Geophysical Research Abstracts
Vol. 13, EGU2011-2909-1, 2011
EGU General Assembly 2011

Study of Mars Global Surveyor data to infer Mars internal conductivity

François Civet and Pascal Tarits
CNRS, Univ. of Brest & UEB, IUEM, Domaines Oceaniques, Plouzané, France (francois.civet@univ-brest.fr)

We investigate the electrical properties of the deep interior of Mars using the magnetic data from Mars Global Surveyor (MGS). In its mapping orbit phase, the satellite measured the 3 components of the Martian magnetic field from 1999-2006 at an altitude ranging from 350-420 km.
The objective is to derive from these data the electromagnetically induced field to obtain profiles of electrical conductivity in the Martian mantle. We analyze the MGS magnetic field in order to obtain the induced response of Mars to the external magnetic forcing.
Techniques developed for Earth satellite magnetic data are not easily applied to Mars. On Earth the main part of the source field has a reasonably simple geometry which leads to a fairly straight forward data processing to get the induced response. In contrast, Mars has a very heterogeneous external field both in space (with a strong day/night behavior) and in time. Furthermore, MGS data are not a continuous time series which makes any classical spectral method used on Earth fail.
Hence we developed a technique including a source field proxy. The approach is tested on Earth synthetic data produced to study the capability of the future constellation SWARM to map the earth mantle conductivity (Kuvshinov et al., 2006). The proxy used for this Earth data set is the Dst index. We obtain good results to recover the induced earth mantle with this technique. We have developed the same approach on Mars using Advanced Composition Explorer satelllite (ACE) which has measured solar wind characteristics during 15 years at the first Lagrange's point of the Earth. ACE data provide us a proxy of the variability of the external source on Mars during time windows when Mars and the Earth were on the same spiral of Parker's arm.
Here we report on progress to recover the induced magnetic field from the Mars mantle and present preliminary results on the martian conductivity structure.

Bibliography:

A. Kuvshinov and N Olsen, A global model of mantle conductivity derived from 5 years of CHAMP, Ørsted, and SAC-C magnetic data, Geophysical Research Letters, 33, 2006.