

NEAR-SURFACE EXPLORATION WITH THE USAGE OF CONTROLLED SOURCE RADIOMAGNETOTELLURICS

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Controlled source radio-magnetotellurics (CSRMT) is a high-frequency sounding method based on measuring the electromagnetic field at frequency range from 1 to 1000 kHz. Grounded wire (as for CSAMT method) or vertical loop (horizontal magnetic dipole) usually play a role of the electromagnetic field source for CSRMT implementation. Within the scope of method's fulfilment, the electric and magnetic components of the field are measured. That allows computing surface impedance and deploying magnetotelluric theory for data processing and inversion. The depth of investigation in the CSRMT method depends on frequency and resistivity (as skin-depth). Usually frequency range 1÷1000 kHz corresponds to depths from first meters to first thousands of meters. High frequencies favor rapid field measurements and the usage of ungrounded electrical antennas for simplifying the process of measurements on the ice, in the desert, etc. All the mentioned features make the CSRMT method as very useful and powerful tool for near-surface EM exploration.

This study is meant to discuss the typical equipment that is required for the method's successful realization and to present a few case studies devoted to the solution of such practical tasks as mapping sands and gravel deposits and engineering investigations in permafrost regions.