Data Citation at World Data Center for Geomagnetism, Kyoto

Nosé, M.

WDC for Geomagnetism, Kyoto University

Collaborators:

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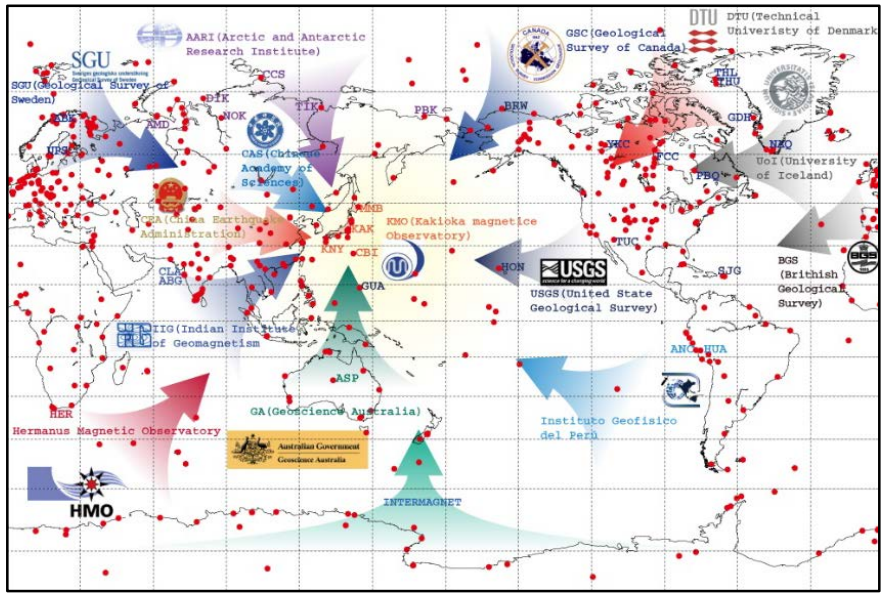
World Data Center for Geomagnetism, Kyoto

- Our data center (WDC-Kyoto) is a regular member of the World Data System (WDS).
- The WDS is an Interdisciplinary Body of the International Council for Science (ICSU).
- Our tasks are (1) collecting and preserving geomagnetic field data recorded at worldwide observatories, (2) providing the data to users, and (3) calculating geomagnetic indices.
- Geomagnetic observatories (i.e., data providers) play a very important role in the WDS. As a data center, we have been thinking how to visualize the contribution of the data providers.

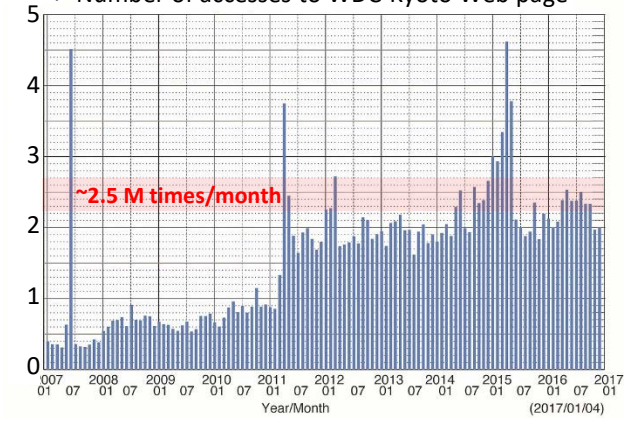
INTERNATIONAL COUNCIL FOR SCIENCE

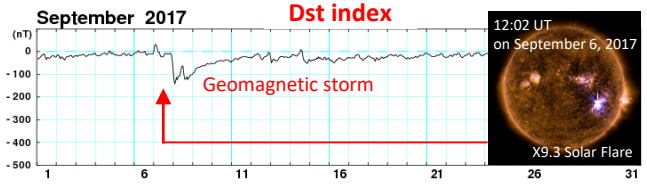
ICSU WORLD DATA SYSTEM

WORLD DATA CENTER WDC KYOTO FOR GEOMAGNETISM



(×1 M) Number of accesses to WDC-Kyoto Web page

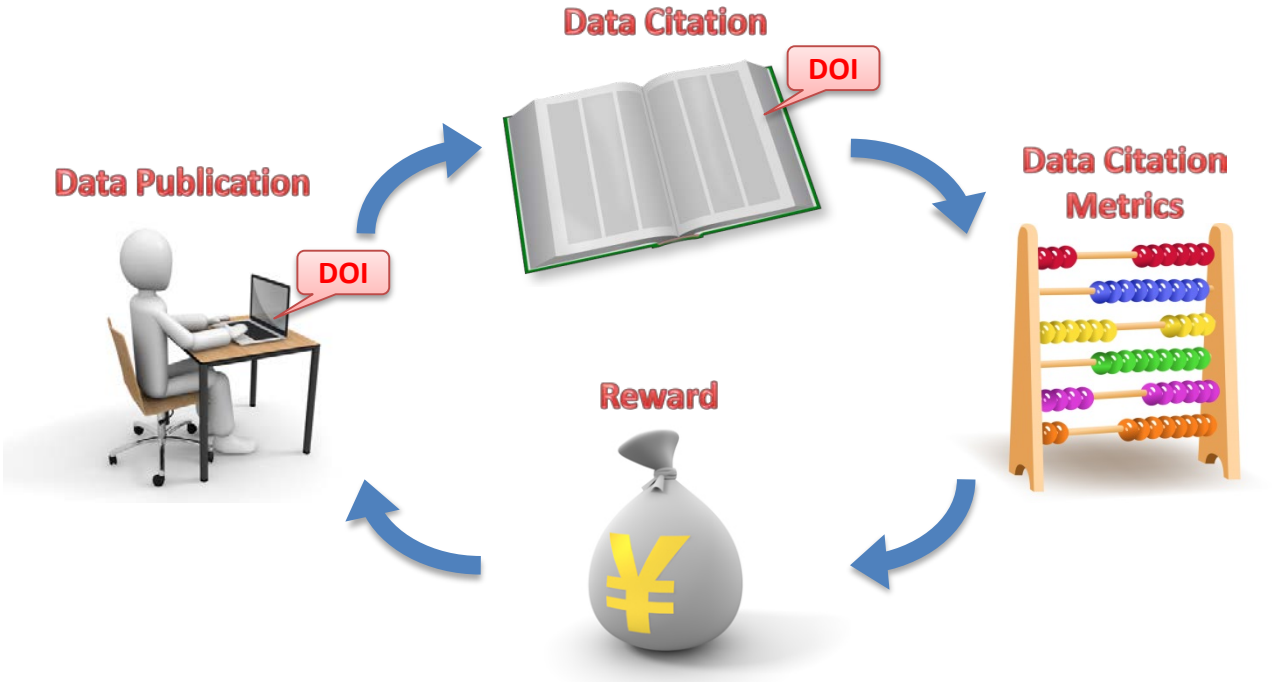




Benefit of DOI-minting to scientific database

For data providers/data centers

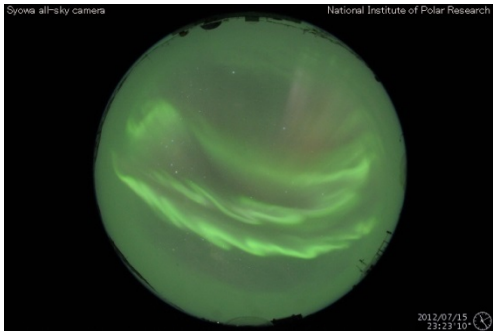
- Data providers and data centers can put necessary information about data (i.e., metadata) on their landing pages, and reduce labor to respond to user's inquiries.
- Data providers can gain professional recognition and rewards for their published data in the same way as for traditional publications.
- Data centers can receive proper credit of their work, such as creating of data, formatting of data, management of database, adding new values to data by secondary data processing.

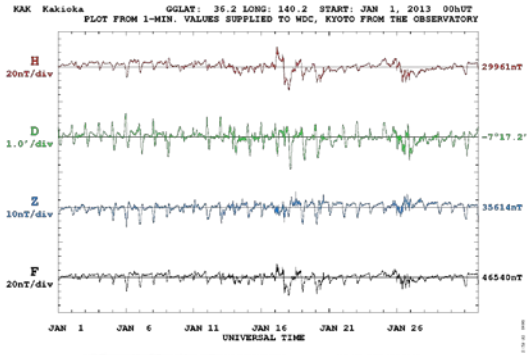


DOI-minting to database by STP data centers in Japan

- Recognizing the importance of data publication and data citation, STP (Solar-Terrestrial Physics) data centers in Japan started discussion about DOI-minting to their database in August 2013.
  - Integrated Science Data System Research Laboratory (NICT)
  - WDC for Aurora (National Institute of Polar Research)
  - WDC for Geomagnetism (Kyoto University)
  - WDC for Ionosphere and Space Weather (NICT)
  - WDC for Space Science Satellites (JAXA)

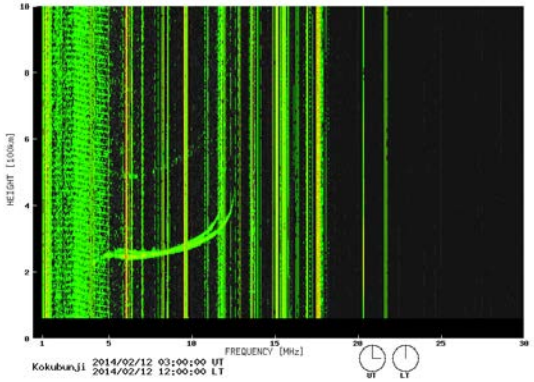
Aurora all-sky camera
(WDC for Aurora)

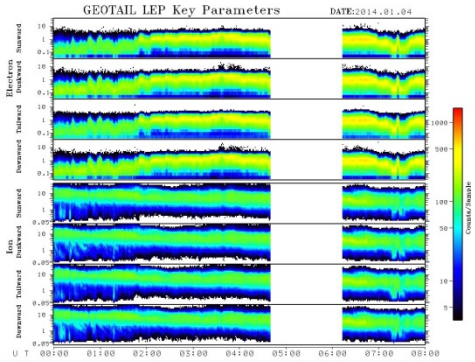




Magnetograms
(WDC for Geomagnetism)

Ionograms
(WDC for Ionosphere
and Space Weather)





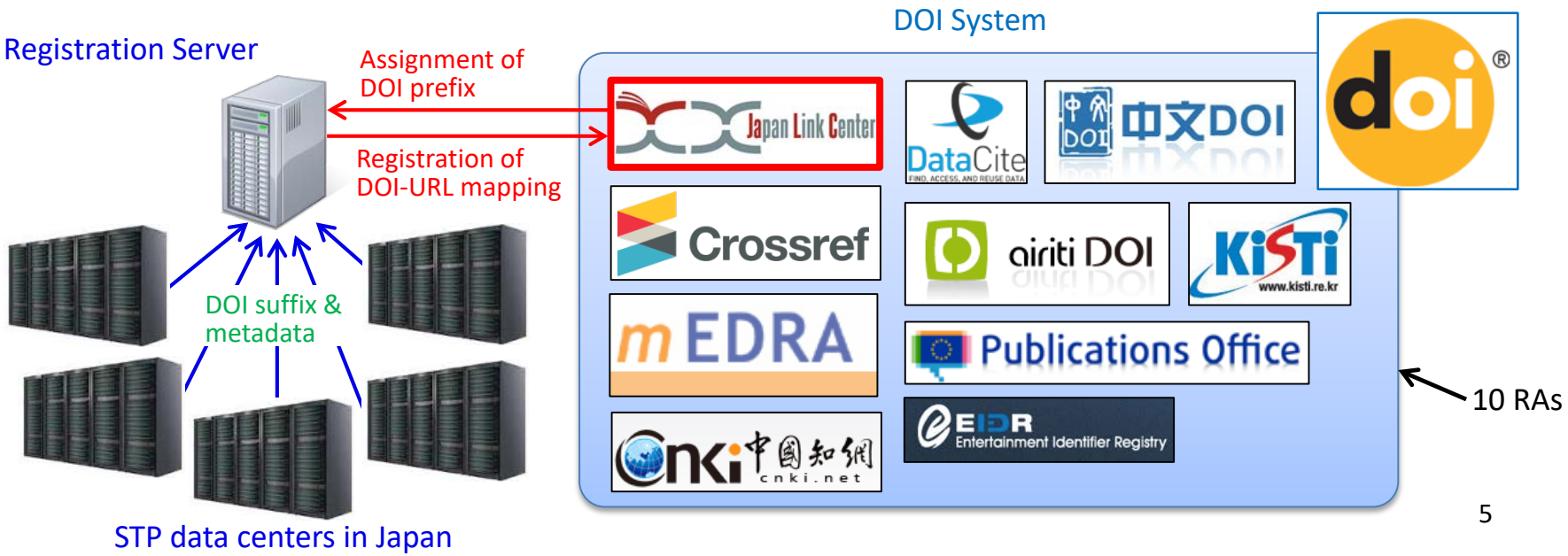
Satellite data of energetic
particle
(WDC for Space Science
Satellite)

Registration agency for DOI minting

- DOI-URL mapping should be registered to a relevant “Registration Agency (RA)” which is qualified by International DOI foundation.
- Japan Link Center (JaLC) is a proper agency in our case, because JaLC handles scientific and academic metadata and contents in Japan.

- We participate in the 1-year pilot program of DOI minting from October 2014.
- A registration server is developed to share among data centers.
- JaLC assigns a DOI prefix and data centers determine DOI suffix.

doi:10.17593/14515-74000
prefix suffix

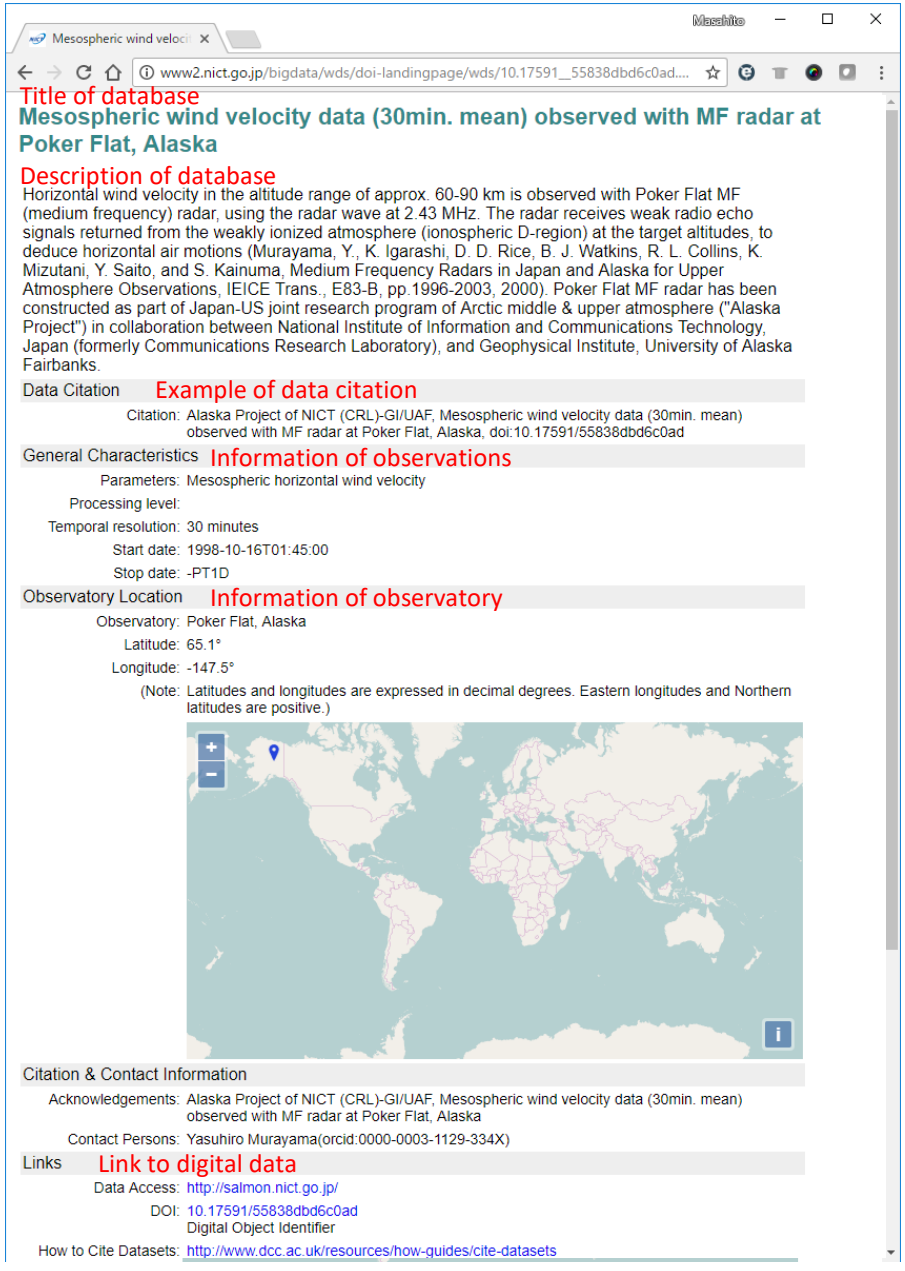


First case of data DOI in Japan

- The first case of data DOI in Japan is created on June 19, 2015.
  - doi:10.17591/55838dbd6c0ad
  - Name of the database is “Mesospheric wind velocity data (30min. mean) observed with MF radar at Poker Flat, Alaska”.

- After termination of the pilot program, JaLC started the regular service of DOI minting.

Landing page of the first “Data DOI” in Japan →



Data DOIs for STP database in Japan

Name of Database	DOI	Date of Minting
Profiles of neutral atmosphere winds 30min average with MF radar at Poker Flat, Alaska	10.17591/55838dbd6c0ad	2015/06/19
Dst Index	10.17593/14515-74000	2015/12/30
Ionogram at Kokubunji, Japan	10.17594/567ce8e9d3a52	2016/04/01
Manually scaled parameters of Ionogram at Kokugunji, Japan	10.17594/567ced454d15b	2016/04/04
Automatically scaled parameters of Ionogram at Kokugunji, Japan	10.17594/567ced0bbccf9	2016/04/04
Ionogram at Wakkanai, Japan	10.17594/5704b5259137a	2016/04/06
Manually scaled parameters of Ionogram at Wakkanai, Japan	10.17594/5704641f8b11d	2016/04/06
Automatically scaled parameters of Ionogram at Wakkanai, Japan	10.17594/5704b5444c661	2016/04/06
Ionogram at Yamagawa, Japan	10.17594/5704b78099ac0	2016/04/06
Manually scaled parameters of Ionogram at Yamagawa, Japan	10.17594/5704b7b16d387	2016/04/06
Automatically scaled parameters of Ionogram at Yamagawa, Japan	10.17594/5704b79d253fd	2016/04/06
Ionogram at Okinawa, Japan	10.17594/5704b8b1d8dbc	2016/04/06
Manually scaled parameters of Ionogram at Okinawa, Japan	10.17594/5704b8e3a7ffa	2016/04/06
Automatically scaled parameters of Ionogram at Okinawa, Japan	10.17594/5704b8ce63d3b	2016/04/06
Wp index	10.17593/13437-46800	2016/08/10
Wind Profiler at NICT Tokyo (1993-2003)	10.17591/14791-10297	2017/01/25
Magnetotelluric Data at Muroto, Japan	10.17593/13882-05900	2017/02/14
AE index	10.17593/15031-54800	2017/08/20

Data DOIs for STP database in Japan

Name of Database	DOI	Date of Minting
Profiles of neutral atmosphere winds 30min average with MF radar at Poker Flat, Alaska	10.17591/55838dbd6c0ad	2015/06/19
Dst Index	10.17593/14515-74000	2015/12/30
Ionogram at Kokubunji, Japan	10.17594/567ce8e9d3a52	2016/04/01
Manually scaled parameters of Ionogram at Kokugunji, Japan	10.17594/567ced454d15b	2016/04/04
Automatically scaled parameters of Ionogram at Kokugunji, Japan	10.17594/567ced0bbccf9	2016/04/04
Ionogram at Wakkanai, Japan	10.17594/5704b5259137a	2016/04/06
Manually scaled parameters of Ionogram at Wakkanai, Japan	10.17594/5704641f8b11d	2016/04/06
Automatically scaled parameters of Ionogram at Wakkanai, Japan	10.17594/5704b5444c661	2016/04/06
Ionogram at Yamagawa, Japan	10.17594/5704b78099ac0	2016/04/06
Manually scaled parameters of Ionogram at Yamagawa, Japan	10.17594/5704b7b16d387	2016/04/06
Automatically scaled parameters of Ionogram at Yamagawa, Japan	10.17594/5704b79d253fd	2016/04/06
Ionogram at Okinawa, Japan	10.17594/5704b8b1d8dbc	2016/04/06
Manually scaled parameters of Ionogram at Okinawa, Japan	10.17594/5704b8e3a7ffa	2016/04/06
Automatically scaled parameters of Ionogram at Okinawa, Japan	10.17594/5704b8ce63d3b	2016/04/06
Wp index	10.17593/13437-46800	2016/08/10
Wind Profiler at NICT Tokyo (1993-2003)	10.17591/14791-10297	2017/01/25
Magnetotelluric Data at Muroto, Japan	10.17593/13882-05900	2017/02/14
AE index	10.17593/15031-54800	2017/08/20

doi:10.17593/14515-74000

doi:10.17593/15031-54800

Title of database

Description of database

Example of data citation

Information of observations

Information of observatory

Link to digital data and plots

Dst Index

The Dst index was proposed by Sugiura [1964] to measure the magnitude of the current which produces the axially symmetric disturbance field. It is derived from geomagnetic field variations in the H component measured at 4 stations at low latitude.

Data Citation

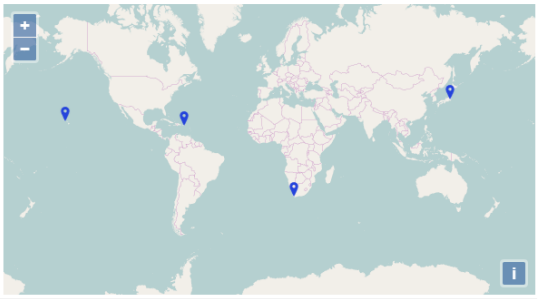
Citation: World Data Center for Geomagnetism, Kyoto, M. Nose, T. Iyemori, M. Sugiura, T. Kamei (2015), Geomagnetic Dst index, doi:10.17593/14515-74000

General Characteristics

Parameters: Geomagnetic index
Processing level: Final
Temporal resolution: 1 hour
Start date: 1957-01-01T00:00:00
Stop date: 1 hour, before Present

Observatory Location

Observatory: Kakioka
Latitude: 36.23°
Longitude: 140.19°
Observatory: Honolulu
Latitude: 21.32°
Longitude: 202.00°
Observatory: San Juan
Latitude: 18.11°
Longitude: 293.85°
Observatory: Hermanus
Latitude: -34.43°
Longitude: 19.23°
(Note: Latitudes and longitudes are expressed in decimal degrees. Eastern longitudes and Northern latitudes are positive.)



Citation & Contact Information

Acknowledgements: Please cite with doi when and where appropriate. Also please acknowledge the geomagnetic observatories (Kakioka, Honolulu, San Juan, and Hermanus). The provisonal and realtime values are subject to change; thus please use the updated values.

Contact Persons: Masahito Nose(orcid:0000-0002-2789-3588), Masahisa Sugiura, Toyohisa Kamei, Toshihiko Iyemori, Yukinobu Koyama(orcid:0000-0001-5363-3870)

Links

Final Dst Index: http://wdc.kugi.kyoto-u.ac.jp/dst_final/index.html
Data files and plots can be downloaded from this link.

Provisional Dst Index: http://wdc.kugi.kyoto-u.ac.jp/dst_provisional/index.html
Data files and plots can be downloaded from this link.

Realtime Dst Index: http://wdc.kugi.kyoto-u.ac.jp/dst_realtime/index.html
Data files and plots can be downloaded from this link.

Derivation Scheme of Dst index: http://wdc.kugi.kyoto-u.ac.jp/dstdir/dst2/onDstindex.html
Description in the IAGA Bulletin No. 40 published by Sugiura and Kamei [1991].

DOI: 10.17593/14515-74000
Digital Object Identifier

How to Cite Datasets: http://www.dcc.ac.uk/resources/how-guides/cite-datasets
Ball, A. and M. Duke [2011], How to cite datasets and link to publications, DCC How-to Guides, Edinburgh: Digital Curation Centre.

Provider Version

1.0

Update History

2016-01-15T13:20:15+0900
2015-12-30T13:58:18+0900

Landing page for the Dst index

AE Index

The AE index was proposed by Davis and Sugiura [1966] to measure a global electrojet activity in the auroral zone. It is derived from geomagnetic field variations in the H component measured at 12 stations along the auroral zone in the northern hemisphere.

Data Citation

Citation: World Data Center for Geomagnetism, Kyoto, M. Nose, T. Iyemori, M. Sugiura, T. Kamei (2015), Geomagnetic AE index, doi:10.17593/15031-54800

General Characteristics

Parameters: Geomagnetic index
Processing level: Final
Temporal resolution: 1 minute
Start date: 1975-01-01T00:00:00
Stop date: 1 minute, before Present

Observatory Location

Observatory: Abisko
Latitude: 68.36°
Longitude: 18.82°
Observatory: Dixon Island
Latitude: 73.55°
Observatory: Narssarssuaq
Latitude: 61.20°
Longitude: 314.16°
Observatory: Leirvogur
Latitude: 64.18°
Longitude: 338.30°
(Note: Latitudes and longitudes are expressed in decimal degrees. Eastern longitudes and Northern latitudes are positive.)

Citation & Contact Information

Acknowledgements: Please cite with doi when and where appropriate. Also please acknowledge the geomagnetic observatories (Abisko, Dixon Island, Cape Chelyuskin, Tixie Bay, Pebek, Barrow, College, Yellowknife, Fort Churchill, Sanikiluaq, Narssarssuaq, and Leirvogur). The provisonal and realtime values are subject to change; thus please use the updated values.

Contact Persons: Masahito Nose(orcid:0000-0002-2789-3588), Masahisa Sugiura, Toyohisa Kamei, Toshihiko Iyemori

Links

Final AE Index: http://wdc.kugi.kyoto-u.ac.jp/aeasy/index.html
Data files and plots can be downloaded from this link.

Provisional AE Index: http://wdc.kugi.kyoto-u.ac.jp/ae_provisional/index.html
Data files and plots can be downloaded from this link.

Realtime AE Index: http://wdc.kugi.kyoto-u.ac.jp/ae_realtime/index.html
Plots can be downloaded from this link.

Derivation Scheme of AE index: http://wdc.kugi.kyoto-u.ac.jp/aedir/ae2/onAEindex.html
Description in the Data Book No 25, "Auroral electrojet indices (Provisional AE) 1992", 1998

DOI: 10.17593/15031-54800
Digital Object Identifier

How to Cite Datasets: http://www.dcc.ac.uk/resources/how-guides/cite-datasets
Ball, A. and M. Duke [2011], How to cite datasets and link to publications, DCC How-to Guides, Edinburgh: Digital Curation Centre.

Provider Version

1.0

Update History

2017-08-20T11:50:32+0900

Landing page for the AE index

doi:10.17593/13437-46800

doi:10.17593/13882-05900

Title of database

Description of database

Example of data citation

Information of observations

Information of observatory

Link to digital data and plots

Wp Index

The Wp index was proposed by Nose et al. [2012] to measure the Pi2 wave power at low latitude. It is derived from 1-s geomagnetic field variations in the H component measured at 11 stations at low latitude.

Data Citation

Citation: World Data Center for Geomagnetism, Kyoto, and M. Nose (2016), Geomagnetic Wp index, doi:10.17593/13437-46800

General Characteristics

Parameters: Geomagnetic index
Processing level: Final
Temporal resolution: 1 minute
Start date: 2005-01-01T00:00:00
Stop date: 1 minute, before Present

Observatory Location

Observatory: Ebro
Latitude: 40.82°
Longitude: 0.50°
Observatory: Fuerstenfeldbruck
Latitude: 48.17°
Observatory: Honolulu
Latitude: 21.32°
Longitude: 202.00°
Observatory: Tuscon
Latitude: 32.17°
Longitude: 249.27°
Observatory: San Juan
Latitude: 18.11°
Longitude: 293.85°
Observatory: Tristan da Cunha
Latitude: -37.25°
Longitude: 347.50°
(Note: Latitudes and longitudes are expressed in decimal degrees. Eastern longitudes and Northern latitudes are positive.)

Citation & Contact Information

Acknowledgements: Please cite with doi when and where appropriate. Also please acknowledge the geomagnetic observatories.
Contact Persons: Masahito Nose

Links

Wp Index: http://s-cubed.info/
Data files and plots can be downloaded from this link.
Derivation Scheme of Wp index: http://doi.org/10.1029/2012SW000785
Research paper published by Nose et al. [2012].
DOI: 10.17593/13437-46800
Digital Object Identifier
How to Cite Datasets: http://www.dcc.ac.uk/resources/how-guides/cite-datasets
Ball, A. and M. Duke [2011], How to cite datasets and link to publications, DCC How-to Guides, Edinburgh: Digital Curation Centre.

Provider Version

1.0

Update History

2016-08-10T12:18:11+0900

Landing page for the Wp index

Magnetotelluric Data at Muroto, Japan

This dataset includes data measured with induction magnetometer and electrodes that are installed at Muroto, Japan.

Data Citation

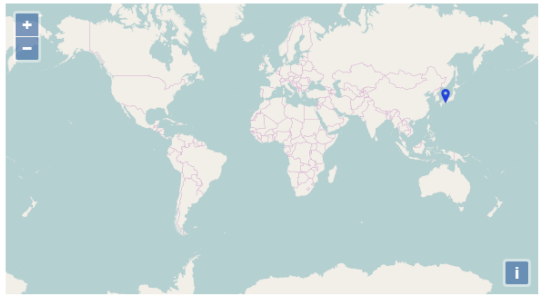
Citation: Nose, M. (2017), Magnetotelluric Data at Muroto, Japan, doi:10.17593/13882-05900

General Characteristics

Parameters: Magnetic Field,Electric Field
Processing level: Final
Temporal resolution: PT1/60S
Start date: 2013-12-28T04:45:00
Stop date: 2016-08-13T23:47:52

Observatory Location

Observatory: Muroto
Latitude: 33.32°
Longitude: 134.12°
(Note: Latitudes and longitudes are expressed in decimal degrees. Eastern longitudes and Northern latitudes are positive.)



Citation & Contact Information

Acknowledgements: Please cite with doi when and where appropriate. Please contact PI before presentation and publication.
Contact Persons: Masahito Nose

Links

Magnetotelluric Data at Muroto, Japan: http://swdc244.kugi.kyoto-u.ac.jp/muroto/
Data files can be downloaded from this link.
DOI: 10.17593/13882-05900
Digital Object Identifier
How to Cite Datasets: http://www.dcc.ac.uk/resources/how-guides/cite-datasets
Ball, A. and M. Duke [2011], How to cite datasets and link to publications, DCC How-to Guides, Edinburgh: Digital Curation Centre.

Provider Version

1.0

Update History

2017-02-13T17:19:36+0900

Landing page for magnetotelluric data at Muroto, Japan

Data citation in Journal of Geophysical Research

- Data citation becomes possible in Journal of Geophysical Research.
- In the recently published article [Nosé et al., 2017], the magnetotelluric data (doi:10.17593/13882-05900) were cited.
- Similar data citation for the Dst, AE, and Wp indices will be performed in future JGR articles.

AGU PUBLICATIONS Nosé et al. [2017]

JGR

Journal of Geophysical Research: Space Physics

RESEARCH ARTICLE
10.1002/2017JA024204

Key Points:
- The ionospheric Alfvén resonator (IAR) observed at a low-latitude station, Muroto (24.40° geomagnetic latitude), is statistically studied
- IAR occurs frequently during nighttime and from May to

Ionospheric Alfvén resonator observed at low-latitude ground station, Muroto

M. Nosé[1], M. Uyeshima[2], J. Kawai[3], and H. Hase[4]

[1]Data Analysis Center for Geomagnetism and Space Magnetism, Graduate School of Science, Kyoto University, Kyoto, Japan, [2]Earthquake Research Institute, University of Tokyo, Tokyo, Japan, [3]Applied Electronics Laboratory, Kanazawa Institute of Technology, Kanazawa, Japan, [4]Geothermal Energy Research and Development Co., Ltd, Tokyo, Japan

Text

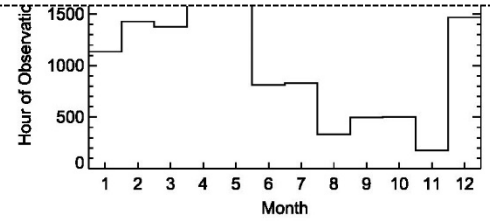


Figure 1. Hours of observations as a function of LT and month at Muroto for the period from 28 December 2013 to 13 August 2016.

We analyze data from the induction magnetometer for the period from 28 December 2013 to 13 August 2016 [*Nosé*, 2017]. However, because of power outage and instrument failure, there are some data gaps during this period. Figure 1 shows distributions of observation hours as a function of LT and season. The LT distribution is rather uniform (Figure 1a), but the seasonal distribution is uneven (Figure 1b). We have less data from August to November than other months. As shown later, we do not calculate the occurrence probability of IAR in November, because the smaller amount of data (<200 h of observations) would give a larger statistical uncertainty.

References

P., G. Satori, B. Zieger, L. M. Rabinowicz, and I. G. Kudintseva, (1998), Parameters of global thunderstorm activity deduced from the long-term Schumann resonance records. *J. Atmos. Sol. Terr. Phys.*, *60*(3), 387–399, doi:10.1016/S1364-6826(97)00121-1.

Nickolaenko, A. P., M. Hayakawa, and M. Sekiguchi (2006), Variations in global thunderstorm activity inferred from the OTD records, *Geophys. Res. Lett.*, *33*, L06823, doi:10.1029/2005GL024884.

Nosé, M. (2017), Magnetotelluric data at Muroto, Japan, doi:10.17593/13882-05900.

Noto, H. (1931), Statistical investigations on thunderstorms in Japan (1), *Jpn. J. Astron. Geophys.*, *9*, 207–243.

Parent, A., I. R. Mann, and I. J. Rae (2010), Effects of substorm dynamics on magnetic signatures of the ionospheric Alfvén resonator, *J. Geophys. Res.*, *115*, A02312, doi:10.1029/2009JA014673.

Summary

- DOI-minting, data publication, and data citation, are beneficial to data providers and data centers.

- STP data centers in Japan have been working to mint DOI to their database since August 2013.
  - Integrated Science Data System Research Laboratory (NICT)
  - WDC for Aurora (National Institute of Polar Research)
  - WDC for Geomagnetism (Kyoto University)
  - WDC for Ionosphere and Space Weather (NICT)
  - WDC for Space Science Satellites (JAXA)
- We participated in the 1-year pilot program for DOI-minting to science data launched by Japan Link Center from October 2014.
- Japan Link Center is now in the regular operation of DOI-minting to data.

- The first case of data DOI in Japan was created in June 2015.
- There are now 18 data DOIs for STP database in Japan, including 4 DOIs related to geomagnetic field data (the AE, Dst, Wp indices, and magnetotelluric data).

- Data citation of the magnetotelluric data was made in a JGR paper.
- Similar data citation for the Dst, AE, and Wp indices will be expected in future JGR articles.

Interdisciplinary “Units” at Kyoto University

- At Kyoto University, the Center for the Promotion of Interdisciplinary Education and Research (C-PIER) supports research group activity to address the cutting-edge academic challenge. The group is refereed to as “Unit”.
- “Academic data innovation unit” is approved last month. (Unit leader: Prof. Kajita)
- This unit aims at developing a prototype of research data management that includes data sharing, releasing, archiving, etc., with computing basis.
- WDC-Kyoto joins the unit.