



Metadata DB for Upper Atmosphere

超高層大気長期変動の全地球上ネットワーク観測・研究
Inter-university Upper atmosphere Global Observation NETwork

Training session

SPEDAS-GUI & IUGONET Type-A

The 3rd ISEE Symposium
PWING-ERG conference and school on the inner
magnetosphere

on March 8-12, 2021

1. Basic operation of IUGONET data service
(IUGONET Type-A)
2. Basic operation of the GUI tool of SPEDAS



What is IUGONET Type-A?

IUGONET Web Service
Upper Atmosphere Lab. v Web Technology
Type-A

Inter-University Upper Atmosphere Global Observation NETWORK

IUGONET DataSet

Instrument/Project	Observed Region	ERG Campaign		
Satellites				
Ground-Based:				
SMART (Telescope)	DST (Telescope)	FMT (Telescope)	Refractor (Telescope)	Huon (Telescope)
Geomagnetic Indices	WDC Geomag., Kyoto	Geomag., Kakioka	MAGDAS/CPMN	HM210
Induction	Magnetometer	SuperDARN	EISCAT	Imager
PWING/PSA	OMTI	Lidar	Ionosonde	Röntmeter
VLF/ELF	MU Radar	EA Radar	MF Radar	MW Radar
VHF Radar	GPS Receiver	AWS	BL/LT/WP Radar	Radiosonde
X-Band Radar	Others			

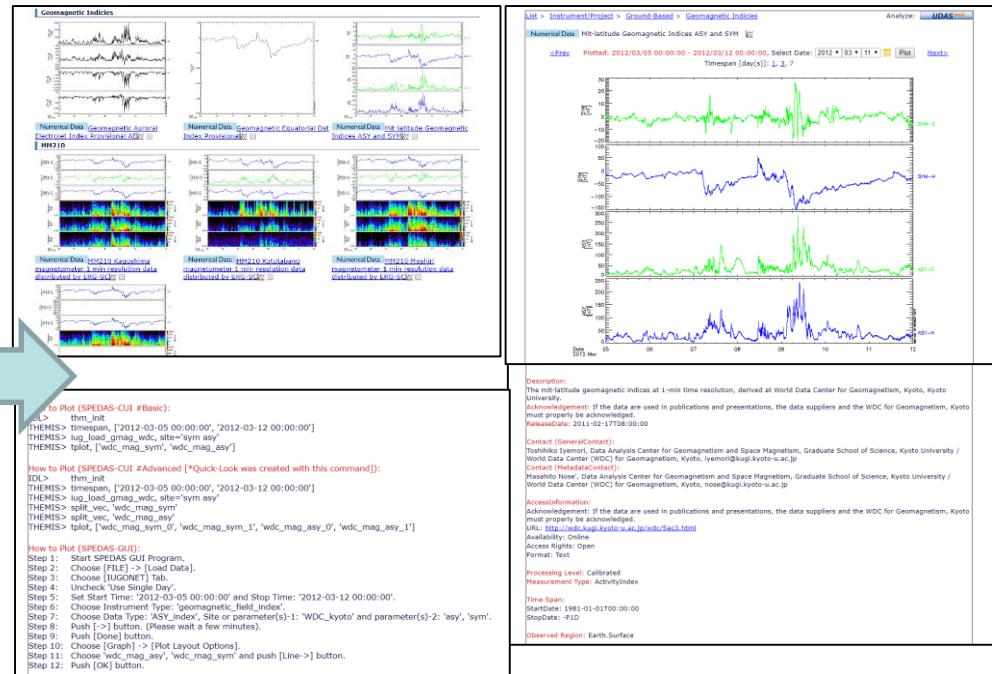
Keyword: To

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: 260 km, apogee: 33,200 km, and period: 550 min). The main purpose of the mission is to study the Earth's magnetosphere and measure DC electric and magnetic field 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/mw/index.php/CampaignObs/Campaign2017>



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

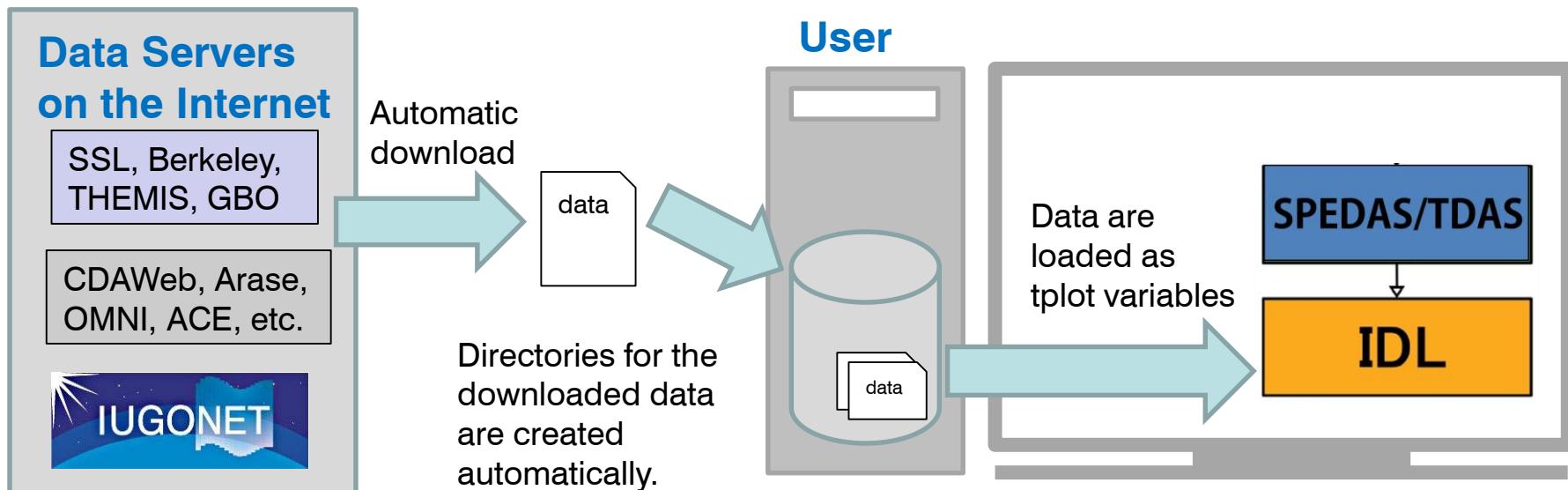
- IUGONET data service (called **IUGONET Type-A**) is capable of cross-searching observational data distributed across the IUGONET universities and institutes, including the PWING data, .
- IUGONET Type-A provides one-stop web services such as searching data, finding interesting events, interactively plotting the data, and leading users to more detailed analysis.

Space Physics Environment Data Analysis Software : SPEDAS

Users can easily load and visualize various kinds of data by a few commands with SPEDAS.

1. Set a time period
2. Load *** data
3. Plot the loaded data

timespan, 'yyyy-mm-dd'
xxx_load_***
tplot, + + +



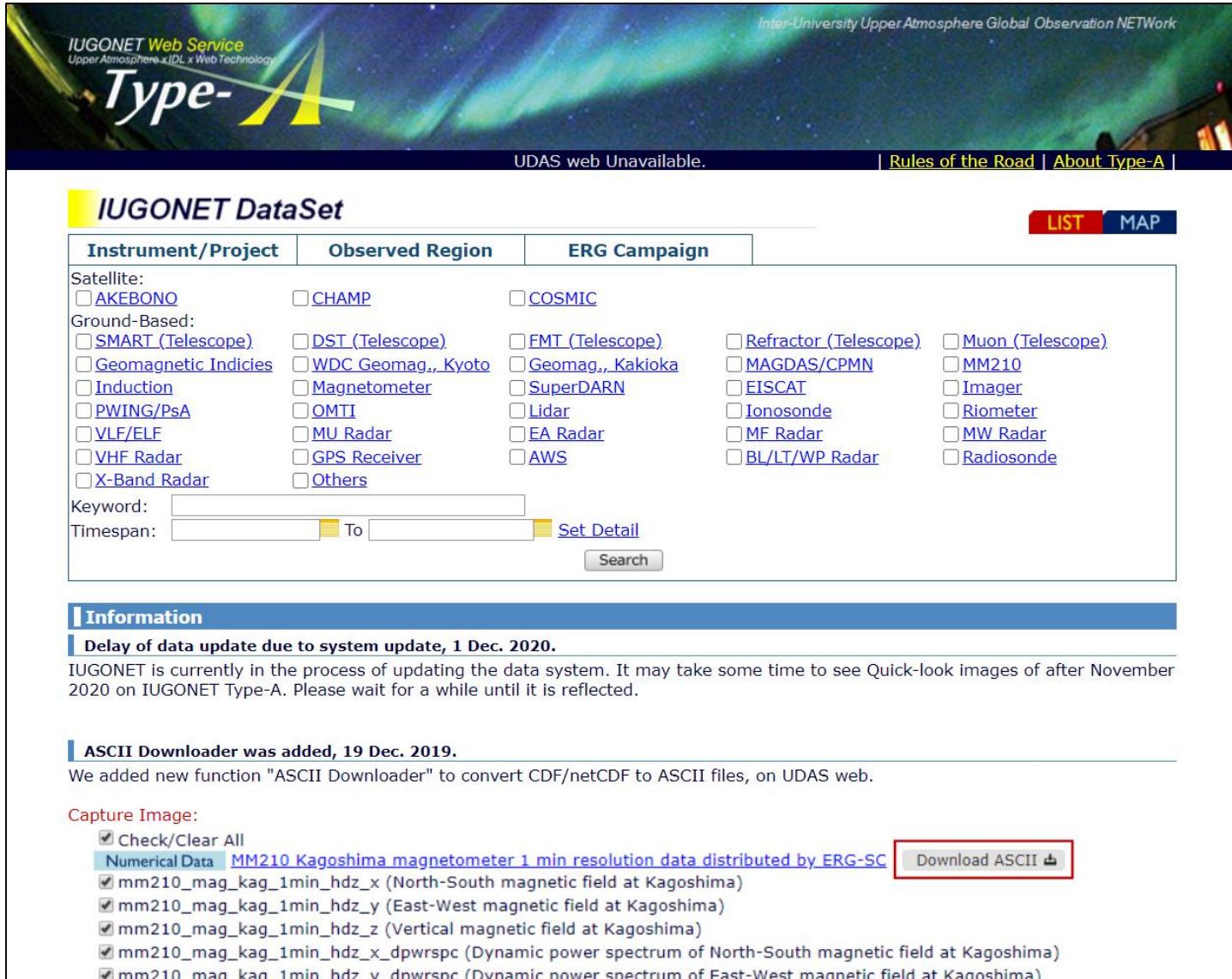
If you use the GUI tool, only a few simple clicks of your mouse are required to make the same plot as that created by the SPEDAS commands above.



Metadata DB for Upper Atmosphere

・ 超高層大気長期変動の全地球上ネットワーク観測・研究
Inter-university Upper atmosphere Global Observation NETwork

How to use IUGONET Type-A

Access to IUGONET Type-A (<http://search.iugonet.org>)

IUGONET Web Service
Upper Atmosphere x IDL x Web Technology

Type-A

Inter-University Upper Atmosphere Global Observation NETWork

UDAS web Unavailable.

| Rules of the Road | About Type-A |

IUGONET DataSet

Instrument/Project **Observed Region** **ERG Campaign**

Satellite:

<input type="checkbox"/> AKEBONO	<input type="checkbox"/> CHAMP	<input type="checkbox"/> COSMIC
----------------------------------	--------------------------------	---------------------------------

Ground-Based:

<input type="checkbox"/> SMART (Telescope)	<input type="checkbox"/> DST (Telescope)	<input type="checkbox"/> FMT (Telescope)	<input type="checkbox"/> Refractor (Telescope)	<input type="checkbox"/> Muon (Telescope)
<input type="checkbox"/> Geomagnetic Indices	<input type="checkbox"/> WDC Geomag., Kyoto	<input type="checkbox"/> Geomag., Kakioka	<input type="checkbox"/> MAGDAS/CPMN	<input type="checkbox"/> MM210
<input type="checkbox"/> Induction	<input type="checkbox"/> Magnetometer	<input type="checkbox"/> SuperDARN	<input type="checkbox"/> EISCAT	<input type="checkbox"/> Imager
<input type="checkbox"/> PWING/PsA	<input type="checkbox"/> OMTI	<input type="checkbox"/> Lidar	<input type="checkbox"/> Ionosonde	<input type="checkbox"/> Riometer
<input type="checkbox"/> VLF/ELF	<input type="checkbox"/> MU Radar	<input type="checkbox"/> EA Radar	<input type="checkbox"/> MF Radar	<input type="checkbox"/> MW Radar
<input type="checkbox"/> VHF Radar	<input type="checkbox"/> GPS Receiver	<input type="checkbox"/> AWS	<input type="checkbox"/> BL/LT/WP Radar	<input type="checkbox"/> Radiosonde
<input type="checkbox"/> X-Band Radar	<input type="checkbox"/> Others			

Keyword:

Timespan: To

LIST **MAP**

Information

Delay of data update due to system update, 1 Dec. 2020.

IUGONET is currently in the process of updating the data system. It may take some time to see Quick-look images of after November 2020 on IUGONET Type-A. Please wait for a while until it is reflected.

ASCII Downloader was added, 19 Dec. 2019.

We added new function "ASCII Downloader" to convert CDF/netCDF to ASCII files, on UDAS web.

Capture Image:

Check/Clear All

Numerical Data [MM210 Kagoshima magnetometer 1 min resolution data distributed by ERG-SC](#)

mm210_mag_kag_1min_hdz_x (North-South magnetic field at Kagoshima)
 mm210_mag_kag_1min_hdz_y (East-West magnetic field at Kagoshima)
 mm210_mag_kag_1min_hdz_z (Vertical magnetic field at Kagoshima)
 mm210_mag_kag_1min_hdz_x_dpwrspc (Dynamic power spectrum of North-South magnetic field at Kagoshima)
 mm210_mag_kag_1min_hdz_y_dpwrspc (Dynamic power spectrum of East-West magnetic field at Kagoshima)

Search data

IUGONET Web Service
Upper Atmosphere xIDL x Web Technology

Type-A

Inter-University Upper Atmosphere Global Observation NETWork

UDAS web Unavailable. | Rules of the Road | About Type-A |

IUGONET DataSet

Instrument/Project	Observed Region	ERG Campaign			
Satellite:	<input type="checkbox"/> AKEBONO	<input type="checkbox"/> CHAMP	<input type="checkbox"/> COSMIC		
Ground-Based:	<input type="checkbox"/> SMART (Telescope)	<input type="checkbox"/> DST (Telescope)	<input type="checkbox"/> FMT (Telescope)	<input type="checkbox"/> Refractor (Telescope)	<input type="checkbox"/> Muon (Telescope)
	<input type="checkbox"/> Geomagnetic Indicies	<input type="checkbox"/> WDC Geomag., Kyoto	<input type="checkbox"/> Geomag., Kakioka	<input type="checkbox"/> MAGDAS/CPMN	<input type="checkbox"/> MM210
Inductors:	<input type="checkbox"/> PWING/Psa	<input type="checkbox"/> Magnetometer	<input type="checkbox"/> SuperDARN	<input type="checkbox"/> EISCAT	<input type="checkbox"/> Imager
	<input checked="" type="checkbox"/> VLF/ELF	<input type="checkbox"/> QMTH	<input type="checkbox"/> Lidar	<input type="checkbox"/> Ionosonde	<input type="checkbox"/> Riometer
	<input type="checkbox"/> VHF Radar	<input type="checkbox"/> MU Radar	<input type="checkbox"/> EA Radar	<input type="checkbox"/> MF Radar	<input type="checkbox"/> MW Radar
	<input type="checkbox"/> X-Band Radar	<input type="checkbox"/> GPS Receiver	<input type="checkbox"/> AWS	<input type="checkbox"/> BL/LT/WP Radar	<input type="checkbox"/> Radiosonde
Keyword:	<input type="text"/>				
Timespan:	<input type="text"/> To <input type="text"/>	<input type="button" value="Get Detail"/>	<input type="button" value="Search"/>		

Information

Delay of data update due to system update, 1 Dec. 2020.

IUGONET is currently in the process of updating the data system. It may take some time to see Quick-look images of after November 2020 on IUGONET Type-A. Please wait for a while until it is reflected.

ASCII Downloader was added, 19 Dec. 2019.

We added new function "ASCII Downloader" to convert CDF/netCDF to ASCII files, on UDAS web.

Capture Image:

Check/Clear All

Numerical Data: [MM210 Kagoshima magnetometer 1 min resolution data distributed by ERG-SC](#)

- mm210_mag_kag_1min_hdz_x (North-South magnetic field at Kagoshima)
- mm210_mag_kag_1min_hdz_y (East-West magnetic field at Kagoshima)
- mm210_mag_kag_1min_hdz_z (Vertical magnetic field at Kagoshima)
- mm210_mag_kag_1min_hdz_x_dpwrspc (Dynamic power spectrum of North-South magnetic field at Kagoshima)
- mm210_mag_kag_1min_hdz_y_dpwrspc (Dynamic power spectrum of East-West magnetic field at Kagoshima)
- mm210_mag_kag_1min_hdz_z_dpwrspc (Dynamic power spectrum of Vertical magnetic field at Kagoshima)

This function converts CDF/netCDF to ASCII files, and enables you to download it to your local PC. It is useful for easy reading on your analysis software and confirmation of actual numerical values immediately. In addition, it is also very effective for comparing several research field data on universal platform for data fusion.

Select the LIST or MAP search.

You can limit the search results by selecting the Instrument/Project from the list or inputting the keyword that you want to search.

Input the timespan you want to search the data
**2021/01/01 (from)
2021/01/07 (to)**

Click "Search" button

Search result (list display)

The screenshot shows the IUGONET Type-A search interface. At the top, there's a banner with the text "IUGONET Web Service Upper Atmosphere x IDL x Web Technology" and "Type-A". Below the banner, it says "Inter-University Upper Atmosphere Global Observation NETWork" and "UDAS web Unavailable." There are links for "Rules of the Road" and "About Type-A".

The main area is titled "IUGONET DataSet". It has three tabs: "Instrument/Project" (selected), "Observed Region", and "ERG Campaign".

Instrument/Project:

- Satellite: AKEBONO, CHAMP, COSMIC
- Ground-Based:
 - SMART (Telescope), DST (Telescope), FMT (Telescope), Refractor (Telescope), Muon (Telescope)
 - Geomagnetic Indicies, WDC Geomag., Kyoto, Geomag., Kakioka, MAGDAS/CPMN, MM210
 - Induction, Magnetometer, SuperDARN, EISCAT, Imager
 - PWING/PsA, OMTI, Lidar, Ionosonde, Riometer
 - VLF/ELF, MU Radar, EA Radar, MF Radar, MW Radar
 - VHF Radar, GPS Receiver, AWS, BL/LT/WP Radar
 - X-Band Radar, Others, Radiosonde

Keyword:

Timespan: 2021/01/01 To 2021/01/07

Plot Contains Summary Plot, Create Plot (Select one or more variables from list below and press 'Plot')

Search Results:

Text **Plot**

Ground-based

PWING/PsA

- Numerical Data [64Hz induction magnetometer data for Athabasca in CDF](#)
- Numerical Data [64Hz induction magnetometer data for Gakona in CDF](#)
- Numerical Data [64Hz induction magnetometer data for Husafell in CDF](#)
- Numerical Data [64Hz induction magnetometer data for Istok.\(near Norilisk\) in CDF](#)
- Numerical Data [64Hz induction magnetometer data for Kapuskasing in CDF](#)
- Numerical Data [64Hz induction magnetometer data for Nyrola in CDF](#)
- Numerical Data [64Hz induction magnetometer data for Zhigansk in CDF](#)
- Numerical Data [CDF data of cosmic noise absorption measured with the 30MHz broadbeam riometer at Athabasca, Canada.](#)
- Numerical Data [CDF data of cosmic noise absorption measured with the 30MHz broadbeam riometer at Gakona, Alaska \(US\).](#)
- Numerical Data [CDF data of cosmic noise absorption measured with the 30MHz broadbeam riometer at Husafell, Iceland.](#)
- Numerical Data [CDF data of cosmic noise absorption measured with the 30MHz broadbeam riometer at Istok \(near Norilsk\), Russia.](#)

You can switch between the text and QL-plot display modes.

If you click “Plot”, the search results are shown by QL plots of each dataset.

List of the search results is shown here.

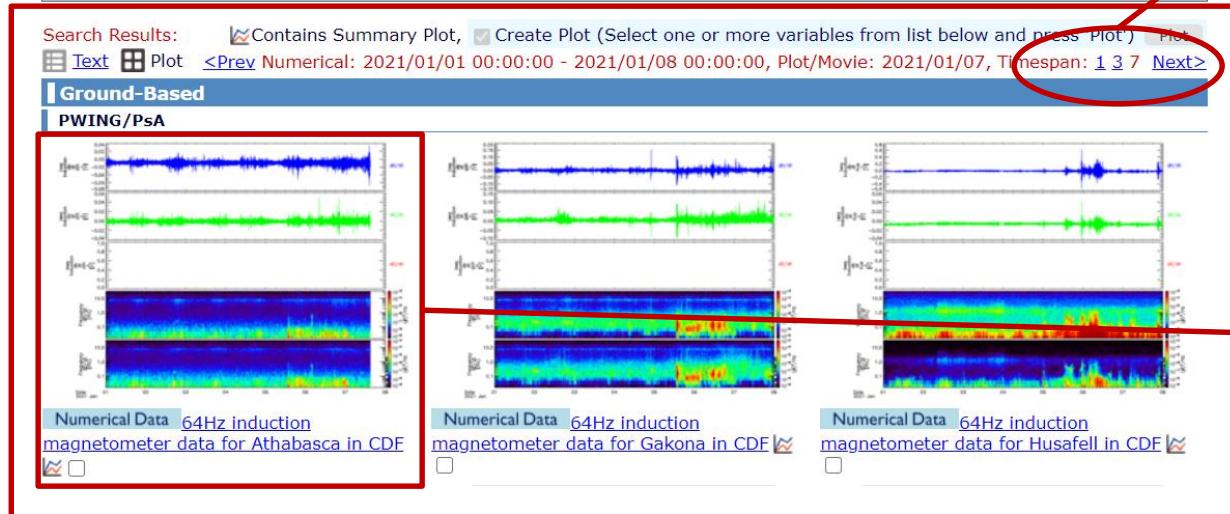
If you click the title of each dataset, you can see the detailed information of the data.

Search result (QL plot display)



IUGONET DataSet

Instrument/Project	Observed Region	ERG Campaign			
Satellite:	<input type="checkbox"/> AKEBONO	<input type="checkbox"/> CHAMP	<input type="checkbox"/> COSMIC		
Ground-Based:	<input type="checkbox"/> SMART (Telescope)	<input type="checkbox"/> DST (Telescope)	<input type="checkbox"/> FMT (Telescope)	<input type="checkbox"/> Refractor (Telescope)	<input type="checkbox"/> Muon (Telescope)
	<input type="checkbox"/> Geomagnetic Indicies	<input type="checkbox"/> WDC Geomag., Kyoto	<input type="checkbox"/> Geomag., Kakioka	<input type="checkbox"/> MAGDAS/CPMN	<input type="checkbox"/> MM210
	<input type="checkbox"/> Induction	<input type="checkbox"/> Magnetometer	<input type="checkbox"/> SuperDARN	<input type="checkbox"/> EISCAT	<input type="checkbox"/> Imager
<input checked="" type="checkbox"/> PWING/PsA	<input type="checkbox"/> OMTI	<input type="checkbox"/> Lidar	<input type="checkbox"/> Ionosonde	<input type="checkbox"/> MF Radar	<input type="checkbox"/> Riometer
<input type="checkbox"/> VLF/ELF	<input type="checkbox"/> MU Radar	<input type="checkbox"/> EA Radar	<input type="checkbox"/> BL/LT/WP Radar	<input type="checkbox"/> MW Radar	<input type="checkbox"/> Radiosonde
<input type="checkbox"/> VHF Radar	<input type="checkbox"/> GPS Receiver	<input type="checkbox"/> AWS			
<input type="checkbox"/> X-Band Radar	<input type="checkbox"/> Others				
Keyword:	<input type="text"/>				
Timespan:	<input type="text"/> 2021/01/01	<input type="button" value="To"/>	<input type="text"/> 2021/01/07	<input type="button" value="Set Detail"/>	<input type="button" value="Search"/>



You can select the time interval from 1 or 3 or 7 days. The default is 7 days.

Search results are shown as QL plots here.

If you click the QL plot or the title of the dataset, you can see the detailed information of the data.

Metadata display

IUGONET Web Service
Upper Atmosphere xIDL x Web Technology

Type-A

Inter-University Upper Atmosphere Global Observation NETWork

UDAS web Unavailable. | Rules of the Road | About Type-A |

IUGONET DataSet

Instrument/Project	Observed Region	ERG Campaign
<input type="checkbox"/> AKEBONO	<input type="checkbox"/> CHAMP	<input type="checkbox"/> COSMIC
Ground-Based:		
<input type="checkbox"/> SMART (Telescope)	<input type="checkbox"/> DST (Telescope)	<input type="checkbox"/> FMT (Telescope)
<input type="checkbox"/> Geomagnetic Indices	<input type="checkbox"/> WDC Geomag., Kyoto	<input type="checkbox"/> Geomag., Kakioka
<input type="checkbox"/> Induction	<input type="checkbox"/> Magnetometer	<input type="checkbox"/> SuperDARN
<input type="checkbox"/> PWING/PsA	<input type="checkbox"/> OMTI	<input type="checkbox"/> Lidar
<input type="checkbox"/> VLF/ELF	<input type="checkbox"/> MU Radar	<input type="checkbox"/> EA Radar
<input type="checkbox"/> VHF Radar	<input type="checkbox"/> GPS Receiver	<input type="checkbox"/> AWS
<input type="checkbox"/> X-Band Radar	<input type="checkbox"/> Others	<input type="checkbox"/> Refractor (Telescope)
		<input type="checkbox"/> Muon (Telescope)
		<input type="checkbox"/> MAGDAS/CPMN
		<input type="checkbox"/> MM210
		<input type="checkbox"/> EISCAT
		<input type="checkbox"/> Imager
		<input type="checkbox"/> Ionosonde
		<input type="checkbox"/> Riometer
		<input type="checkbox"/> MF Radar
		<input type="checkbox"/> MW Radar
		<input type="checkbox"/> BL/LT/WP Radar
		<input type="checkbox"/> Radiosonde

Keyword:

Timespan: To Set Detail

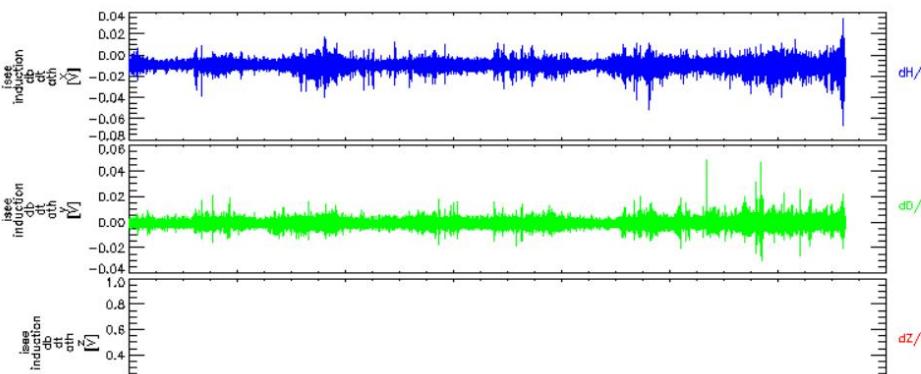
LIST / **MAP**

List > Instrument/Project > Ground-Based > PWING/PsA Analyze: UDAS web

Numerical Data 64Hz induction magnetometer data for Athabasca in CDF

<Prev Plot: 2021/01/01 00:00:00 - 2021/01/08 00:00:00, Select Date: 2021 ▼ 01 ▼ 07 ▼ Plot Next>

Timespan [day(s)]: 1, 3, 7



The metadata display page shows the detailed information of the dataset, such as QL plot, contact person, and data use policy.

You can select the start date of the QL plot and time interval (1, 3, or 7 days).



Scroll down

Metadata display

Description:

The induction magnetometer data observed at Athabasca, Canada. The data consist of variations of three-dimensional (H, D, and Z components) geomagnetic field taken with a sampling rate of 64 Hz, and some engineering parameters for the instrument, such as the sensitivity and phase difference. The digital data are distributed in the Common Data Format (CDF) through the ERG-SC repository. Importnat Notes: 1. For frequencies below ~1Hz, use the following equation to obtain amplitude values in units of nT/s: dB/dt (nT/s) = data (V) / quick_sensitivity. The value of quick_sensitivity is given in global attributes. For frequencies above ~1Hz, use the exact sensitivity curve to obtain absolute amplitude of waves. 2. Please note that the positive direction (polarity) of H, D, and Z are different depending on the station. For example, in February 2011, the polarity is ATH: positive=northward, eastward, upward; MGD: positive=northward, eastward, downward; PTK: positive=northward, eastward, downward; MSR: positive=southward, westward, upward; STA: positive=northward, eastward, downward. Please see http://stdb2.isee.nagoya-u.ac.jp/magne/magne_stations.html for the latest information.

Acknowledgement: 1. Please contact Kazuo Shiokawa ([shiokawa at ise.e.nagoya-u.ac.jp](mailto:shiokawa@isee.nagoya-u.ac.jp)) before using the data for any publications and/or presentations. 2. References: Shiokawa, K., R. Nomura, K. Sakaguchi, Y. Otsuka, Y. Hamaguchi, M. Satoh, Y. Katoh, Y. Yamamoto, B. M. Shevtsov, S. Smirnov, I. Poddelsky, and M. Connors, The STEL induction magnetometer network for observation of high-frequency geomagnetic pulsations, *Earth Planets Space*, 62(6), 517-524, doi:10.5047/eps.2010.05.003, 2010.

ReleaseDate: 2011-04-01T00:00:00

ExpirationDate: 2199-12-31T00:00:00

Contact (PrincipalInvestigator):

Kazuo Shiokawa, Institute for Space and Earth Environmental Research, Nagoya University, shiokawa (at) ise.e.nagoya-u.ac.jp

Contact (Publisher):

Kanako Seki, Institute for Space and Earth Environmental Research, Nagoya University, seki (at) ise.e.nagoya-u.ac.jp

Contact (MetadataContact):

Tomoaki Hori, Institute for Space and Earth Environmental Research, Nagoya University, horit (at) ise.e.nagoya-u.ac.jp

Contact (MetadataContact):

ISEE IUGONET Metadata Management Group, Institute for Space and Earth Environmental Research, Nagoya University, stel-iugonet (at) ise.e.nagoya-u.ac.jp

AccessInformation:

Acknowledgement: 1. Please contact Kazuo Shiokawa ([shiokawa at ise.e.nagoya-u.ac.jp](mailto:shiokawa@isee.nagoya-u.ac.jp)) before using the data for any publications and/or presentations. 2. References: Shiokawa, K., R. Nomura, K. Sakaguchi, Y. Otsuka, Y. Hamaguchi, M. Satoh, Y. Katoh, Y. Yamamoto, B. M. Shevtsov, S. Smirnov, I. Poddelsky, and M. Connors, The STEL induction magnetometer network for observation of high-frequency geomagnetic pulsations, *Earth Planets Space*, 62(6), 517-524, doi:10.5047/eps.2010.05.003, 2010.

URL: <https://ergsc.isee.nagoya-u.ac.jp/index.shtml.en>

Availability: Online

Access Rights: Open

Format: CDF

Processing Level: Uncalibrated

Measurement Type: Magnetogram

Time Span:

StartTime: 2005-09-09T00:00:00

StopDate: -P180D

Observed Region: Earth.NearSurface.Ionosphere.ERegion

Observed Region: Earth.Magnetosphere

Keywords: EARTH SCIENCE Atmosphere Sun-earth Interactions Ionosphere/Magnetosphere Dynamics Magnetic Fields/Magnetic Currents

Instrument:

Name: Induction Magnetometer at Athabasca of ISEE Magnetometer Data

Description: Induction Magnetometer at Athabasca of ISEE Magnetometer Data. This induction magnetometer measures variations of 3-D vector geomagnetic field with a sampling rate of 64 Hz controlled by the PC clock signal.

Data description:
This information is useful for writing scientific papers.

Data use policy

Contact person:
You can easily contact Pls of the dataset.

Data location and file format:
You can access the webpage of the data

Information of instrument

Scroll down

Metadata display

```

Observatory:
Name: ISEE Magnetometer Athabasca station
Description: ISEE Magnetometer station at Athabasca, Canada.
Contact (GeneralContact):
Kazuo Shiokawa, Institute for Space and Earth Environmental Research, Nagoya University, shiokawa (at) isee.nagoya-u.ac.jp
Contact (MetadataContact):
Tomoaki Hori, Institute for Space and Earth Environmental Research, Nagoya University, horit (at) isee.nagoya-u.ac.jp
Contact (MetadataContact):
ISEE IUGONET Metadata Management Group, Institute for Space and Earth Environmental Research, Nagoya University, stel-iugonet (at) isee.nagoya-u.ac.jp
Location:
ObservatoryRegion: Earth.Surface
CoordinateSystemName: WGS84
Latitude: 54.60
Longitude: 246.36

```

Observed Data:

```

How to Plot (SPEDAS-CUI #Basic):
IDL> thm_init
THEMIS> timespan, ['2020-12-26 00:00:00', '2021-01-02 00:00:00']
THEMIS> iug_load_gmag_isee_induction, site='ath'
THEMIS> tplot, 'isee_induction_db_dt_ath'

```

```

How to Plot (SPEDAS-CUI #Advanced [*Quick-Look was created with this command]):
IDL> thm_init
THEMIS> timespan, ['2020-12-26 00:00:00', '2021-01-02 00:00:00']
THEMIS> iug_load_gmag_isee_induction, site='ath'
THEMIS> tdpwrspc, 'isee_induction_db_dt_ath', nboxpoints=8192
THEMIS> zlim, 'isee_induction_db_dt_ath_x_dpwrspc', 0.000000001, 0.001
THEMIS> zlim, 'isee_induction_db_dt_ath_y_dpwrspc', 0.000000001, 0.001
THEMIS> zlim, 'isee_induction_db_dt_ath_z_dpwrspc', 0.000000001, 0.001
THEMIS> options, 'isee_induction_db_dt_ath_x_dpwrspc', 'title', 'Frequency!CdH/dt'
THEMIS> options, 'isee_induction_db_dt_ath_y_dpwrspc', 'title', 'Frequency!CdD/dt'
THEMIS> options, 'isee_induction_db_dt_ath_z_dpwrspc', 'title', 'Frequency!CdZ/dt'
THEMIS> options, 'isee_induction_db_dt_ath_x_dpwrspc', 'ysubtitle', '[Hz]'
THEMIS> options, 'isee_induction_db_dt_ath_y_dpwrspc', 'ysubtitle', '[Hz]'
THEMIS> options, 'isee_induction_db_dt_ath_z_dpwrspc', 'ysubtitle', '[Hz]'
THEMIS> tplot_options, 'region', [0.05, 0, 1, 1]
THEMIS> tplot, ['isee_induction_db_dt_ath_x', 'isee_induction_db_dt_ath_y', 'isee_induction_db_dt_ath_z',
'isee_induction_db_dt_ath_x_dpwrspc', 'isee_induction_db_dt_ath_y_dpwrspc',
'isee_induction_db_dt_ath_z_dpwrspc']

```

```

How to Plot (SPEDAS-GUI):
Step 1: Start SPEDAS GUI Program.
Step 2: Choose [Data] -> [Load Data from Plug-in].
Step 3: Choose [IUGONET] Tab.
Step 4: Uncheck 'Use Single Day'.
Step 5: Set Start Time: '2020-12-26 00:00:00' and Stop Time: '2021-01-02 00:00:00'.
Step 6: Choose Instrument Type: 'geomagnetic_field_induction'.
Step 7: Choose Data Type: 'STEL#', Site or parameter(s)-1: 'ath' and parameter(s)-2: ''.
Step 8: Push [>] button. (Please wait a few minutes).
Step 9: Push [Done] button.
Step 10: Choose [Plot] -> [Plot Layout Options].
Step 11: Choose 'stel_induction_db_dt_ath' and push [Line->] button.
Step 12: Push [OK] button.

```

```

How to Plot (M-UDAS #Basic):
Note: Integrated Software M-UDAS based on MATLAB, http://www.iugonet.org/product/analysis/m-udas/
> iug_load_gmag_isee_induction('2020-12-26 00:00:00', '2021-01-02 00:00:00', 'site', 'ath');
> plot(isee_induction_ath_time, isee_induction_ath_db_dt);
> datetick('x', 'mm/dd');

```

Information of observatory

Basic SPEDAS commands (for the command line interface) to load and plot the data.

Advanced SPEDAS commands to customize the plot

How to load and plot with GUI of SPEDAS.

MATLAB command to load and plot the data with M-UDAS.



Metadata DB for Upper Atmosphere

超高層大気長期変動の全地球上ネットワーク観測・研究
Inter-university Upper atmosphere Global Observation NETwork

Hand on of SPEDAS-GUI

Prepare 64 bit Operating System.

1. Access the following URL

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

2. Download **SPEDAS 4.1** zip file for your operating system(Win or Mac), and then unzip it to your desktop.

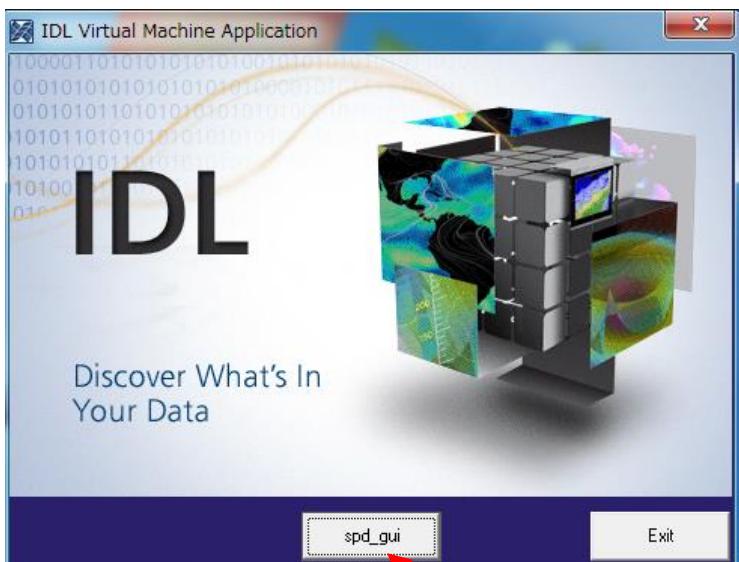
3. **Executable files (SPEDAS 4.1, October 2020).** These zip files contain executable files that can be run directly without installing anything else. They include a Virtual Machine (VM) version of IDL and they open the SPEDAS GUI but they do not include a command line tool, nor the TDAS or SPEDAS IDL source code. They also include Geopack.

IDL 8.5.1

- [TDAS 12.1 + SPEDAS 4.1 , Windows 64bit executable with IDL 8.5.1, CDF 3.7.1, Geopack 10.6 \(~55 MB\)](#)
- [TDAS 12.1 + SPEDAS 4.1 , MacOs 64bit executable with IDL 8.5.1, CDF 3.7.1, Geopack 10.6 \(~70 MB\)](#)
- [TDAS 12.1 + SPEDAS 4.1 , Linux 64bit executable with IDL 8.5.1, CDF 3.7.1, Geopack 10.6 \(~70 MB\)](#)
- [TDAS 12.1 + SPEDAS 4.1 , Linux 64bit executable with IDL 8.5.1, CDF 3.7.1, 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'.



Click the icon
'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

**Doule-click the
executable file named
'spedas'**

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



Metadata DB for Upper Atmosphere

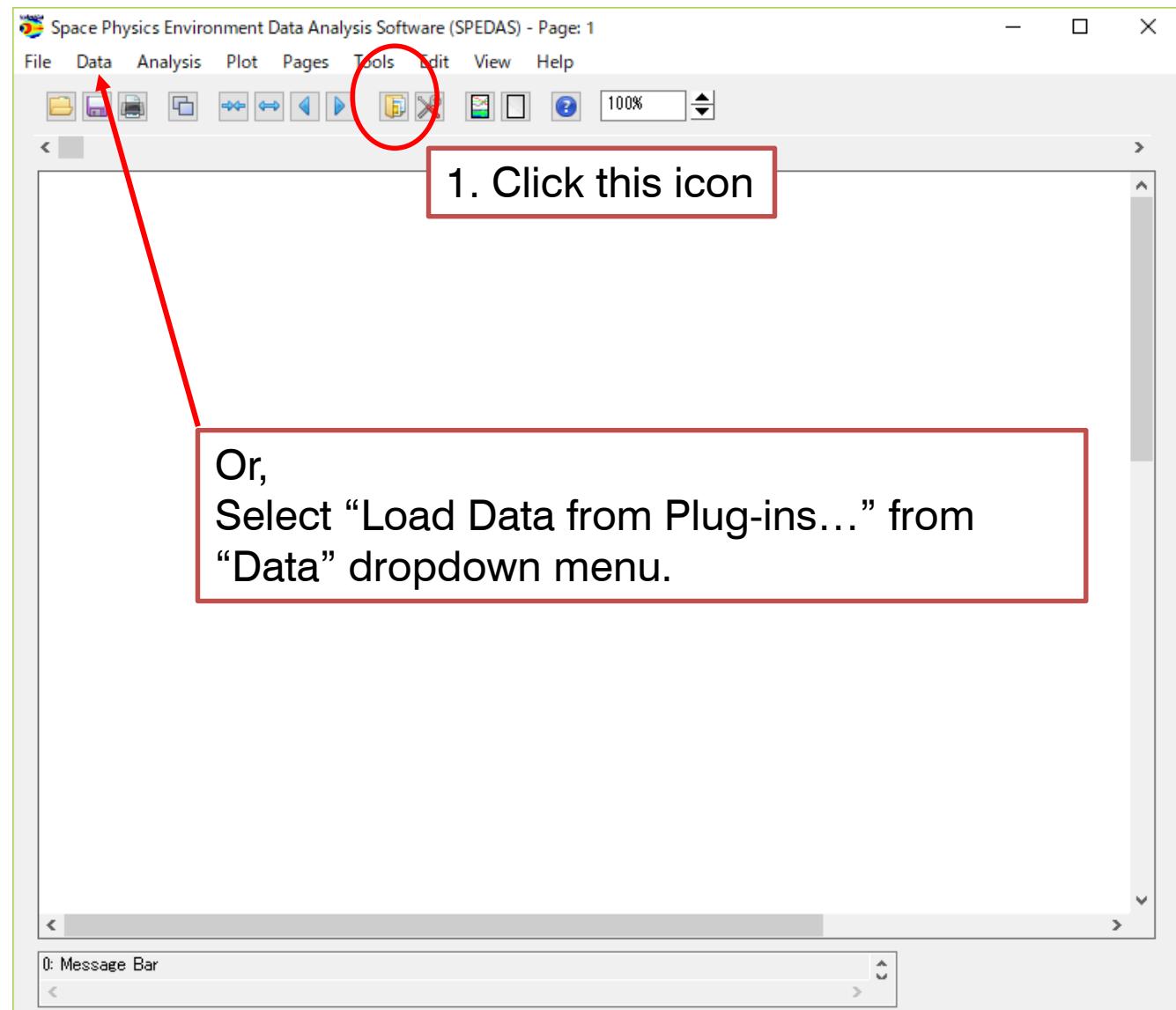
・ 超高層大気長期変動の全地球上ネットワーク観測・研究
Inter-university Upper atmosphere Global Observation NETwork

How to Use SPEDAS-GUI

part1

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

Load Dst index





Basic Operation of SPEDAS GUI

IUGONET

SECS THEMIS THEMIS Derived Product

ACE BARREL DSCOVR ELMIN FAST GOES ICON Geomagnetic Indices IUGONET

IUGONET Data Selection:

Start Time: 2012-03-04/00:00:00 1. Click IUGONET Tab

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

Single Day 2. Uncheck "Use Single Day"

Instrument Type: geomagnetic_field_index

Data Type: Dst_index *all* WDC_kyoto Parameter(s)-2: * final prov

Site or parameter(s)-1:

Parameter(s)-2:

Clear Site or Parameters-1 Clear Parameters-2

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

3. Set Date and Time
Start Time: 2012-03-04/00:00:00
Stop Time: 2012-03-11/00:00:00

4. Change Instrument Type
geomagnetic_field_index

Delete All Data

Done

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

IUGONET

SECS THEMIS THEMIS Derived Products WIND

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: Site or parameter(s)-1: Parameter(s)-2:

Dst_index	*(all)	*
AE_index	WDC_kyoto	final
ASY_index		prov
Wp_index		

1. Choose three parameters

- Dst_index
- *(all)
- *

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

2. Click the arrow

Delete All Data

Done

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



Basic Operation of SPEDAS GUI

IUGONET

SECS THEMIS THEMIS Derived Products WIND

ACE BARREL DSCOVR ELMIN FAST GOES ICON Geomagnetic Indices IUGONET Lomonosov MAVEN_PPP MMS OMNI POES

IUGONET Data Selection: Data Loaded:

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

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

Use Single Day

Instrument Type: geomagnet Rules of Data Use:

Data Type: Site
Dst_index *
AE_index (all)
ASY_index
Wp_index

i 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.

Note: # means that the load p in collaboration with the キャンセル

1. Click "OK"

Done

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



Basic Operation of SPEDAS GUI

IUGONET

SECS THEMIS THEMIS Derived Products WIND

ACE BARREL DSCOVR ELMFIN 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

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

Data Loaded:

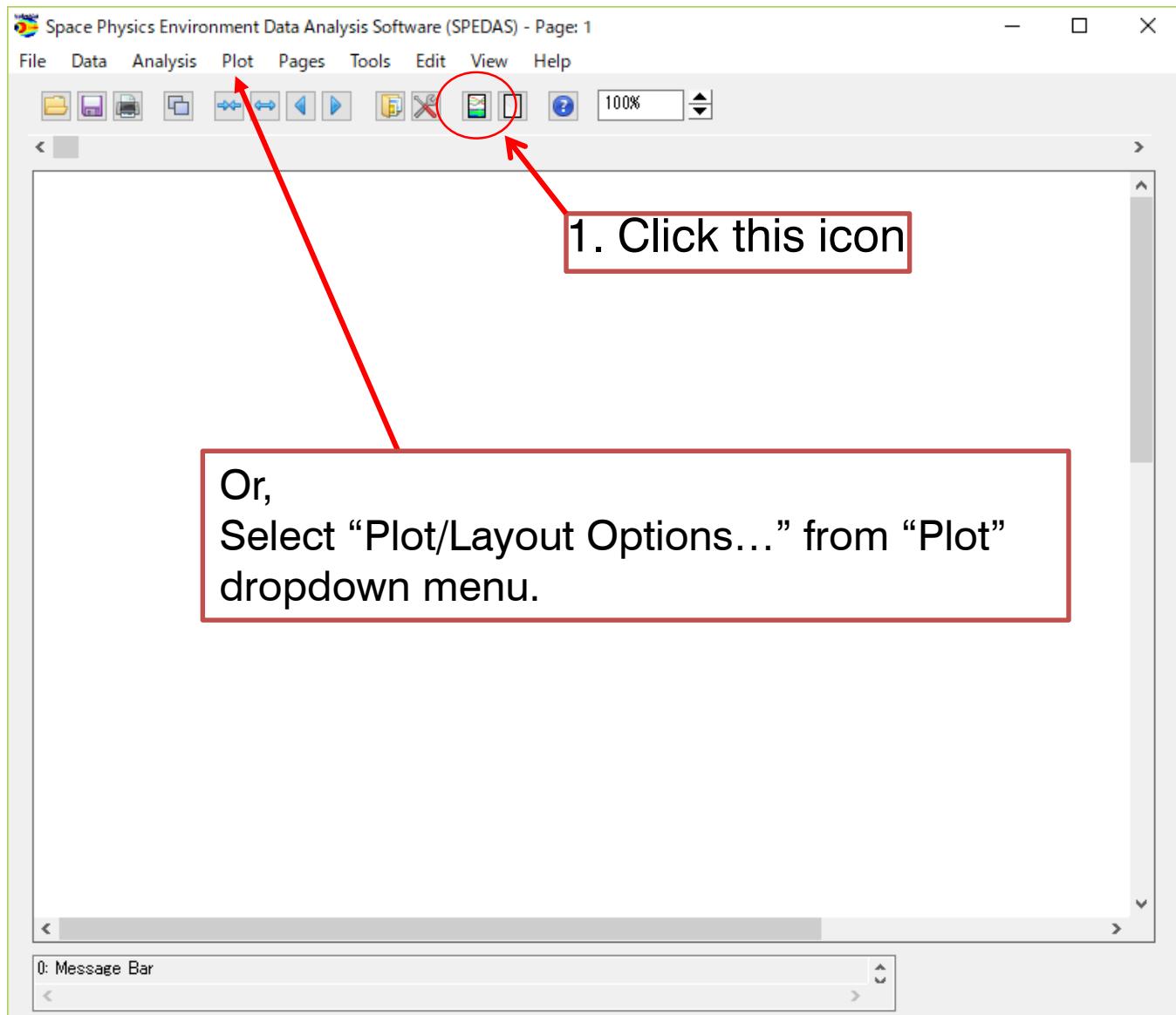
- IUGONET
 - geomagnetic_field_index
 - dst
 - wdc_mag_dst_prov [2012-03-04/00:30:00 to 2012-03-10/

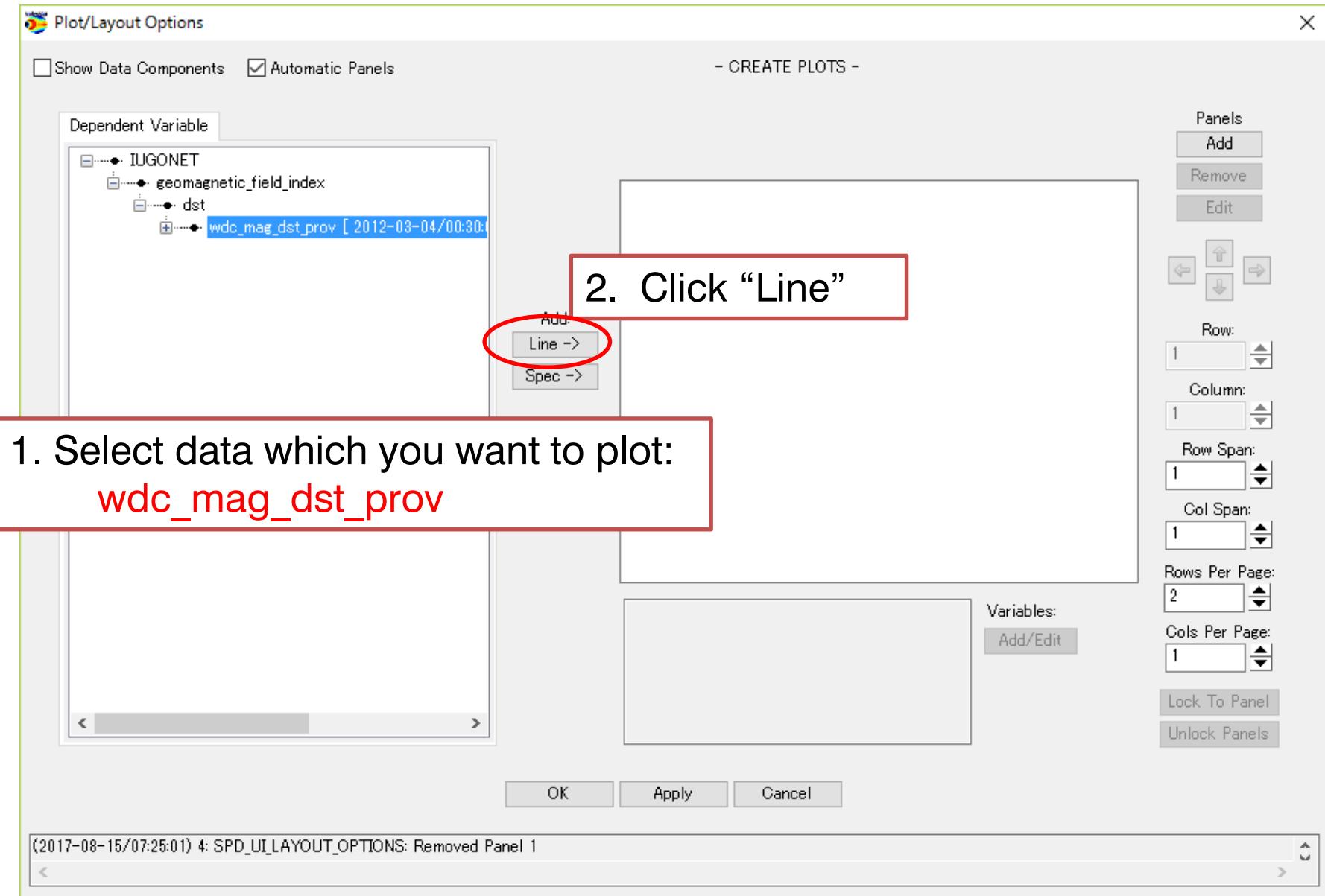
1. Data was loaded successfully!

(2019-01-30/08:03:41) 22: IUGONET Data Loaded Successfully

2. Click "Done"

Plot data







Basic Operation of SPEDAS GUI

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 ->

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

1. Selected variable name is added to this box

Variables:
Add/Edit

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

OK Apply Cancel

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

2. Click OK



Basic Operation of SPEDAS GUI

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:

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

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

Unlock Panels

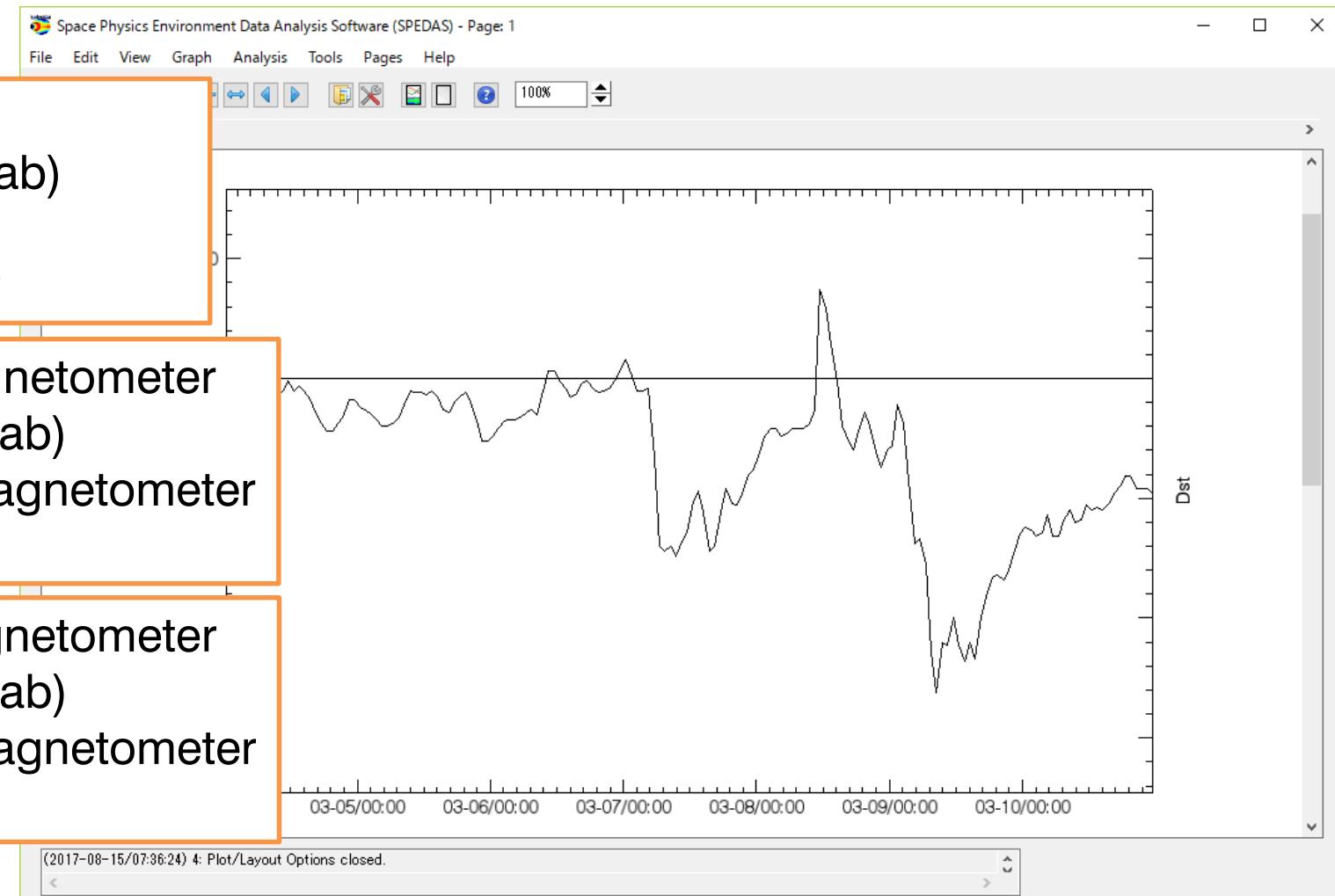
OK Apply Cancel

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

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

The screenshot shows the "Plot/Layout Options" dialog box of the SPEDAS GUI. On the left, there's a tree view of dependent variables under the IUGONET category. In the center, a list shows a single panel entry: "(L) Panel 1 (1, 1) - wdc_mag_dst_prov_time -vs- wdc_mag_dst_prov_data". On the right, there are several controls: "Panels" buttons (Add, Remove, Edit), a grid layout editor with "Row" and "Column" dropdowns, and "Row Span" and "Col Span" buttons. At the bottom right, there are "Variables" buttons (Add/Edit) and two checkboxes: "Lock To Panel" and "Unlock Panels". Red boxes and arrows highlight the "Panels" buttons, the grid layout controls, and the "Lock To Panel" checkbox. A red border also surrounds the explanatory text for the "PanelsX(Y,Z)" concept.

Load other three data





Basic Operation of SPEDAS GUI

IUGONET

ACE BARREL ELFIN Lomo FAST GOES Geomagnetic Indices IUGONET MA

IUGONET Data Selection:

Start Time: 2012-03-04/00:00:00 Stop Time: 2012-03-11/00:00:00

Instrument Type: geomagnetic_field_index

Data Type: Dst_index AE_index ASY_index

Site or parameter(s)-1: *(all) WDC_kyoto

Parameter-2: * min hour prov_min prov_hour

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

1. Select IUGONET tab

2. Select magnetic_field_index

3. Select AE_index, *(all), *

4. Click arrow

5. Data is loaded

>Delete All Data

The screenshot shows the SPEDAS GUI interface for IUGONET data selection. Step 1 highlights the 'IUGONET' tab in the top navigation bar. Step 2 highlights the 'magnetic_field_index' instrument type. Step 3 highlights the 'AE_index', '*(all)', and '*' parameters selected in the 'Site or parameter(s)-1' and 'Parameter-2' fields respectively. Step 4 highlights the 'Load' button (indicated by a red circle). Step 5 highlights the 'Data Loaded' panel showing the structure of the loaded data, including 'geomagnetic_field_index' with 'dst' and 'ae' sub-folders, and their corresponding time ranges. A note at the bottom states that '#' means the load procedure was developed in collaboration with the ERG Science Center.



Basic Operation of SPEDAS GUI

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: magdas# 210mm# STEL# WDC_kyoto NIPR# *(all) ama asb daw her hln hob kuj laq mcq

Site or parameter(s)-1: * 1sec

Part of day: IPK

Clear Site or Parameters-1 Clear Parameters-2

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

3. Click arrow

4. Data is loaded

5. Click Done

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

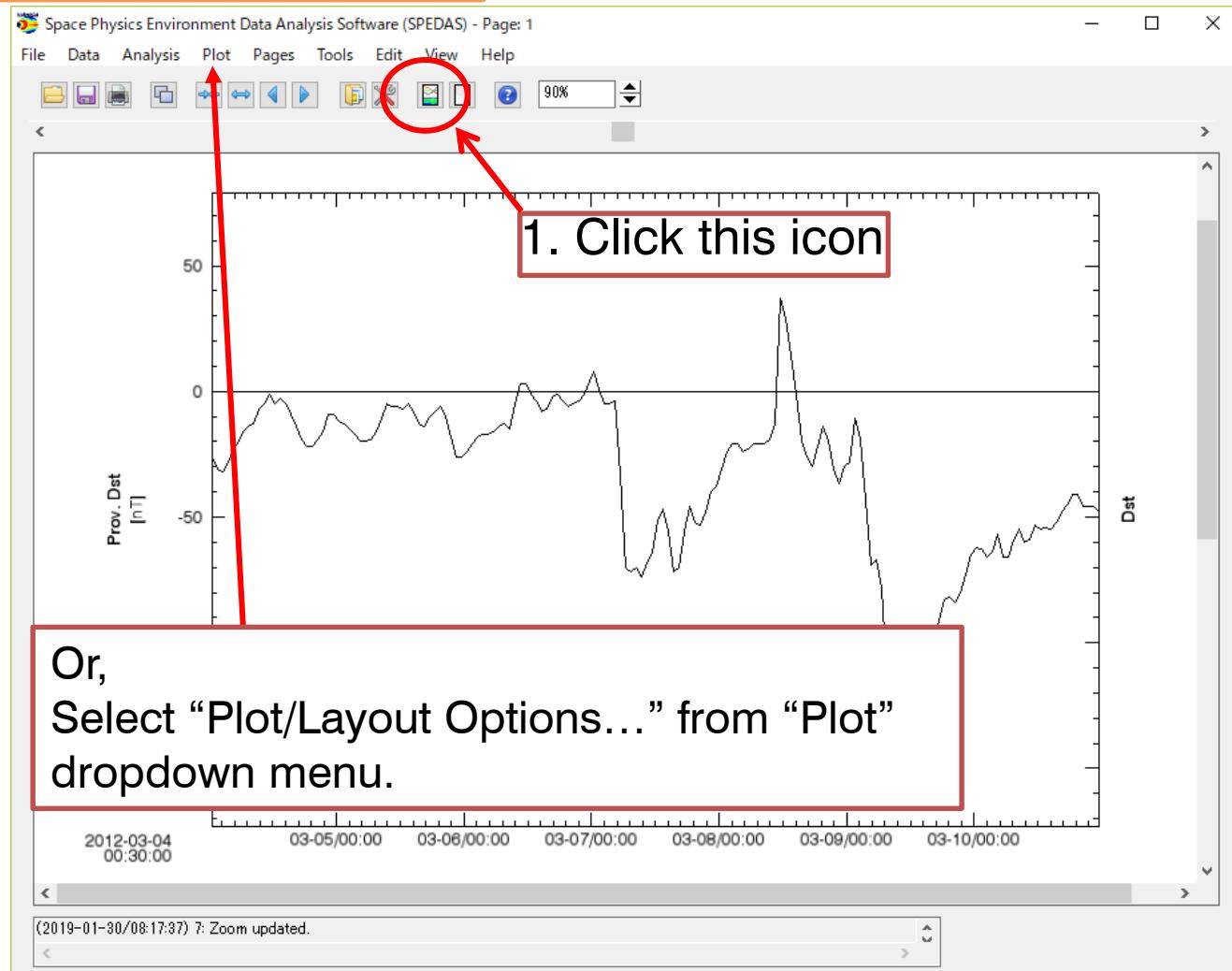
Data Loaded:

- IUGONET
 - geomagnetic_field_index
 - dst
 - wdc_mag_dst_prov [2012-03-04/00:30:00 to 2012-03-10/23:30:00]
 - ae
 - wdc_mag_ae_prov_1min [2012-03-04/00:00:30 to 2012-03-10/23:30:00]
 - geomagnetic_field_fluxgate
 - magdas_mag_asb_1sec_f [2012-03-04/00:00:00 to 2012-03-10/23:30:00]
 - magdas_mag_asb_1sec_hdz [2012-03-04/00:00:00 to 2012-03-10/23:30:00]
 - her
 - magdas_mag_her_1sec_f [2012-03-04/00:00:00 to 2012-03-10/23:30:00]
 - magdas_mag_her_1sec_hdz [2012-03-04/00:00:00 to 2012-03-10/23:30:00]
 - asb
 - magdas_mag_asb_1sec_f [2012-03-04/00:00:00 to 2012-03-10/23:30:00]
 - magdas_mag_asb_1sec_hdz [2012-03-04/00:00:00 to 2012-03-10/23:30:00]
 - her
 - magdas_mag_her_1sec_f [2012-03-04/00:00:00 to 2012-03-10/23:30:00]
 - magdas_mag_her_1sec_hdz [2012-03-04/00:00:00 to 2012-03-10/23:30:00]

Delete All Data

Add plot

wdc_mag_ae_prov_1min





Basic Operation of SPEDAS GUI

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 [2]
- 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]

1. Click Add

2. Select wdc_mag_ae_prov_1min

3. Click "Line"

4. Data are added

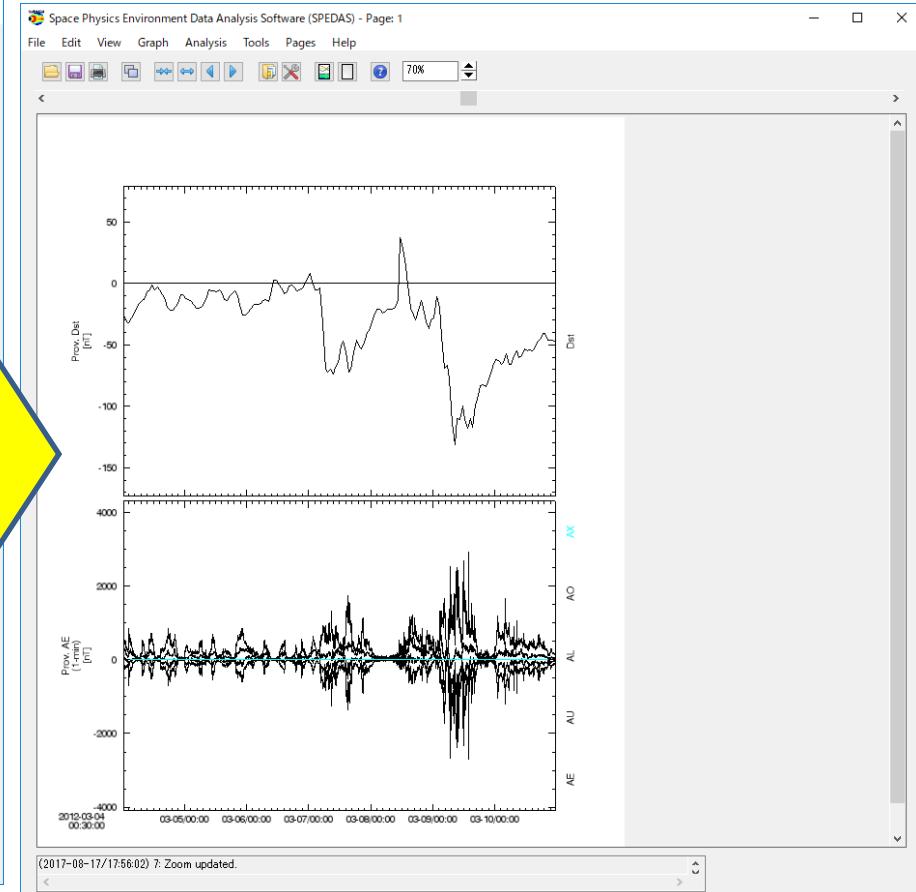
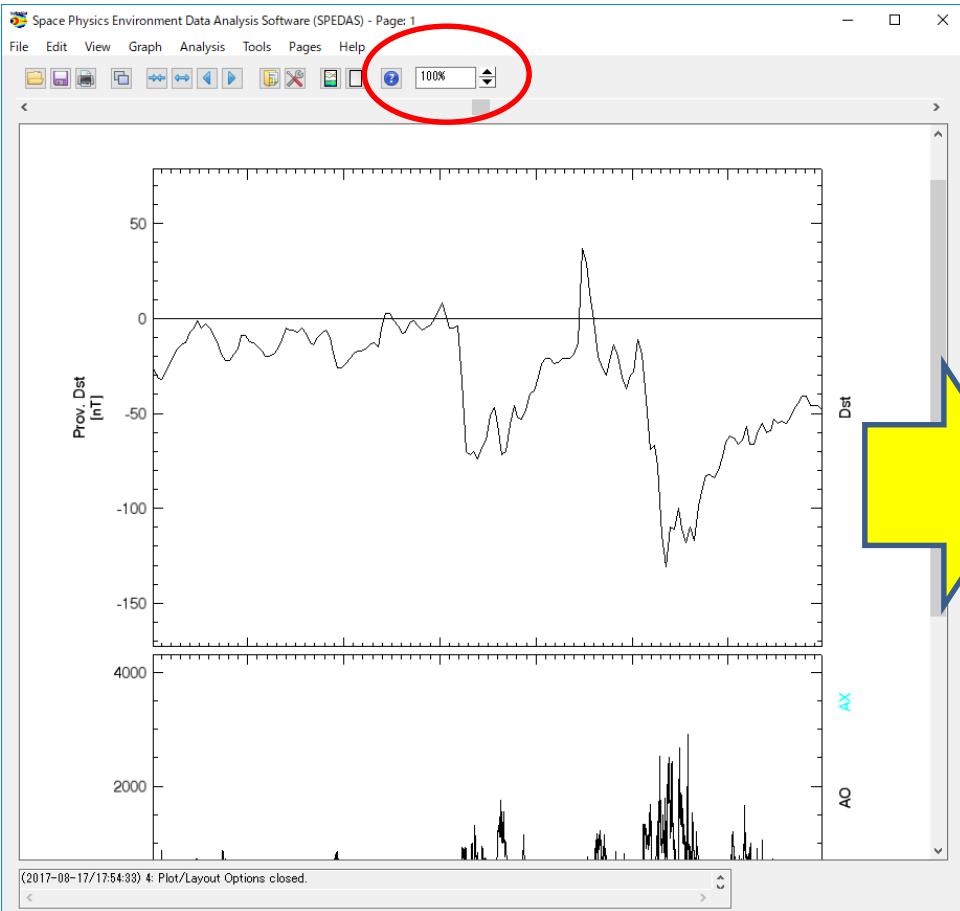
5. Click OK

Panel Add Remove Edit Row: 2 Column: 1 Row Span: 1 Col Span: 1 Rows Per Page: 2 Cols Per Page: 1 Lock To Panel Unlock Panels

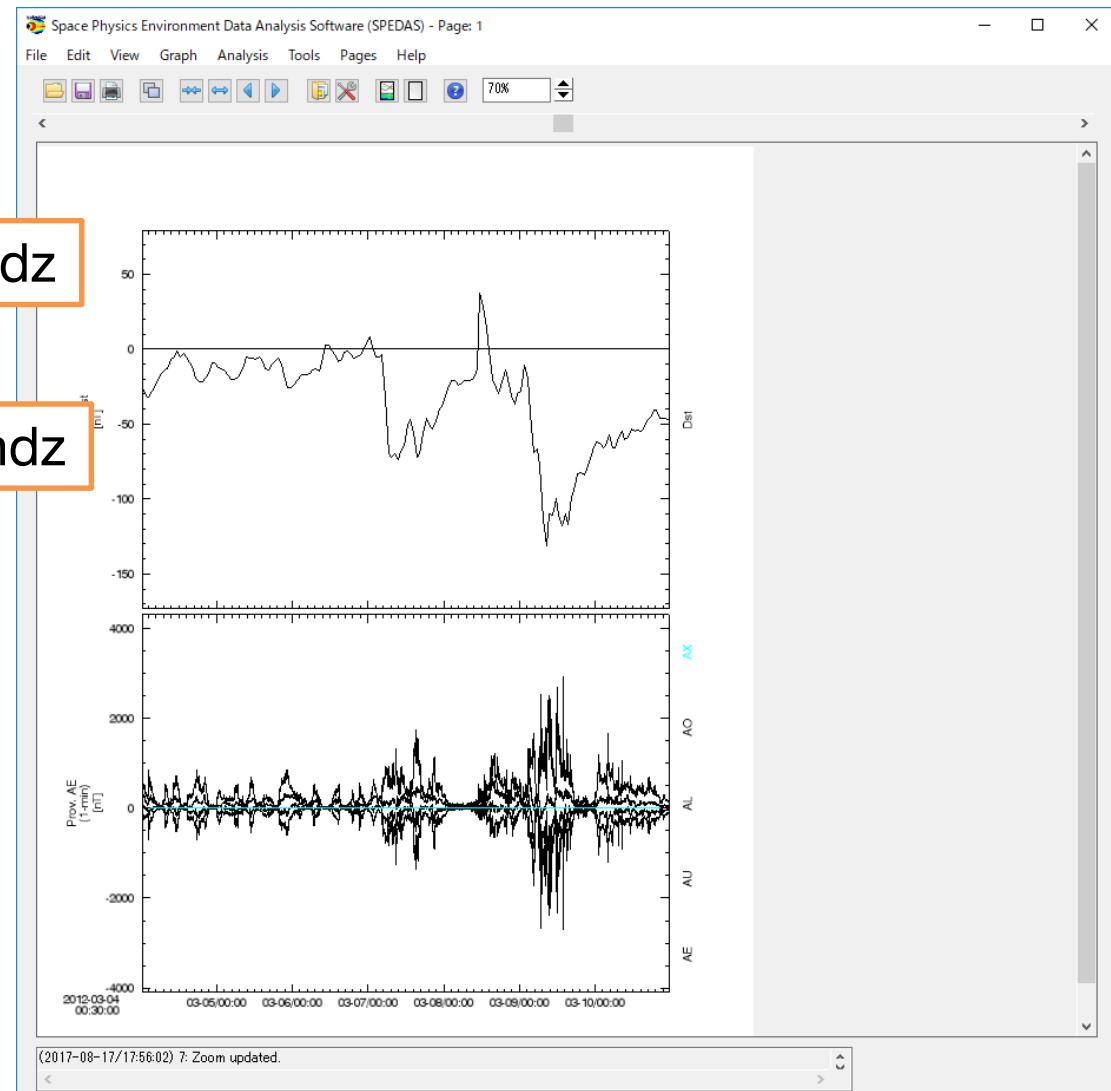
OK Apply Cancel

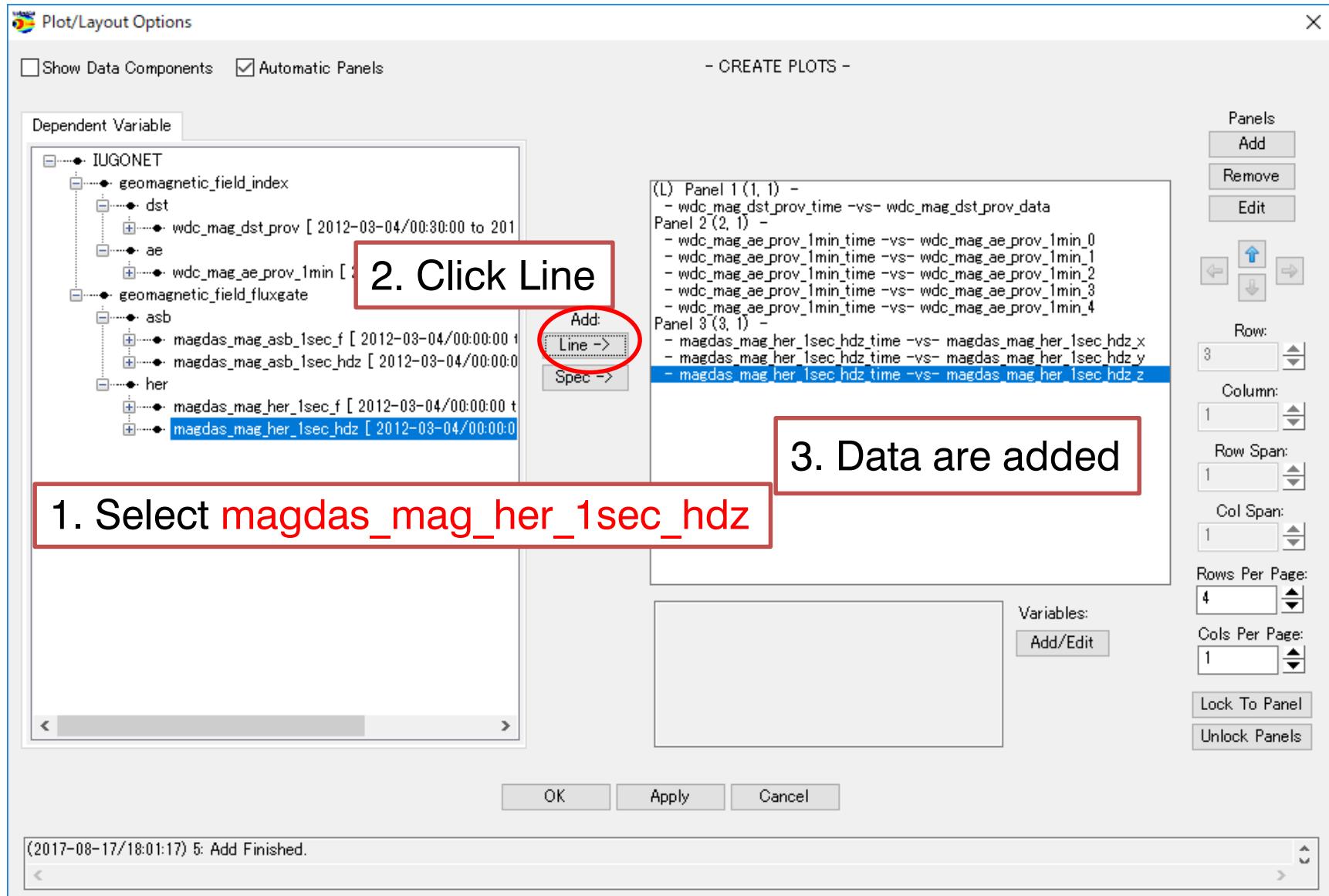
(2017-08-17/17:22:52) 6: Add Finished.

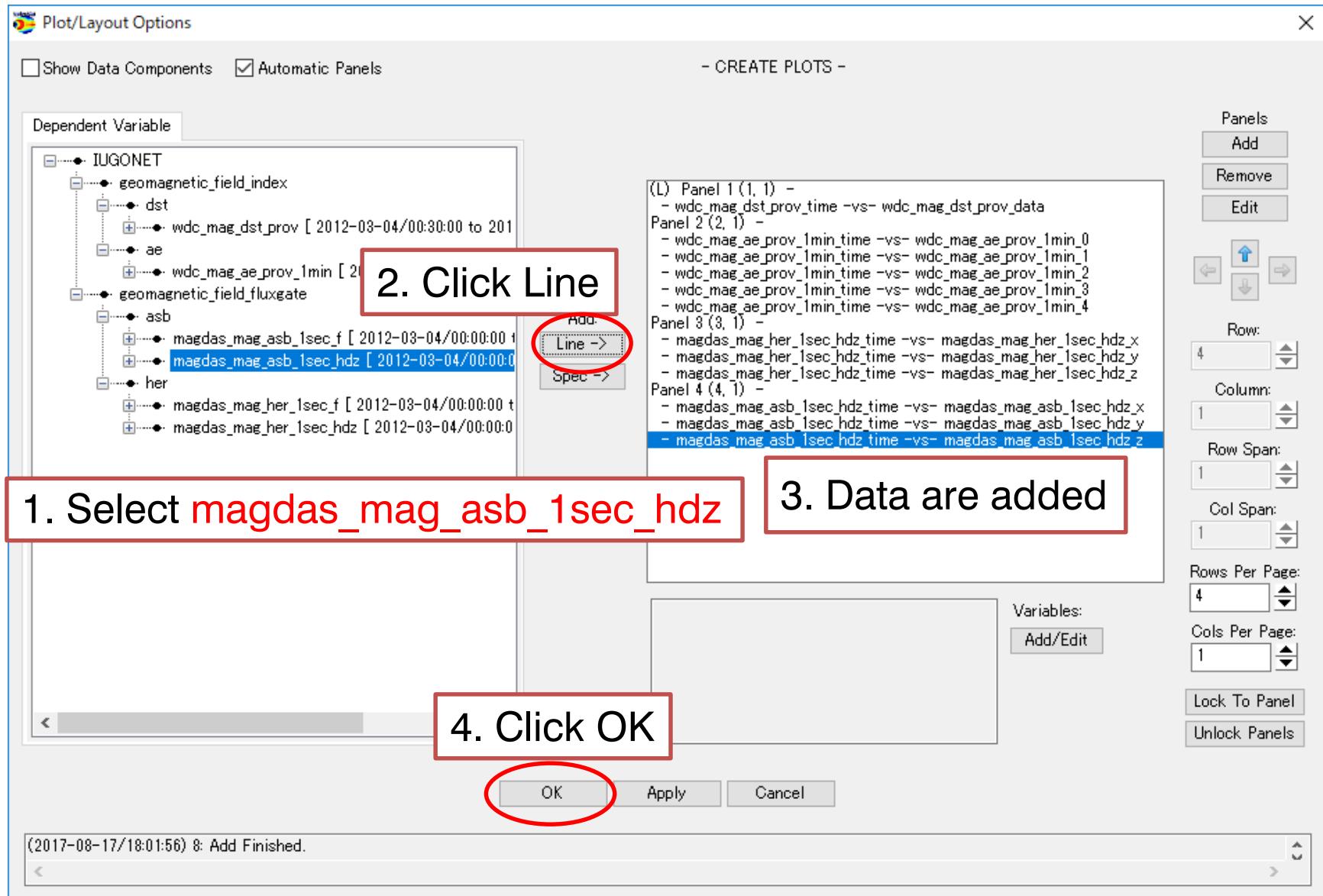
1. Click black triangles



Plot other two data

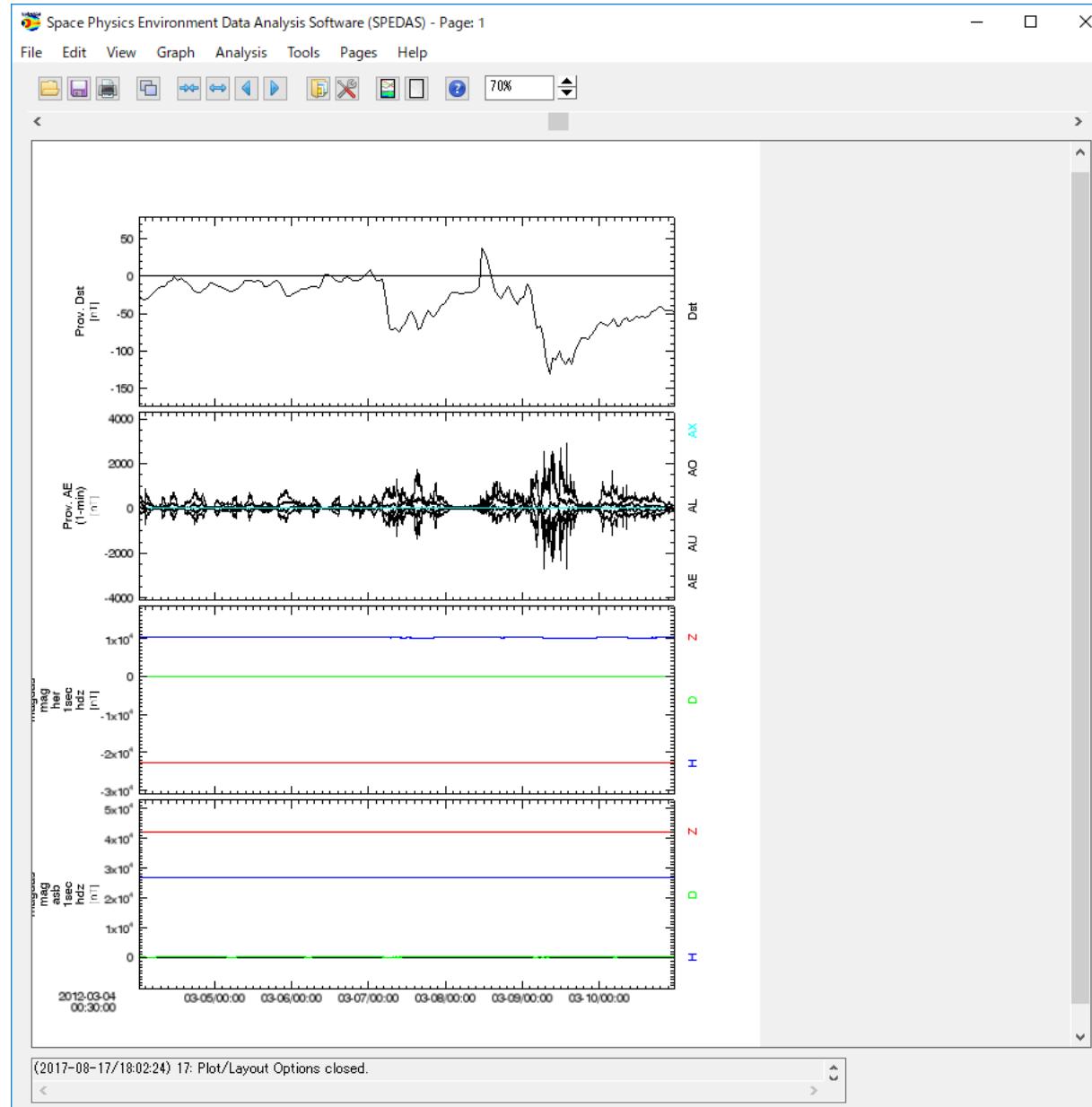






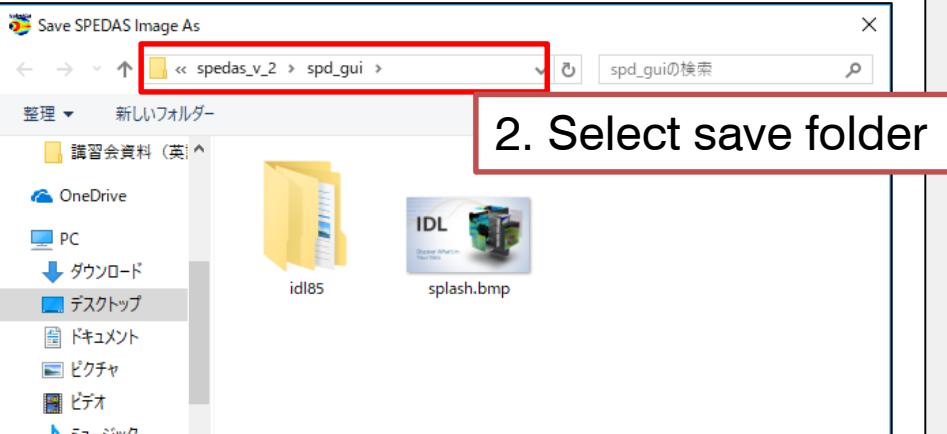
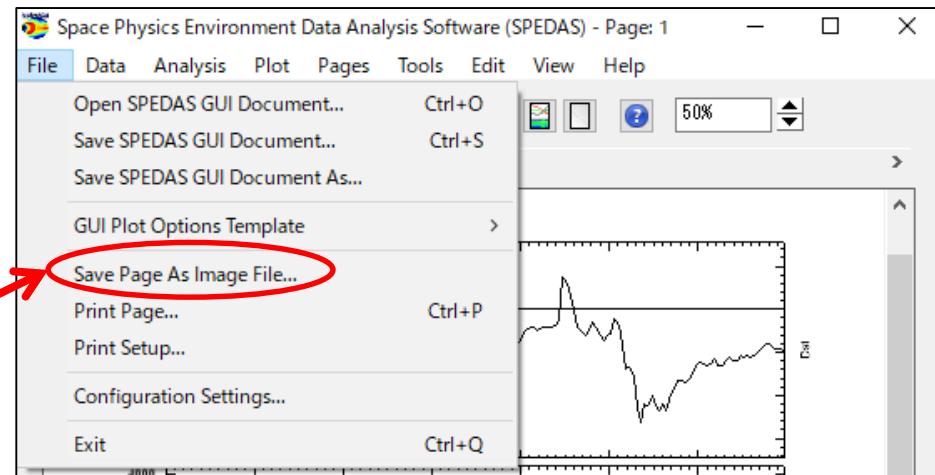


Basic Operation of SPEDAS GUI

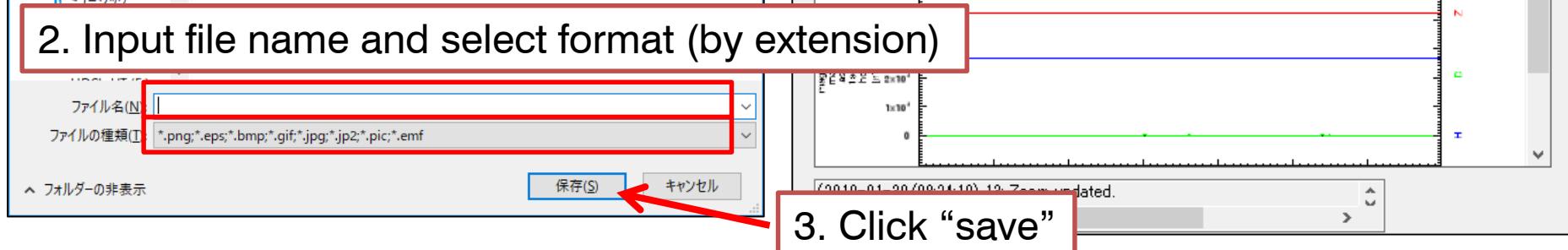


Save plot as image file

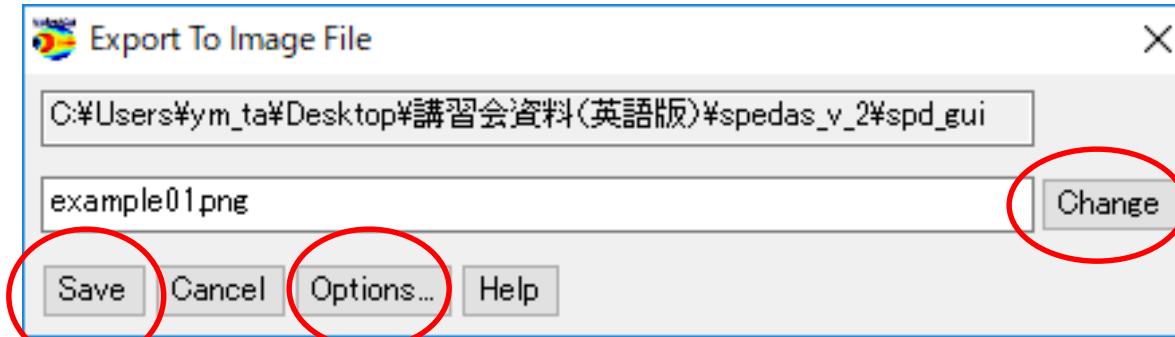
1. Select
File – Save Page As Image File...



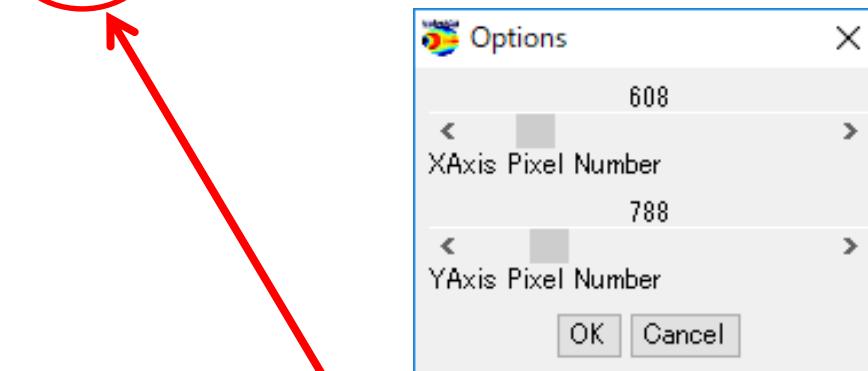
2. Select save folder



2. Input file name and select format (by extension)
3. Click "save"



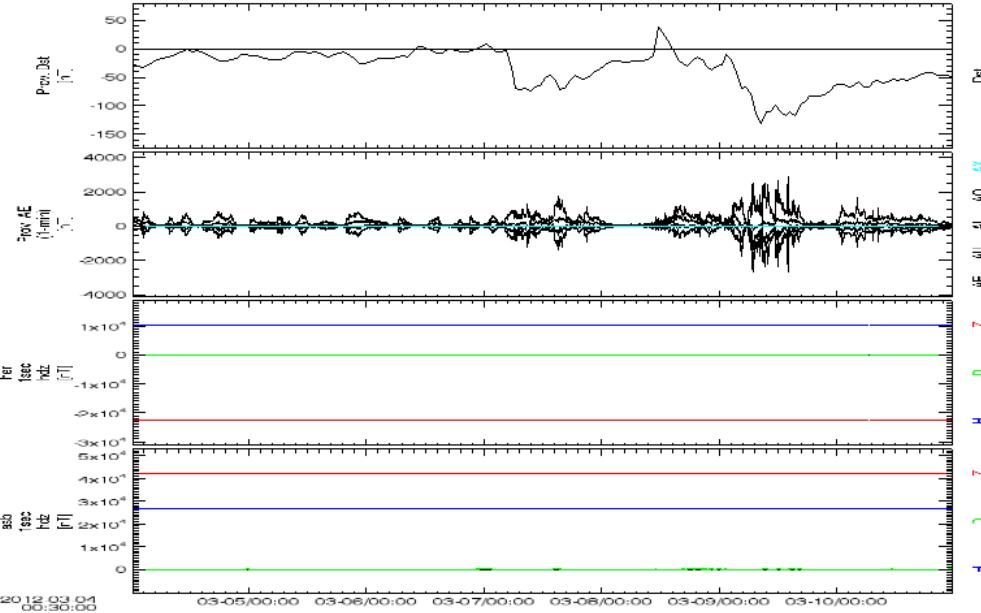
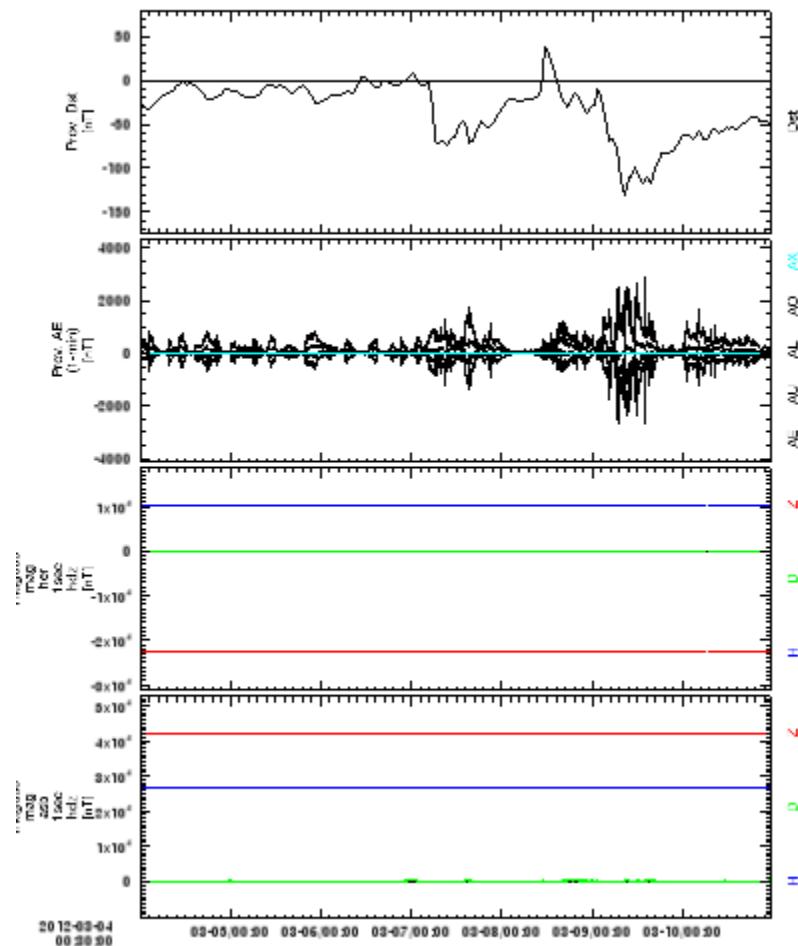
Back to previous



Click "Save"



Basic Operation of SPEDAS GUI

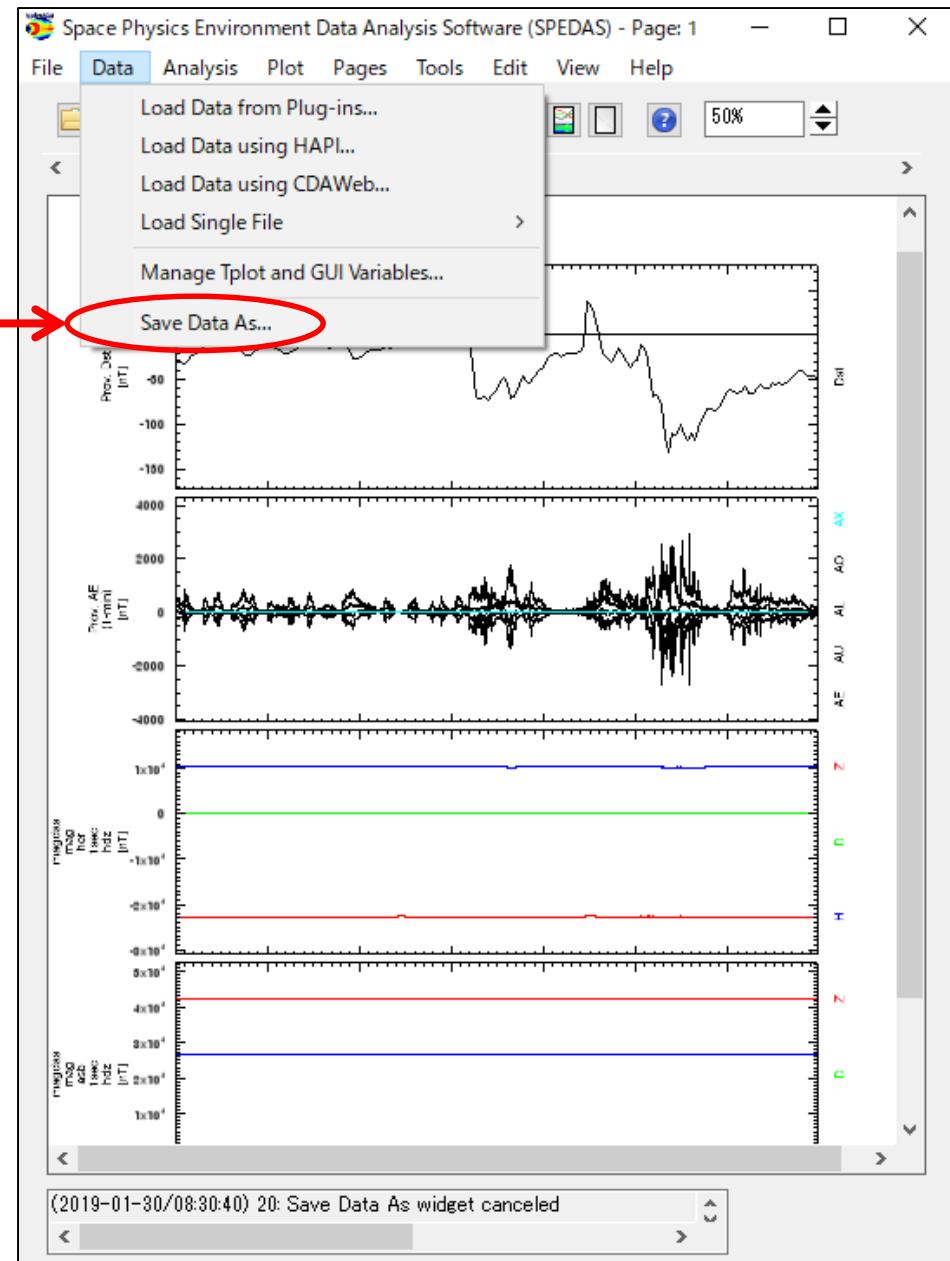


X pixel 856, Y pixel 554
(65%)

X pixel 428, Y pixel 554

Save data as ASCII

1. Select
Data – Save Data As





Basic Operation of SPEDAS GUI

1. Select data which you want to save
magdas_mag_her_1sec_hdz_x

2. check this box

3. Select time interval

4. check this box

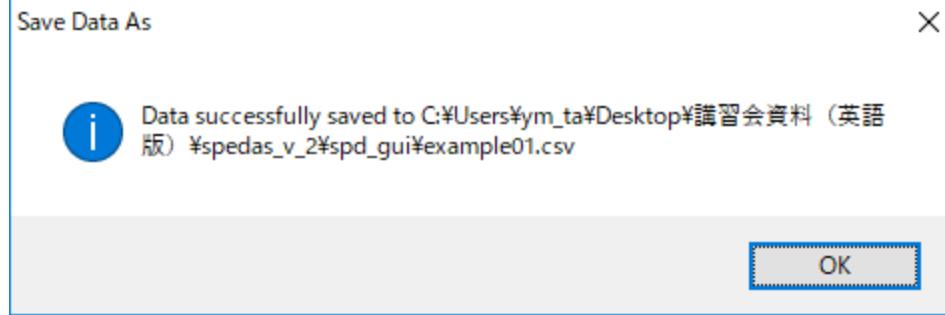
5. Click Save

6. Select save folder

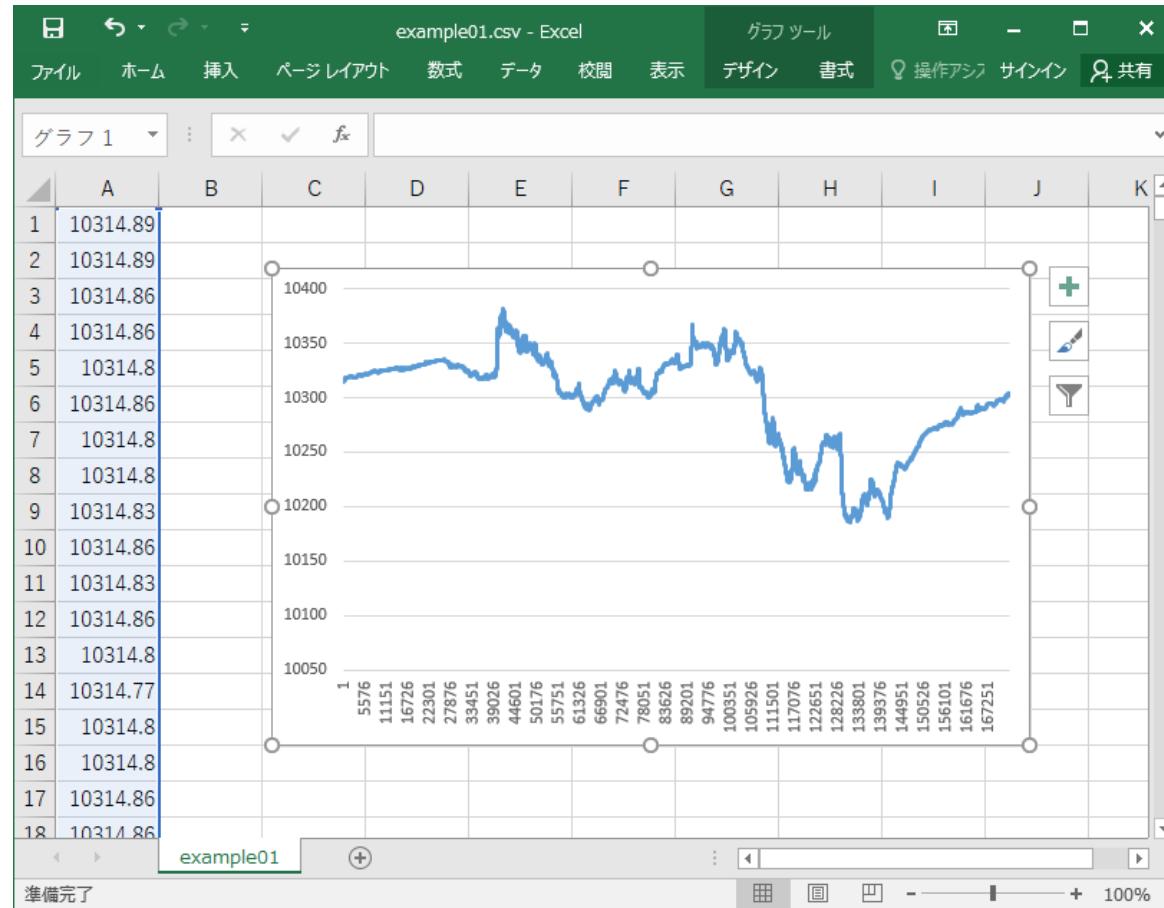
7. Input file name (data is saved in csv format)

8. Click “save”

The screenshot shows the SPEDAS GUI interface. On the left, a tree view displays loaded data under the 'IUGONET' node, including 'geomagnetic_field_fluxgate', 'asb', 'her', and various magnetic field components like 'magdas_mag_asb_1sec_f', 'magdas_mag_asb_1sec_hdz', 'magdas_mag_her_1sec_f', 'magdas_mag_her_1sec_hdz', and 'magdas_mag_her_1sec_hdz_x'. A red arrow points from step 1 to the 'magdas_mag_her_1sec_hdz_x' item. Step 2 points to the 'Restrict Time Range' checkbox. Step 3 points to the 'Start Time' and 'End Time' fields set to '2012-03-08/00:00:00' and '2012-03-09/23:59:59'. Step 4 points to the 'Save as ASCII data file' checkbox. Step 5 points to the 'Save' button in the bottom right of the save dialog. Step 6 points to the 'spd_gui' folder in the save file dialog. Step 7 points to the 'ファイル名(N)' input field. Step 8 points to the '保存(S)' button in the save file dialog.

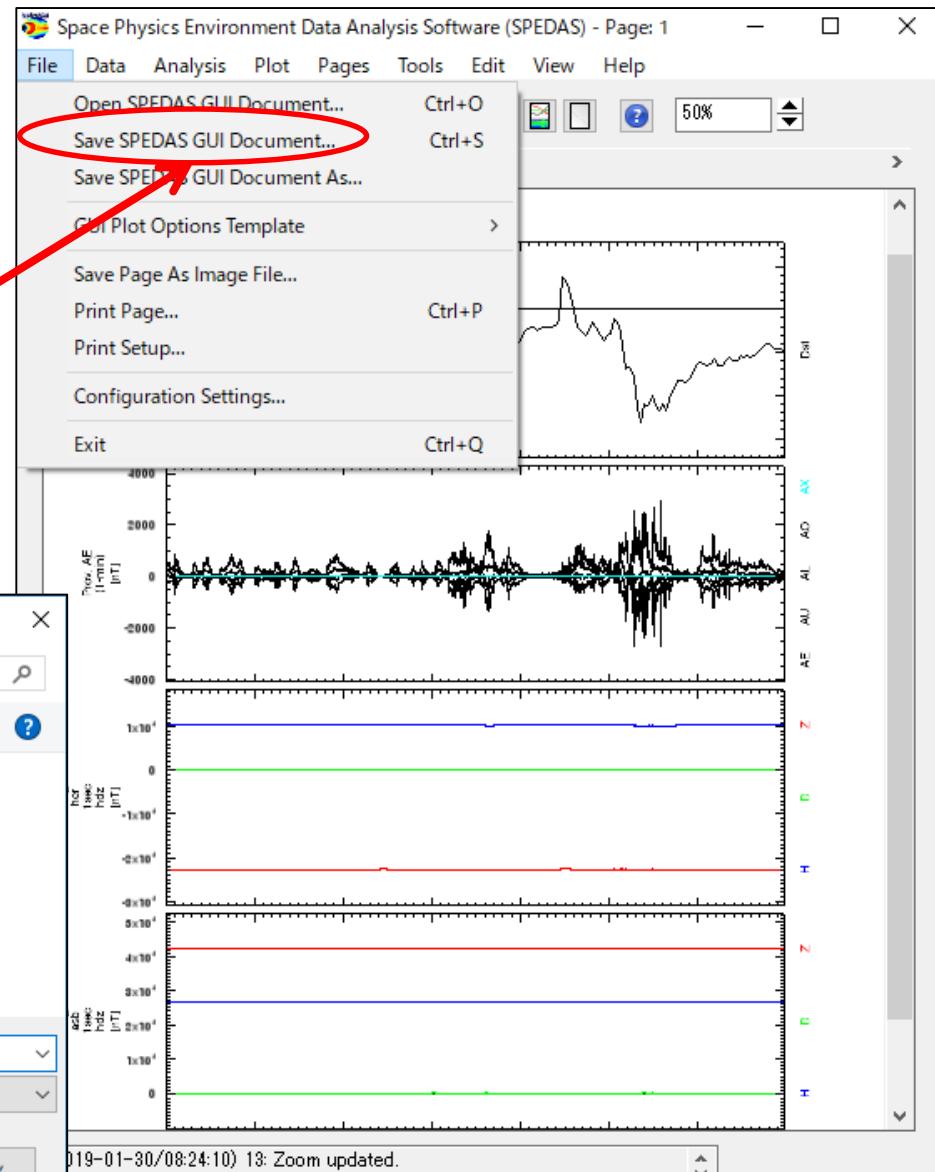


An ASCII data file was successfully saved!!!



Save your workspace

1. Select
File – Save SPEDAS GUI Document



4. Click "save"

※ SPEDAS Document is written in XML format



Metadata DB for Upper Atmosphere

・ 超高層大気長期変動の全地球上ネットワーク観測・研究
Inter-university Upper atmosphere Global Observation-NETwork

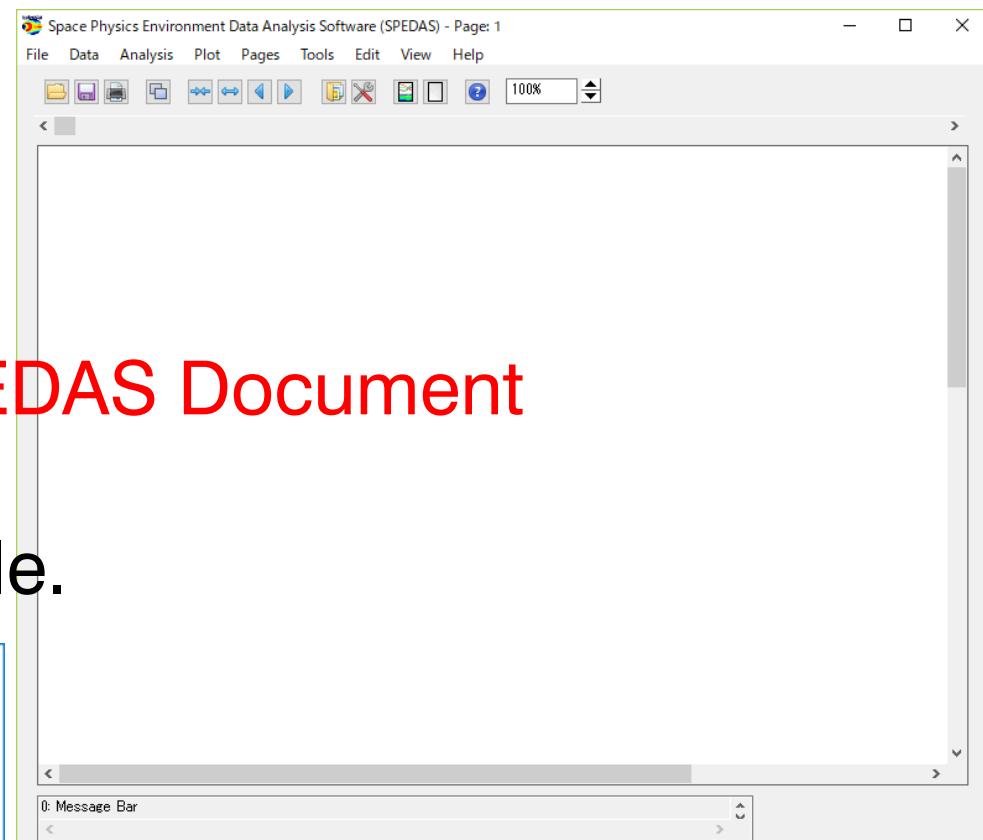
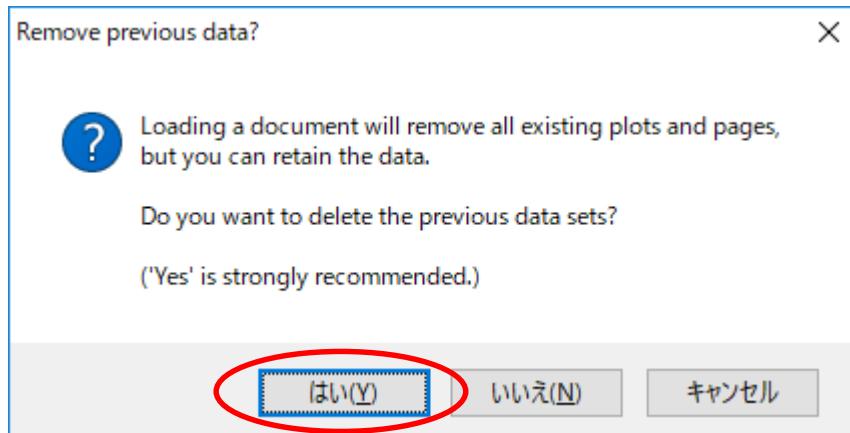
How to Use SPEDAS-GUI

part2

- **Restore your work**
- **Manage axis**
- **Process and data**

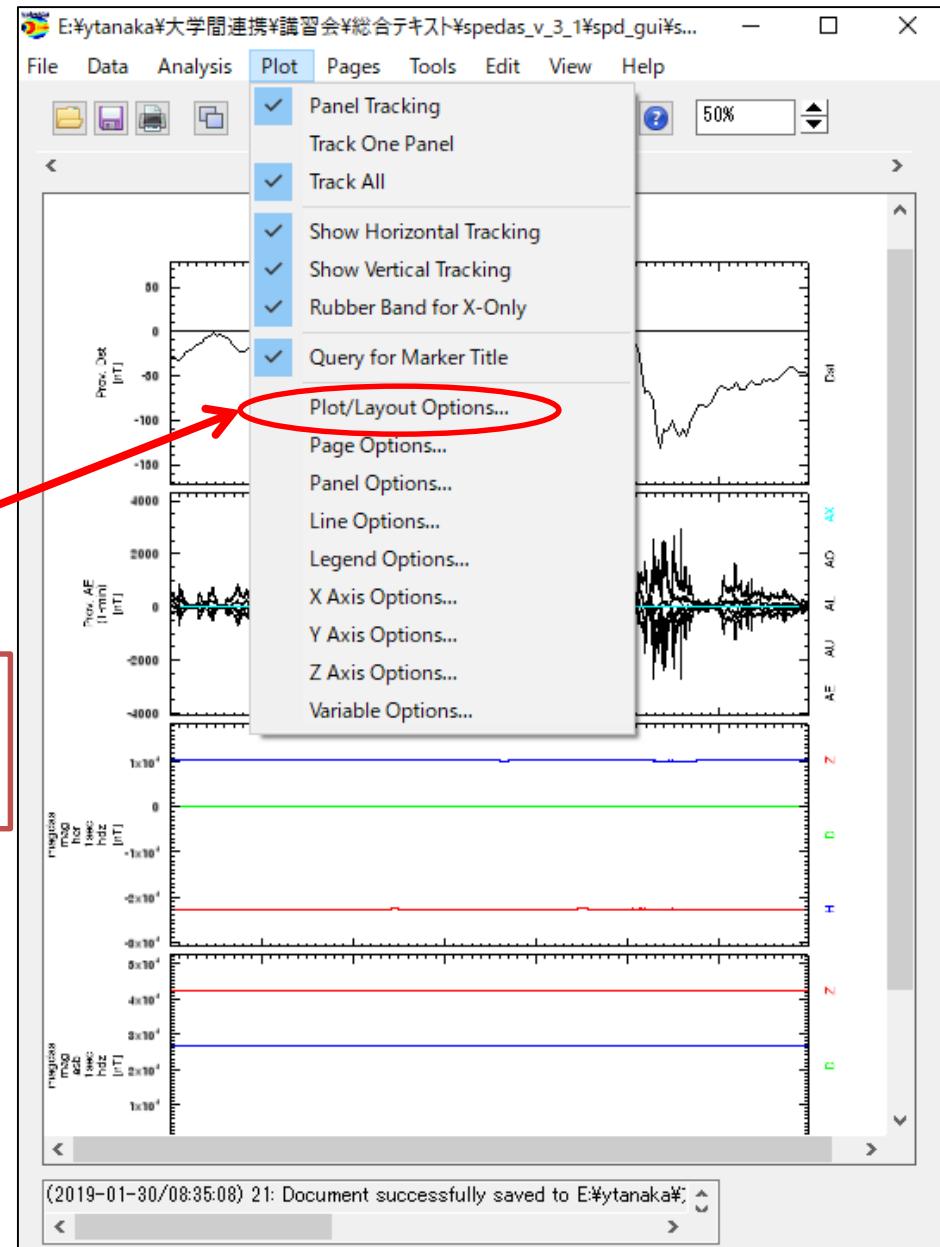
Restore part1 workspace

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



Remove plot

1. Select
Plot – Plot/Layout Options



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"

The screenshot shows the SPEDAS GUI's Plot/Layout Options window. On the left, a tree view lists various data series under categories like 'ae', 'geomagnetic_field_fluxgate', 'asb', and 'her'. A specific entry, 'wdc_mag_ae_prov_1min [2012-03-04/00:00:30 to 2012-03-04/00:30:00]', is selected and highlighted in blue. In the center, there are 'Add' buttons for 'Line' and 'Spec'. To the right, a list of plots is displayed in a grid format:

- 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

On the far right, a 'Panels' panel includes buttons for 'Add', 'Remove' (which is circled in red), and 'Edit'. It also contains controls for 'Row' (set to 2), 'Column' (set to 1), 'Row Span' (set to 1), 'Col Span' (set to 1), 'Rows Per Page' (set to 4), and 'Cols Per Page' (set to 1). At the bottom, there are 'OK', 'Apply', and 'Cancel' buttons, with 'OK' also circled in red. A status message at the bottom left says '(2017-08-17/20:32:02) 9: Add Finished.'

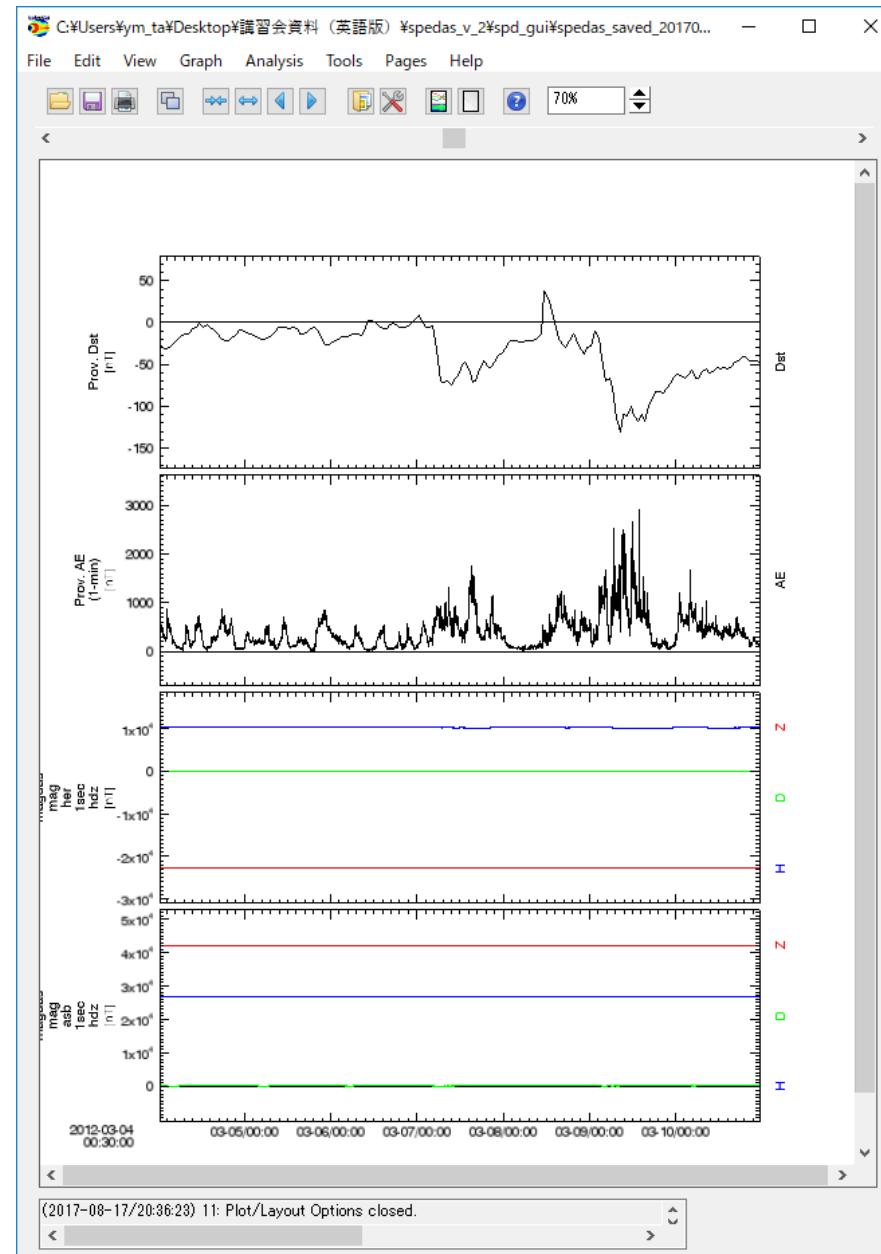
3. Remove

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

4. Click OK



Basic Operation of SPEDAS GUI



Change X range (time scale)

(1)



Reduces X range
by major tick
marker



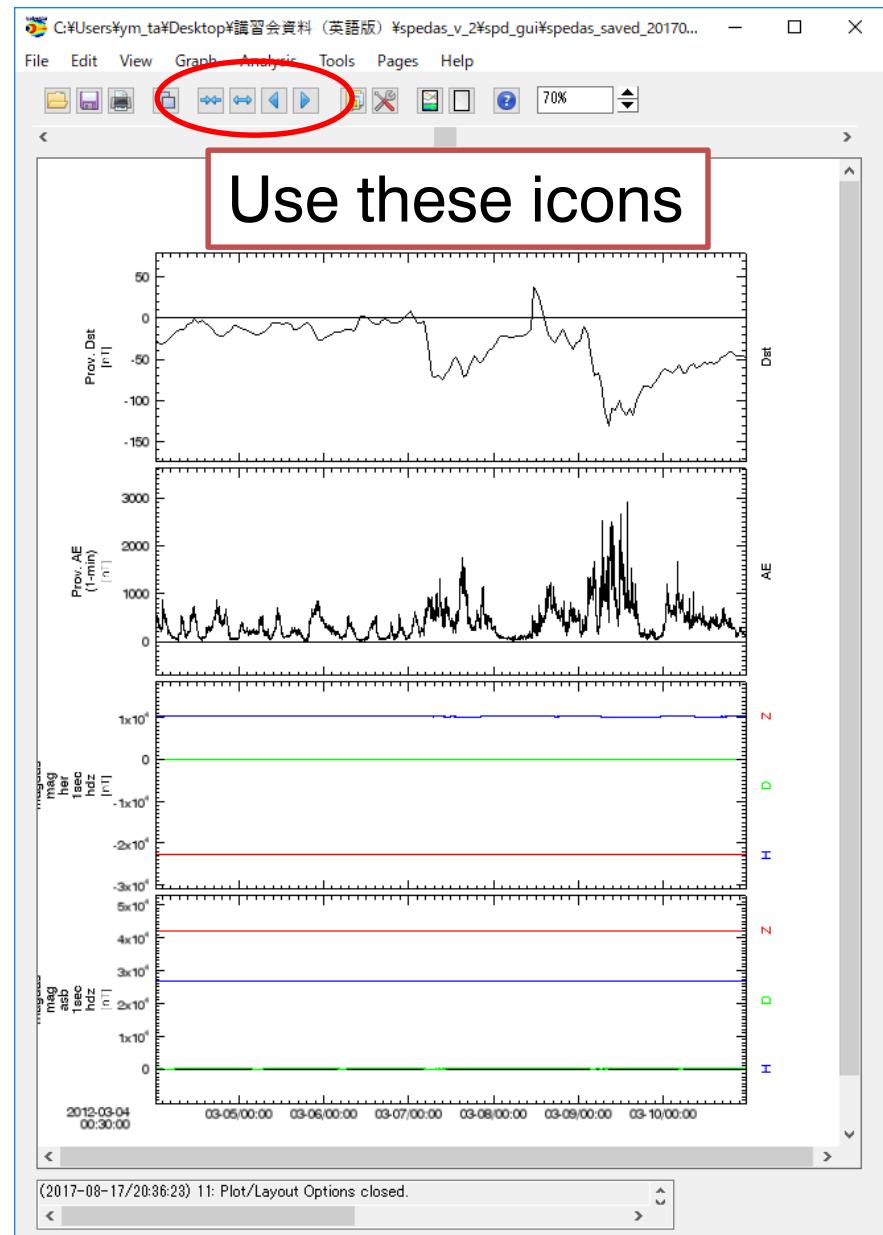
Expands X range
by major tick
marker



Shift left X range
by major tick
marker

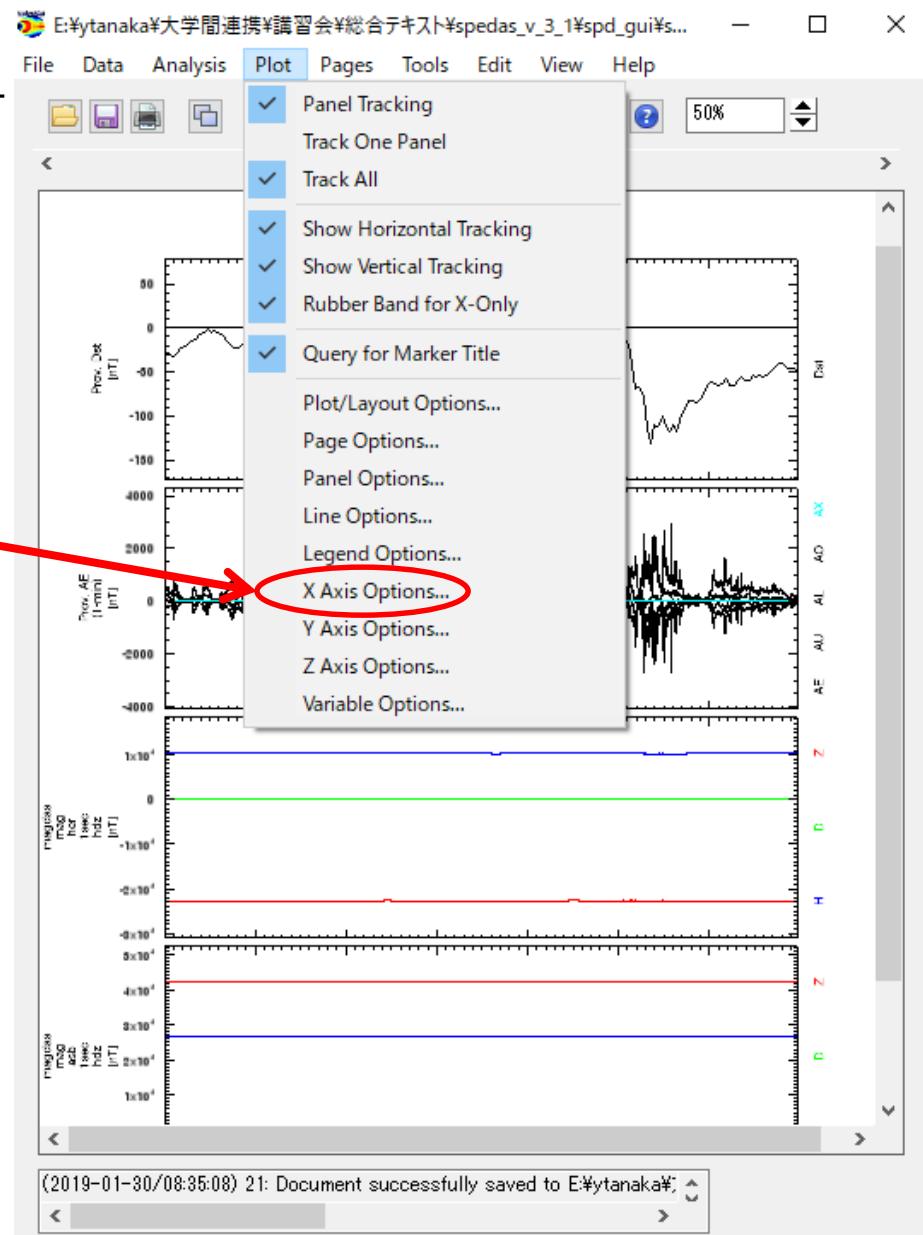


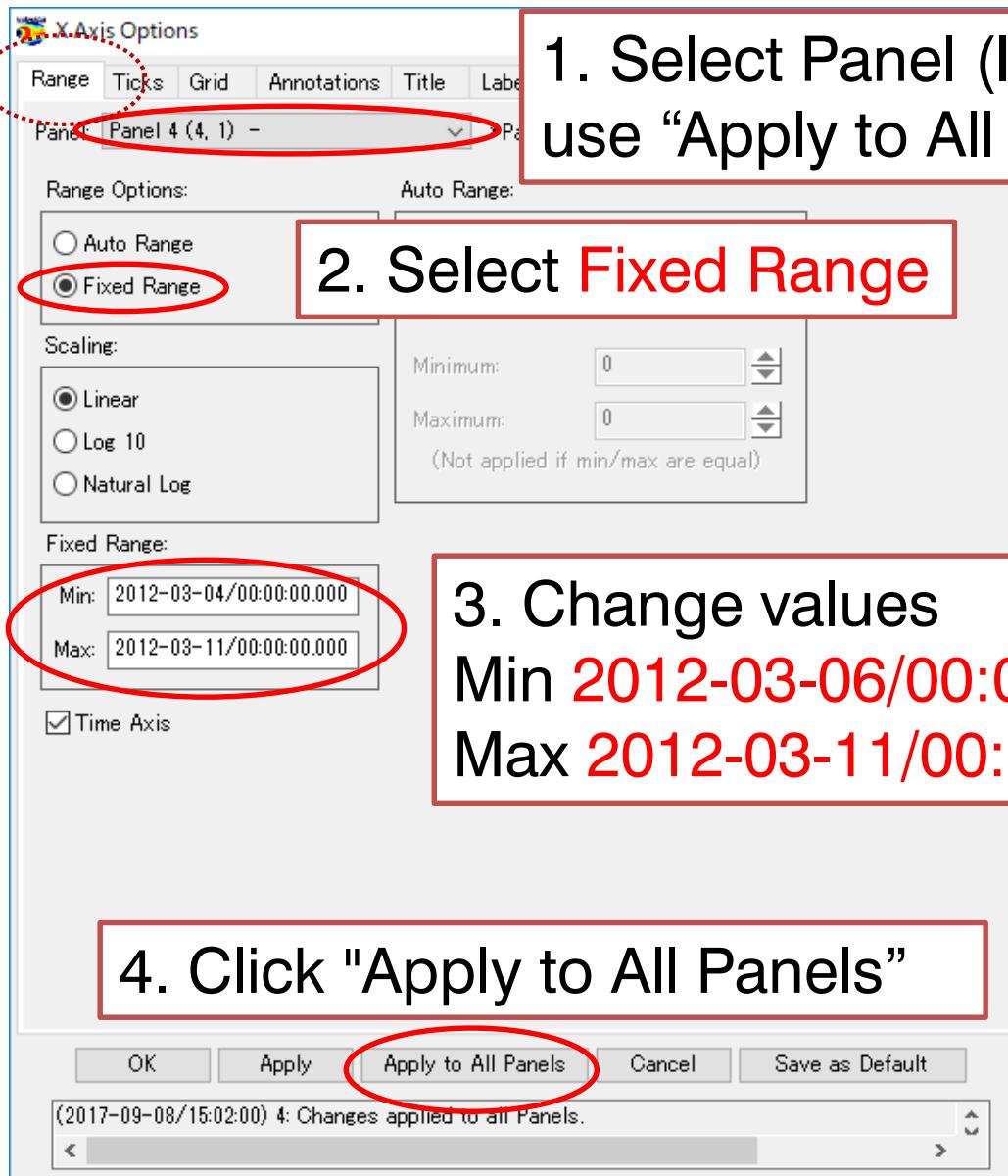
Shift right X range
by major tick
marker



Change X range (time scale) (2)

1. Select
Plot – X Axis Options

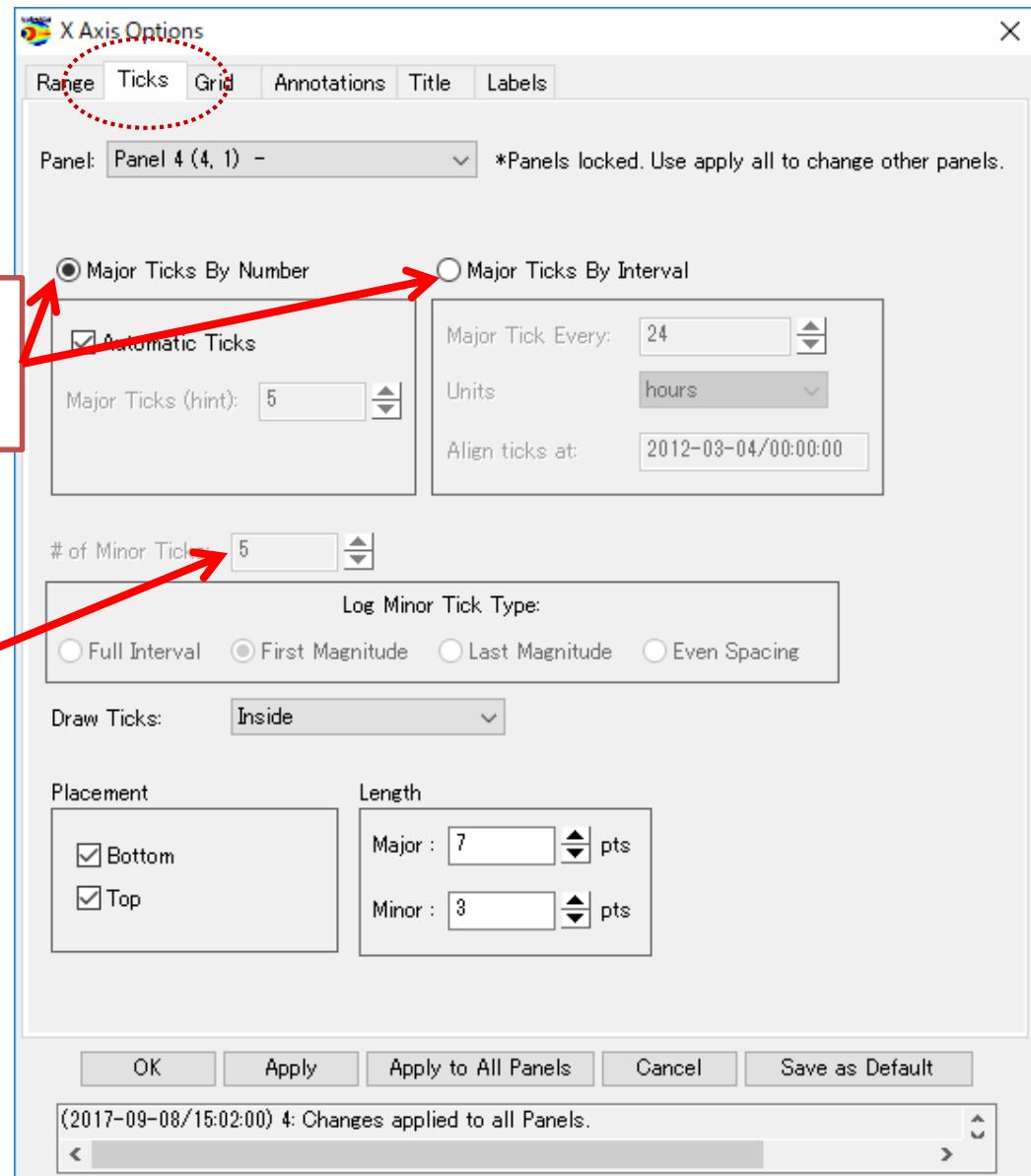




Customize ticks

1. Select Major Ticks By Number or Interval.

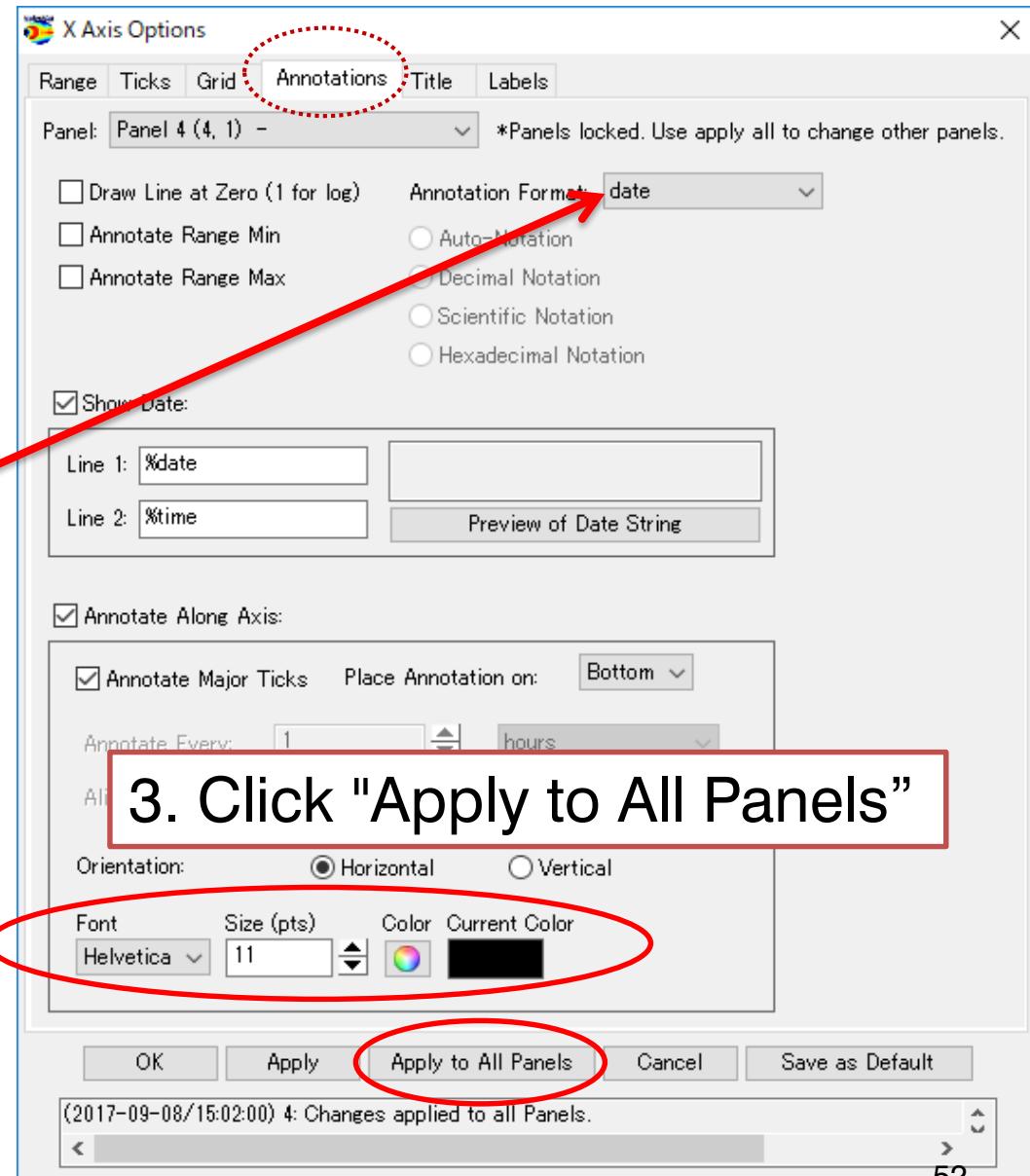
2. Input the number into # (Number or Interval) of Minor Ticks



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.



3. Click "Apply to All Panels"

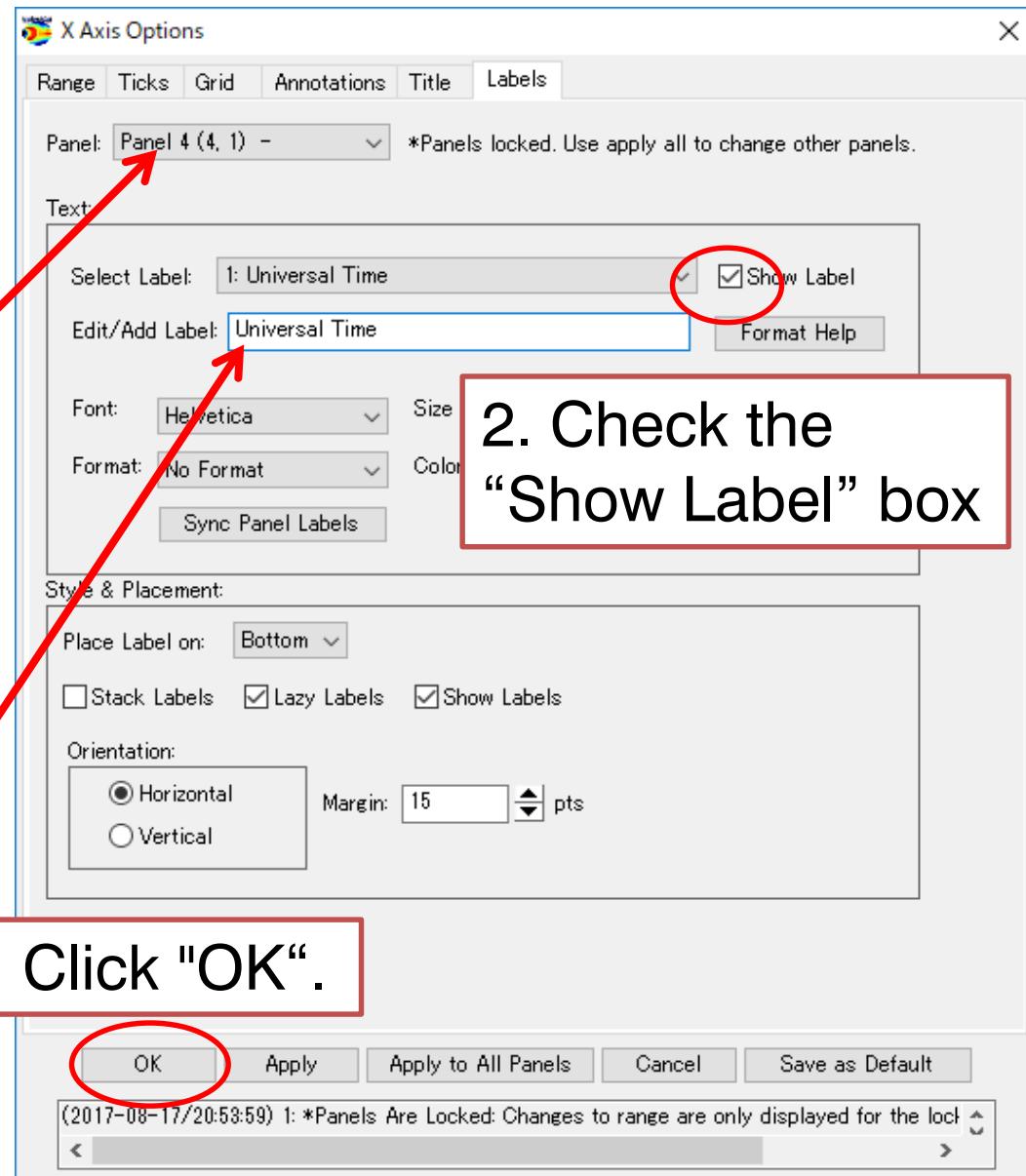
Customize labels (of X axis)

1. Select Panel 4
(bottom panel)

3. Type “Universal
Time ” on the Edit/Add
Label

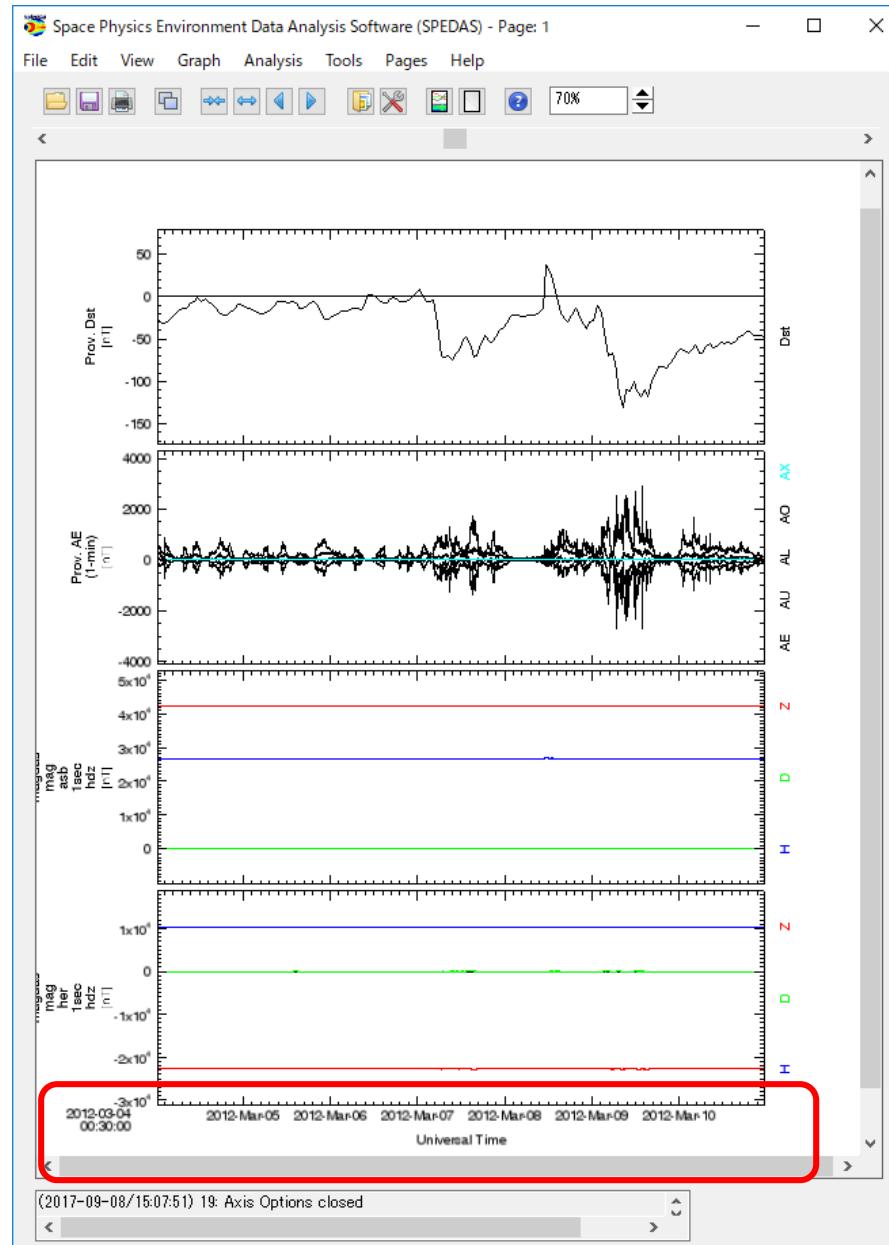
2. Check the
“Show Label” box

4. Click “OK“.





Basic Operation of SPEDAS GUI



Other options

- **Page Options...**

Customize the text and layout of the page.

- **Panel Options...**

Customize the title and color of each panel.

- **Line Options...**

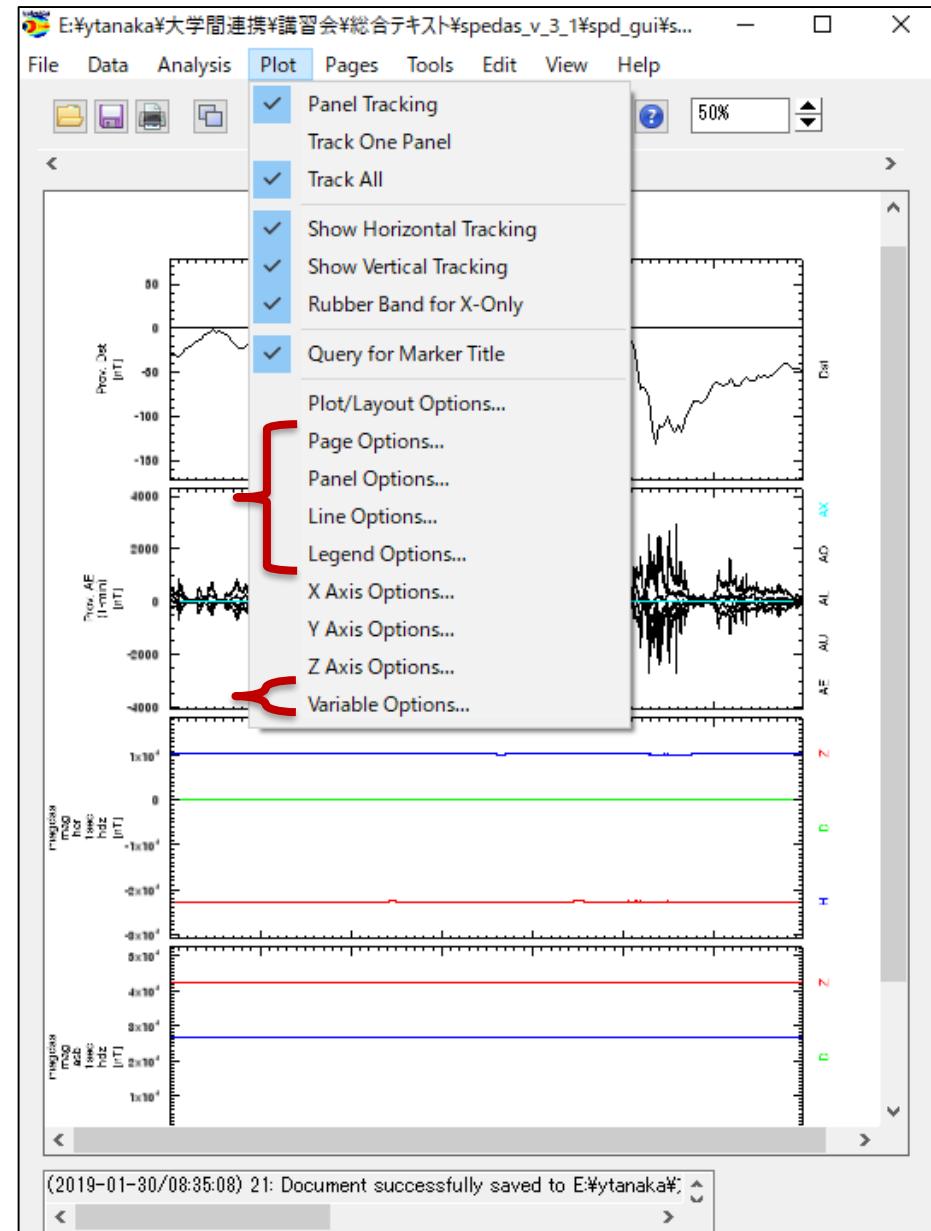
Customize the line and symbol of each plot panel.

- **Legend Options...**

Customize the legend which appears when you put the mouse cursor on the plot.

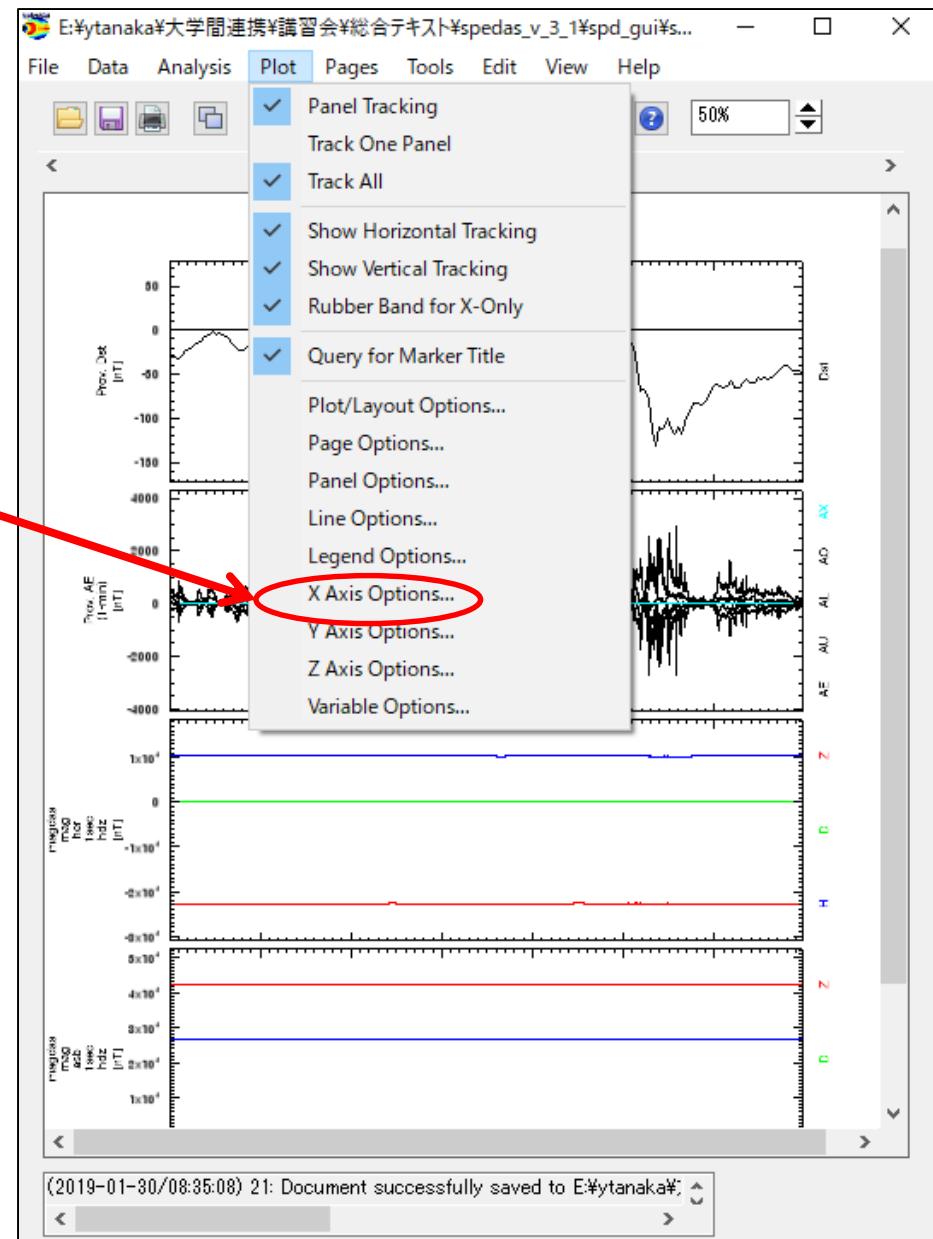
- **Variable Options...**

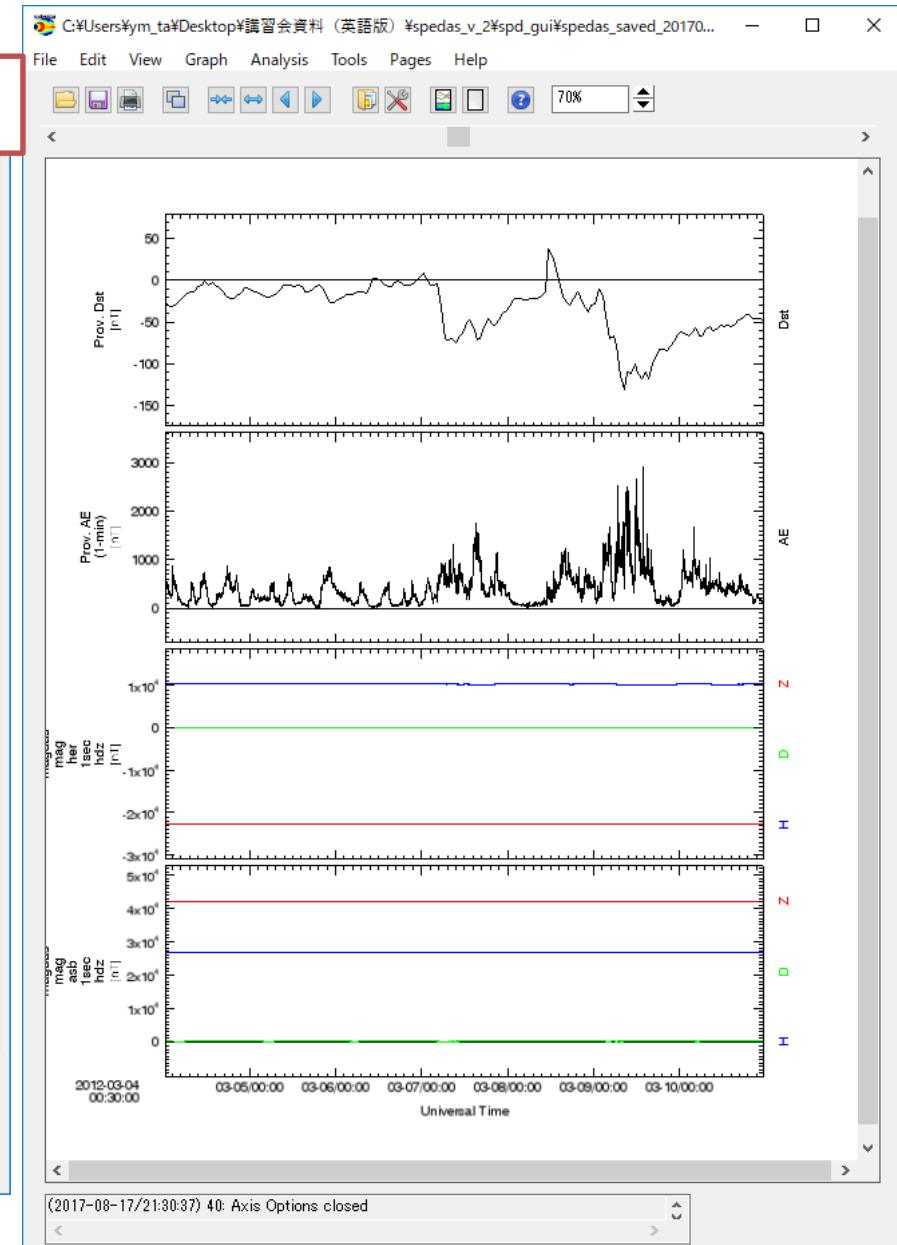
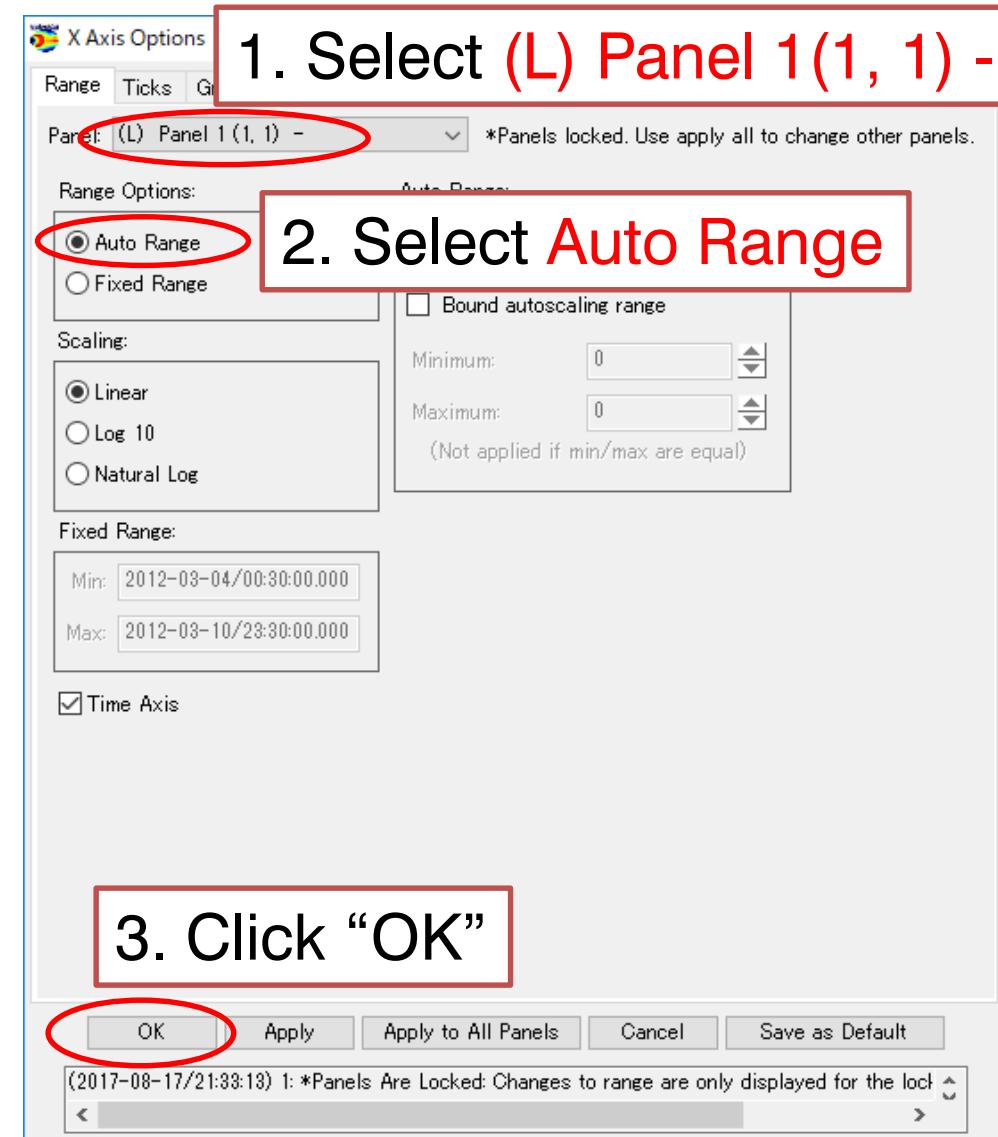
Display the values of the selected parameters under the time label.



Reset X range (time scale)

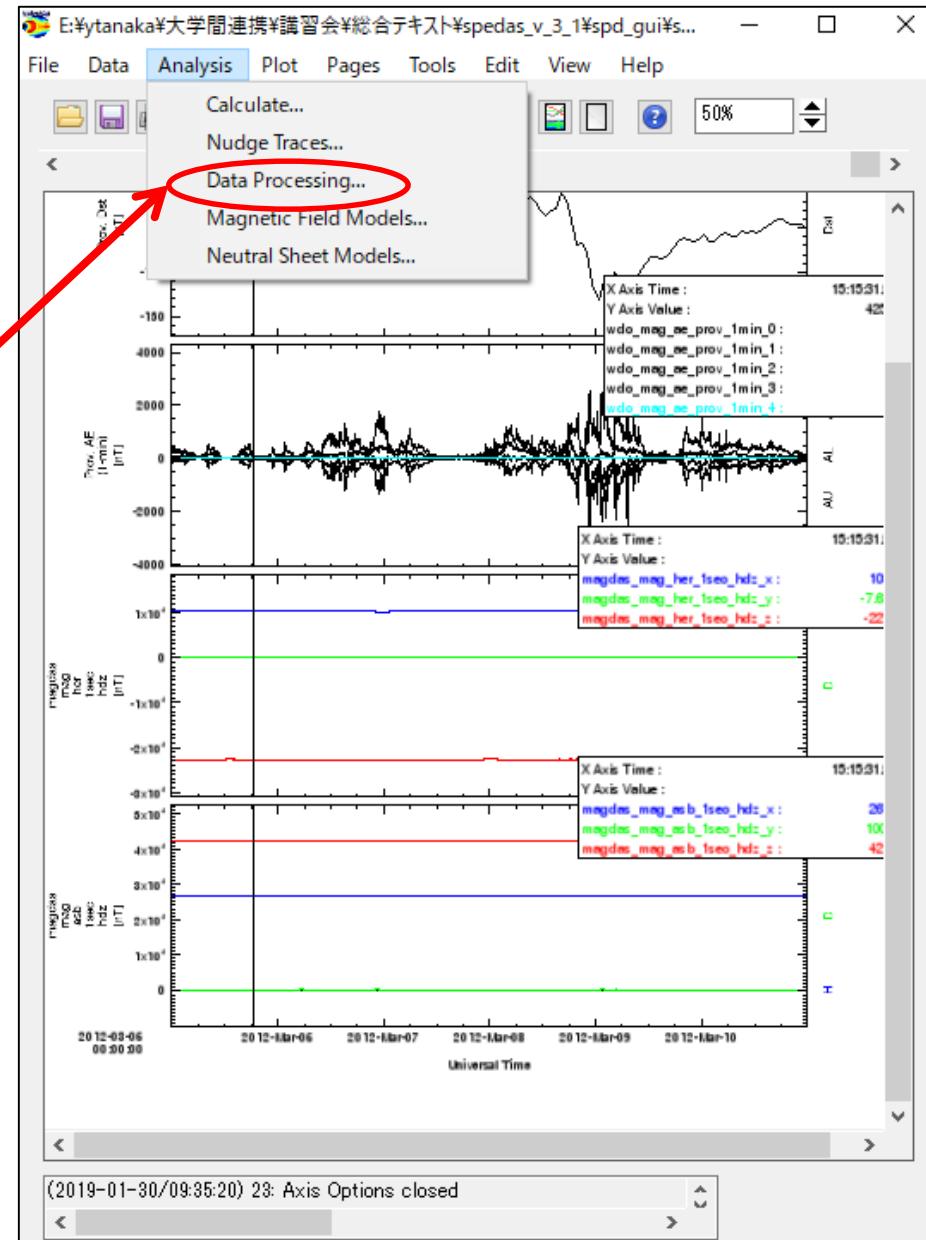
1. Select X Axis Options





Data processing (subtract average)

1. Select
Analysis – Data Processing



1. Select data you want to process
magdas_mag_asb_1sec_hdz
magdas_mag_her_1sec_hdz

2. Click right arrow

3. Active Data are added

4. Click Subtract Average

The screenshot shows the SPEDAS Data Processing interface. On the left, the 'Loaded Data' tree view shows various datasets under 'IUGONET'. In the center, the 'Active Data' list contains two items: 'magdas_mag_asb_1sec_hdz' and 'magdas_mag_her_1sec_hdz'. To the right is a vertical list of processing operations. A red box highlights the first two steps (selection and moving data to active) in the center-left area. Another red box highlights the fourth step (processing) on the right. A red arrow points from the 'Active Data' list to the 'Subtract Average' button. At the bottom, there are buttons for 'Clear Active' and 'Done', and a status message in a scrollable text area.

Loaded Data

Active Data

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...

More...

Clear Active Done

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

Data Processing

Loaded Data

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

Active Data

- magdas_mag_asb_1sec_hdz-d: 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

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...
- More...

New variables are created.

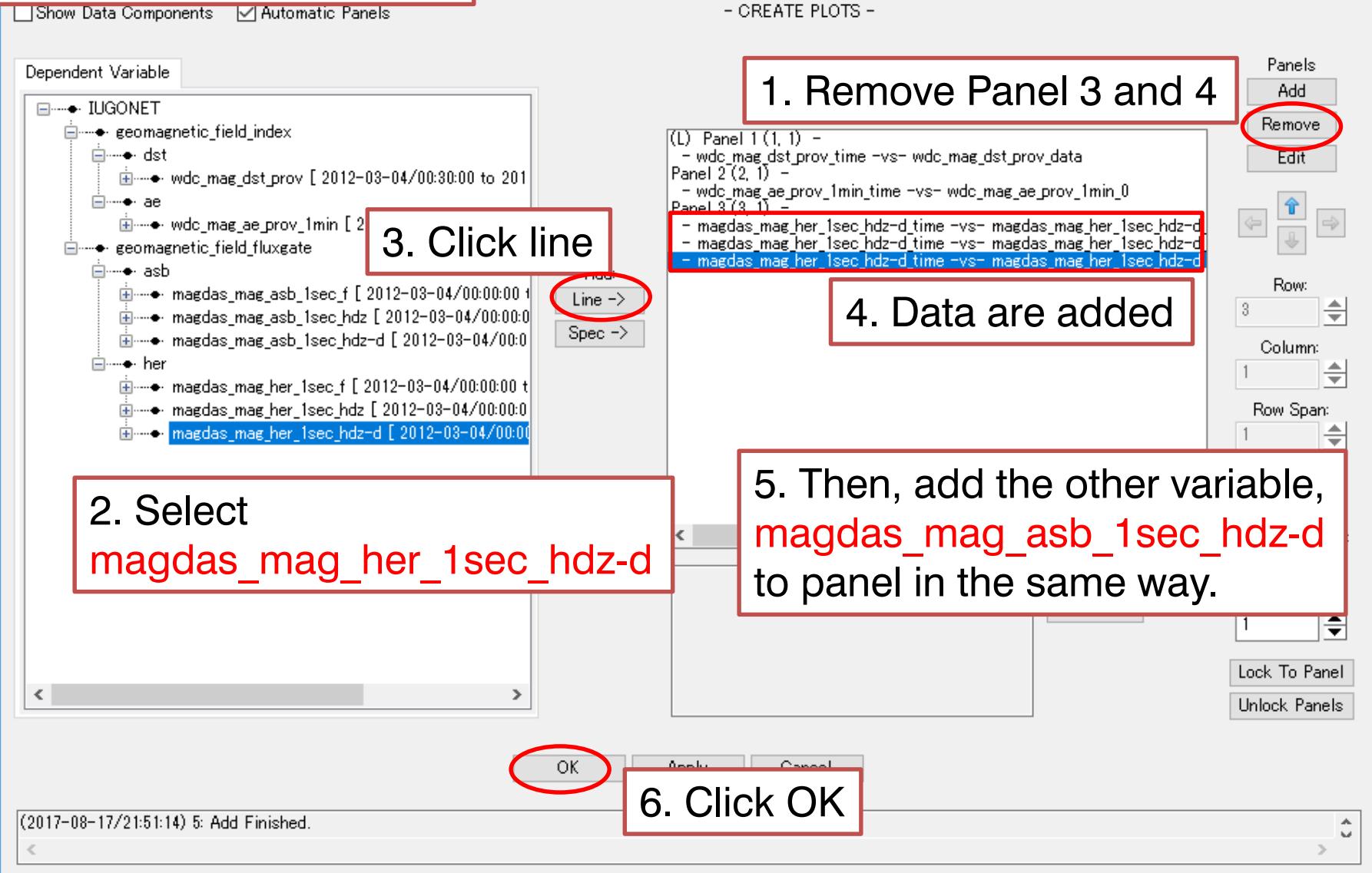
magdas_mag_asb_1sec_hdz-d
magdas_mag_her_1sec_hdz-d

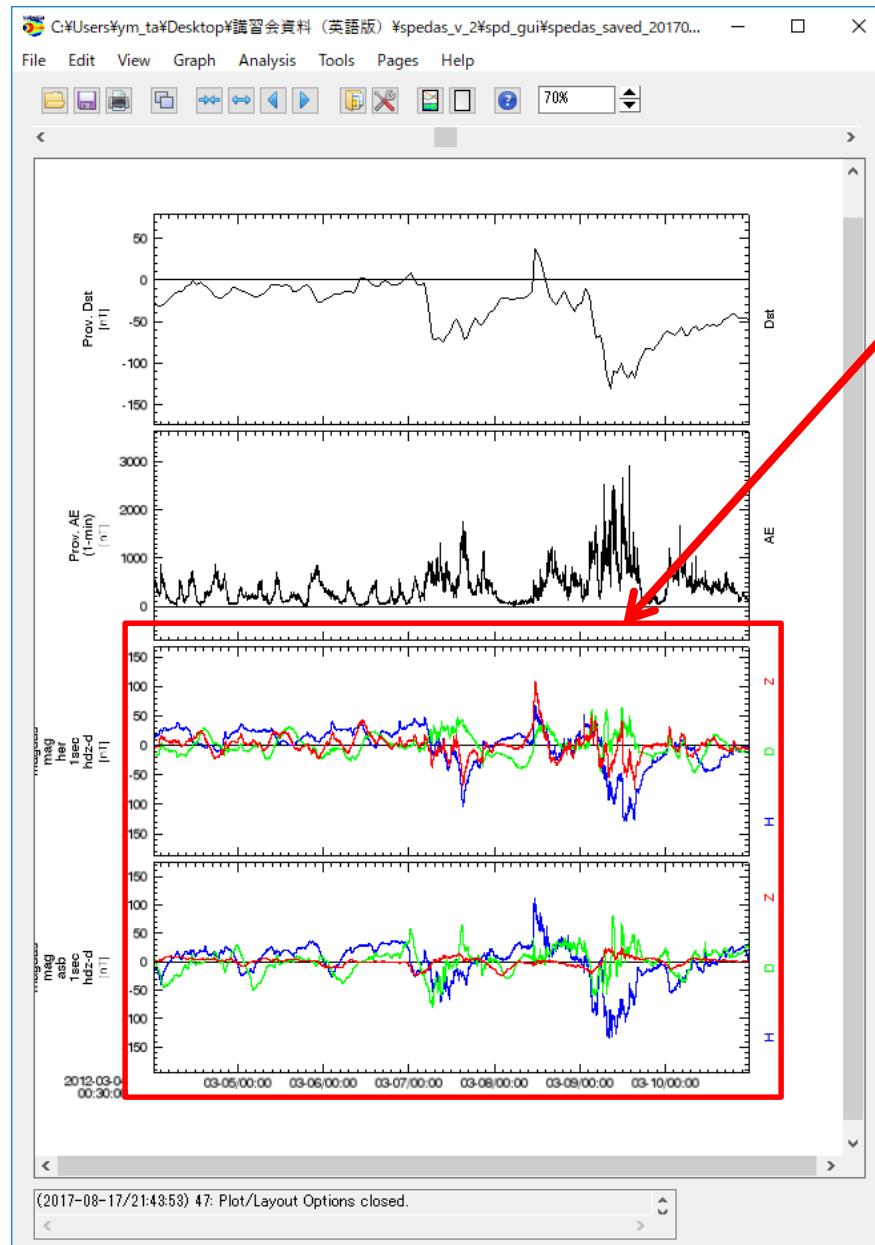
Clear Active Done

(2017-08-17/21:41:13) 15: Added variable: magdas_mag_her_1sec_hdz-d

1. Click Done

Open “Plot/Layout Options”





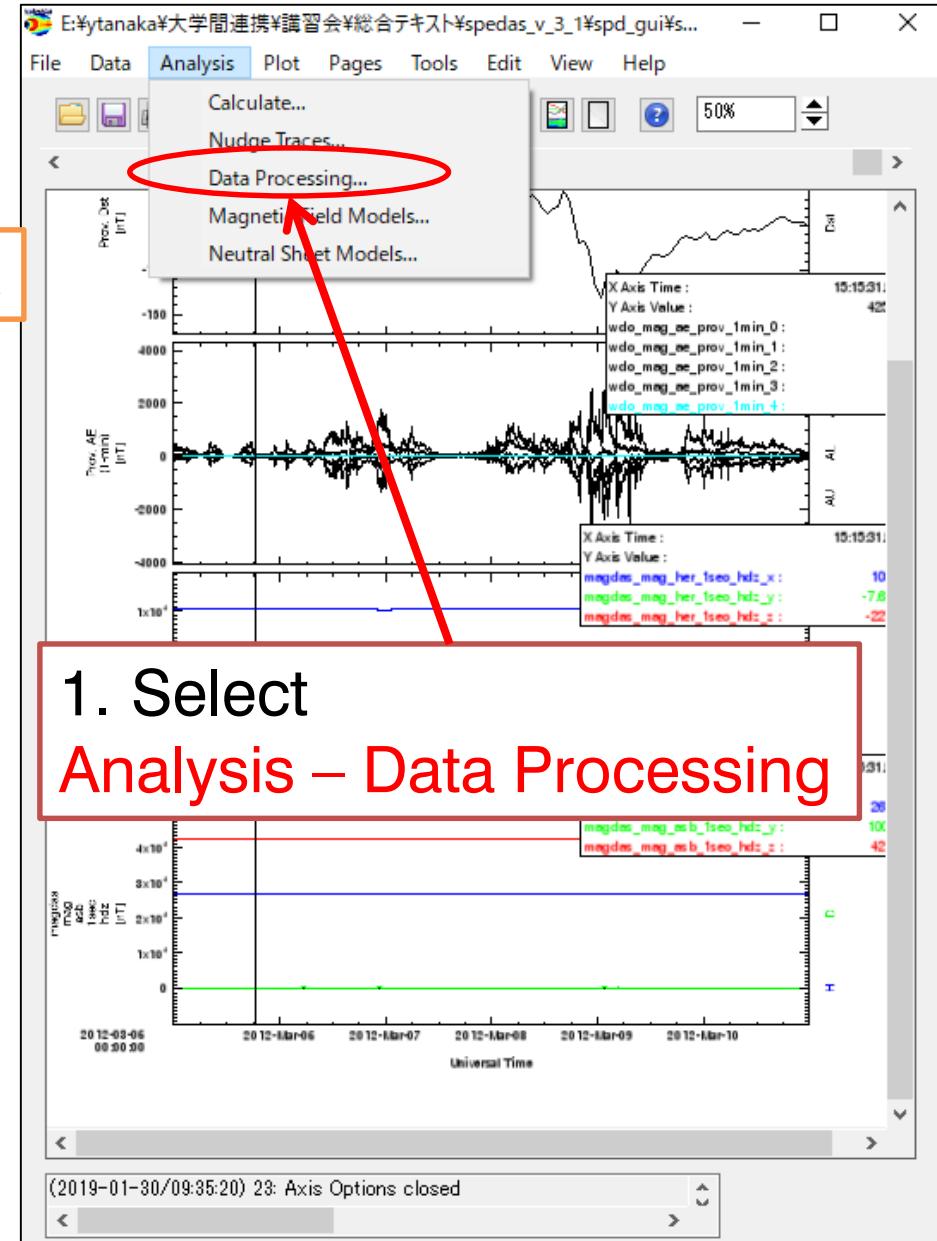
Subtracted average!

Data processing (power spectrum)

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



Data Processing

Loaded Data

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

Active Data

No Active Data

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...

More...

2. Active Data is removed

1. Click Clear Active

Clear Active Done

(2017-08-17/21:59:05) 6: All Active variables cleared

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 SPEDAS Data Processing interface. On the left, the 'Loaded Data' tree view shows a hierarchy of IUGONET datasets, including geomagnetic_field_index, dst, ae, geomag, asb, and her. Under the her dataset, 'magdas_mag_her_1sec_hdz' is selected and highlighted with a red box. In the center, the 'Active Data' panel displays 'magdas_mag_her_1sec_hdz: 2012-03-04/00:00:00 to 201'. To the right is a context menu with various processing options: Subtract Average, Subtract Median, Smooth Data..., High Pass filter..., Block Average, Detlag..., Degap..., Interpolate..., Clear Spikes..., Time Derivative..., Wavelet Transform..., Power Spectrum..., Coordinate Transform..., Split Variable, Join Variables..., and More... A red box highlights the 'Power Spectrum...' option, which is also circled with a red circle. At the bottom of the dialog, the 'OK' button is circled with a red circle.

Power Spectra Options

Dynamic

Suffix: _dpwrspe

Window Size: 256

Window Shift: 128

Set Time Range:

Start Time: 2007-03-23/00:00:00

Stop Time: 2007-03-24/00:00:00

Use Single Day

Bins: 3

Remove NaNs From Input?

No Line No Hanning Not Per Hz

OK Cancel Help

Data Processing

Loaded Data

- 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]

Active Data

magdas_mag_her_1sec_hdz_x_dpwrspc:	2012-03-04/00:00
magdas_mag_her_1sec_hdz_y_dpwrspc:	2012-03-04/00:00
magdas_mag_her_1sec_hdz_z_dpwrspc:	2012-03-04/00:00

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...
More...

1. New variables are created!

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]
magdas_mag_her_1sec_hdz_z_dpwrspc [2012-03-04]

Clear Active Done

(2017-08-17/22:00:53) 13: Spectra creation successful.

2. Click Done

Open “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 [2012-03-04/00:00:30 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]
 - + magdas_mag_asb_1sec_hdz-d [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]
 - + magdas_mag_her_1sec_hdz-d [2012-03-04/00:00:00 to 201]
 - + magdas_mag_her_1sec_hdz_x_dpwrspc [2012-03-04/00:00:00 to 201]
 - + magdas_mag_her_1sec_hdz_y_dpwrspc [2012-03-04/00:00:00 to 201]
 - + magdas_mag_her_1sec_hdz_z_dpwrspc [2012-03-04/00:00:00 to 201]

2. Click Spec

Spec ->

(L) 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
Panel 4 (4, 1) -
- magdas_mag_asb_1sec_hdz-d_time -vs- magdas_mag_asb_1sec_hdz-d
- magdas_mag_asb_1sec_hdz-d_time -vs- magdas_mag_asb_1sec_hdz-d
- 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_x_dpwrspc

3. Data are added

1. Select

magdas_mag_her_1sec_hdz_x_dpwrspc

Variables:

Add/Edit

Rows Per Page:

5

Cols Per Page:

1

Lock To Panel

Unlock Panels

OK

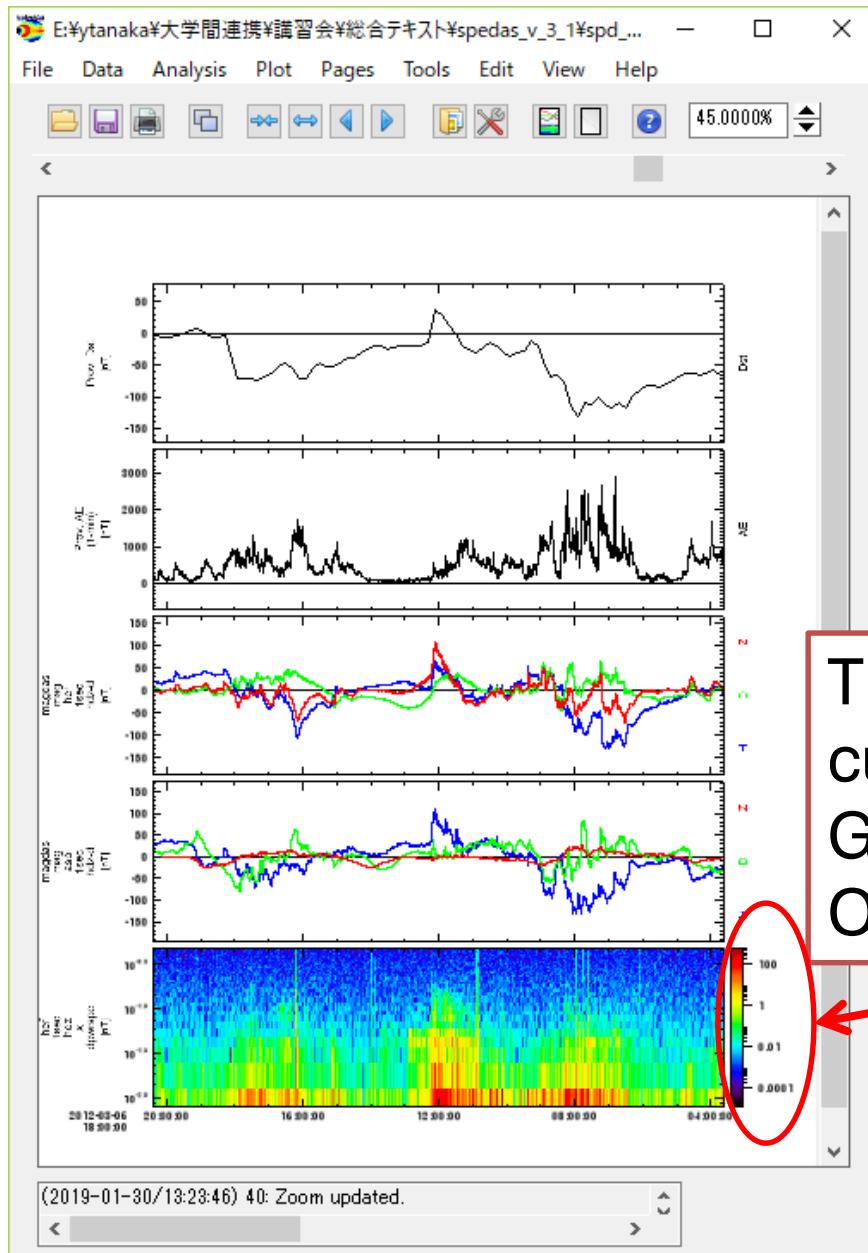
Apply

Cancel

4. Click OK

(2017-08-17/22:01:31) 8: Add Finished.

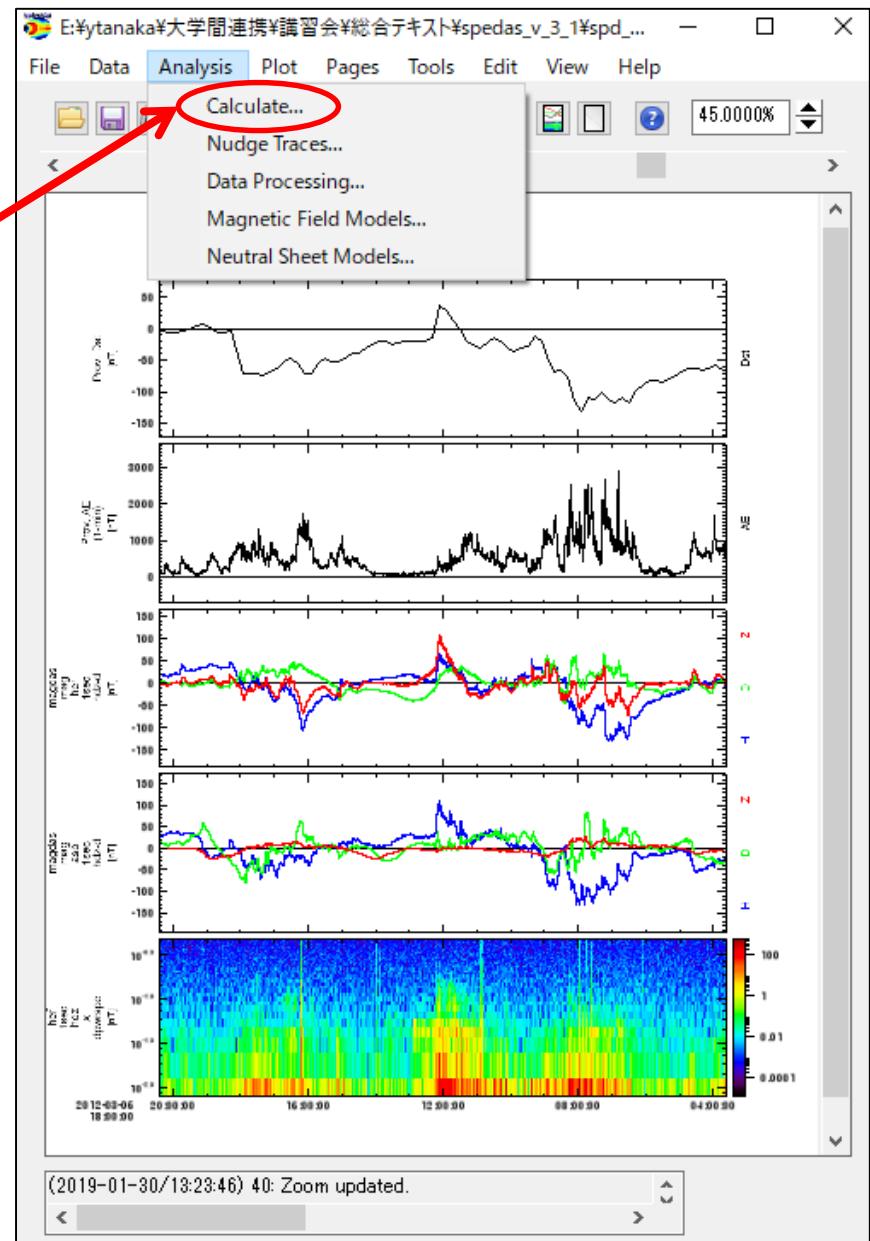
Basic Operation of SPEDAS GUI



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

Calculate (Equation editor)

1. Select
Analysis – Calculate...



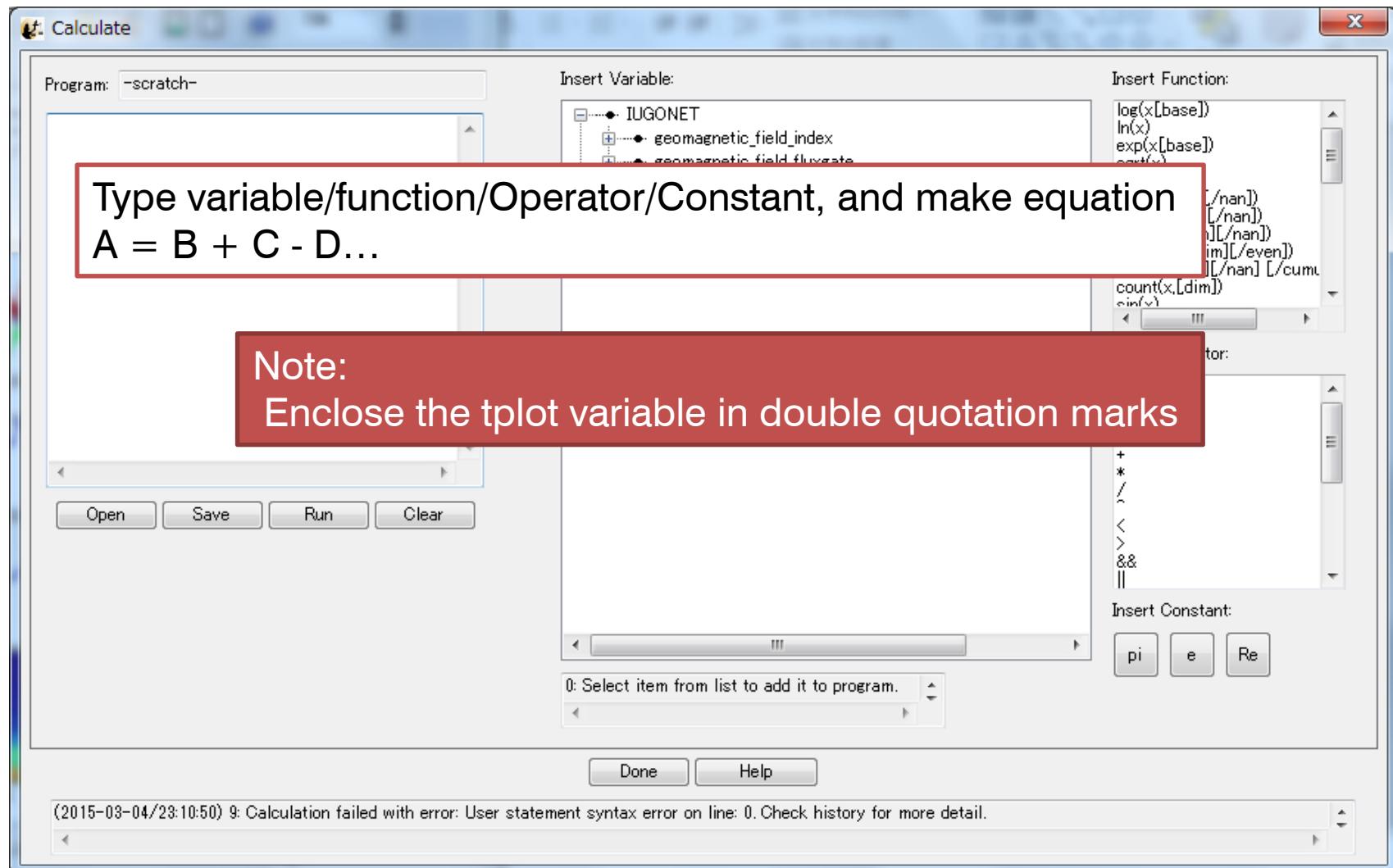
Equation Editor for SPEDAS

The screenshot shows the SPEDAS Equation Editor interface. On the left is a text editor window with buttons for Open, Save, Run, and Clear. To the right are several toolbars:

- Variable**: A tree view of loaded data, with a red box highlighting the text "Variable = Your loaded data".
- Built-in function**: A list of mathematical functions like log, ln, exp, sqrt, abs, min, max, mean, average, median, total, count, and sum.
- Built-in Operator**: A list of operators including +, -, *, /, <, >, &&, ||, and !.
- Built-in Constant**: Buttons for pi, e, and Re.

At the bottom, a status bar displays the message "(2017-08-17/23:24:21) 1: Calculate opened. Displaying File: -scratch-".

Make an equation using the loaded variables



The screenshot shows the SPEDAS Calculate dialog box. On the left, there is a code editor window with the text "magdas_mag_her_1sec_hdz-d_x". Below it are buttons for Open, Save, Run, and Clear. To the right is a tree view of variables under the IUGONET group, with a red box around the path "magdas_mag_her_1sec_hdz-d_x". A red arrow points from the text "1. Select magdas_mag_her_1sec_hdz-d_x" to this path. Another red arrow points from the text "2. Click arrow" to a blue double-headed arrow icon located between the code editor and the variable tree. A third red box surrounds the text "3. Variable is added" and the variable tree area. On the far right, there are panels for Insert Operator (with operators like log, ln, exp, sqrt, abs, min, max, mean, average, median, total, count, etc.) and Insert Constant (with pi, e, Re). At the bottom, a status bar says "(2017-08-17/22:21:28) 5: Variable selected: magdas_mag_her_1sec_hdz-d_x." and a Done/Help button.

1. Select `magdas_mag_her_1sec_hdz-d_x`

2. Click arrow

3. Variable is added

Then, add the offset (+200) to
`magdas_mag_her_1sec_hdz-d_x`
and plot it on new panel.

(2017-08-17/22:21:28) 5: Variable selected: `magdas_mag_her_1sec_hdz-d_x`.

Basic Operation of SPEDAS GUI

Note: one line, never return

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

The screenshot shows the SPEDAS GUI interface. On the left, a script editor window contains the following text:

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

A red arrow points from the text above to the script editor. A red circle highlights the "Run" button at the bottom of the editor window. A red box labeled "1. Click Run" is positioned over the "Run" button.

In the center, a tree view of variables is shown under the "geomagnetic_field_fluxgate" category. A red circle highlights the "magdas_mag_her_1sec_hdz-d_x_ofst" entry under the "her" section. A red box labeled "2. A new variable is created" is positioned over this highlighted entry.

On the right, there are two panels: "Insert Operator" containing mathematical operators like ++, --, *, /, <, >, &&, ||; and "Insert Constant" containing constants pi, e, Re. A red circle highlights the "Done" button at the bottom of the right panel. A red box labeled "3. Click done" is positioned over the "Done" button.

At the bottom left, a status bar displays the message "(2017-08-17/22:53:49) 14: Calculation complete".

Open “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 []
 - 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]
 - magdas_mag_asb_1sec_hdz-d [2012-03-04/00:00:00 to 201]
 - magdas_mag_asb_1sec_hdz-d_x_ofst [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]
 - magdas_mag_her_1sec_hdz-d [2012-03-04/00:00:00 to 201]
 - magdas_mag_her_1sec_hdz-d_time [2012-03-04/00:00:00 to 201]
 - magdas_mag_her_1sec_hdz-d_x_ofst [2012-03-04/00:00:00 to 201]
 - magdas_mag_her_1sec_hdz-d_y [2012-03-04/00:00:00 to 201]
 - magdas_mag_her_1sec_hdz-d_z [2012-03-04/00:00:00 to 201]
 - magdas_mag_her_1sec_hdz-d_yaxis [2012-03-04/00:00:00 to 201]
 - magdas_mag_her_1sec_hdz_x_dpwrspc [2012-03-04/00:00:00 to 201]
 - magdas_mag_her_1sec_hdz_y_dpwrspc [2012-03-04/00:00:00 to 201]
 - magdas_mag_her_1sec_hdz_z_dpwrspc [2012-03-04/00:00:00 to 201]
 - magdas_mag_her_1sec_hdz-d_x_ofst [2012-03-04/00:00:00 to 201]

3. Click Line

Line ->

Spec ->

(L) Panel 1 (1, 1) -
Panel 2 (2, 1) -
Panel 4 (4, 1) -
Panel 5 (5, 1) -
Panel 6 (6, 1) -

Remove

Edit

Row: 6

Column: 1

Row Span: 1

Col Span: 1

Rows Per Page:

Page:

Panel

Panels

1. Select Panel 3 and Remove it

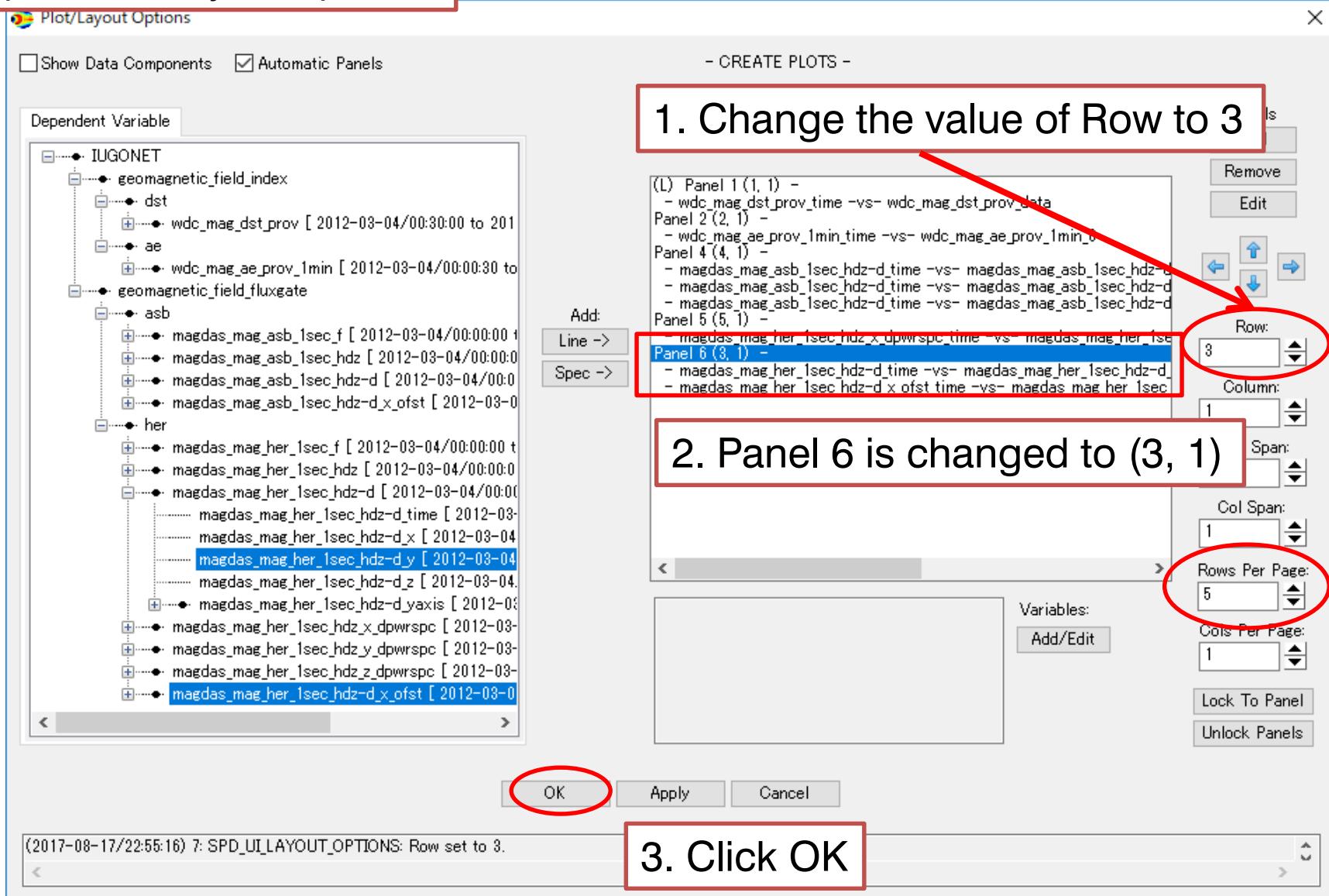
2. Select
magdas_mag_her_1sec_hdz-d_y
magdas_mag_her_1sec_hdz-d_x_ofst

4. Data are added

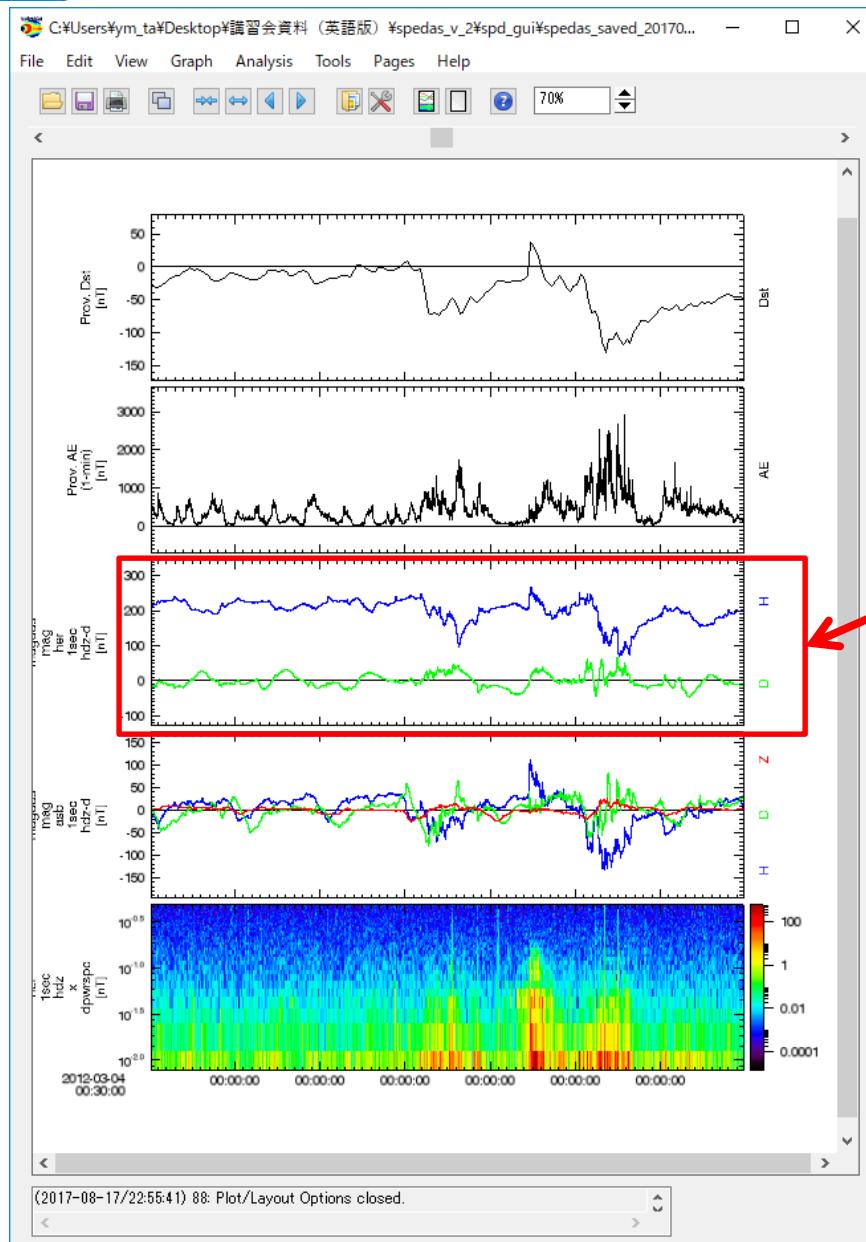
OK Apply Cancel

(2017-08-17/22:54:53) 4: Add Finished.

Open “Plot/Layout Options”

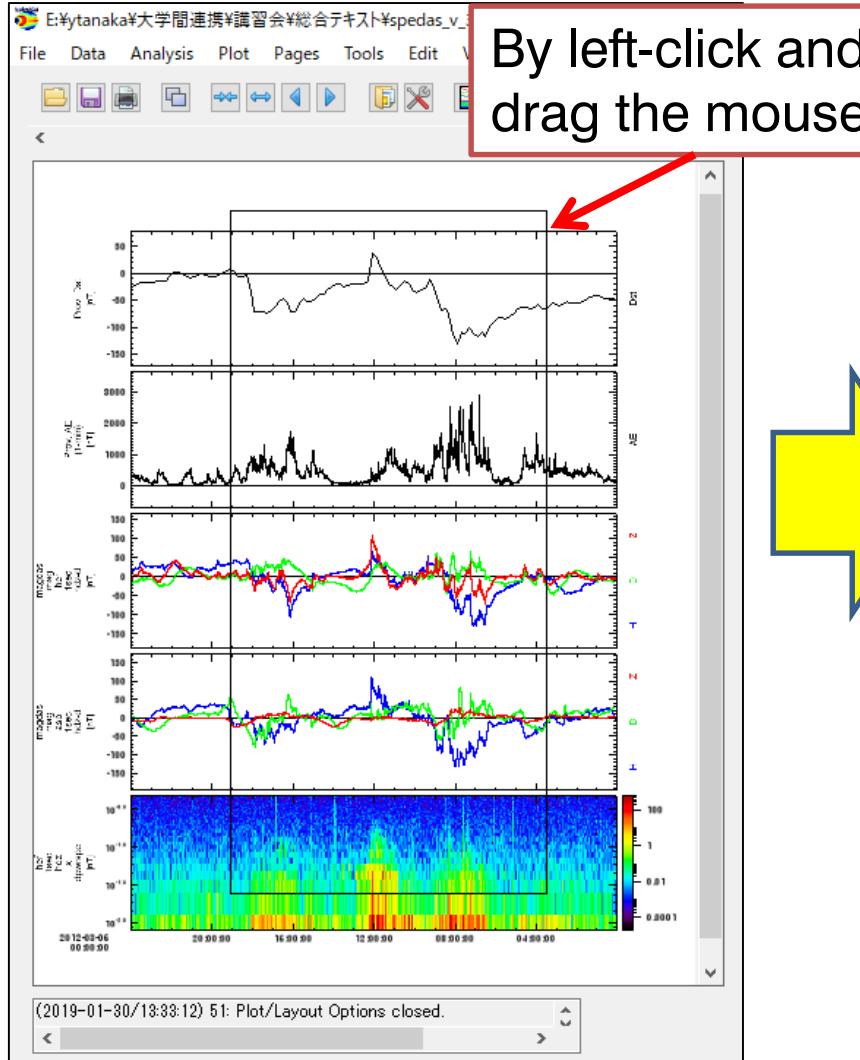


Basic Operation of SPEDAS GUI

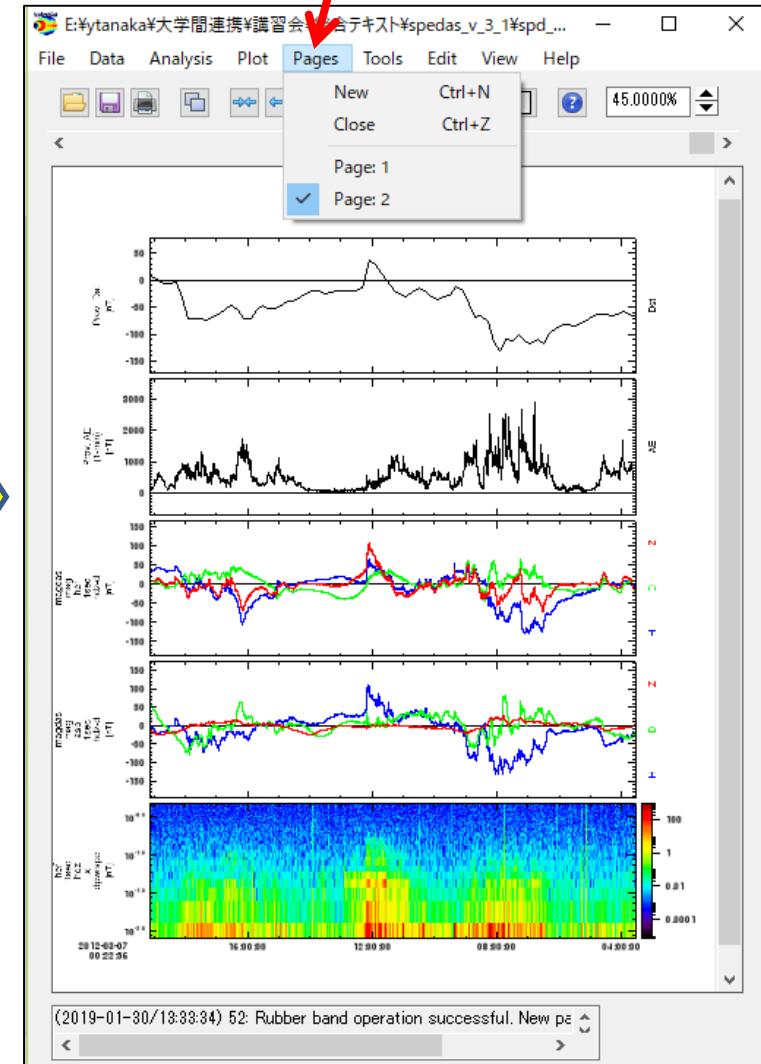


Offset (+200nT)
was added to the H
comp.

Expand X range using the mouse



A new page opens





Metadata DB for Upper Atmosphere

・ 超高層大気長期変動の全地球上ネットワーク観測・研究
Inter-university Upper atmosphere Global Observation-NETwork

How to Use SPEDAS-GUI

part3

Additional data loading

Load your ASCII file (1)

HEADER(13 lines)

Data(1440lines)

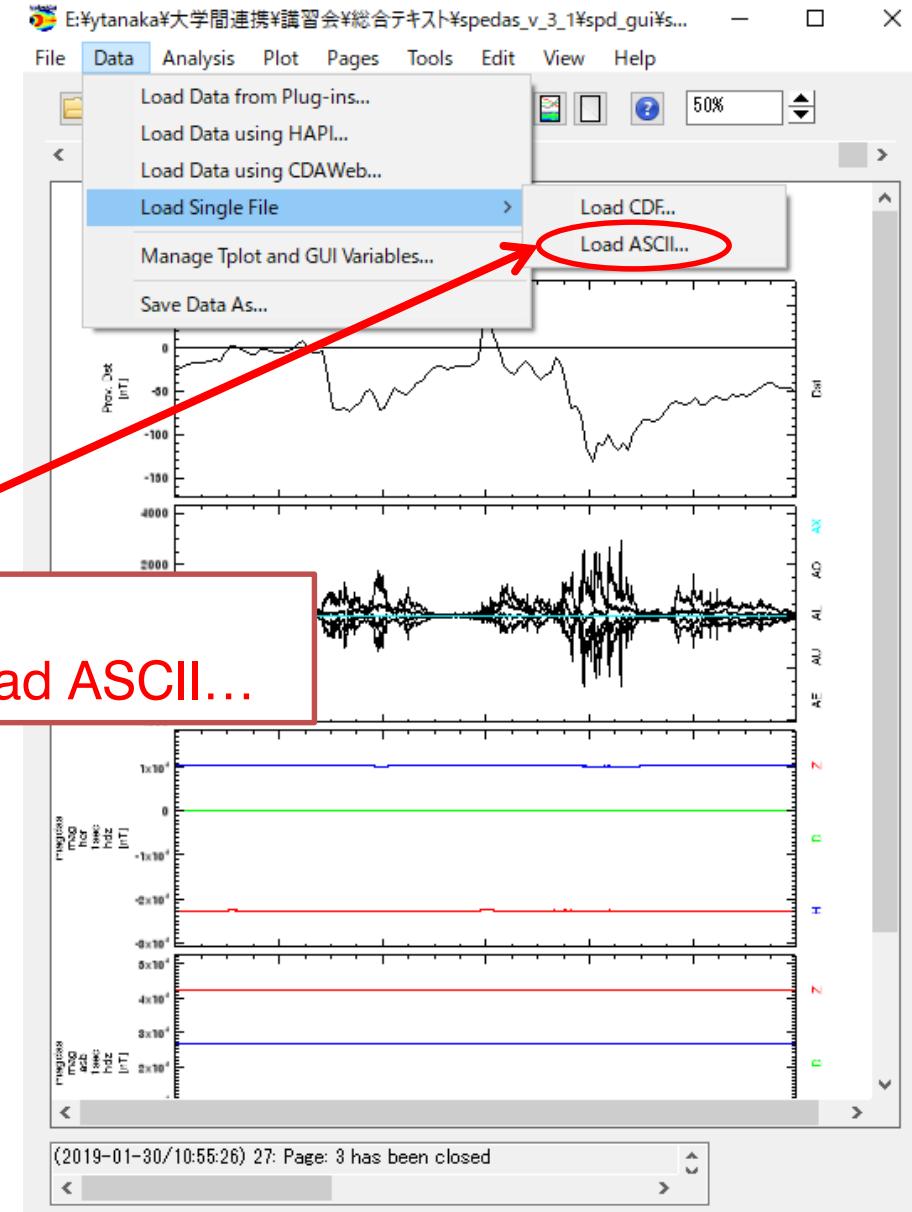
This example reads an ASCII
file from

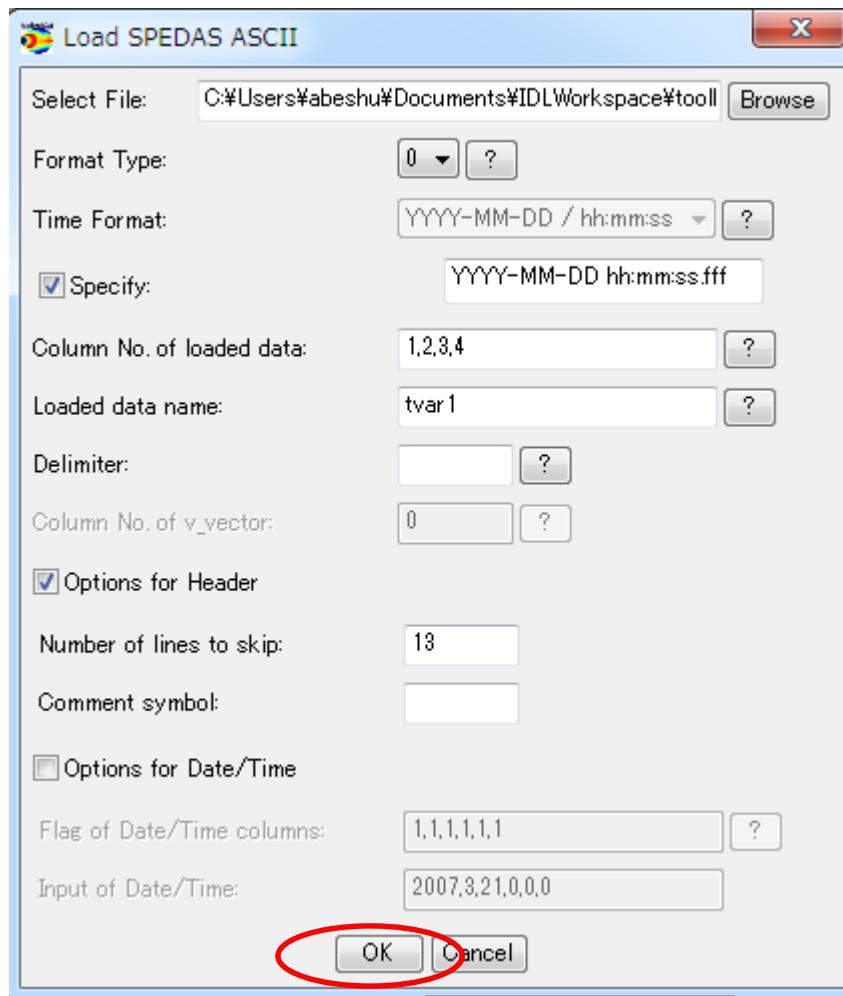
<http://data.icswse.Kyushu-u.ac.jp/gmag/data/ASB/Min/2012/ASB20120301pmin.min>

Sample1: magnetometer data

Format	IAGA-2002					
Source of Data	Kyushu University (KU)					
Station Name	Ashibetu					
IAGA CODE	ASB (KU code)					
Geodetic Latitude	043.460					
Geodetic Longitude	142.170					
Elevation	8888.88					
Reported	HDZF					
Sensor Orientation	HDZ					
Digital Sampling	1 seconds					
Data Interval Type	Averaged 1-minute (00:30 - 01:29)					
Data Type	Provisional					
DATE	TIME					
DOY	ASRH					
ASPD	ASB7					
ASBF						
2012-03-01	00:00:00.000	061	26723.83	111.31	42126.86	49888.35
2012-03-01	00:01:00.000	061	26723.91	110.90	42126.65	49888.22
2012-03-01	00:02:00.000	061	26723.98	110.84	42126.45	49888.09
2012-03-01	00:03:00.000	061	26723.71	111.25	42126.29	49887.80
2012-03-01	00:04:00.000	061	26723.54	111.38	42126.16	49887.61
2012-03-01	00:05:00.000	061	26723.48	111.37	42125.99	49887.43
2012-03-01	00:06:00.000	061	26723.29	111.32	42125.81	49887.18
2012-03-01	00:07:00.000	061	26723.19	111.37	42125.61	49886.95
2012-03-01	00:08:00.000	061	26723.07	111.25	42125.38	49886.70
2012-03-01	00:09:00.000	061	26722.95	110.96	42125.16	49886.44
2012-03-01	00:10:00.000	061	26722.62	110.67	42124.93	49886.08
2012-03-01	00:11:00.000	061	26722.38	110.10	42124.68	49885.73
2012-03-01	00:12:00.000	061	26722.23	109.67	42124.40	49885.41
2012-03-01	00:13:00.000	061	26721.96	109.25	42124.15	49885.06
2012-03-01	00:14:00.000	061	26721.77	108.95	42123.89	49884.74
2012-03-01	00:15:00.000	061	26721.44	108.56	42123.65	49884.35
2012-03-01	00:16:00.000	061	26721.59	107.61	42123.36	49884.19
2012-03-01	00:17:00.000	061	26721.29	107.81	42123.11	49883.82
2012-03-01	00:18:00.000	061	26720.83	108.25	42122.95	49883.44
2012-03-01	00:19:00.000	061	26721.12	107.27	42122.72	49883.10

Data(6 columns)





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**'

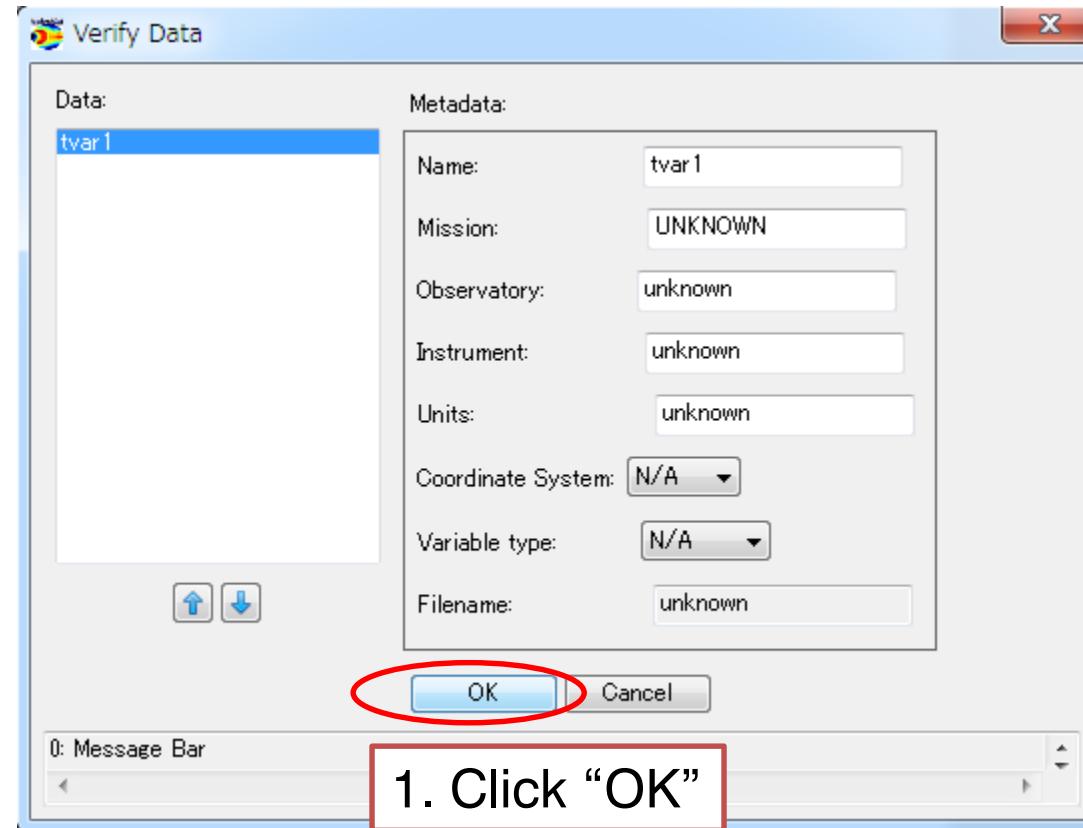
Note: Column number starts from 0.

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

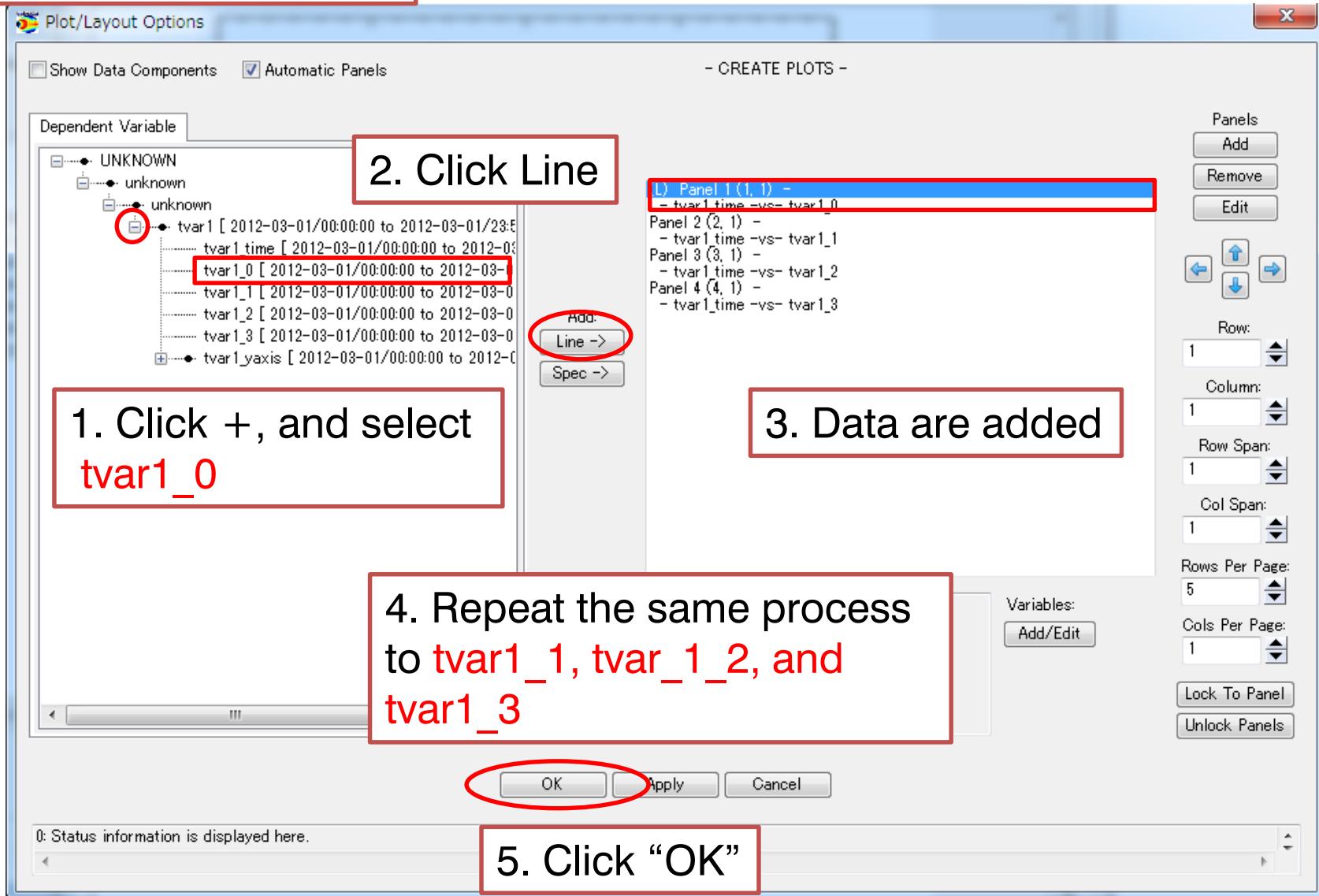
6. Click OK

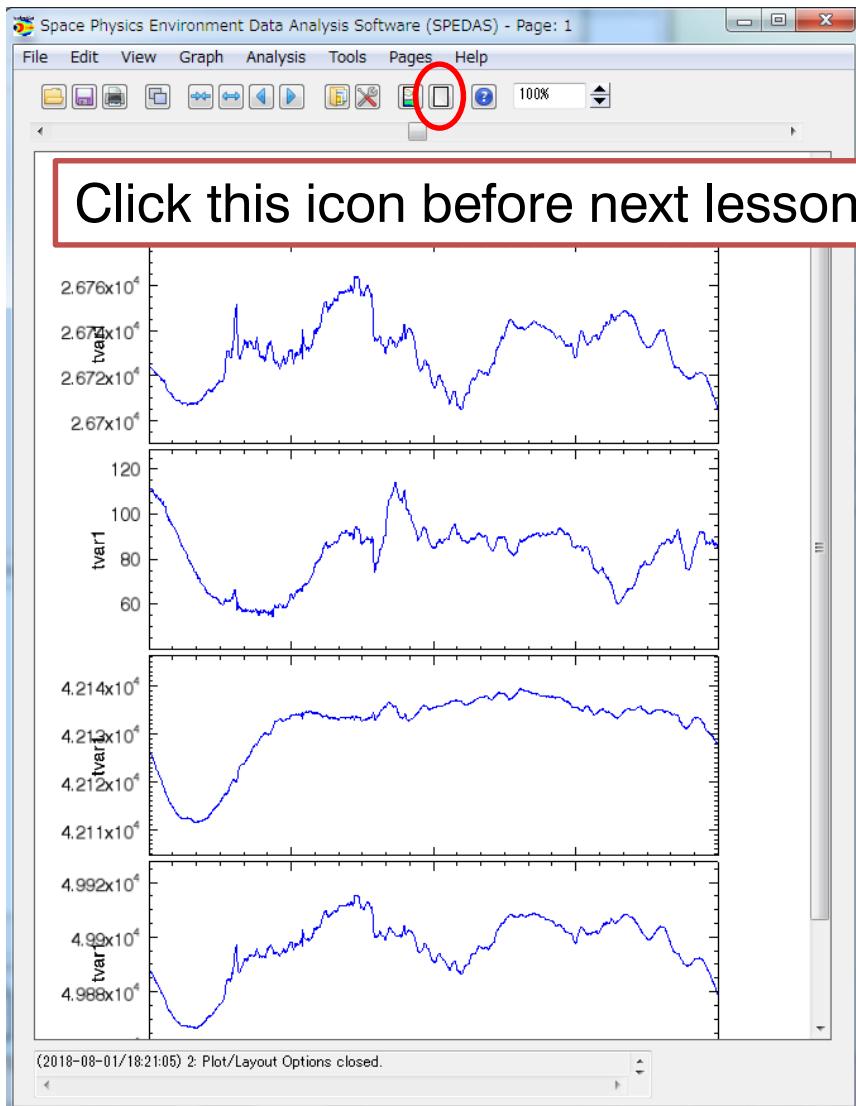


Basic Operation of SPEDAS GUI



Open “Plot/Layout Options”





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



Basic Operation of SPEDAS GUI

Load your ASCII file (2)

Sample2: EISCAT radar data

The screenshot shows a Windows-style text editor window titled "xyzzy 0.2.2.253@LUNANUEVA - C:/Users/abeshu/Documents/IDLWorkspace/toolbox/spd_ui_load_ascii/gui/testfile_format1.txt". The window contains an ASCII file with radar data. The first few lines are header information starting with "%". A red box highlights this header area with the label "HEADER(starts from %)". Below the header is a large block of data with 11520 lines, each containing 19 columns of numerical values. This data block is highlighted by a red box and labeled "Data(11520lines)". At the bottom of the window, the status bar shows "11541行読み込みました" (11541 lines read) and the date "08/01 18:08".

HEADER(starts from %)

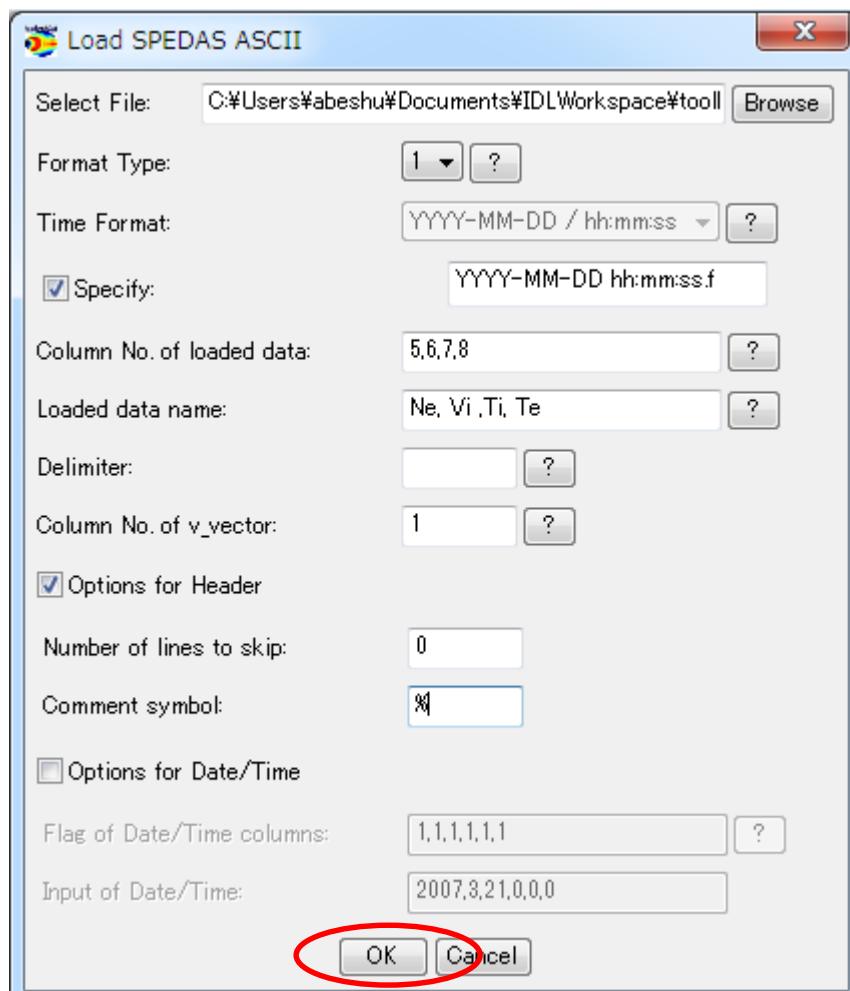
Data(11520lines)

Data(19 columns)

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	m^-3	m/s	K	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	125.2	77.00	15.97	0	9.70	102	270	227	8.80	22	210	210	184.50	81.60	0	1.75	120.0

http://pc115.seg20.nipr.ac.jp/www/eiscatdata/esr/ascii/42m_ascii/2014/20140108_42m0_ipy0_0060.txt

Open File – Load Your Data – Load ASCII



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**'

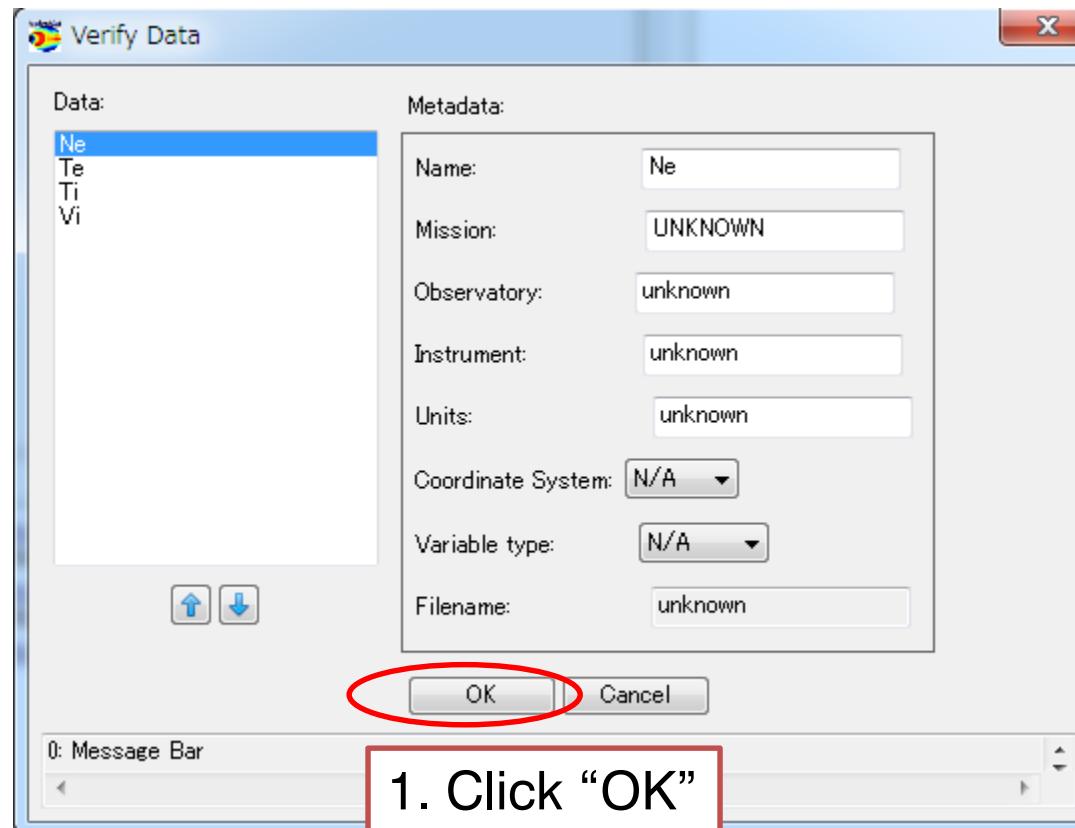
4. Column No. of loaded data:
put '**5,6,7,8**'

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

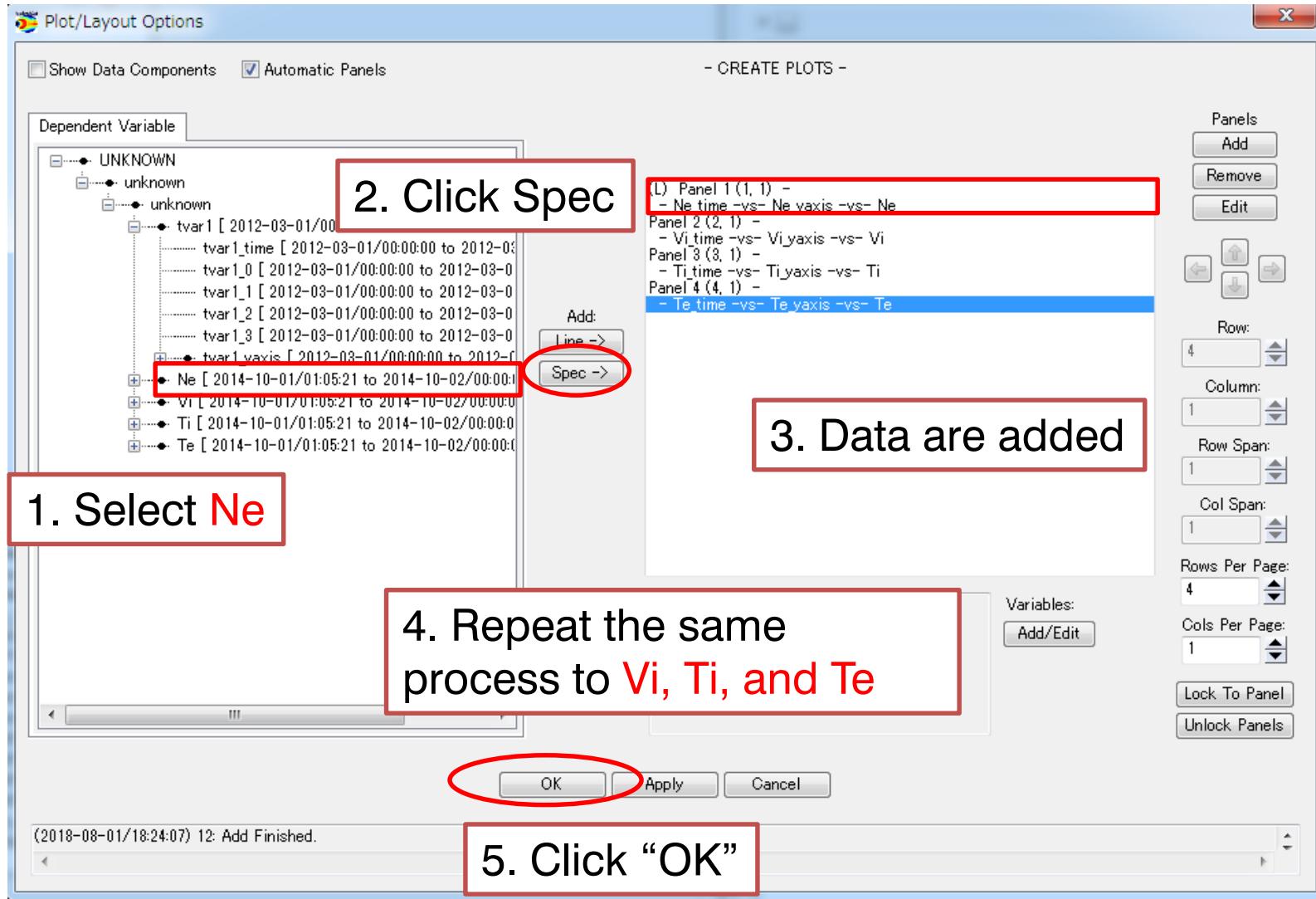
6. Column No. of v_vector:
put '**1**'

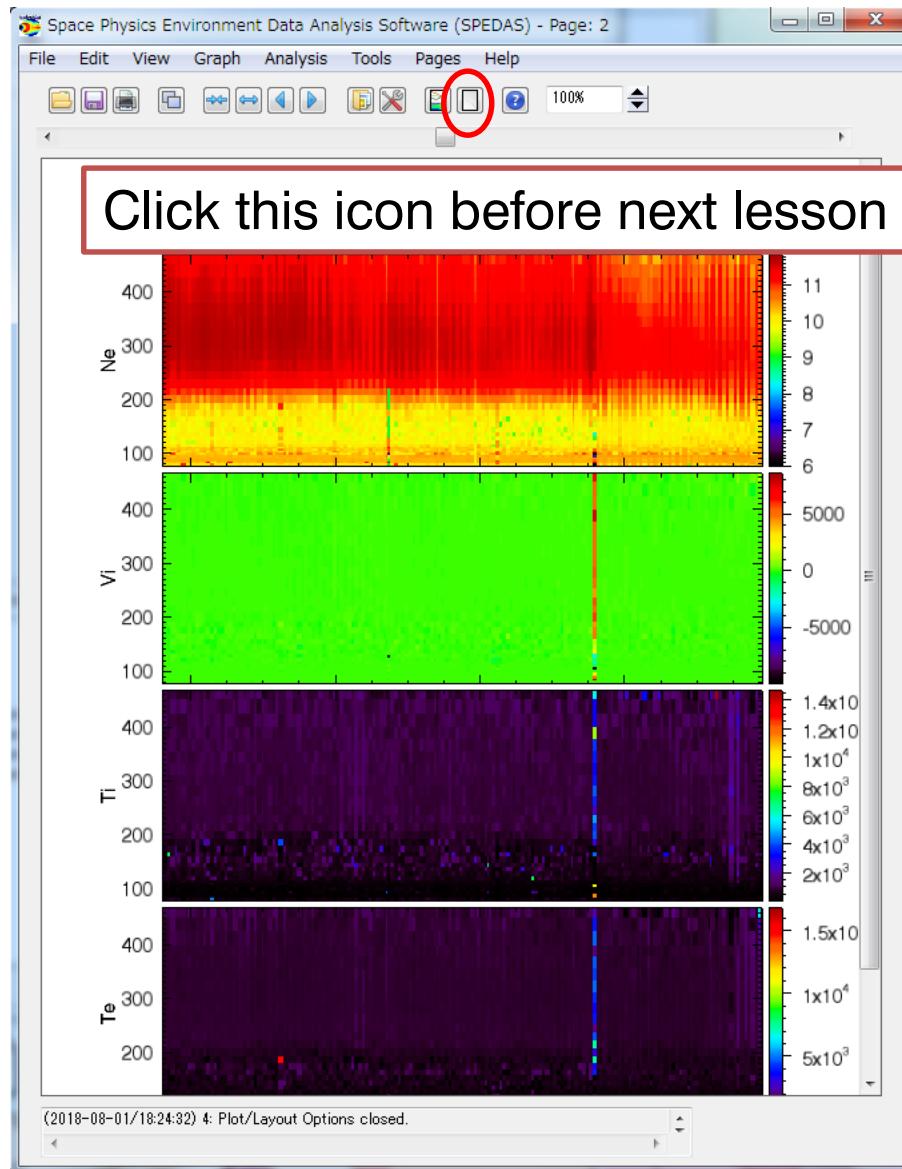
7. Options for Header:
Check **the box**, and put '**%**' to Comment symbol

Basic Operation of SPEDAS GUI



Open “Plot/Layout Options”





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

Acknowledgments

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.

References:

Angelopoulos et al., The Space Physics Environment Data Analysis System (SPEDAS), *Space Sci. Rev.*, 215:9, doi:10.1007/s11214-018-0576-4, 2019.