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World Data Centre For Geomagnetism, Edinburgh: New Data Portal, API, and Metadata Tools

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British Geological Survey

Try it out!
Feedback welcome!

INTRODUCTION

The World Data Centre (WDC) for Geomagnetism, Edinburgh serves the geomagnetism community by providing access to geomagnetic data records from around the world. It is a regular member of the World Data System, a community of trusted scientific data repositories.

The WDC holds definitive magnetic observatory data in a range of time cadences. It also provides information about magnetic field models, geomagnetic indices and magnetic surveys records.

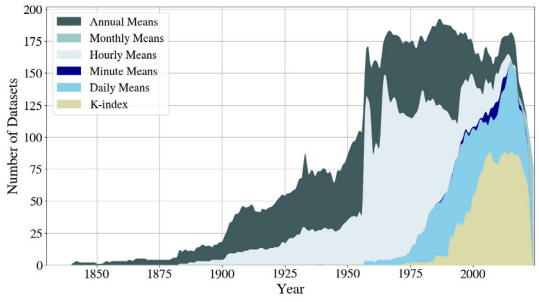


Chart showing the number of datasets available for each time cadence available from the WDC Edinburgh.

NB. Monthly mean data availability is nearly identical to definitive hourly mean availability, except for the most recent years where the monthly means are calculated using quasi-definitive minute mean data.

NEW API RELEASE

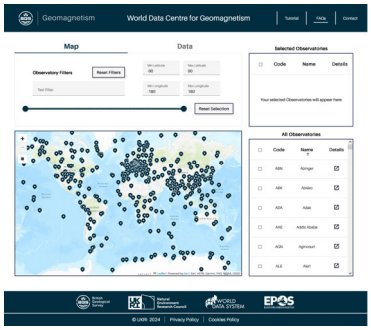
A new API to deliver WDC data programmatically (wdcapi.bgs.ac.uk/docs) has been developed using the FastAPI Python framework deployed on a Kubernetes cluster. This ensures a robust architecture that limits downtime and allows for asynchronous requests for data while maintaining fast response times. Improvements include:

- **New datasets:** The previous API only delivered minute and hourly magnetic means; the new API can also supply daily, monthly and annual means, as well as K-index data where available.
- **Improved precision:** Our data repository contains an array of file format types, such as IAGA-2002, Intermagnet Binary and WDC, each with limiting precisions due to their encoding. The new API parses the WDC database to ensure that data delivered is now of the highest precision available.
- **More data formats:** Each dataset can be requested in any standard format: IAGA-2002, WDC, JSON, CSV, XML, CovJSON.
- **New HAPI server capabilities:** Data can be loaded into an array using a single command in IDL, Javascript, MATLAB, and Python.

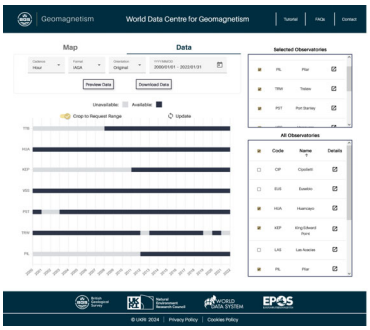
NEW DATA PORTAL

A new front-end data portal (wdc-dataportal.bgs.ac.uk) has also been developed using this API. This provides users with easier access to search for and download observatory data. Improvements include:

- **Data discovery:** Temporal, spatial and text-based filtering. Custom date ranges may be selected so users can investigate specific geomagnetic events. Data availability can be displayed as a chart.
- **Larger downloads:** Up to 10 years of minute means and 50 years of hourly means available in a single download.
- **Data plotting and preview:** Users can choose between the original dataset orientation or convert between XYZ and HDZ. Plots can be saved as PNG figures.
- **Detailed metadata:** Web pages displaying detailed metadata for each observatory is maintained as a service, with new improvements also added (wdc.bgs.ac.uk/observatories).
- **Acknowledgements:** Information about observatory operator acknowledgements are automatically included for all datasets downloaded.

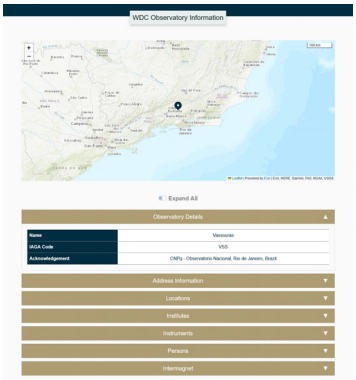


Data Portal front page with filter options.



Data availability chart for selected observatories.

Plot of selected observatory data.



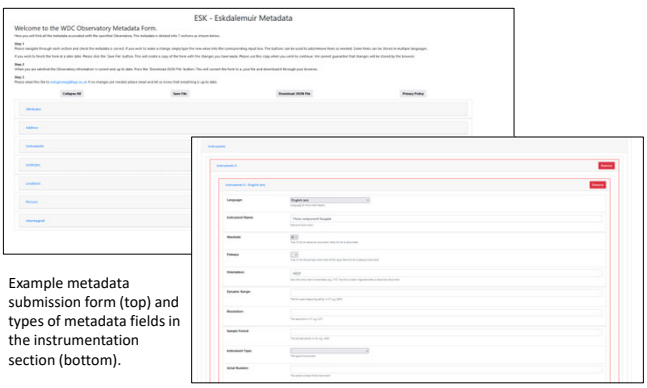
Observatory metadata information display.

METADATA SUBMISSON FORM

A new metadata submission form is in development to help observatory operators update and enhance the information held in the WDC about their observatories.

Users will be able to request a metadata submission form from the WDC. An HTML file will be generated containing all the metadata fields, divided into seven sections. In some sections submission of multiple items and/or multiple entries in different languages will be possible. Users will need an internet connection to update the form.

Once the updates have been added, the form will create a .json file which is emailed back to the WDC. This file is passed to an ingestion workflow, written in Python and PL/SQL, which updates the records in the database. This database is used by the WDC, INTERMAGNET and EPOS end points.



Example metadata submission form (top) and types of metadata fields in the instrumentation section (bottom).