N. Schleifer, J. Bigalke, M. Koetter, A. Junge

# Geophysical Application of the Induced-Polarization(IP)-Effect for the Detection of Medieval Wells.

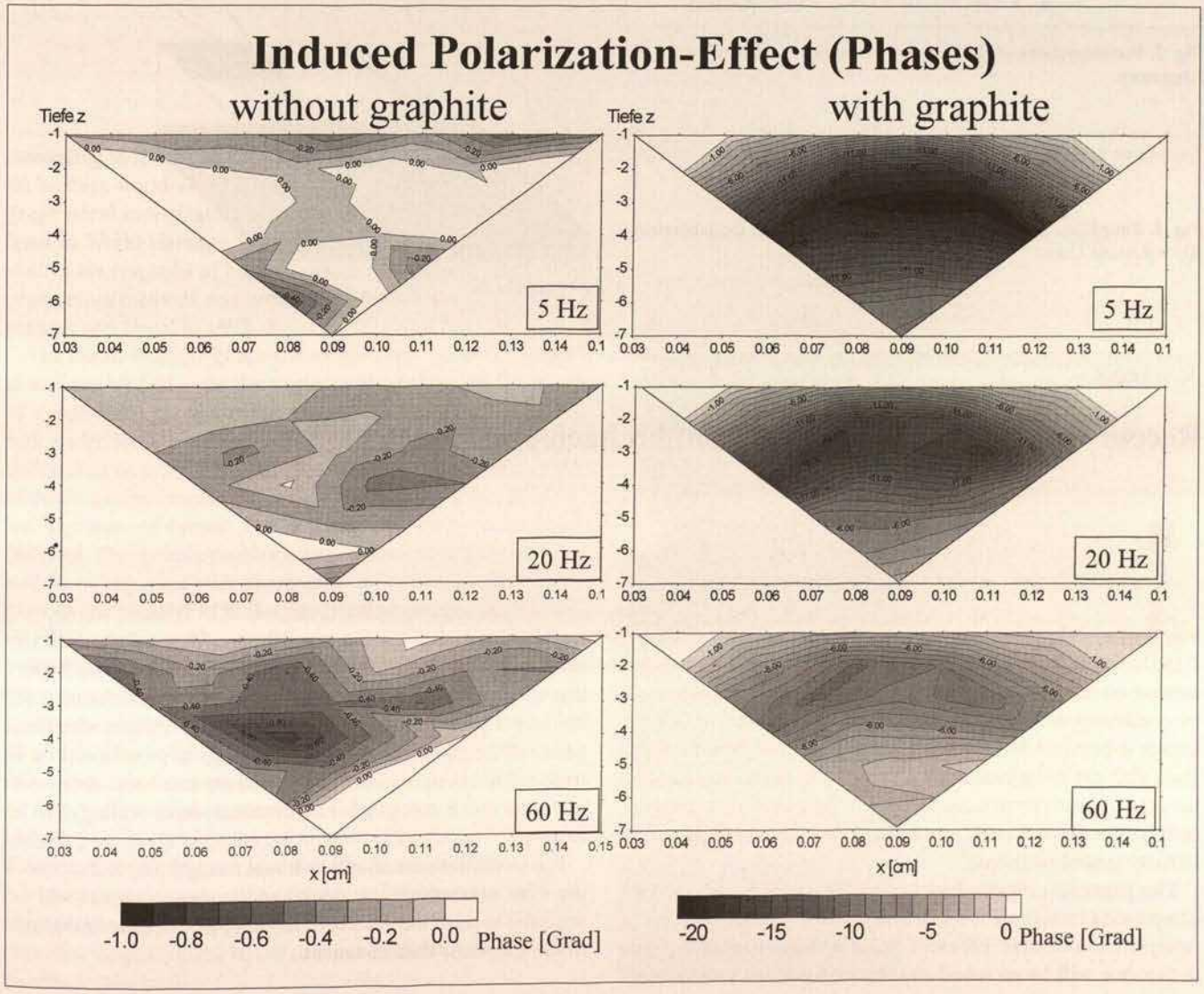
Besides the well-established groundspecific parameters, magnetic susceptibility and apparent resistivity, the polarizability of the soil is another possible parameter for archaeological problems.

The induced polarization (IP) bases on electrochemical processes in the subsoil that take place while an electrical current is injected into the ground. Consequently the resulting potential field at the surface is frequency dependent and reflects additional electrical properties of the soil. So far the method has been successfully applied for the monitoring of groundwater contamination and the distinction between clay and water-bearing rocks.

An application within the archaeological environment could be the detection of medieval wells containing wooden remains for subsequent dendrochronological investigations.

Within the "Graduiertenkolleg Archäologische Analytik" supported by the DFG (German Research Foundation) our institute is developing a multichannel geoelectrics-instrument (SIP-256) that is able to measure both the apparent resistivity and the induced polarization-effect. By using an "intelligent" remote unit at each electrode the speed of the measurement has been increased tremendeously. Thus the instrument enables fast mapping and sounding and a real-time visualization of three-dimensional structures.

Fig. 1. Pseudosections of the parallel performed IP-measurements



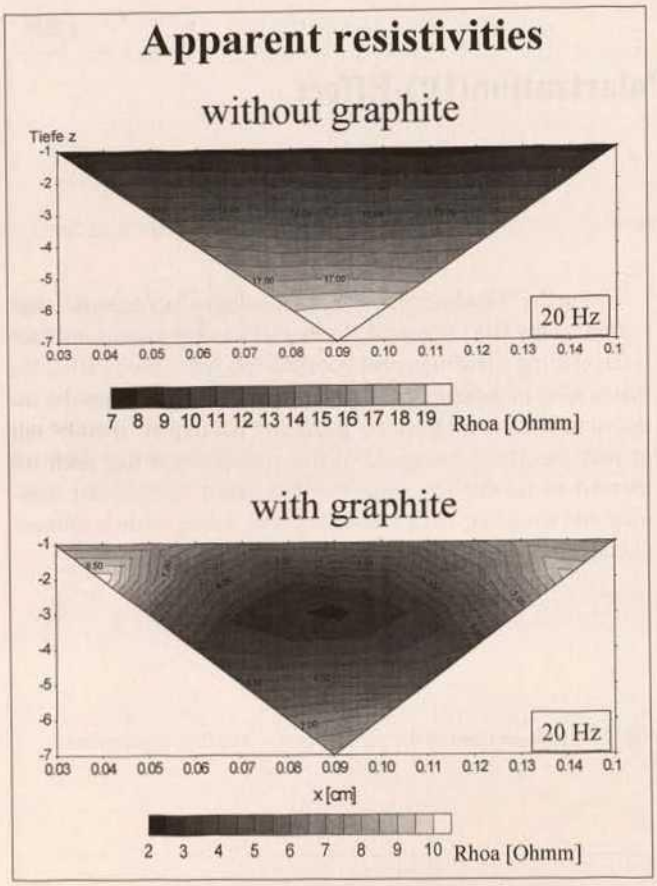



Fig. 2. Pseudosections of the apparent resistivity measurements in the laboratory

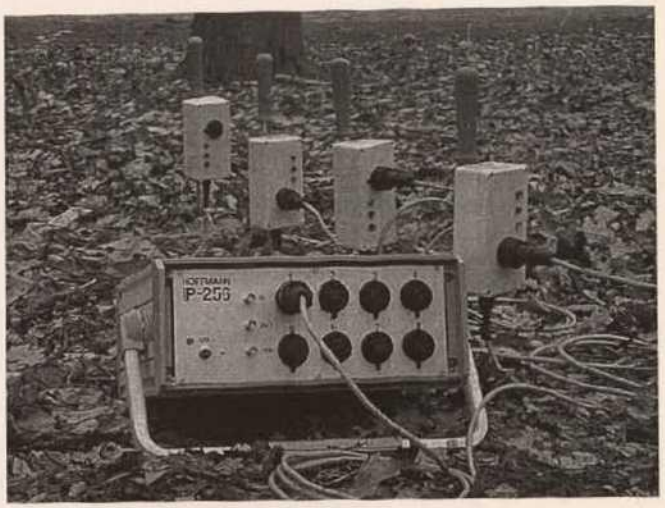



Fig. 3. SIP-256 Multichannel Geoelectrics-Instrument

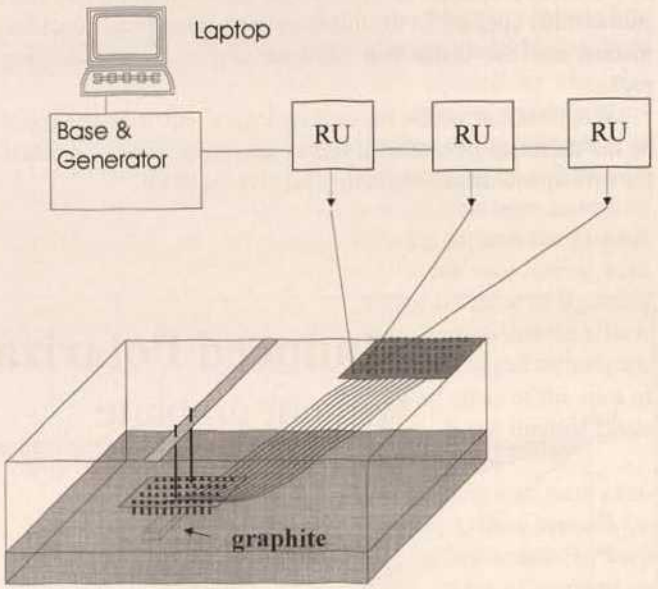



Fig. 4. Simplified picture of the experimental setup in the laboratory; RU = Remote Units

**A. Schmidt**

# Recent Work on Pseudosections for Archaeology

Standard earth resistance surveys for archaeology normally use fixed electrode arrays to cover large areas. The features detected depend on the penetration depth of the probe arrangement and by combining surveys undertaken with various electrode spacings it is possible to investigate anomalies at different depths. Such data can be subjected to complex algorithms to calculate the actual resistivity distribution of the ground (tomography) or converted without further processing into values of apparent resistivity (pseudosections).

This paper investigates how the simple use of pseudosections can provide images of the subsurface to aid the archaeological interpretation of sites. Efficient field techniques for cheap data acquisition will be reviewed and the responses to various electrode arrangements (twin-probe, Wenner, Wenner-broadside) illustrated. Data collection, manipulation and display are important issues when dealing with such data sets and case studies for the use of pseudosections, pseudoslices and volume visualisations will be provided. A major advantage of pseudosections is their minimal requirement for processing and basic data treatment tools (e. g. topographic adjustments, depth scaling) will be assessed.

Pseudosections are an efficient tool for an initial evaluation of the third dimension (i. e. depth) and survey examples will be provided to show the validity of this approach despite limitations of the simplistic data treatment.