



超高層大気長期変動の全球地上ネットワーク・研究  
Inter-university Upper atmosphere Global Observation NETwork

# IUGONET新システムが目指すオープンサイエンス

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[4] RISH, Kyoto University

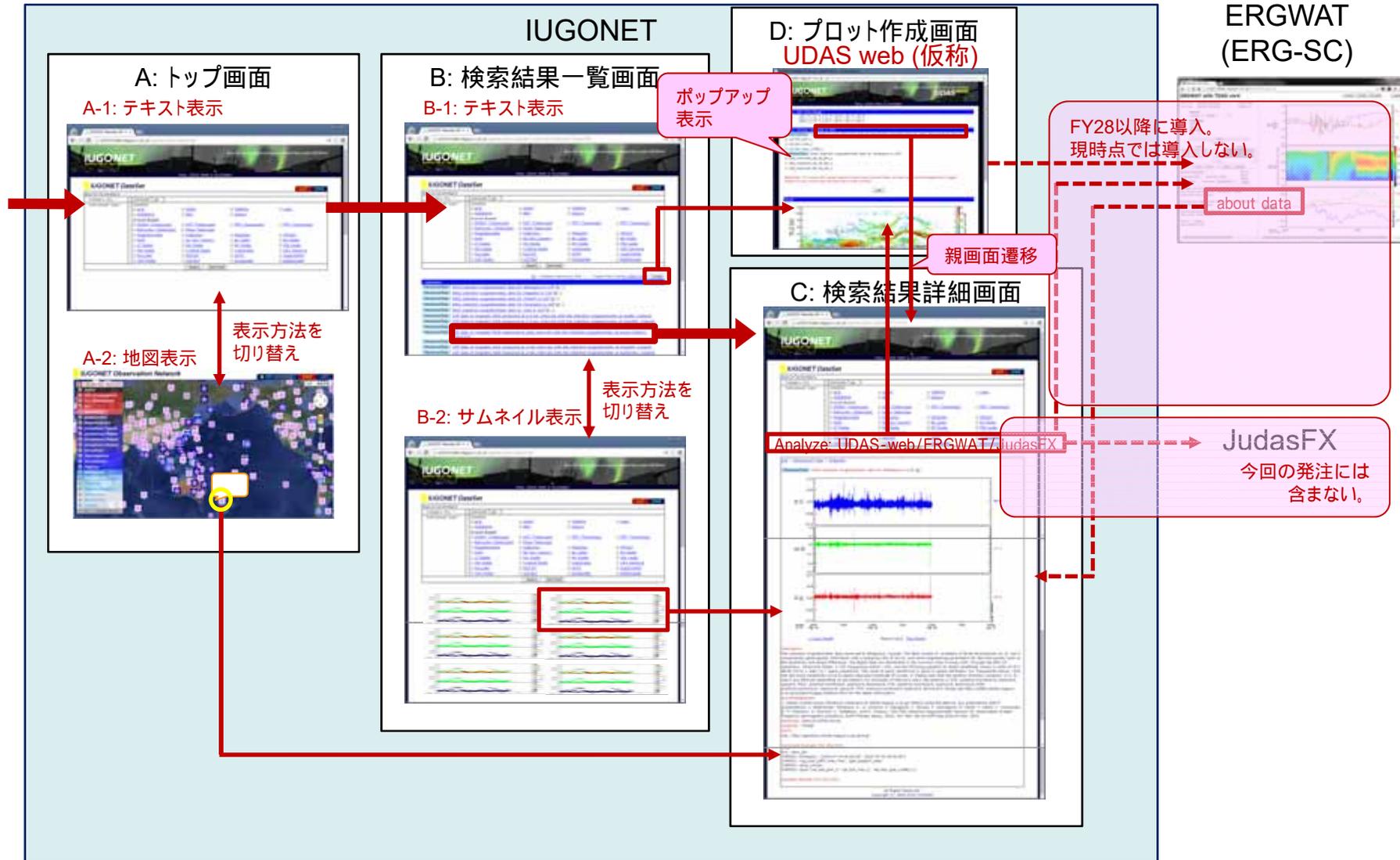
[5] WDC-Kyoto, Kyoto University

[6] Kwasan and Hida Obs., Kyoto University

第3回「太陽地球環境データ解析に基づく超高層大気の空間・時間変動の解明」  
第320回生存圏シンポジウム/平成28年度名大ISEE研究集会  
平成28年度極地研研究集会

平成28年10月18日

画面遷移図 <http://search.iugonet.org/>



第5回 太陽地球環境データ解析に基づく超高層大気の上向き・時間変動の解明



# IUGONET Type-A

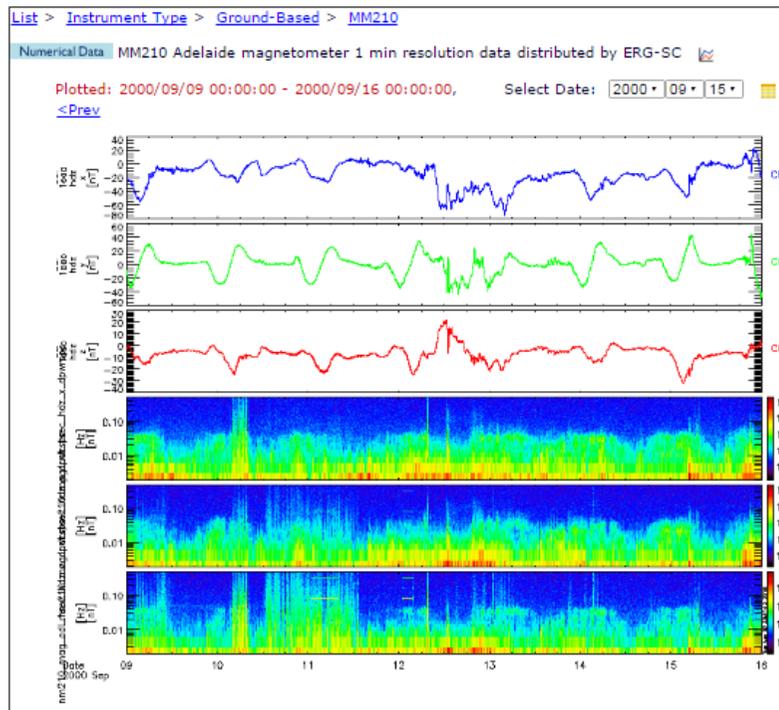
改良点(入口): 導線の見直し、Quick Look の前面化

Instrument Type	Observed Region
Satellite: <input type="checkbox"/> AKEBONO	<input type="checkbox"/> CHAMP
Ground-Based: <input type="checkbox"/> SMART (Telescope)	<input type="checkbox"/> DST (Telescope)
<input type="checkbox"/> Magnetometer	<input type="checkbox"/> Induction
<input type="checkbox"/> All Sky Imager	<input type="checkbox"/> EA Radar
<input type="checkbox"/> X-Band Radar	<input type="checkbox"/> GPS Receiver
<input type="checkbox"/> SuperDARN	<input type="checkbox"/> VHF Radar
<input type="checkbox"/> BL/LT/WP Radar	<input type="checkbox"/> Riometer
	<input type="checkbox"/> Others
	<input type="checkbox"/> Muon (Tel)
	<input type="checkbox"/> Refractor (Telescope)
	<input type="checkbox"/> MM210
	<input type="checkbox"/> MF Radar
	<input type="checkbox"/> EISCAT
	<input type="checkbox"/> Ionosonde
	<input type="checkbox"/> AWS
	<input type="checkbox"/> MW Radar
	<input type="checkbox"/> OMTI
	<input type="checkbox"/> Radiosonde

Keyword: \_\_\_\_\_  
Timespan: \_\_\_\_\_ To \_\_\_\_\_ [Set Detail](#)

カテゴリの導入 **NEW!!**

マップ選択の導入 **NEW!!**



### IUGONET Observation Network

**OBSERVED REGION**

- All (Close Panel)
- Satellite
  - AKEBONO
  - CHAMP
- Ground-Based
  - SMART (Telescope)
  - DST (Telescope)
  - FMT (Telescope)
  - Refractor (Telescope)
  - Muon (Telescope)
  - Magnetometer
  - Induction
  - MAGDAS
  - MM210
  - AWS
  - All Sky Imager
  - EA Radar
  - MU Radar
  - MF Radar
  - MW Radar
  - X-Band Radar
  - GPS Receiver
  - Na-Lidar
  - EISCAT
  - OMTI
  - SuperDARN
  - VHF Radar
  - VLF/ELF

[EMN observation network 3sec-resolution geomagnetic field data at Pohapel, FSM](#)

Geomagnetic field data observed at EMN Pohapel station, FSM. The time resolution is 3 second. The data consist of 3 components (H, D, Z).

Timespan

Start: 1992-10-06T00:00:00

Stop: 1995-11-29T23:59:59

Instrument: EMN fluxgate magnetometer at POH

Observatory: EMN Pohapel station

**Description:**  
Geomagnetic field data with 1 min resolution for Adelaide of 210 Magnetic Meridian (210MM) magnetometer network, distributed as CDF files by ERG-SC

**Acknowledgement:** 1. Please contact the Principal Investigator (PI), Prof. K. Yumoto, Kyushu University (yumoto at

く超高層大気の空間・時間変動の解明

改良点(中): データを発見する、実際に得る

QLを並べて表示 **NEW!**

Instrument Type	Observed Region
Satellite:	
<input type="checkbox"/> AKEBONO	<input type="checkbox"/> CHAMP
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"/> Magnetometer	<input type="checkbox"/> Induction
<input type="checkbox"/> All Sky Imager	<input type="checkbox"/> EA Radar
<input type="checkbox"/> X-Band Radar	<input type="checkbox"/> GPS Receiver
<input type="checkbox"/> SuperDARN	<input type="checkbox"/> VHF Radar
<input type="checkbox"/> BL/LT/WP Radar	<input type="checkbox"/> Riometer
	<input type="checkbox"/> MAGDAS
	<input type="checkbox"/> MU Radar
	<input type="checkbox"/> Na-Lidar
	<input type="checkbox"/> VLF/ELF
	<input type="checkbox"/> Others
	<input checked="" type="checkbox"/> MM210
	<input type="checkbox"/> MF Radar
	<input type="checkbox"/> EISCAT
	<input type="checkbox"/> Ionosonde
	<input type="checkbox"/> AWS
	<input type="checkbox"/> MW Radar
	<input type="checkbox"/> OMTI
	<input type="checkbox"/> Radiosonde

Keyword:

Timespan:  To 2000/01/12

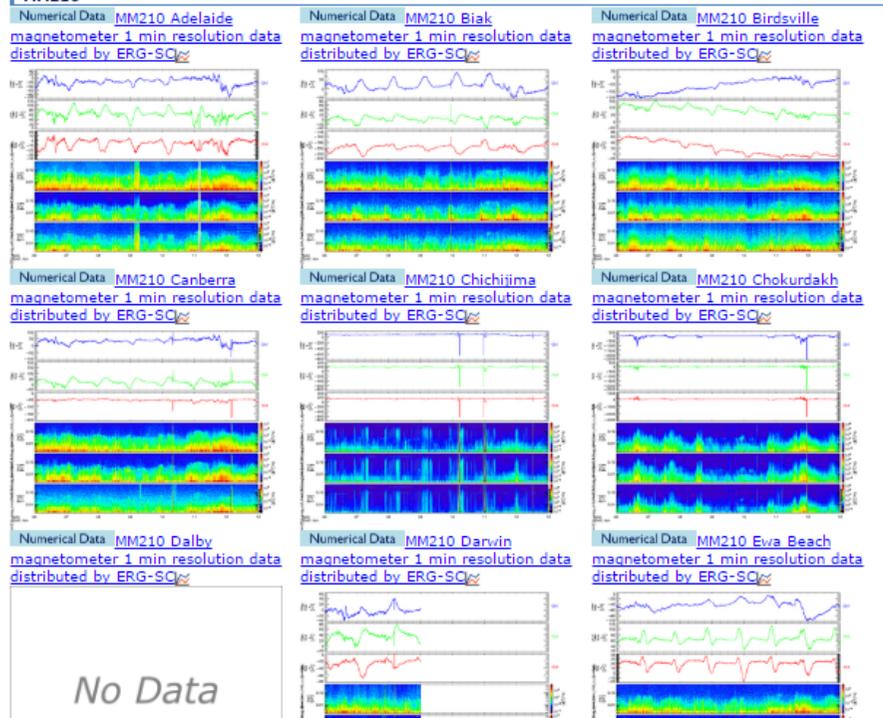
Instrument Type	Observed Region
Satellite:	
<input type="checkbox"/> AKEBONO	<input type="checkbox"/> CHAMP
Ground-Based:	
<input checked="" type="checkbox"/> SMART (Telescope)	<input type="checkbox"/> DST (Telescope)
<input type="checkbox"/> FMT (Telescope)	<input type="checkbox"/> Refractor (Telescope)
<input type="checkbox"/> Muon (Telescope)	
<input type="checkbox"/> Magnetometer	<input type="checkbox"/> Induction
<input checked="" type="checkbox"/> All Sky Imager	<input type="checkbox"/> EA Radar
<input type="checkbox"/> X-Band Radar	<input type="checkbox"/> GPS Receiver
<input type="checkbox"/> SuperDARN	<input type="checkbox"/> VHF Radar
<input type="checkbox"/> BL/LT/WP Radar	<input type="checkbox"/> Riometer
	<input type="checkbox"/> MAGDAS
	<input type="checkbox"/> MU Radar
	<input type="checkbox"/> Na-Lidar
	<input type="checkbox"/> VLF/ELF
	<input type="checkbox"/> Others
	<input type="checkbox"/> MM210
	<input type="checkbox"/> MF Radar
	<input type="checkbox"/> EISCAT
	<input type="checkbox"/> Ionosonde
	<input type="checkbox"/> AWS
	<input type="checkbox"/> MW Radar
	<input type="checkbox"/> OMTI
	<input type="checkbox"/> Radiosonde

Keyword:

Timespan:  To 2016/09/10

Search Results:    Contains Summary Plot  Create Plot (Using UDAS-Web)

Ground-Based



Search Results:    Contains Summary Plot  Create Plot (Using UDAS-Web)

SMART (Telescope)



(超高層大気の空間・時間変動の解明)

## 改良点(中)：データを発見する、実際に得る

**観測機器情報**

Observed Region: Earth.NearSurface.Ionosphere.ERegion  
Observed Region: Earth.Magnetosphere

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

Instrument:  
Name: Induction Magnetometer at Athabasca of STEL Magnetometer Data  
Description: Induction Magnetometer at Athabasca of STEL 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.  
Contact (PrincipalInvestigator): Kazuo Shiokawa, Solar-Terrestrial Environment laboratory, Nagoya University, shiokawa@stelab.nagoya-u.ac.jp  
Contact (MetadataContact): Tomoaki Hori, Solar-Terrestrial Environment laboratory, Nagoya University, horit@stelab.nagoya-u.ac.jp  
Contact (MetadataContact): ISEE IUGONET Metadata Management Group, Solar-Terrestrial Environment Laboratory, Nagoya University, stel-iugonet (at) isee.nagoya-u.ac.jp  
InstrumentType: Magnetometer  
InvestigationName: STEL Magnetometer Data

**説明**

Description:  
The induction magnetometer data observed at Athabasca, Canada. The data cover 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. Important Notes: 1. For frequencies below ~1Hz, use the following equation to obtain amplitude values in units of nT/s:  $dB/dt (nT/s) = \text{data} (V) / \text{quick\_sensitivity}$ . 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, positive=northward, eastward, upward; MGD: positive=northward, eastward, downward; MSR: positive=southward, westward, upward; STA: Please see [http://stdb2.stelab.nagoya-u.ac.jp/magne/magne\\_stations.htm](http://stdb2.stelab.nagoya-u.ac.jp/magne/magne_stations.htm).

**観測所情報**

Observatory:  
Name: STEL Magnetometer Athabasca station  
Description: STEL Magnetometer station at Athabasca, Canada.  
Contact (GeneralContact): Kazuo Shiokawa, Solar-Terrestrial Environment laboratory, Nagoya University, shiokawa@stelab.nagoya-u.ac.jp  
Contact (MetadataContact): Tomoaki Hori, Solar-Terrestrial Environment laboratory, Nagoya University, horit@stelab.nagoya-u.ac.jp  
Contact (MetadataContact): ISEE IUGONET Metadata Management Group, Solar-Terrestrial Environment Laboratory, Nagoya University, stel-iugonet (at) isee.nagoya-u.ac.jp  
Location:  
ObservatoryRegion: Earth.Surface  
CoordinateSystemName: WGS84  
Latitude: 54.7  
Longitude: 246.7

**利用ポリシー**

Acknowledgement: 1. Please contact Kazuo Shiokawa (shiokawa at stelab.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

**実データへの直接リンク**

Observed Data:  
How to Analysis (SPEDAS-CUI):  
IDL> thm\_init  
THEMIS>timespan, ['2014-09-09 00:00:00', '2014-09-16 00:00:00']  
THEMIS>iug\_load\_gmag\_stel\_induction, site='ath'  
THEMIS>tdpwrspc, 'stel\_induction\_db\_dt\_ath', nboxpoints=8192  
THEMIS>tpplot, ['stel\_induction\_db\_dt\_ath\_x', 'stel\_induction\_db\_dt\_ath\_y', 'stel\_induction\_db\_dt\_ath\_z', 'stel\_induction\_db\_dt\_ath\_x\_dpwrspc', 'stel\_induction\_db\_dt\_ath\_y\_dpwrspc', 'stel\_induction\_db\_dt\_ath\_z\_dpwrspc']

**コンタクト先**

Contact (PrincipalInvestigator): Kazuo Shiokawa, Solar-Terrestrial Environment laboratory, Nagoya University, shiokawa@stelab.nagoya-u.ac.jp  
Contact (Publisher): Kanako Seki, Solar-Terrestrial Environment laboratory, Nagoya University, seki@stelab.nagoya-u.ac.jp  
Contact (MetadataContact): Tomoaki Hori, Solar-Terrestrial Environment laboratory, Nagoya University, horit@stelab.nagoya-u.ac.jp  
Contact (MetadataContact): ISEE IUGONET Metadata Management Group, Solar-Terrestrial Environment Laboratory, Nagoya University, stel-iugonet (at) isee.nagoya-u.ac.jp

**サイト情報**

AccessInformation:  
Acknowledgement: 1. Please contact Kazuo Shiokawa (shiokawa at stelab.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: <http://qemsiisc.stelab.nagoya-u.ac.jp/erg/>  
Availability: Online  
Access Rights: Open  
Format: CDF

Processing Level: Uncalibrated  
Measurement Type: Magnetogram

Time Span:  
StartDate: 2005-09-09T00:00:00  
StopDate: -P1800

Observed Region: Earth.NearSurface.Ionosphere.ERegion  
Observed Region: Earth.Magnetosphere

Original Metadata Files:  
64hz\_ergsc\_cdf.xml: [64Hz induction magnetometer data for Athabasca in CDF](#)  
(Observatory) ATH.xml: [STEL Magnetometer Athabasca station](#)  
(Instrument) induction.xml: [Induction Magnetometer at Athabasca of STEL Magnetometer Data](#)  
(Person) Kazuo.Shiokawa.xml: [Kazuo Shiokawa](#)  
(Person) Kanako.Seki.xml: [Kanako Seki](#)  
(Person) Tomoaki.Hori.xml: [Tomoaki Hori](#)  
(Person) ISEE.Metadata.Management.Group.xml: [ISEE IUGONET Metadata Management Group](#)

改良点(出口): データをいじってみる

The screenshot shows the IUGONET web interface with the following sections:

- Step.1: Set Time Range**: From: 2015/07/19 00:00:00, To: 2015/07/20 00:00:00
- Step.2: Choose Variables to Plot**:
  - Numerical Data: The common time files are distributed by ERG-SC.
    - sd\_hok\_pwr\_ (Echo Power for Beam 1) Y-axis/Color Range: min max ASCII
    - sd\_hok\_vlos\_ (Alias Name ...) min max ASCII
    - sd\_hok\_spec\_width 1 (Alias Name ...) min max ASCII
  - Numerical Data: 64Hz induction magnetometer data for Athabasca in CDF.
    - stel\_induction\_db\_dt\_ath\_x (Magnetic Field Variation) Y-axis/Color Range: min max ASCII
    - stel\_induction\_db\_dt\_ath\_y (Alias Name ...) min max ASCII
    - stel\_induction\_db\_dt\_ath\_z (Alias Name ...) min max ASCII
- Step.3: If You Have Another Data, Please Post Here!**:
  - How to: First, Choose Date and Variables You'd Like to Plot on Step.1 and 2. Second, Post the File of csv or tsv Format. Next, Post the Data, and Submit. Finally, You'd be Able To Compare Your Data with IUGONET Data!
  - File: ファイルを選択 選択されていません Post
  - Message: OK, Validated Your File.
- Result**: A plot showing two data series. The top series is a scatter plot of "sd\_hok\_pwr\_" (range gate) vs "LOS Doppler vel. (km/s)". The bottom series is a time-series plot of "sd\_hok\_vlos\_" vs "dt/dt".

ウェブ上でのプロット作成 **NEW!!**

専門用語の補足 **NEW!!**

データの比較 **NEW!!**

国をまたがる! (SaaS)

利用が増えると運用コストも上がる...

PLANNING

自分が持っているデータをPOSTして比較する

分野をまたがる!

普遍的なデータ形式への変換が求められる?

「空間・時間変動の解明」  
「SEE研究集会」

## IUGONET Type-A の特徴

- 変更や拡張が容易
- 他分野(他データ)への展開が容易

## UDAS web の今後の拡張

The screenshot shows the UDAS web interface with several key sections highlighted:

- Step 1: Set Time Range**: Shows date and time selection fields.
- Step 2: Choose Variables to Plot**: A list of variables with checkboxes and 'Y-axis/Color Range' options. A callout points to 'sd\_hok\_spec\_width 1' with the text '専門用語の補足 NEW!!'.
- Step 3: If You Have Another Data, Please Post Here!**: A section for uploading external data files, with a 'Post' button and a 'Message: OK, Validated Your File.' confirmation.
- Result**: A plot area showing two data series: 'hOK all beams [range gate]' (top, green) and 'di/dt' (bottom, blue). A callout points to the plot with the text 'データの比較 NEW!!'.

ウェブ上でのプロット作成 **NEW!!**

国をまたがる! (SaaS)

途上国への研究環境の提供

詳細なパラメータの投入 **NEW!!**

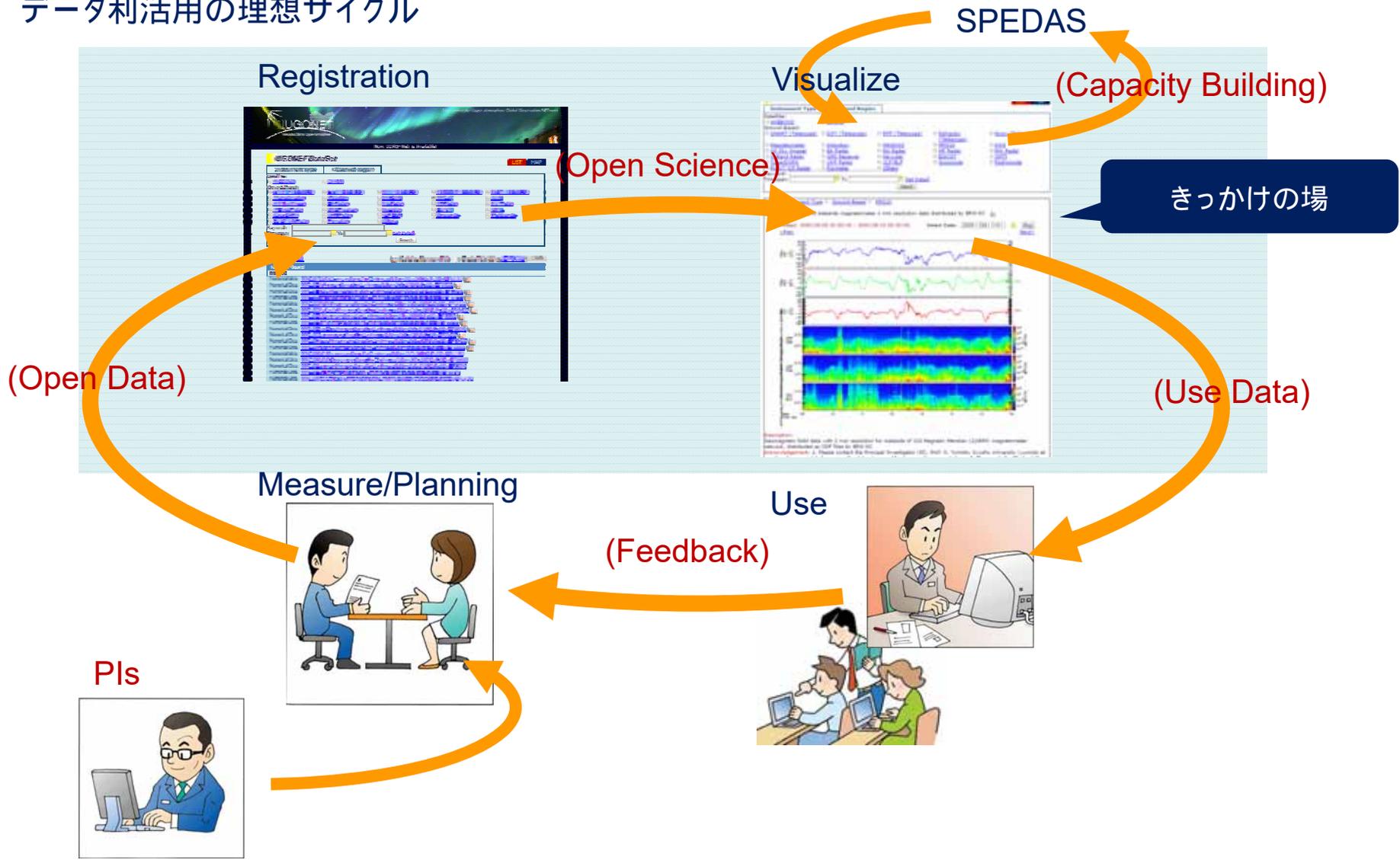
**PLANNING**

自分が持っているデータをPOSTして比較する

分野をまたがった解析!

オープンサイエンスに向けたチャレンジ

## データ利活用の理想サイクル



## システム自体の展開：アプリケーション構造



図3.5. 各レイヤに対する依存性

フォーマットが異なる  
メタデータも登録可能

依存性を極力排除

バックエンドの解析エンジンの  
差し替えもトライ

システム自体の展開：パッケージ？フレームワーク？

パッケージとは？

- ・ある用途に特化して作成されたアプリケーションの一式

例：WEKO, DSpace, Word Press, EC-CUBE, and more

利点：迅速な導入が可能。

欠点：機能の拡張にはあまり向かない。変更可能箇所はUI部のみに限られる場合が多い。

フレームワークとは？

- ・構造化されたアプリケーションの基盤

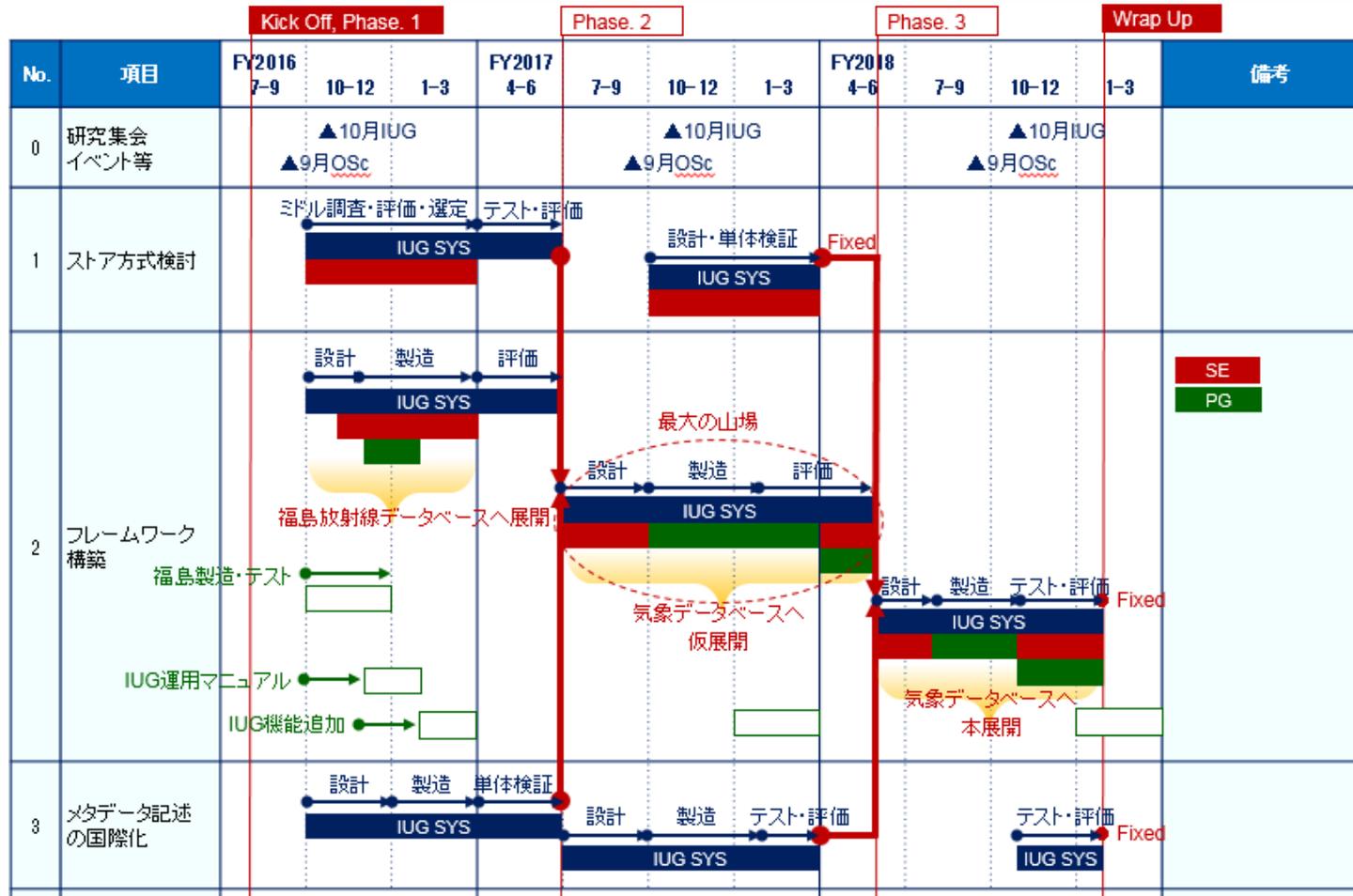
利点：ジャンルや分野を問わない。低コストで多種のシステムを構築できる。

欠点：固有部の作成に技術的な知識が必要。

例えて言うと、自動車に共通OSを載せる、マンションのスケルトンリフォーム・自由設計など。

限られた予算事情においては、フレームワークを適用していくことで、IUGONETのようなデータ公開の場、データ利用の機会が広まって欲しい。

## 2. マスタスケジュール



科学データ共有のためのウェブフレームワーク開発 (-FY2018)

展開予定先 1. 福島放射線データ (RADARC)、2. 極地研気象データ、3. 統数研再解析データ

## 1. 新システム IUGONET Type-A への切替え

- ・ 操作性、可視性を改善した
  - ・ QuickLook の導入
  - ・ インタラクティブ解析ツール UDAS web の提供

## 2. IUGONET type-A の特徴と将来

- ・ UDAS web の充実による本格的なオープンサイエンスを目指す
- ・ フレームワークを導入
  - ・ 他分野への展開が用意
  - ・ FY2016-2018 に、3つのシステムへ展開
  - ・ 実際に展開することで、データ公開、データ利用の機会を広めていく