INTERMAGNET:
Worldwide Near-Real-Time Geomagnetic Observatory Data

David Kerridge,
British Geological Survey, West Mains Road, Edinburgh, EH9 3LA, UK

A European Space Weather programme will rely on the availability of near real time data to monitor and predict the Earth's response to changes in solar activity and conditions in the near-Earth space environment. Some relevant datasets are derived from ground-based geomagnetic field measurements and, through the INTERMAGNET programme, magnetic observatories are encouraged to send one-minute data in near real time to data collection centres designated Geomagnetic Information Nodes (GINs). Many observatories send data to a GIN within one hour, some within minutes. In 2001 there were 80 INTERMAGNET observatories worldwide and six GINs, two located in Europe. GINs also act as data supply centres, with data delivery by electronic mail or by direct download from web pages hosted at GINs (http://www.intermagnet.org). The number and distribution of INTERMAGNET observatories, and the capability to deliver data, means that the programme is well-positioned to play a significant role in providing space weather services.

What is INTERMAGNET?

- An informal federation of institutions running magnetic observatories operating to agreed standards
- Magnetic observatory characteristics:
  - High standards of (absolute) data quality and continuous recording maintained over many years at a stable location
  - Producing data suitable for studies of changes in the main (core) geomagnetic field, and long-term changes in geomagnetic activity

The INTERMAGNET Objective

The first trials began in 1987 with data exchange between the UK and the US by satellite, motivated by requirements for near-real-time data for space weather applications.

The success of the trial encouraged the start of INTERMAGNET, with the following objective:

"…to establish a global network of co-operating digital magnetic observatories, adopting modern standard specifications for measuring and recording equipment, in order to facilitate data exchange and the production of geomagnetic data products in close to real time."

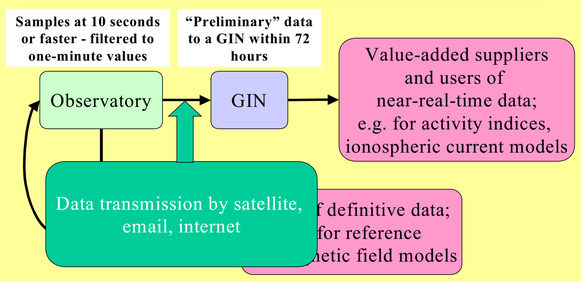
INTERMAGNET Management

- Executive Council (Canada, France, UK, US)
  - Policy
  - Liaison with external bodies
- Operations Committee (members from 8 countries)
  - Technical implementation and expertise
  - Practical assistance to members and prospective members
  - Annual production of CD-ROM
  - Publication of a Technical Manual (observatory standards and practice, data transmission, formats etc)
  - Assessment of new applications

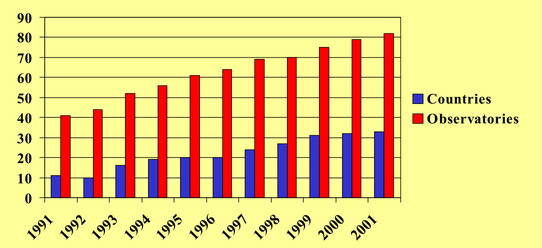
Components of INTERMAGNET Operations

- Observatories
- Data communication
- Geomagnetic Information Nodes (GINs)
  - INTERMAGNET data centres

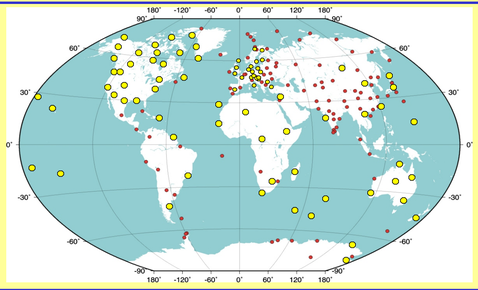
Summary of INTERMAGNET Operations



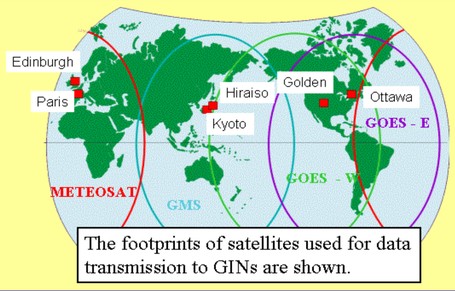
INTERMAGNET Observatories



Currently Operating Geomagnetic Observatories

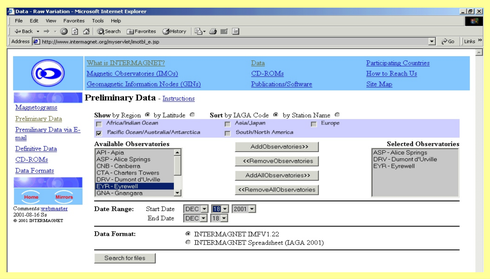


Geomagnetic Information Nodes

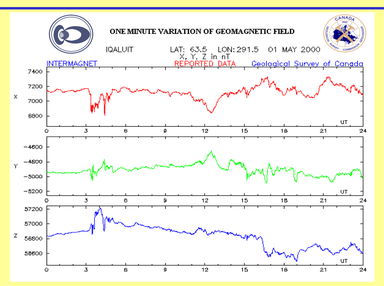


www.intermagnet.org

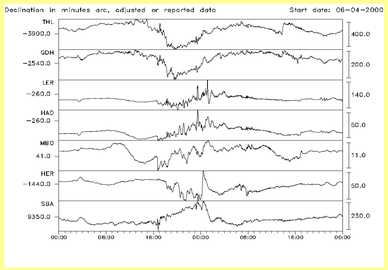
Requesting Observatory Data



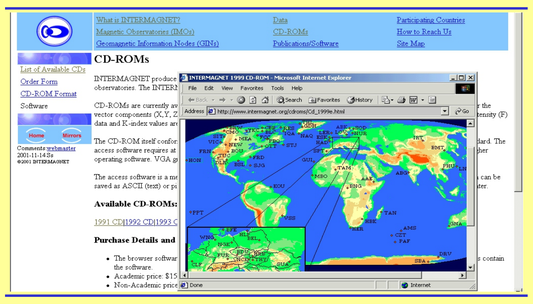
On-line magnetograms



Stackplots

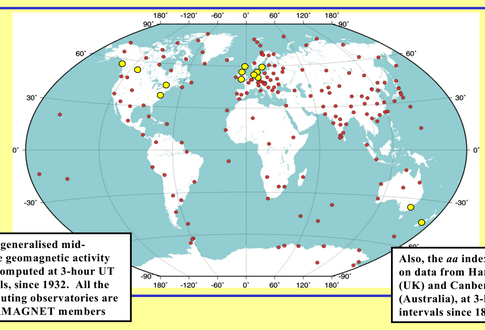


Definitive Data on CD-ROM



INTERMAGNET CD-ROMs

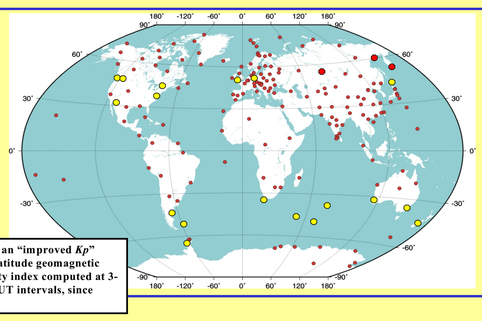
The *Kp/ap* Index Observatories



Kp **is a generalised mid-latitude geomagnetic activity index computed at 3-hour UT intervals, since 1932. All the contributing observatories are INTERMAGNET members**

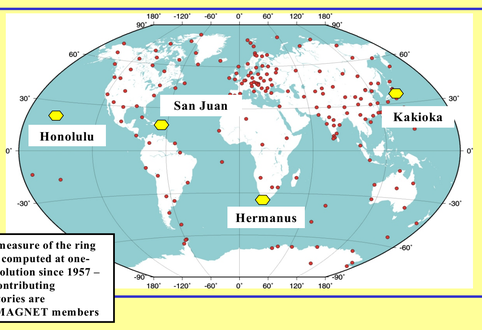
Also, the *aa* index, based on data from Hartland (UK) and Canberra (Australia), at 3-hour UT intervals since 1868.

The *Km/am* Index Observatories



Km **is an "improved *Kp*" mid-latitude geomagnetic activity index computed at 3-hour UT intervals, since 1959.**

The *Dst* Index Observatories



Dst **is a measure of the ring current, computed at one-hour resolution since 1957 – all the contributing observatories are INTERMAGNET members**

AE Index Observatories

AE measures the intensity of the auroral electrojet current system, at one-minute resolution, since 1978.