1003-41-1371   **Thorsten Maier*** (`tmaier@mathematik.uni-kl.de`), University of Kaiserslautern, Department of Mathematics, Geomathematics Group, P.O.Box 3049, 67653 Kaiserslautern, Germany. *New Tools for Geomagnetic Field Analysis From Satellite Data.*

At the present time there is an unprecedented opportunity to use satellite magnetometer records to improve our knowledge of the Earth's electromagnetic environment. Satellites like MAGSAT and the recently launched Oersted and CHAMP, for example, provide us with high-precision geomagnetic vector and scalar measurements from low-Earth orbits. These measurements contain contributions from (time-varying) magneto- and ionospheric current systems, the corresponding induced responses of the conductive Earth, magnetic signals of the Earth's liquid outer core and, finally, the comparatively weak fields of lithospheric magnetization. From a mathematical point of view, analysing the data for its different parts usually involves severely ill-posed problems and, from a physical point of view, these problems are interdependent. Consequently, it is critical to have at hand the appropriate mathematical tools allowing for reasonable analysis and physical interpretation of the data. We approach this subject in terms of scalar and vectorial multiscale regularization techniques combined with wavelet-Mie-representations for solenoidal vector fields. Depending on the topicality, examples include crustal field downward continuation, determination of ionospheric currents and electromagnetic induction. (Received October 05, 2004)