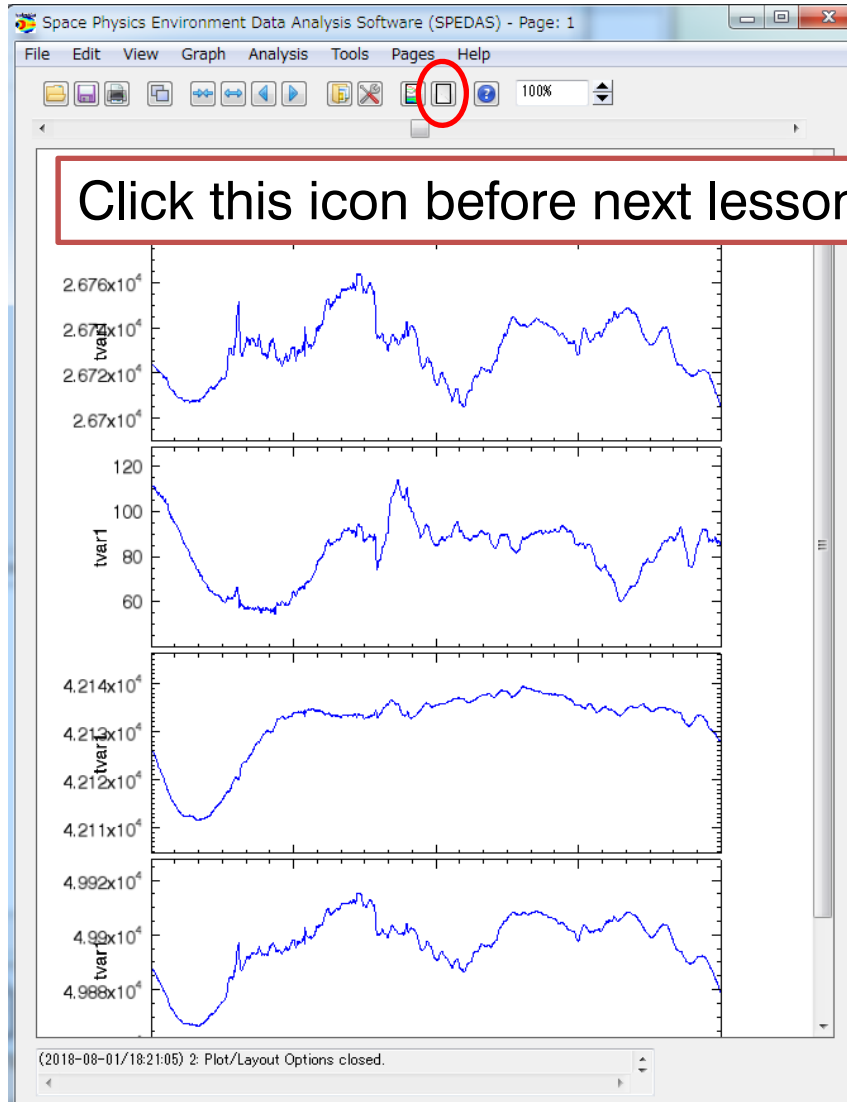


Open "Plot/Layout Options"

The screenshot shows the 'Plot/Layout Options' dialog box with the following elements and callouts:

- 1. Click +, and select tvar1_0**: A red box highlights the '+' icon next to 'tvar1_0' in the 'Dependent Variable' tree.
- 2. Click Line**: A red box highlights the 'Line ->' button in the 'Add:' section.
- 3. Data are added**: A red box highlights the first entry in the 'CREATE PLOTS' list: 'L) Panel 1 (1, 1) - tvar1_time -vs- tvar1_0'.
- 4. Repeat the same process to tvar1_1, tvar_1_2, and tvar1_3**: A red box highlights the 'Line ->' button and the 'Add:' section.
- 5. Click "OK"**: A red box highlights the 'OK' button at the bottom of the dialog.

Other visible elements include the 'Show Data Components' checkbox, 'Automatic Panels' checkbox, 'Dependent Variable' tree, 'CREATE PLOTS' list, 'Panels' section with 'Add', 'Remove', and 'Edit' buttons, and 'Variables' section with 'Add/Edit' button.



Magnetometer data written in ASCII(IAGA-2002) format are plotted.



GUI Basic Operation

Lesson:
Load External ASCII Data

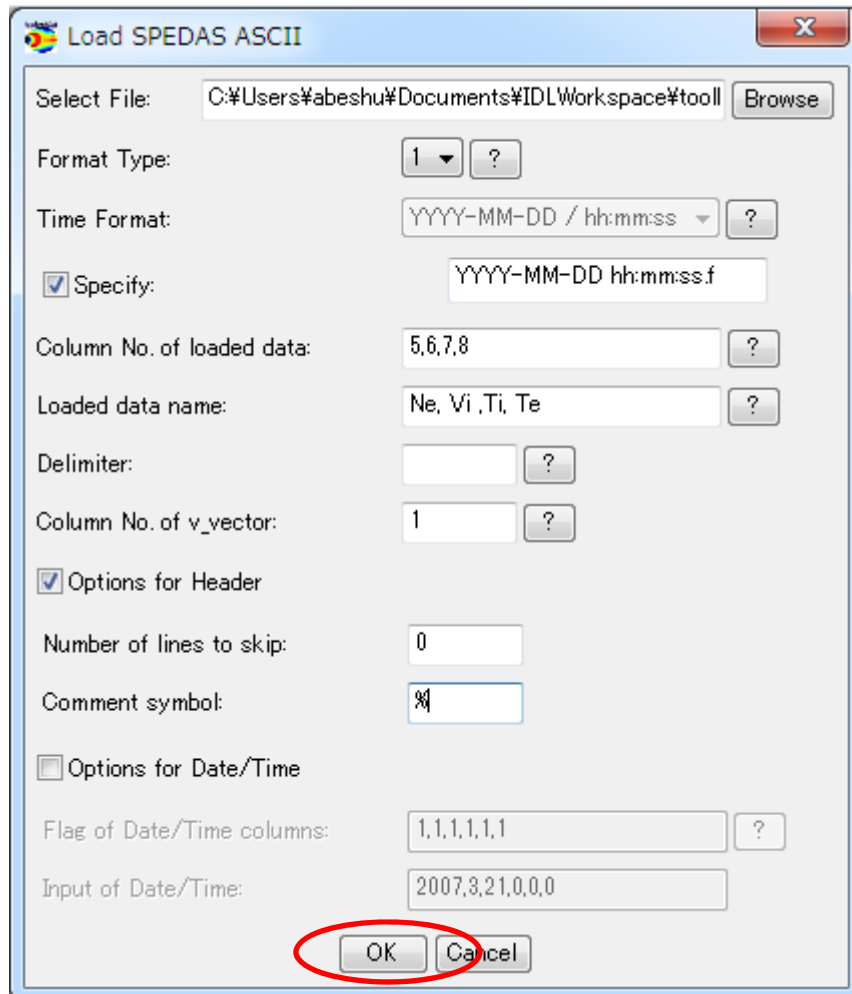
Sample2: EISCAT radar data

```
*scratch* testfile_format0.txt testfile_format1.txt
% Number of header line: 21
% Filename: 20140108_42m0_ipy0_0060.txt
%
% Generation date: 2014/12/24 00:08:51
% Radar site: 5
% Radar antenna: 42m
% Radar pulse code: ipy
% Experiment version: 4
% Raw data directory: ipy_fixed42p_4.11_CP@42m
% Start date and Time: 2014/01/08 18:01:24
% End date and Time: 2014/01/09 00:01:00
% Integration time: 0060
% Magic const: 1.5 * 1
% Extra settings:
% fit_altitude=[0 Inf;70 Inf;95 1000;90 95;0 Inf];
%
% Data format (Vi: positive is away from the radar):
% S & E TIME (UT) ALT LAT LONG q log(Ne) Vi Ti Te errNe errVi errTi errTe AZ EL O+/Ne log(Co) RANGE
% YYMMDD HHMMSS.S HHMMSS.S km deg deg deg m^-3 m/s K K m^-3 m/s K K deg deg % rad/s km
20140108 180124.0 180200.0 77.5 78.05 16.00 0 10.17 5 796 796 8.71 5 85 85 184.50 81.60 0 5.00 78.4
20140108 180124.0 180200.0 81.1 78.05 15.99 0 10.35 14 219 219 8.59 2 25 25 184.50 81.60 0 4.76 81.9
20140108 180124.0 180200.0 84.9 78.04 15.99 0 10.36 11 123 123 8.44 2 11 11 184.50 81.60 0 4.51 85.8
20140108 180124.0 180200.0 89.1 78.04 15.99 0 10.35 8 167 167 8.52 3 9 9 184.50 81.60 0 4.24 90.0
20140108 180124.0 180200.0 93.3 78.03 15.99 3 10.29 -6 61 61 8.36 3 2 2 184.50 81.60 1 0.00 94.3
20140108 180124.0 180200.0 97.5 78.03 15.99 0 10.98 6 21 213 10.59 4 10 207 184.50 81.60 0 3.67 98.6
20140108 180124.0 180200.0 101.3 78.02 15.98 0 10.16 20 283 129 9.33 7 62 92 184.50 81.60 0 3.41 102.4
20140108 180124.0 180200.0 105.0 78.02 15.98 0 10.34 -16 127 205 9.38 7 20 72 184.50 81.60 0 3.13 106.1
20140108 180124.0 180200.0 109.1 78.01 15.98 0 10.21 7 289 252 9.11 12 38 80 184.50 81.60 0 2.82 110.3
20140108 180124.0 180200.0 113.6 78.01 15.98 0 10.04 44 244 398 9.06 16 37 137 184.50 81.60 0 2.48 114.8
20140108 180124.0 180200.0 119.1 78.00 15.98 0 9.84 113 394 714 8.94 42 69 270 184.50 81.60 0 2.09 120.4
20140108 180124.0 180200.0 125.0 77.99 15.97 0 9.70 100 370 627 8.80 30 30 210 184.50 81.60 0 1.75 126.0
---- testfile_format1.txt (Text) [sjs:lf] 1:1 File: C:/Users/abeshu/Documents/IDLWorkspace/toolbox/spd_ui_load_ascii/gui/testfile_format1.txt
11541行読み込みました 08/01 18:08
```

See [Data/testfile_format1.txt](#)

Data(19 columns)

Open File – Load Your Data – Load ASCII



Load SPEDAS ASCII

Select File: C:\Users\abeshu\Documents\IDLWorkspace\tool1 Browse

Format Type: 1 ?

Time Format: YYYY-MM-DD / hh:mm:ss ?

Specify: YYYY-MM-DD hh:mm:ss.f

Column No. of loaded data: 5,6,7,8 ?

Loaded data name: Ne, Vi, Ti, Te ?

Delimiter: ?

Column No. of v_vector: 1 ?

Options for Header

Number of lines to skip: 0

Comment symbol: %

Options for Date/Time

Flag of Date/Time columns: 1,1,1,1,1,1 ?

Input of Date/Time: 2007,3,21,0,0,0

OK Cancel

5. Click OK

1. Click "Browse", and select 'testfile_format1.txt'.

2. Format Type: Select 1

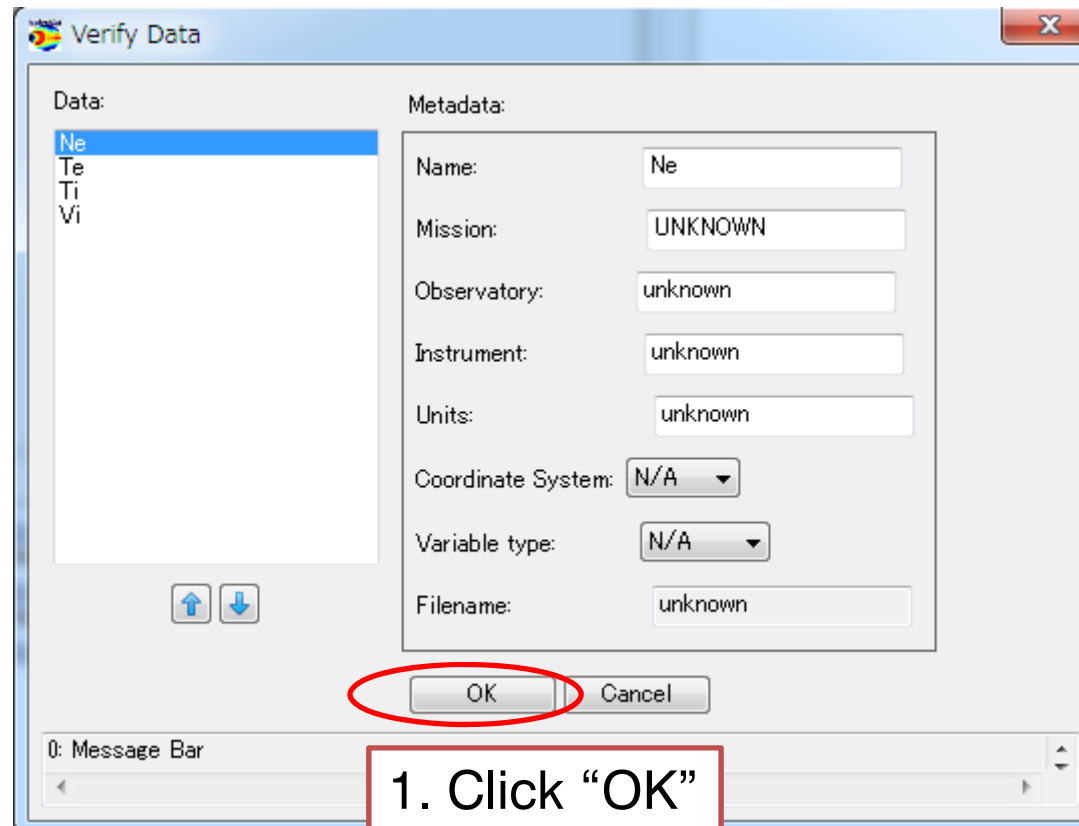
3. Time Format: Check **Specify**, and put **'YYYY-MM-DD hh:mm:ss.f'**

4. Column No. of loaded data: put **'5,6,7,8'**

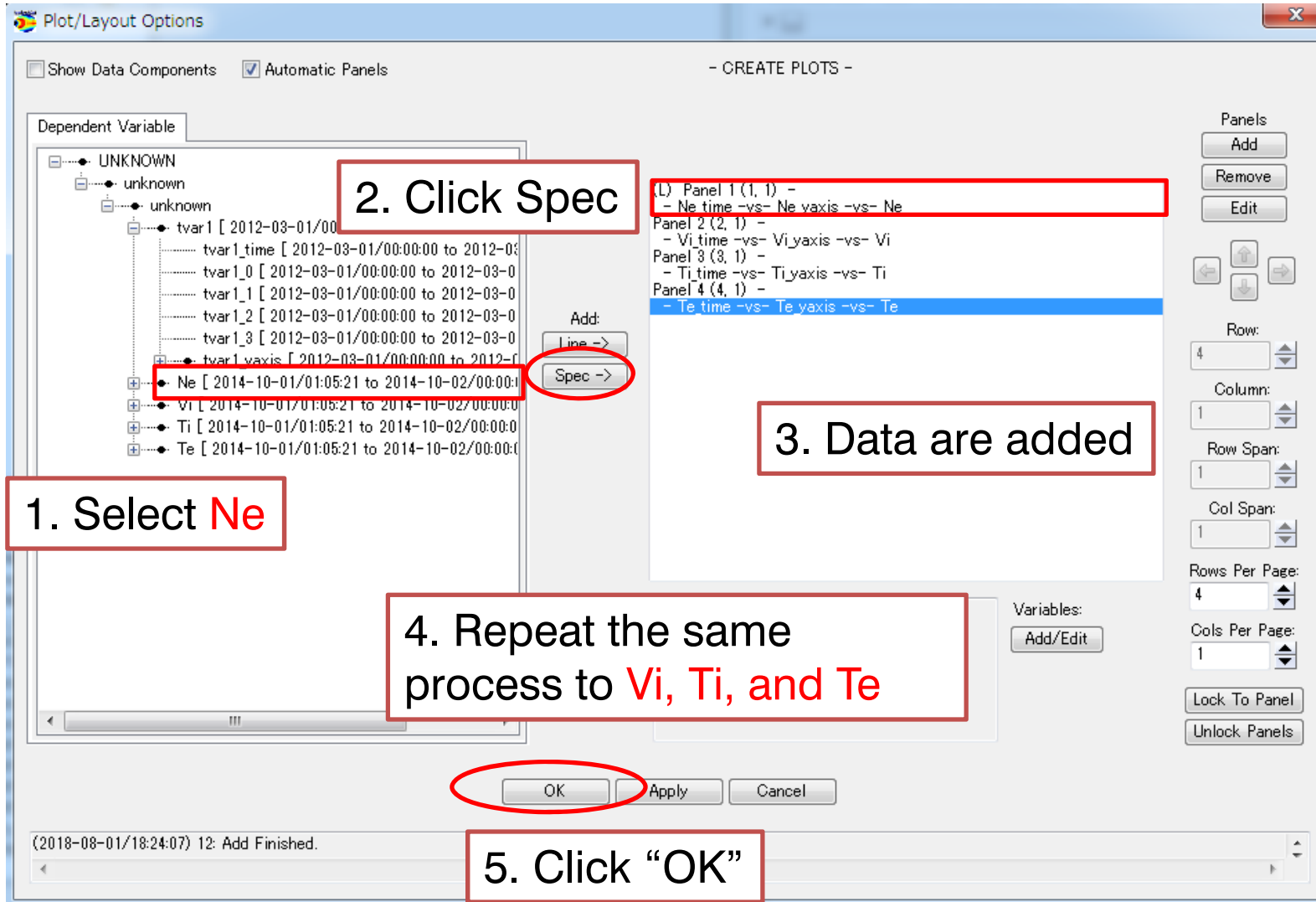
5. Loaded data name: put **'Ne, Vi, Ti, Te'**

6. Column No. of v_vector: put **'1'**

7. Options for Header: Check **the box**, and put **'%'** to Comment symbol



Open "Plot/Layout Options"



The screenshot shows the "Plot/Layout Options" dialog box. The "Dependent Variable" tree on the left lists variables: UNKNOWN, unknown, tvar1, tvar1_time, tvar1_0, tvar1_1, tvar1_2, tvar1_3, **Ne**, Vi, Ti, and Te. The "Add:" section has "Line ->" and "Spec ->" buttons. The "Plots" list on the right shows four panels, with the first panel selected: "(1) Panel 1 (1, 1) - - Ne time -vs- Ne yaxis -vs- Ne". The "OK" button at the bottom is circled. A status bar at the bottom left shows "(2018-08-01/18:24:07) 12: Add Finished."

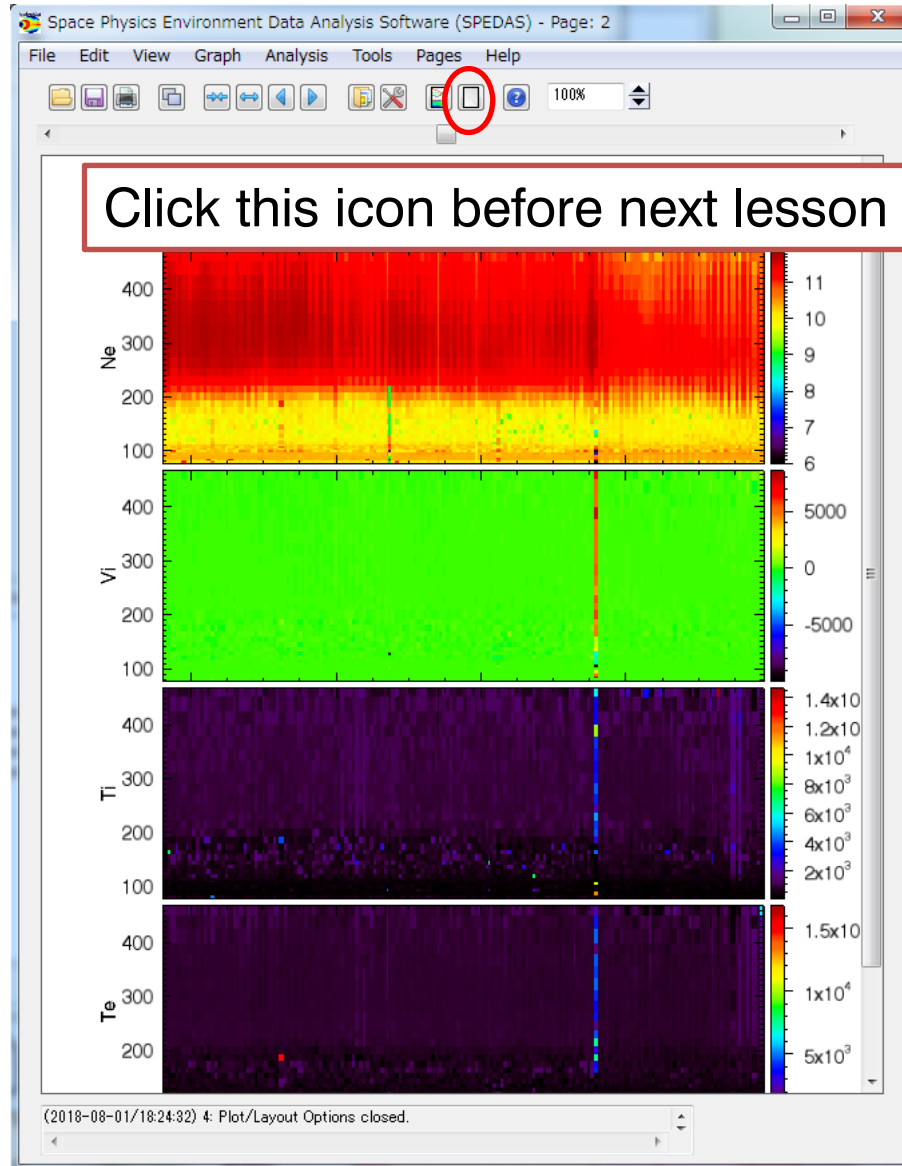
2. Click Spec

1. Select Ne

3. Data are added

4. Repeat the same process to Vi, Ti, and Te

5. Click "OK"

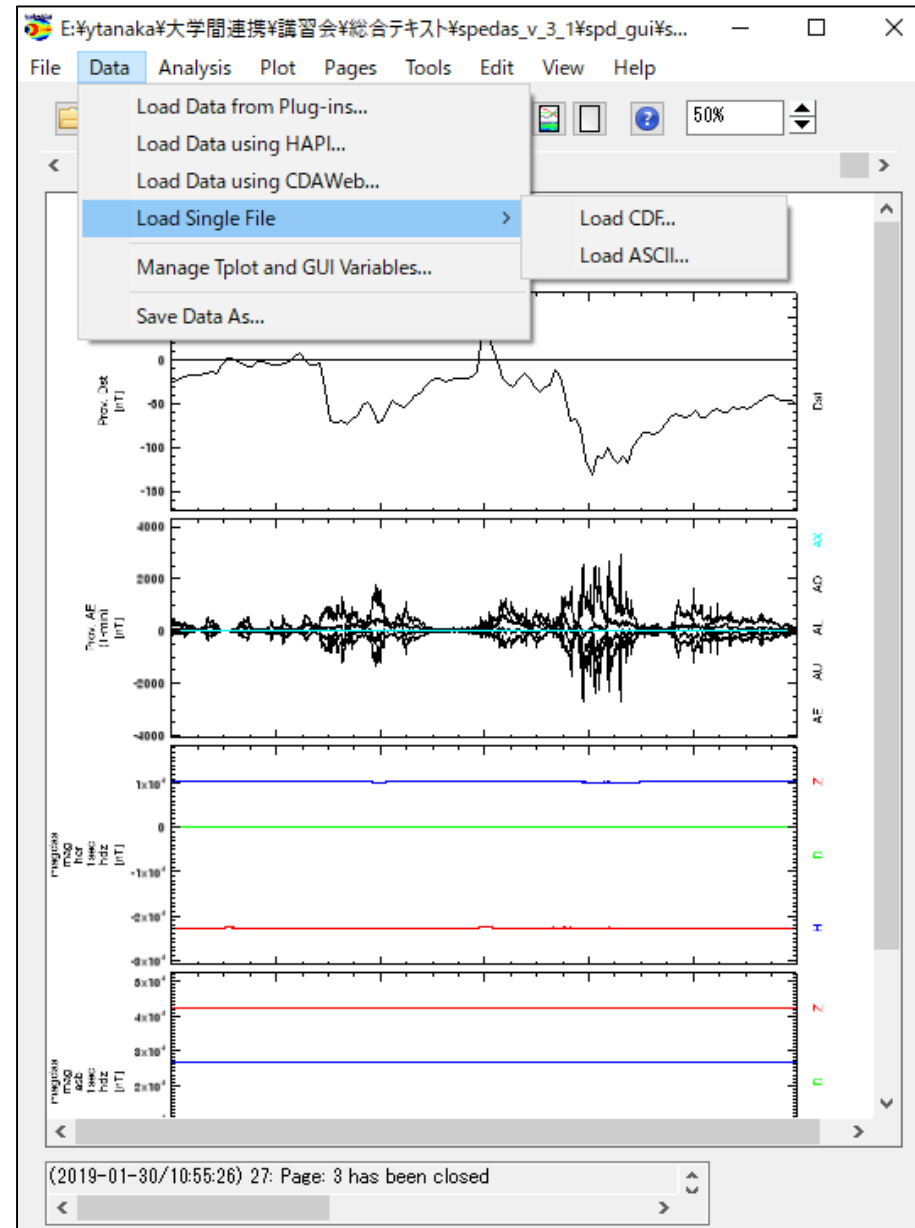


EISCAT radar data written in ASCII format are plotted in spectrogram.

Try:
 Plot your own ASCII/CDF
 data using **Data – Load
 Single File – Load ASCII...**

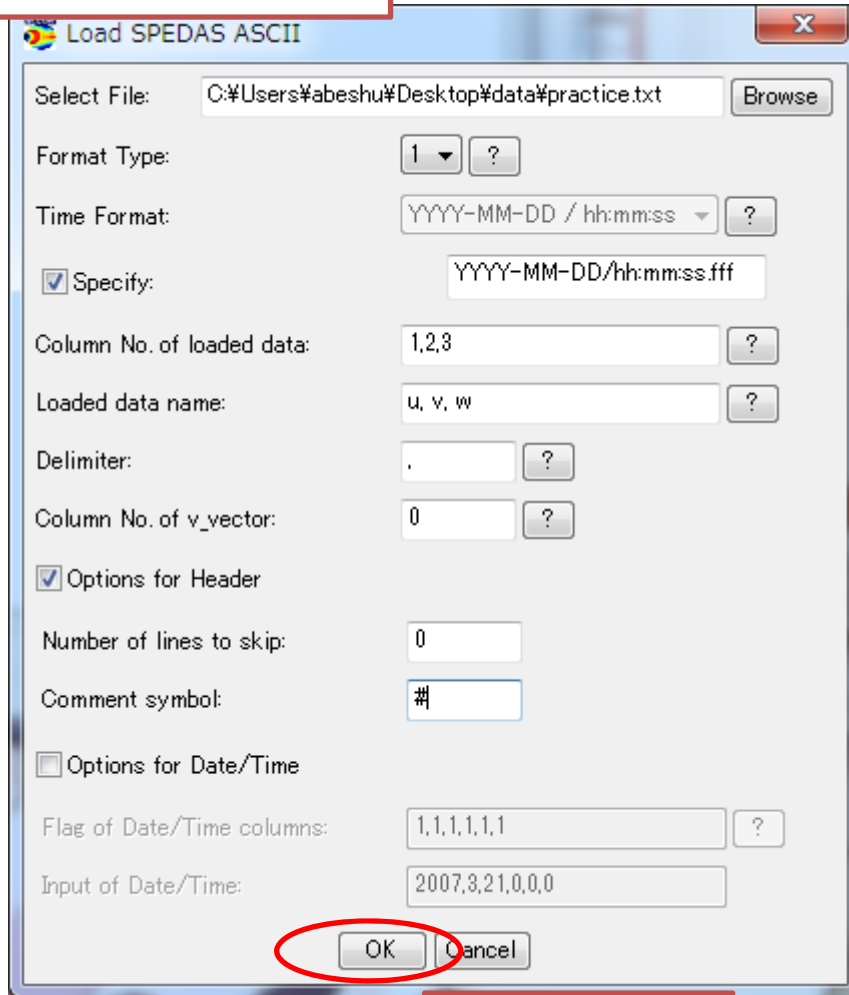
If you do not prepare your
 own data, let's try to plot
Data/practice.txt

Hint: Use format 1 for data
 loading, and use SPEC for
 data plotting



Answer

Open "Load ASCII"



Load SPEDAS ASCII

Select File: C:\Users#abeshu\Desktop\data#practice.txt

Format Type: 1

Time Format: YYYY-MM-DD / hh:mm:ss

Specify: YYYY-MM-DD/hh:mm:ss.fff

Column No. of loaded data: 1,2,3

Loaded data name: u, v, w

Delimiter: ,

Column No. of v_vector: 0

Options for Header

Number of lines to skip: 0

Comment symbol: #

Options for Date/Time

Flag of Date/Time columns: 1,1,1,1,1

Input of Date/Time: 2007,3,21,0,0,0

9. Click OK

1. Click "Browse", and select 'practice.txt'.

2. Format Type: Select 1

3. Time Format: Check Specify, and put 'YYYY-MM-DD/hh:mm:ss.fff'

4. Column No. of loaded data: put '1,2,3'

5. Loaded data name: put 'u, v, w'

6. Delimiter: put ','

7. Column No. of v_vector: put '0'

8. Options for Header: Check the box, and put '#' to Comment symbol

Open "Plot/Layout Options"

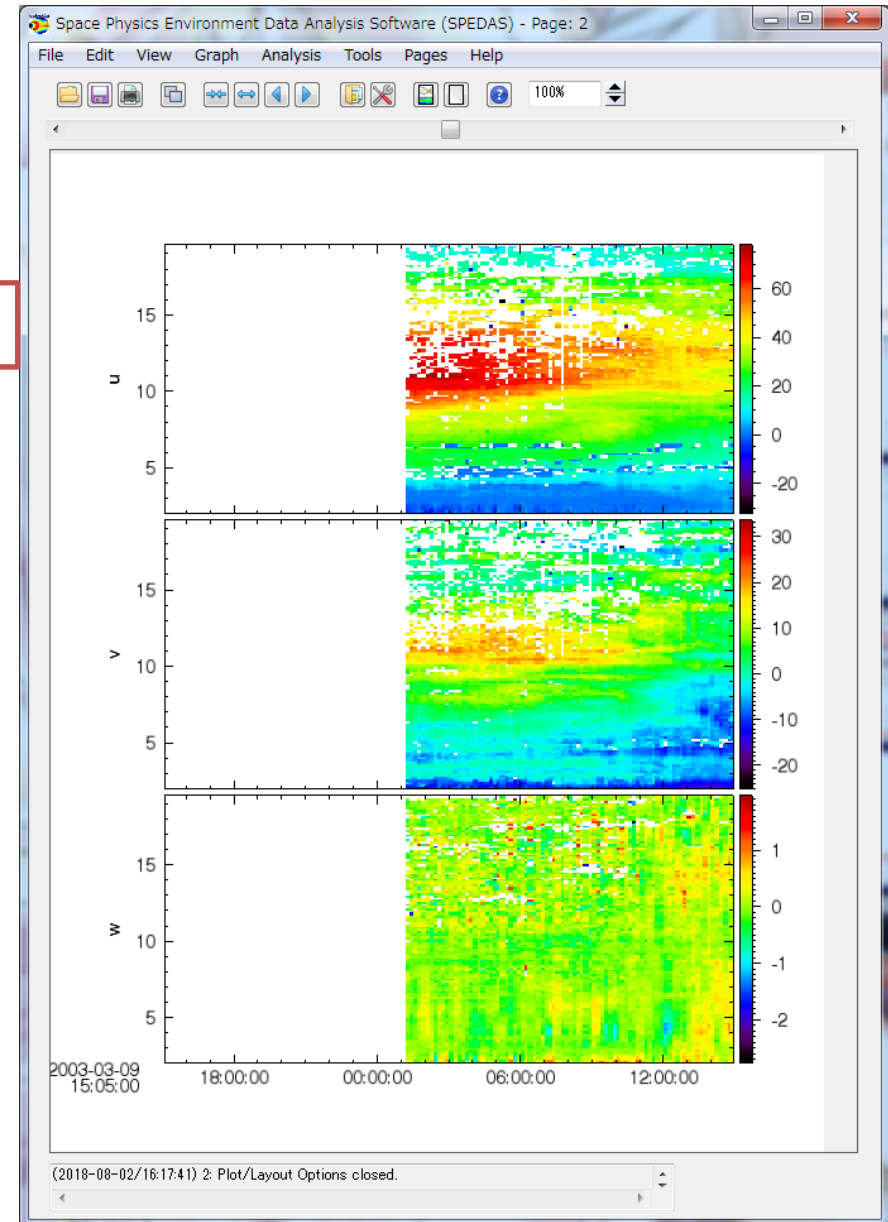
1. Select **u**

2. Click Spec

3. Data are added

4. Repeat the same process to **v** and **w**

Practice data(wind velocity observed by MU radar) written in ASCII format are plotted in spectrogram.





For advance...

UDAS website: <http://www.iugonet.org/product/analysis.jsp>

UDAS

IUGONET has provided a plug-in software, UDAS (iUgonet Data Analysis Software), for SPEDAS. UDAS is included as a SPEDAS standard plug-in. Once you install SPEDAS, UDAS will also be installed. To update UDAS part, please download it by clicking links below.

[Release Note](#)

Latest Version

[s3.00.1 for SPEDAS 3.00](#) (zip, 1MB, already included in SPEDAS 3.00)

Previous Version

[s2.00.2 for SPEDAS 2.00](#) (zip, 1MB, already included in SPEDAS 2.00)

[s2.00.1 for SPEDAS 2.00](#) (zip, 1MB, already included in SPEDAS 2.00)

[s1.00.1 for SPEDAS 1.00](#) (zip, 1MB, already included in SPEDAS 1.00)

[3.00.3 for TDAS 8.00](#) (zip, 1MB)

[3.00.2 for TDAS 8.00](#) (zip, 1MB)

[3.00.1 for TDAS 8.00](#) (zip, 1MB)

[2.01.1 for TDAS 7.01](#) (zip, 1MB)

[2.00.2 for TDAS 7.00](#) (zip, 1MB)

[2.00.1 for TDAS 7.00](#) (zip, 1MB)

[1.00.1 for TDAS 6.00](#) (zip, 1MB)

UDAS egg

UDAS egg (UDAS Easy Guide to Generate your load routines) provides users with the templates for IDL procedures that can load your own data files into SPEDAS/IDL. According to the document, the users can easily create the load procedure for their own data by modifying the template procedure (about 10 lines identified in this routine). It supports Windows, Linux, and Macintosh. It's easy to use!

1. Prepare your PC in which IDL 8.0 or higher and SPEDAS 2.00 or higher (3.00 is recommended) were installed.
2. Download UDAS egg to your PC and copy it to the directory you want.
3. Modify the template step by step according to the manual.
4. Compile and run the modified procedure to load and plot your data.
5. Further, you can analyze the loaded data using many useful functions included in the SPEDAS.

[Document \(PDF, 180KB\)](#)

Latest Version

[1.00 for CDF/ASCII](#) (zip, 1MB)



Acknowledgment

SPEDAS is a grass-roots data analysis software for the Space Physics community, which was developed by scientists and programmers of the UC Berkeley's Space Sciences Laboratory, UCLA's IGPP and other contributors

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<http://www.iugonet.org/>



Feedbacks

If you have any feedbacks, questions, requests about this hands-on and software, please send email to the following:

Subject: **IUGONET hands-on @ PRIC**

To: **ytanaka@nipr.ac.jp**

We would appreciate your comments!