

ULRICH SCHMUCKER, PIONEER OF ELECTROMAGNETIC INDUCTION

BAHR, KARSTEN

Geophysik, Friedrich-Hund-Platz 1, 37077 Göttingen

Ulrich Schmucker, a geologist by training, is best known for his theoretical contributions to the electromagnetic (em) method. He also liked to collect his own data, even at a time when only analog equipment was available. In this presentation I give a summary of his early field campaigns in North Germany, California and Peru. Then I concentrate on two of his achievements in em. (i) The definition of the geomagnetic perturbation tensor. Horizontal conductivity gradients give rise to horizontal changes in the vertical and horizontal components of the magnetovariational field. In contrast to earlier approaches to the interpretation of magnetic array data, the perturbation tensor which describes those horizontal changes can either be calculated from field data or from numerical models. In fact, any 2D or 3D forward code that can calculate MT transfer function from the field components at each node can also be used to calculate the elements of the perturbation tensor. (ii) The definition of equivalence transfer functions. Ulrich showed that at periods of the magnetic daily variation or longer, the same transfer function – now called Schmucker's C-response - can be obtained from MT and from two other induction techniques. With the Z/H technique, only magnetic data from one site are necessary, if the form of the source field is known – e.g. if the daily variation is characterized by one dominant spherical harmonic. Global induction studies started, when Schuster (1889) applied the Gauss separation technique to the daily variation, and the C-response can also be obtained from the ratio of the internal to external magnetovariational fields. Ulrich was aware of the fact that the techniques (i) and (ii) provide field data without electric field measurements, which can help to overcome the static shift problem in MT, and he initiated research in this direction in 1975.

Ulrich Schmucker, perturbation tensor, C-response

K. Bahr, kbahr@uni-geophys.gwdg.de