

THEMIS

Ground Magnetometer L2 Data files Variable Name Definition

THM-SOC-108
July 28, 2010

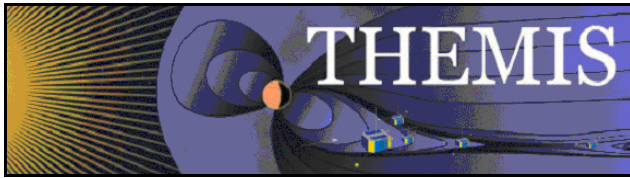
Patrick Cruce, THEMIS Programmer/Analyst

Dr. C. T. Russell, THEMIS Ground Magnetometers

Dr. Stephen Mende, THEMIS GBOs

David King, THEMIS Software Manager

Vassilis Angelopoulos, THEMIS Principal Investigator



Document Revision Record

Rev.	Date	Description of Change	Approved By
1	2006-09-11	Draft	-
2	2006-09-22	Signature Version	Signatories
3	2006-09-27	Varnames lower case, NaNs for FILLVAL of R4, R8	Signatories
4	2010-07-28	Added description of gmag coordinate system.	D. King,

Distribution List

Name	Email
Jim Lewis, U.C. Berkeley	jwl@ssl.berkeley.edu
Dr. Ian Mann, U of Alberta	imann@space.ualberta.ca
Dr. Brian Jackel, U of Calgary	fmozer@ssl.berkeley.edu
Dr. Eric Donovan, U of Calgary	eric@phys.ucalgary.ca
Dr. David Sibeck, NASA GSFC	david.g.sibeck@nasa.gov

TBD List

Identifier	Description

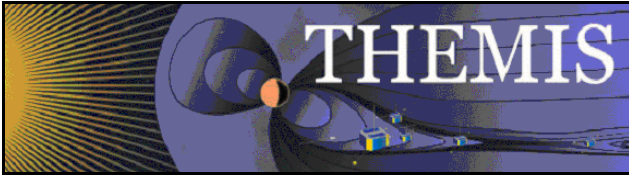


Table of Contents

DOCUMENT REVISION RECORD.....	2
DISTRIBUTION LIST.....	2
TBD LIST.....	2
1. INTRODUCTION.....	4
1.1 Purpose and Scope.....	4
1.2 Applicable Documents.....	4
2. GENERAL L2DAT FILE VARIABLE NAMING CONVENTIONS.....	4
2.1 Construct of VARNAMES: thg_mag_ssss.....	4
2.2 Calibration files used.....	5
2.3 Calibration files used.....	5
2.4 Coordinate System.....	7

1.Introduction

1.1Purpose and Scope.

THEMIS Level 2 GMAG data, shall be CDF files containing each one day's worth of data in calibrated physical quantities (nT) with no need for further calibration or offset. Plotting tools designed to integrated these data with the rest of the L1 or L2 data products on THEMIS shall be provided by the THEMIS team. SPDF, NSSDC and CDAWeb are expected to plot, use and distribute these files for scientific use, using nominal CDAWeb capabilities.

THEMIS ground magnetometer (GMAG) data are two types: Type 1, are those data that produced by UCLA-built ground magnetometers. Those are the GBO stations in Alaska and Canada that are an integral component of the THEMIS Ground Based Observatories, necessary for achieving mission objectives; and the EPO stations in the US that are part of the THEMIS Education and Public Outreach program. In addition, Type 2 data are those data that are produced by existing stations in Alaska or Canada, part of other efforts but contributed to THEMIS for use in its data analysis. The time resolution and sensitivity of all stations is equivalent: 0.5s, and 0.1nT respectively. The GBO data are downloaded from the ground based observatory stations via the University of Calgary data collection and dissemination site and are then relayed daily via internet connection to both UCLA and UCB. They are also included in local disks at the sites, which are then swapped-out by local custodians and mailed 1-3months after data collection. The EPO data are downloaded daily at UCLA and UCB via internet from the school sites. Type-2 are contributed data, received by internet connection from the University of Alberta or the University of Alaska.

All datasets are processed at UCB in order to adhere to the same format and file structure described herein. The same structure is intended for use by future Ancillary datasets, as they become available, such that analysis can proceed seamlessly for those stations as well.

The purpose of this document is to define the L2 GMAG variable names within the CDF.

1.2Applicable Documents.

- | | |
|--------------------------------|--------------------------------------|
| 1. THM_SYS_012_PDMP | THEMIS Project Data Management Plan |
| 2. THM_SOC_101_TIME | THEMIS TIME Definition |
| 3. THM_SOC_109_ASI_L1_VARNAMEs | THEMIS ASI Variable Name Definitions |

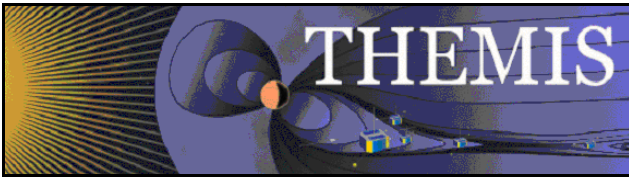
2.General L2DAT File Variable Naming Conventions

2.1Construct of VARNAMEs: thg_mag_ssss

Following an overall principle of naming THEMIS variables using more general to less general descriptors, separated by the underscore character “_”, the GMAG variables shall be named: thg_mag_ssss, where “g” denotes ground based observatory, the “mag” denotes magnetic field and “ssss” is the 4-letter identification of the station (Figure 1).

This construct works well with data from all probe data, and when further specificity is required in order to ensure optimal file size, such as in the number of spectral quantities, additional descriptors _YY may be utilized.

Ancillary magnetometer data in CDF format for use by THEMIS shall adhere to the same format with the identifier “o” for “other”.



2.2 Calibration files used

The calibration files utilized for the production of the L1DAT data shall be documented in the L2 Data file by pointing to the web site http://www-ssc.igpp.ucla.edu/themis_data/calib_files/ where the files reside.

Figure 1 List of the required quantities for a single station L2 data CDF file.

The screenshot shows the SKTEditor interface for configuring a CDF file. The main window displays the following information:

- File:** SKTEditor: thg_l2_mag_pgeo_00000000_v01.cdf
- Menu:** File Edit Tools Variables Help
- Tab:** Variables
- Left Panel (List of Variables):**
 - thg_mag_pgeo
 - thg_mag_pgeo_unit
 - thg_mag_pgeo_labl
 - thg_mag_pgeo_compono
 - thg_mag_pgeo_time
 - thg_mag_pgeo_epoch
 - thg_mag_pgeo_epoch0
 - range_epoch
- Right Panel (Configuration):**
 - CDF Specifications:**

Name	Data Type	Time Varying	Dimensions
thg_mag_pgeo	CDF_REAL4/1	true	1:[3]
 - Description:**
 - Expanded Label:** B in HDZ Components
 - One-Line Description:** Magnetic field B in HDZ vector components
 - Variable Notes:** (Empty)
 - Axis Information:**

Label 1	Label 2	Label 3
thg_mag_pgeo_lak		
Magnetic North, local		
Magnetic East, local		
Vertical Down, local		
 - Scale Type, Format, Units:**

Scale Type	Format	Units
linear	f7.1	thg_mag_pgeo_un
		nT
		nT
		nT
 - Plot Information:**

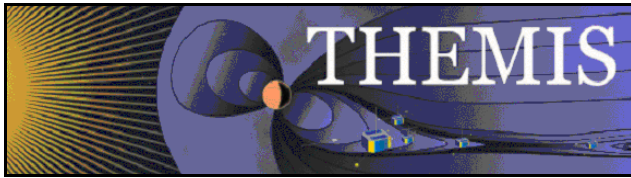
Variable Type	Display Type
Data	Time Series
 - Depends:**
 - Depend 0: thg_mag_pgeo_...
 - Depend 1: thg_mag_pgeo_...
 - Depend 2: (Empty)
 - Depend 3: (Empty)
 - Valid Min:**

-60000.0
-60000.0
-60000.0
 - Valid Max:**

60000.0
60000.0
60000.0

2.3 Calibration files used

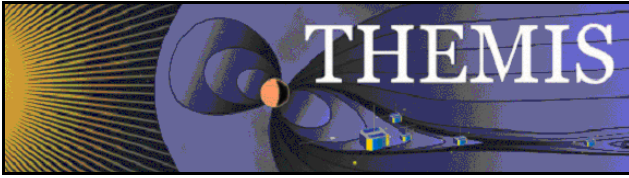
The calibration files utilized for the production of the L1DAT data shall be documented in the L2 Data file by pointing to the web site http://www-ssc.igpp.ucla.edu/themis_data/calib_files/ where the files reside.



Attached is a copy of that directory and a copy of a sample file as of Sep 29, 2006. For updates and to check current status please consult the above web page.

File Name	Date	Time	Size
Parent Directory	-	-	-
ACBO.txt	11-Jul-2006	13:42	222
AMER.txt	11-Jul-2006	13:42	252
BENN.txt	11-Jul-2006	13:42	227
BMLS.txt	11-Jul-2006	13:42	224
CCNV.txt	11-Jul-2006	13:42	226
DRBY.txt	11-Jul-2006	13:42	220
EKAT.txt	20-Aug-2006	18:33	223
FYTS.txt	11-Jul-2006	13:42	225
GBAY.txt	20-Aug-2006	19:08	222
GLYN.txt	11-Jul-2006	13:42	221
HOTS.txt	11-Jul-2006	13:42	226
KAPU.txt	20-Aug-2006	19:11	221
KINA.txt	20-Aug-2006	19:15	216
LBCT.txt	20-Aug-2006	19:17	216
LOYS.txt	11-Jul-2006	13:42	224
LRES.txt	11-Jul-2006	13:42	220
LYFD.txt	11-Jul-2006	13:42	220
MCGR.txt	20-Aug-2006	18:39	221
NAIN.txt	20-Aug-2006	19:13	215
PCEL.txt	11-Jul-2006	13:42	221
PGEO.txt	20-Aug-2006	18:30	224
PINE.txt	11-Jul-2006	13:42	225
PTRS.txt	11-Jul-2006	13:42	225
RICH.txt	11-Jul-2006	13:42	225
RMUS.txt	11-Jul-2006	13:42	220
SATX.txt	11-Jul-2006	13:42	255
SWNO.txt	11-Jul-2006	13:42	221
TPAS.txt	20-Aug-2006	18:27	220
UKIA.txt	11-Jul-2006	13:42	220
WHIT.txt	20-Aug-2006	18:36	226
bof	11-Jul-2006	13:42	366

EKAT Lac de Gras
Start date = 6/23/2004
calx = 89.50
caly = 90.95
calz = 89.70
dacx = 462.1
dacy = 454.3



```
dacz = 461.9  
offx = -151  
offy = -257  
offz = 60  
# Calibration determined 6/23/2004  
# END OF CAL RECORD
```

2.4 Coordinate System

Calibrated data are not rotated out of instrument coordinate system. Ground Magnetometers are installed such that the instruments are geomagnetically aligned. In THEMIS this coordinate system is called HDZ and is described in detail in the document `thm_soc_110_COORDINATES_yyyymmdd.pdf`. Corrections are not routinely applied to correct for drift after installation, so end-users who need accurate orientation information should determine orientation by comparing mean measured field over some interval (e.g. 1 month), to expected local field for that location. Note that the site PTRS is the exception. Because it was installed in a bog, it can drift much more rapidly than other gmags. (Also note that due to installation error the second-component of PTRS points in the -D direction).