ON THE 2D MODELING OF CONTROLLED SOURCE SCALAR RADIOMAGNETOTELLURIC DATA: AN EXAMPLE ABOUT THE MAPPING OF BURIED FAULTS

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Controlled Source Radiomagnetotellurics (CSRMT) is a relative new geophysical method for near surface applications. A rectangular signal with base frequencies between 0.1 kHz and 150 kHz are injected through a grounded electric dipole which is used as a transmitter. Electric and magnetic field components are observed at these frequencies and at their subharmonics, usually in the far field, so that apparent resistivities and phases can be obtained in the broad frequency range between 1 kHz and 1 MHz. Inline or broadside configuration can be used. Similar to controlled source audiomagnetotellurics measurements tonsorial measurement are also possible by using two transmitters located perpendicular of each other.

A scalar CSRMT survey were carried out on the buried faults in the Vuoksa region, 150 km north of St. Petersburg to test the applicability of the method for mapping of near surface located faults. A 700 m electric dipole was used as transmitter with base frequencies of 0.5, 11,3,30 and 105 kHz. Apparent resistivity and phase values are observed in the far field and in the inline configuration at 57 stations using a station distance of 20 m. Electric fields observed in the direction of transmitter were perpendicular of the assumed strike direction of the buried faults so that they could be associated to the TM mode. The observed data were interpreted using the 2D inversion algorithm and a good data fitting could be obtained. The resistivity structure beneath the survey area down to 80 m could be derived and the buried faults could be successfully mapped.

In addition to the CSRMT observations a conventional radiomagnetotelluric (RMT) survey were also carried out on the same profile. An excellent correlation of observed RMT and CSRMT transfer functions and 2D Conductivity models were achieved.