

GMAG data rate and volume:

- Digitization 16 bits
- Quantities 1+3 (time, Bx, By, Bz)
- Rep. rate 1 sample/sec
- Data rate 68 bits/s w/H/K & overhead
- Tx data per day 5.8 Mbits
- Tx Baud rate 30 kbps
- Tx time (only stream 1) 193 sec
- Data volume 0.265 Gbytes/year

Each site returns about 63 Gbytes of data per season via :

- 
- Hard disk swapping
- Mail distribution
- Direct Internet FTP or upload

These amount to about 4 terrabytes for the lifetime of the mission, including full data retrieval from the two winters before the THEMIS launch. Most of this is imaging data. EPO magnetometer data can be analyzed with standard Windows software packages such as Excel, by simply importing the ASCII data generated in the Science Files. THEMIS ground data, accessible to the public and to schools that host the magnetometers, are equipped with ASCII conversion routines, and web-based download functions.

## **VII Related Web Resources**

### **7.1 THEMIS-Related resources**

The main THEMIS education and outreach web page supports this guide and the other teacher guides in this series. The data from the magnetometers in the classroom are available on the site, and also information on the schools and teachers involved in the program. Additional information about the THEMIS mission can be found there, as well as images from the building of the instruments and spacecraft, scientist and engineer interviews, launch videos, and information about the education team.

**<http://ds9.ssl.berkeley.edu/themis>**

## **7.2 THEMIS Satellite Information**

- ✓ THEMIS Mission Science  
[http://ds9.ssl.berkeley.edu/themis/mission\\_mystery.html](http://ds9.ssl.berkeley.edu/themis/mission_mystery.html)
- ✓ News and Events  
<http://ds9.ssl.berkeley.edu/themis/news.html>

## **7.3 Magnetic observatories**

Professional research observatories often have web pages displaying real-time magnetometer data similar to the type of data that you will be recording on your own station. Visit the NASA Student Observation Network web page for a complete introduction and links to sample sites.

[http://son.gsfc.nasa.gov/magnetosphere/from\\_obs.html](http://son.gsfc.nasa.gov/magnetosphere/from_obs.html)

## **7.4 ACE spacecraft data**

The NASA ACE satellite is located 1 million miles from Earth at what's known as the L1 point. It monitors the solar wind magnetic field on a minute-to-minute basis, and serves a critical role in modern space weather forecasting. Visit its web page and click on the SWEPAM instrument link. It can also be reached through the Student Observation Network portal:

[http://son.gsfc.nasa.gov/magnetosphere/sat\\_ace.htm](http://son.gsfc.nasa.gov/magnetosphere/sat_ace.htm)

## **7.5 Elementary geophysics**

Here are some resources that will give you a quick introduction to basic geophysics and geomagnetism:

- ✓ USGS:  
<http://geomag.usgs.gov>
- ✓ NASA/GSFC - Exploring the Magnetosphere:

<http://www-istp.gsfc.nasa.gov/Education/Intro.html>

- ✓ NASA/IMAGE:

<http://image.gsfc.nasa.gov/poetry/magnetism/magnetism.html>

## **7.6 Paleomagnetism**

There are many web pages that discuss this fascinating topic in detail.

- ✓ Education Resources:

<http://mahi.ucsd.edu/cathy/Gpmag/gphome.html>

- ✓ Reversals and Wander

[http://www.geolab.nrcan.gc.ca/geomag/reversals\\_e.shtml](http://www.geolab.nrcan.gc.ca/geomag/reversals_e.shtml)

- ✓ More Reversal Info:

<http://www.geomag.bgs.ac.uk/reversals.html>

## **7.7 Space Weather resources**

- ✓ NASA/IMAGE:     <http://image.gsfc.nasa.gov/poetry>

- ✓ NOAA/SEC:       <http://www.sec.noaa.gov/SWN>

- ✓ Human Impacts    <http://www.solarstorms.org>

## **7.8 Mathematical models of the IGRF Reference Field**

Over 100 years of careful study have resulted in the design of a super-precise field model. Here is a page where you can access it:

- ✓ NASA/NSSDC International Geophysical Reference Field:

<http://nssdc.gsfc.nasa.gov/space/model/models/igrf.html>