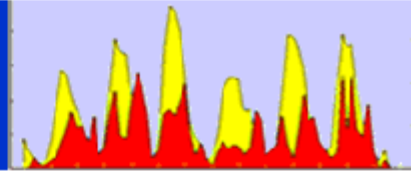


Working Group V-DAT: Geomagnetic Data and Indices



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Format

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IAGA2002 Data Exchange Format

Revision December 2001
Additions made July 2003
[Additions made August 2011](#)
Additions made June 2015

This file provides information on the IAGA ASCII Exchange Format, adopted August 2001. Content includes some general information and description of the file header, [comment records](#), [data header and records](#), [file naming recommendations](#), and sample data file ([html](#) and [text](#)).

This format is intended as a data exchange format for geomagnetic data (samples and means) from observatories and variometer stations at time intervals from millisecond up to and including monthly means. The format comprises:

- Twelve (12) mandatory and one (1) optional file header records
- Unlimited optional comment records
- One (1) mandatory data header record
- A series of data records.
- **Every record is 70 characters long** plus the machine-dependent carriage return / line feed.

Pad records with spaces if needed. Data records report exactly 4 magnetic field elements (DHIF, DHZF, XYZF, or DHIG, DHZG, XYZG). Use missing data values (8's or 9's) if fewer than 4 elements are available.

The 12 mandatory and 1 optional file header records

Mandatory header and optional comment records begin with a space character in column 1 and end with the vertical bar | (ASCII 124) in column 70. Content labels begin in column 2 and descriptions begin in column 25.

- This **format** is designated IAGA-2002.
- **Source of Data** is the name of the institute responsible for collecting the data.
- Please spell the entire **station name**, do not use abbreviations. Capitalize the first letter.
- The **IAGA Code** is the official IAGA 3-letter station code. It should be in capital letters and correspond to the IAGA list of magnetic observatories. Variation stations must check observer suggested 3-letter codes against the IAGA list (WDC SEG, Boulder) and confirm through the IAGA Division V WG1 or leave the

code blank.

- Location of the station is reported to the one thousandth degree in **geodetic latitude** (positive north) from -90 to 90 degrees and in **geodetic longitude** (positive east) from -180 to 180 or 0 to 360 degrees.
- Report **elevation** in meters above mean sea level.
- **Reported** refers to the magnetic field elements contained in the data record, **in the order recorded in data record**. Valid values are DHIF, DHZF, and XYZF (or DHIG, DHZG, and XYZG). Use E/V instead of D/I for declination/inclination given in intensity units (ONLY if data type is variation). G is defined by $G=F(v)-F(s)$, where $F(v)$ represents the total field value calculated from the main observatory instrument ("vector F") and $F(s)$ represents the total field from an independent (scalar) instrument ("scalar F").
- **Sensor Orientation** is the physical orientation of the observing instruments, i.e. XYZF, HDZ.
- **Digital Sampling** is the rate (in seconds) of the data sampling of the magnetic field sensor (instrument) or the digitizing interval for analogue data.
- **Data interval** type is the mean or instantaneous time interval of the data. Common values include 1-minute (00:30-01:29), 1-minute (00:00-00:59), 1-hour (00-59), 1-day (00-23) and 1-month (01-31); the last day could also be 30, 29, or 28. There are many possible intervals, including a fraction of a second (instant value), averages by 1-second (501-1500), 1-second (0-1000), 10 second, or 2.5 minute. **Define the type of mean and how values are centered in the comment section.**
- **Data type** is provisional (P), definitive(D), quasi-definitive (Q), or variation (V).
- **Publication date** (optional) is date when the data is published. This is added in June 2015. The inclusion of this line (#13) is optional but desirable for the modern data. The old data files can be not modified. Example is "Publication date 2014-10-20".

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The optional comment header records

Use these records to record important information concerning the data that is not contained in the defined fields. Types of information may include the type of means and how the mean values are centered, important gaps in the data record, or explanations of missing values (9 filled element field).

- Every record begins with a space character in column 1 and # (hash or number sign) in column 2.
- The end of each record is indicated with a vertical bar | (ASCII 124) in column 70.
- Include the formula for computing the missing (non-reported) magnetic elements. For example, if an observatory reports XYZF, the comments should contain the formula for computing HDI.
- Addition July 2003: for transmission of incomplete day files include two additional optional comment headers stating the start time and duration in seconds. These records must have the form:

```
#Start Time          hh:mm:ss
                        duration-in-seconds
```

- Addition July 2003: for computing approximate values of D in angular units from E values in nT one additional optional comment header is required. This record should contain an approximate H value (eg the most recent annual mean value or a value from the IGRF) and must be of the form:

```
#Approx H           17000
```

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The mandatory data header record

The mandatory data-header record contains column headers useful for multi-station analysis. Elements, both type and order, are indicated in the file-header field **Reported**.

- The date and time headers are DATE, TIME, and DOY (day of year).
- The magnetic element headers comprise 4 letters: 3 letters for the observatory IAGA code and 1 letter for the magnetic element reported. Valid values are H, D (or E), I (or V), X, Y, Z, F (or G). The column headers are space delimited.
- The end of each record is indicated with a vertical bar | (ASCII 124) in column 70.

The data records

The data records contain the date, time, and magnetic field elements reported. Report data to the least significant digit. Indicate missing data with 99999 to the corresponding accuracy for a given component (e.g., 99999.0 or 99999.00). If an element is not observed, please record 88888 (to the corresponding accuracy) in that field. The format for field elements is 4(1X, F9.2). Each record is exactly 70 characters long plus the machine dependent carriage return / line feed.

- DATE is the calendar date in ISO YYYY-MM-DD format (4-digit year, month as 01-12, day as 01-31).
- TIME is in ISO hh:mm:ss.sss format (hour as 0-24, minute as 0-59, second as 0-59
Note: if the hour is 24, the minute and second must be 0).

Values beyond the time interval of the means being reported must be zero-filled i.e.

14:01:00.000 for 1 minute data for the 14th hour, first minute. DOY is the day of the year, from 1 - 365 (or 366 for leap years). Describe the method of average, i.e., centered to the hour for hourly means, in the comments area.

- D and I are reported in angular units of minutes of arc to the precision of the instruments.
- F, H, X, Y, Z, E, G, and V are reported in nanotesla and a fraction of nT.

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Recommended File Name Procedure

To improve the ease with which data are exchanged and recognized, IAGA recommends the following guidelines and style for naming files containing magnetic observatory data. The recommendations closely follow the current International Standards Organization (ISO) Level II recommendations, and are fully compliant with both the Joliette extension to Level II and to the proposed modifications for the ISO standard. These recommendations are for data exchange and do not necessarily apply to data archive. Some changes have been made in this section in July 2003 to allow for

existence of multiple fragments of data starting at different times (which is a possibility for some data transmission systems) and to ease usage with compression programs.

1. File names are composed of two parts, the base name and a three-character extension. A full stop (period) separates the base from the extension. The base name may be up to 27 characters long. The extension is exactly three characters (total file name length not to exceed 31 characters). This format is sometimes referred to as the "27.3" format.

BASENAME (1 to 27 characters) "." **EXTENSION** (3 characters)

Ex. **my_file_name.dat**

2. File names are composed of lower case a-z, 0-9, underscore "_", and dash "-" characters. No spaces, unusual characters (i.e. *, /, \, :, ;, ?) or upper case characters allowed.
3. File names must begin with the IAGA 3-Letter Code, Date, and Type of data. The Extension defines the Data Interval (monthly, daily, hourly, minute, or second data). The Extension is duplicated in the last three characters of the base name, so that if the Extension is stripped on compression the Data Interval is not lost. The file name only indicates the general data interval, specific information is contained in the file header *Data Interval* field (i.e. 2.5 and 1-minute averages are both "minute" data, 10 second averages and 1 second instantaneous are both "second" data).
4. The first several characters in the base name are strictly defined. Files may be further defined with the remaining characters by using an underscore "_" to separate the standard name. For example, naq20020101dmin.min and naq20020101d_2-5min.min are both acceptable names for 2.5 minute definitive data from Narsarsuaq.

General format: iagyyyyymmddtint.int

Where: iag = IAGA 3-letter observatory code

yyyy = four digit year (i.e. 2002)

mm = two digit month (i.e. 01 for January, 12 for December)

dd = two digit day of month (01-31)

t = type of data (p - provisional, d - definitive, q - quasi-definitive v - variation)

int = data interval (mon - monthly, day - daily, hor - hourly, min - minute, sec - second)

Comment	Data Interval	Files	File Name Pattern	Example Name
1	Monthly	Year	iagyyyytint.int	naq2002dmon.mon
2	Daily	Year	iagyyyytint.int	naq2002dday.day
3	Hourly	Month	iagyyyymmtint.int	naq200201phor.hor
4	Minute	Day	iagyyyyymmddtint.int	naq20020101pmin.min

5	Second	Day	iagyyyyymmddtint.int	naq20020211vsec.sec
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1. File contains 1 year of definitive monthly data for 2002 from Narsarsuaq.
2. File contains 1 year of definitive daily data for 2002 from Narsarsuaq.
3. File contains 1 month of provisional hourly data for January 2002 from Narsarsuaq.
4. File contains 1 day of provisional minute data for 1 January 2002 from Narsarsuaq.
5. File contains 1 day of variation second data for 11 February 2002 from Narsarsuaq.

Additional format to handle multiple fragments of data starting at different times: iagyyyyymmddhhMMsstint.int

Where: iag = IAGA 3-letter observatory code

yyyy = four digit year (i.e. 2002)

mm = two digit month (i.e. 01 for January, 12 for December)

dd = two digit day of month (01-31)

hh = hour at which data starts (00-23)

MM = minute at which data starts (00-59)

ss = second at which data starts (00-59)

t = type of data (p - provisional, d - definitive, q - quasi-definitive v - variation)

int = data interval (mon - monthly, day - daily, hor - hourly, min - minute, sec - second)

Comment	Data Interval	Files	File Name Pattern	Example Name
1	Minute	Part-day	iagyyyyymmddhhMMtint.int	clf200306121320vmin.min
2	Second	Part-day	iagyyyyymmddhhMMsstint.int	clf20030612132000vsec.sec

1. File contains part-day of 1-minute variation data from CLF for 12 June 2003, starting at 13:20
2. File contains part-day of 1-second variation data from CLF for 12 June 2003, starting at 13:20:00

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