



# International Association of Geomagnetism and Aeronomy

Task Group for the World Digital Magnetic Anomaly Map (WDMAM)

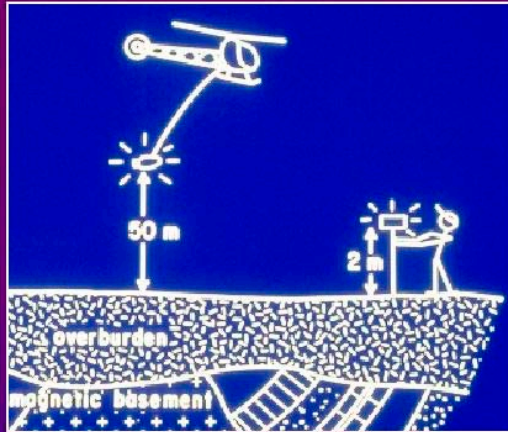
## ***An Introduction to WDMAM***

*July 2004 12+1 slides*

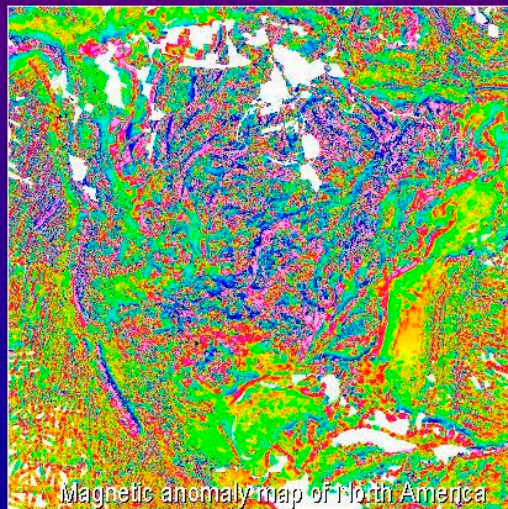


The study of the Earth's magnetic field has led to some of the most important parts of our scientific understanding of how the Earth has evolved.

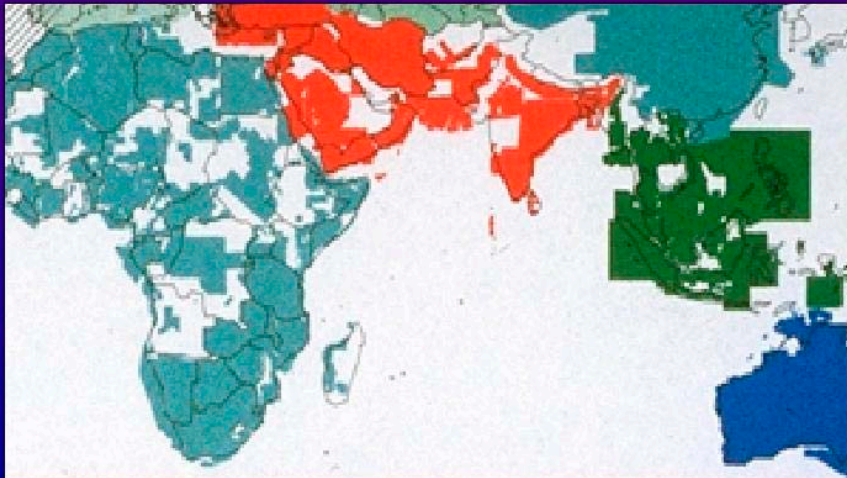
The present wealth of information on geomagnetism grew from early usage of the magnetic compass in the Age of Exploration, through more sophisticated mechanical, then electronic, magnetometers in the 20th Century.



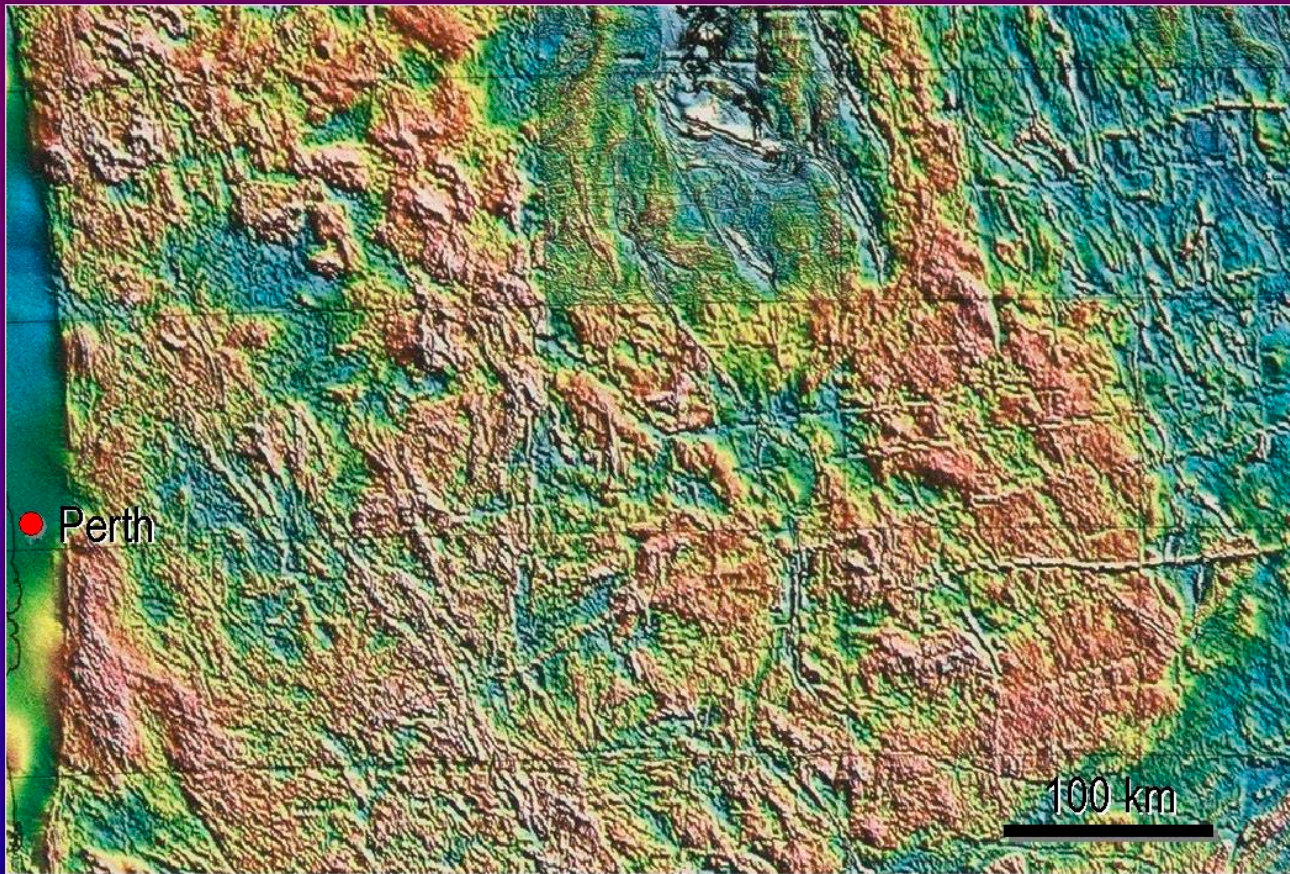
Magnetometer surveys have been carried out on land, at sea and from the air on all continents and oceans - and some fixed magnetic observatories on the ground have monitored time-variations of the field for centuries.



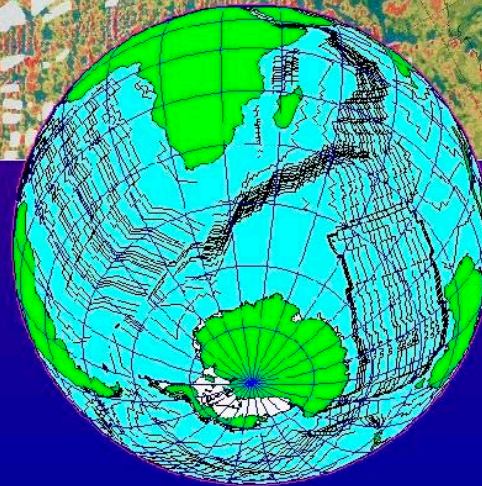
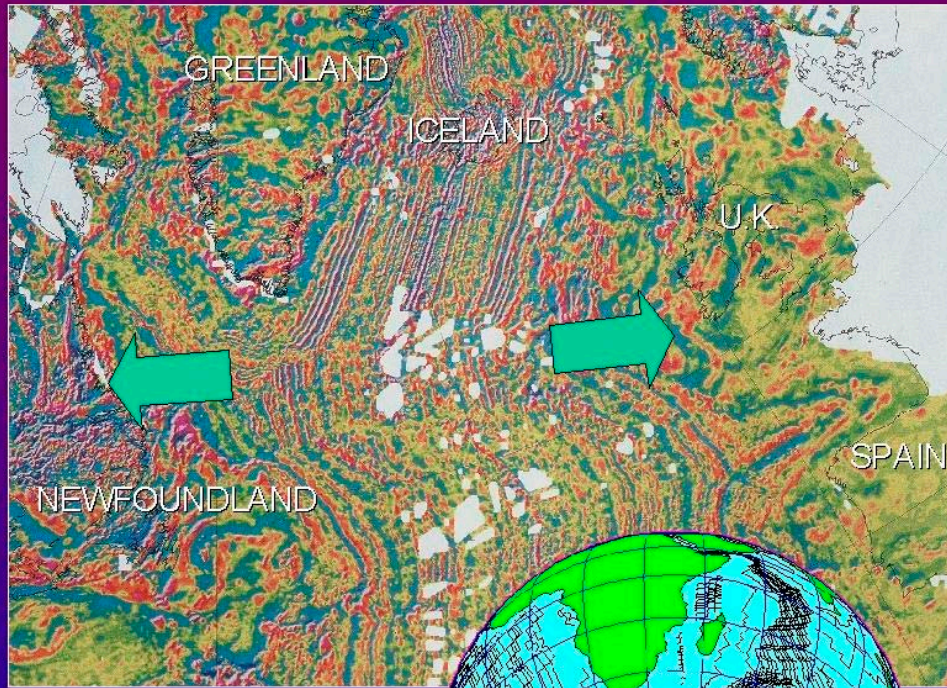
A new initiative is now needed to combine our knowledge of magnetic anomalies into the reliable global compilation necessary to take this work further and make it more accessible for education and research.



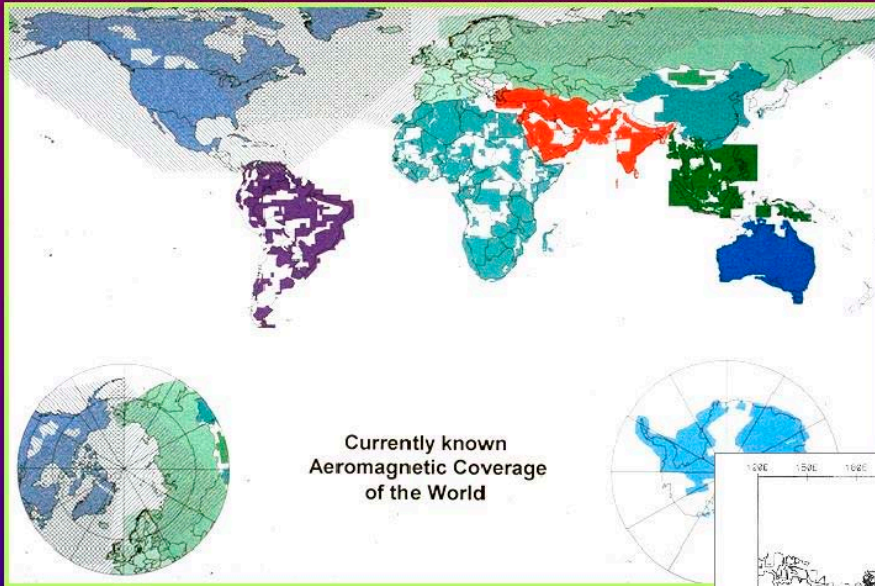
To make use of this unique 'window' on the subsurface, many thousands of magnetic anomaly surveys have been carried out in all parts of the world. Cost-effectiveness demands the use of magnetometers in low-flying light aircraft over land and the towing of sensors behind ships on long traverses at sea.



**Magnetic anomaly patterns over part of Western Australia**  
– *courtesy of Geoscience Australia and GSWA*



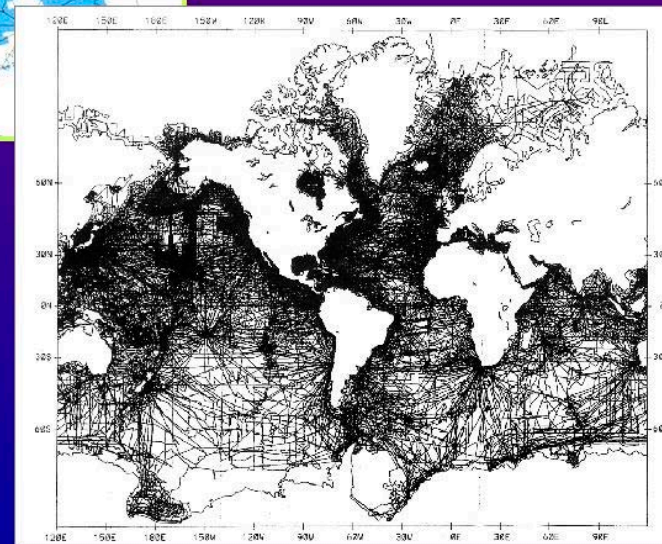
The magnetic anomaly 'stripes' discovered over the oceans - caused by repeated reversals of the Earth's core field over millions of years - was central to establishing that the continents have moved over time - now a basic paradigm of Earth Science that has brought increased understanding of earth-processes in recent decades.



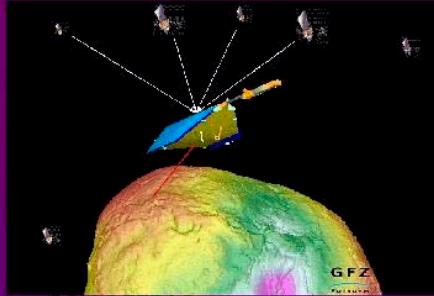
The patchwork of detailed aeromagnetic surveys over the continents...

...and the tracks of oceanographic survey vessels across the oceans...

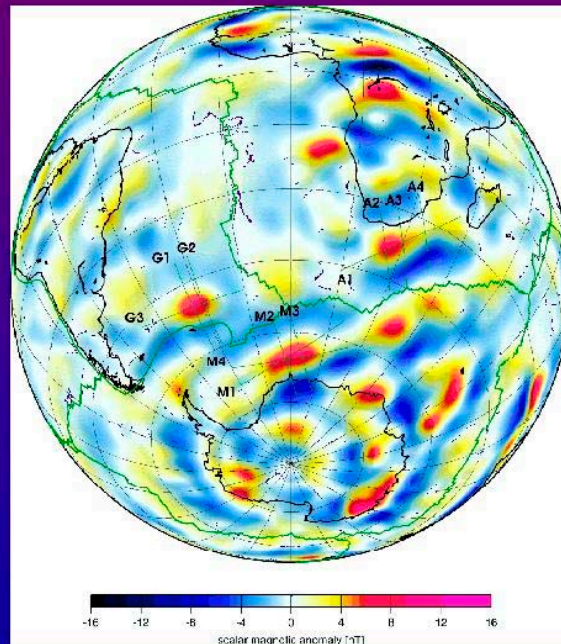
...together make up an enormous but disparate body of data about global magnetic anomalies and, in turn, global geology.



- Reeves, Macnab & Maschenkov, 1998  
EOS, Vol 79, No. 28, p 338.



© GFZ-Potsdam, Germany



Compilations exist of the hundreds of aeromagnetic and marine surveys that have been made over all the continents and some of the oceans. The work of the last fifty years is, however, incomplete and non-uniform in terms of coverage and certain technical specifications. This still-incomplete view of the world's anomalies has recently been supplemented by reliable maps from earth-orbiting satellites such as CHAMP. They provide a uniformity of coverage of the globe that can help resolve uncertainties in accurately compiling the patchwork of local anomaly maps.



**Harmonisation of this vast body of data – aeromagnetic, marine and satellite – is now needed in order to bring the global magnetic anomaly data set into place alongside other worldwide databases so that its use may be maximised for educational purposes and for future research.**

**The original data is held by a large number of individual organisations around the world and, in some cases, is still commercially or politically sensitive. The harmonisation will therefore require a concerted international effort that has been encouraged by IAGA for many years.**

**The IAGA Task Group for the World Digital Magnetic Anomaly Map  
(WDMAM)**

**...has set itself the task of...**

- cataloguing existing data compilations that cover significant areas of the Earth**
- negotiating access to such data at a resolution sufficient for a global compilation**
- producing a preliminary paper map to display at the summer 2005 IAGA Assembly in Toulouse, France**
- addressing the main scientific and practical issues to produce a digital world map for the 24th IUGG General Assembly, Perugia, Italy, summer 2007.**

**If you are able to contribute to this international effort, whether through contributions of data, scientific input or financially to allow the Task Group to execute practical aspects of its task, we will be very pleased to hear from you.**

**Contact one of the members of the Task Group directly:**

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***Picture credits:***

Slide 2 – (proton magnetometer in use and Duyfken in Delft) photos by Colin Reeves.

Slide 3 – (cartoon) – Paterson, Grant and Watson Limited, Toronto, Canada. Aeromagnetic map of North America: Mike Purucker.

Slide 4 – (aircraft) – Kevron Airborne Geophysics Pty. (World Map): Reeves, C., Macnab, R., and Maschenkov, S. 1998. Compiling all the world's magnetic anomalies. EOS, Transactions of the American Geophysical Union, vol 79, p 338.

Slide 5 – Magnetic anomaly map of Western Australia, 2002. Geoscience Australia and the Geological Survey of Western Australia.

Slide 6 – Magnetic Anomalies of Arctic and North Atlantic Oceans and adjacent land areas. Verhoef, Macnab, Roest, et al., Geological Survey of Canada, 1996. Schematic magnetic anomalies of the South Atlantic and Indian Oceans: Cambridge Paleomap Services Limited.

Slide 7 – both maps from Reeves, C., Macnab, R., and Maschenkov, S. 1998. Compiling all the world's magnetic anomalies. EOS, Transactions of the American Geophysical Union, vol 79, p 338.

Slide 8 – both images from GFZ-Potsdam.



# International Association of Geomagnetism and Aeronomy

- A network of more than 2000 scientists from more than 70 countries
- Science-driven, non-governmental, not-for-profit
- Supported by contributions from national bodies of participating countries
- One of the seven associations of the International Union of Geodesy and Geophysics (IUGG) – a member of the International Council for Sciences (ICSU).
  
- Covers solid-Earth magnetism
- Serves science and the general 'public good'
- Promotes collaboration between nations and free interchange of scientific information
- Promotes international scientific activities and initiatives
- Produces databases and catalogues

•<http://www.iugg.org/IAGA/>