

## **Data DOI Task Force Report on “Present Status of DOI-minting to Geomagnetic Data/Indices”**

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### **France (by Vincent Lesur (lesur@ipgp.fr))**

The “Bureau Central de Magnétisme terrestre” (BCMT) has decided to mint a Digital Object Identifier (DOI) and to set a licence (Creative Commons BY NC) for the definitive data it generates. One single DOI (doi:10.18715/BCMT.MAG.DEF) has been set for all definitive data derived from the BCMT observatories where agreement of partner institutions contributing to the data collection has been granted. The landing page describing the involved observatories and giving access to the data is hosted by the data centre of the “Institut de Physique du Globe de Paris” (IPGP).

### **Germany (by Jürgen Matzka (jmat@gfz-potsdam.de))**

The open access research data repository of GFZ Data Services (hosted at GFZ) publishes DOI-referenced datasets since 2004. The datasets are accessible via DOI landing pages with an initial set of standardised metadata for data discovery (ISO19115, DataCite and NASA GCMD DIF Standards). Additional data descriptions necessary for data reuse (e.g. format descriptions, product guides, description of processing steps, etc.) are linked via the metadata or published in data reports (which also have their own DOI) that are also published by GFZ (e.g. <http://doi.org/10.2312/GFZ.b103-16087>). Data can be directly downloaded via the landing page or via a server (e.g. an ftp server) that is linked from the landing page. The data publication services including DOIs are free of charge for GFZ scientists and cooperating institutes or organisations. Example geomagnetic observatory data: Since St. Helena has not yet delivered data to WDC, I have made a data publication:

Matzka, J. (2016), Geomagnetic Observatory St. Helena, preliminary hourly mean values 2010, XYZ components, GFZ Data Services. [Available at doi:10.5880/GFZ.2.3.2016.001]

in combination with a published paper that directly cites the data publication:

Cnossen, I. and Matzka, J., 2016. Changes in solar quiet magnetic variations since the Maunder Minimum: A comparison of historical observations and model simulations. *J. Geophys. Res. Space Physics*, 121, 10,520–10,535, doi:10.1002/2016JA023211.

### **INTERMAGNET (by Simon Flower (smf@bgs.ac.uk))**

Creating DOIs for the existing CDs and DVDs of definitive data would be simple, since the data sets are finished and not changing (barring any error corrections). However, there are yet problems to be resolved: (1) agreement across the community on the license terms under which the data will be released, (2) repeatability of data, and (3) application of DOIs to preliminary/changing data.

### **ISGI (by Aude Chambodut (aude.chambodut@unistra.fr))**

ISGI (International Service of Geomagnetic Indices) is encouraging the 6 ISGI-Collaborating Institutes (GFZ, Germany; Observatori de l'Ebre, Spain; WDC Kyoto for Geomagnetism, Japan; DTU Space, Denmark; AARI, Russian Federation and EOST, France) to define the DOI for the geomagnetic index and/or list of remarkable events they are responsible for. Although, ISGI is registered in re3data (<http://www.re3data.org/>), the global registry of research data repositories. Thus, ISGI data repository is getting a DOI (doi:10.17616/R3WS49).

## Japan (by Masahito Nosé (nose@kugi.kyoto-u.ac.jp))

Recognizing the importance of data publication and data citation, solar-terrestrial physics (STP) data centers in Japan have been working to mint DOI to their database. We participated from October 2014 in a 1-year pilot program for DOI-minting to science data launched by Japan Link Center, which is one of the DOI registration agencies. In the pilot program, a procedure of the DOI-minting for STP data was established. As a result of close collaboration with Japan Link Center, the first case of data-DOI in Japan (doi:10.17591/55838dbd6c0ad) was created in June 2015. The first case of data citation in Japan was also made. As of August 2017, there are 18 data-DOIs for the STP data in Japan. This includes DOIs for the geomagnetic indices: the Dst index (doi:10.17593/14515-74000), the AE index (doi:10.17593/15031-54800), and the Wp index (doi:10.17593/13437-46800), as well as geomagnetic field data measured with induction magnetometer (doi:10.17593/13882-05900).

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
<b>Dst Index</b>	<b>10.17593/14515-74000</b>	<b>2015/12/30</b>
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
<b>Wp index</b>	<b>10.17593/13437-46800</b>	<b>2016/08/10</b>
Wind Profiler at NICT Tokyo (1993-2003)	10.17591/14791-10297	2017/01/25
<b>Magnetotelluric Data at Muroto, Japan</b>	<b>10.17593/13882-05900</b>	<b>2017/02/14</b>
<b>AE index</b>	<b>10.17593/15031-54800</b>	<b>2017/08/20</b>

## Russia (by Anatoly Soloviev (a.soloviev@gcras.ru))

“Earth Science DataBase” (ESDB) project was initiated by the Geophysical Center RAS in 2014 on the basis of the WDC for Solar-Terrestrial Physics, a regular member of ICSU-WDS. The focus is on creation of the modern system of geophysical data registration, publication and DOI assignment through CrossRef system, used for unique identification of intellectual property. Since 2014, the following data sets have been registered in the ESDB system: database including 6 catalogues of Solar proton events over 1970-2008, database on historical recordings from 22 geomagnetic observatories in USSR/Russia over 1983-2009, database on continuous recordings from “Klimovskaya” geomagnetic observatory and “Saint-Petersburg” INTERMAGNET observatory since 2012, and seismotectonics map of Eastern Siberia. It also includes 26 individual data sets,

including 2015 definitive data from INTERMAGNET observatory “Saint-Petersburg”. Each data set, catalogue and database is accompanied with individual response page, located in the central repository of ESDB: <http://esdb.gcras.ru/>. Russian-Ukrainian Geomagnetic Data Center (RUGDC) is also registered in re3data (<http://www.re3data.org/>) with doi:10.17616/R39344.

Title of Database	DOI
Geomagnetic data recorded at Geomagnetic Observatory Vostok (VOS) – Variational Minute Values (1993-2000)	10.2205/Mag-VOS-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Tixie Bay (TIK) – Variational Minute Values (1984-1998)	10.2205/Mag-TIK-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Seykha (SEY) – Variational Minute Values (1988-1993)	10.2205/Mag-SEY-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Sabetta (SBT) – Variational Minute Values (1987-1990)	10.2205/Mag-SBT-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Salekhard (SAL) – Variational Minute Values (1987-1990)	10.2205/Mag-SAL-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Moscow (MSK) – Variational Minute Values (1997-1999)	10.2205/Mag-MSK-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Moscow (MOS) – Variational Minute Values (1985-2009)	10.2205/Mag-MOS-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Mirny (MIR) – Variational Minute Values (1987-1998)	10.2205/Mag-MIR-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Lovozero (LOZ) – Variational Minute Values (1997-2000)	10.2205/Mag-LOZ-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Loparskaya (LOP) – Variational Minute Values (1993-1998)	10.2205/Mag-LOP-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Komsomolskaya (KMS) – Variational Minute Values (1990)	10.2205/Mag-KMS-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Kharasavey (KHS) – Variational Minute Values (1986)	10.2205/Mag-KHS-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Yugorsky Shar (JSH) – Variational Minute Values (1983-1984)	10.2205/Mag-JSH-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Irkutsk (IRT) – Variational Minute Values (1997-2003)	10.2205/Mag-IRT-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Dixon Island (DIK) – Variational Minute Values (1983-1998)	10.2205/Mag-DIK-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Cape Schmidt (CPS) – Variational Minute Values (1984-2000)	10.2205/Mag-CPS-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Cape Kamenniy (CKA) – Variational Minute Values (1988-1998)	10.2205/Mag-CKA-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Cape Chelyuskin (CCS) – Variational Minute Values (1997-1998)	10.2205/Mag-CCS-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Beliy Island (BEY) – Variational Minute Values (1988-1990)	10.2205/Mag-BEY-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Arti (ARS) – Variational Minute Values (1994-1996)	10.2205/Mag-ARS-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Amderma (AMD) – Variational Minute Values (1984-1998)	10.2205/Mag-AMD-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Heiss Island (HIS) – Variational Minute Values (1997-1998)	10.2205/Mag-HIS-minute-values
Geomagnetic data recorded at Geomagnetic Observatory Klimovskaya (IAGA code: KLI)	10.2205/KLI2011
Geomagnetic data recorded at Geomagnetic Observatory Saint Petersburg (IAGA code: SPG)	10.2205/SPG2012
Geomagnetic data recorded at Geomagnetic Observatory Saint Petersburg (SPG) - Minute Definitive Values (2015)	10.2205/SPG2015min-def
Seismotectonics map of Eastern Siberia	10.2205/ESDB-VONZ-125-map
Geomagnetic data recorded at Geomagnetic Observatory Klimovskaya (KLI) - Minute Values	10.2205/KLI2011min
Geomagnetic data recorded at Geomagnetic Observatory Saint Petersburg (SPG)	10.2205/SPG2012min

- Minute Values (2012)	
The Earth's Magnetic Field Variations Database (the Database of the Russian magnetic observatories for the variational minute values of E, H, Z elements of the Earth's magnetic field, 1983-2009)	10.2205/Mag-Variations-Database
Database of Solar Proton Events (1970–2008)	10.2205/ESDB-SAD-P
Catalog of Solar Proton Events in the 23rd Cycle of Solar Activity (1996–2008)	10.2205/ESDB-SAD-P-001
Catalog of Solar Proton Events in the 23rd Cycle of Solar Activity (1996–2008) (in Russian)	10.2205/ESDB-SAD-P-001-RU