University of Cologne

Institute of Geophysics and Meteorology

St. Petersburg State University
Faculty of Geology, Center of Electromagnetic methods,
MicroKOR Ltd., University of Cologne

Radiomagnetotelluric soundings system RMT-F

Recorder of the RMT-F system

Purpose: RMT-F equipment is intended for radiomagnetotelluric soundings using electromagnetic fields of remote radio transmitters. On data of measurements of horizontal and mutually-orthogonal component of electrical and magnetic fields curves of apparent resistivity and impedance phase are calculated, which are used for inversion and plotting of geoelectric cross section.

Technical parameters:

Number of channels	4
ADC, bit	16
Frequency range, kHz	10-1000
Internal memory, Mb	2048
Connection to PC	Ethernet
Display LCD, monochrome,	320x240 pix.
Keypad	18 keys
Built-in accumulator, 5 A*hours, 12±2 V, operation	8 hours
External power, V	12
Temperature range, deg. C	-20…+40
Dimensions and weight	340x295x155 mm 5.0 kg

Areas of application: geological mapping, exploration, hydrogeological and building construction works, environmental investigations (mapping of hydrocarbon contaminations, investigation and contouring of landfills, detection of leakages, etc.).

Properties of the equipment:

- time series or spectrograms of electric and magnetic fields signals recording, apparent resistivity and impedance phase calculation directly in the recorder, visualization of spectral parameters at the display and estimation of data quality directly at a sounding station, data recording into built-in memory or external PC;
- four-channels (tensor) or two-channels (scalar) surveys, software-controlled monitoring, settings of measurement parameters using both keypad of the recorder and external PC, works with GPS receiver (coordinate and time determination);
- electric field measurements using grounded and ungrounded (capacitive) electric lines allow fulfilling works in summer and winter time (on snow and ice) and at the adverse for groundings conditions (asphalt, concrete, gravel);
- short electric lines (10-20 m) permit investigation of local sites;
- used plane wave model ensures the reliable data interpretation, sounding curves for two directions increase the informative value of soundings and horizontally heterogeneous media investigations, depth of investigations is from 1-2 m to 30-50 m;
- measurements time at one station is less then 1 min., efficiency (with account of transfers between stations and installations of array) 80-100 soundings per day - 10 times faster then in the VES method.

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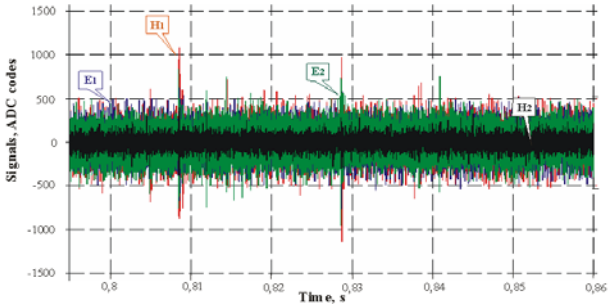
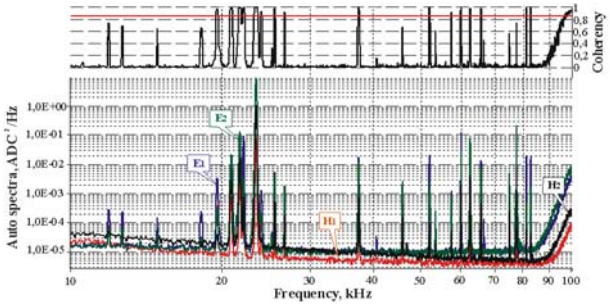
Features of measurements with the RMT-F system

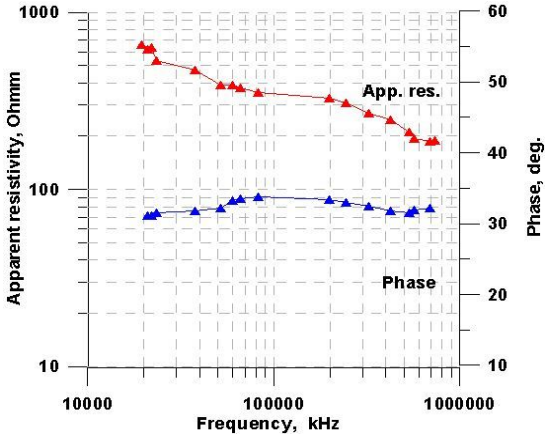


Time series

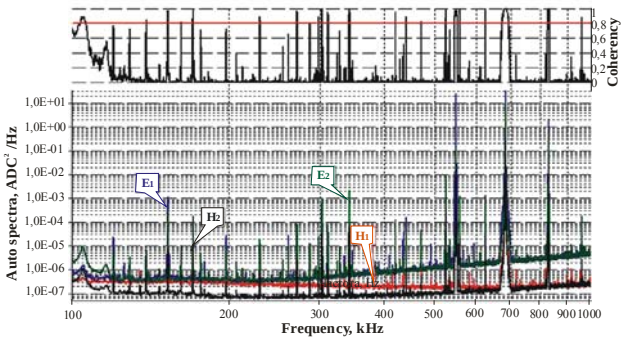
RMT-F system at a sounding station



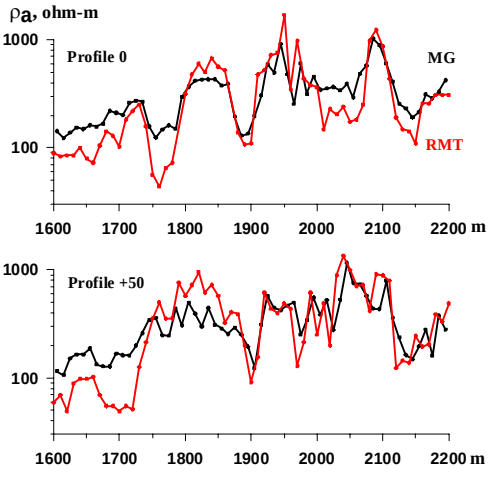
Autospectra and coherency, 10-100 kHz



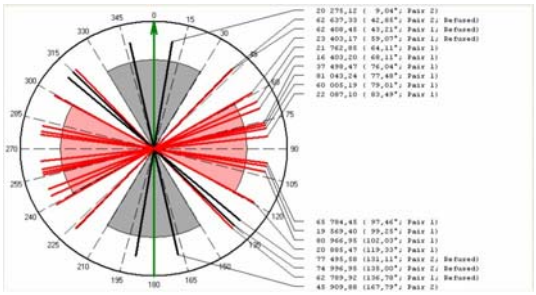
RMT sounding curves



Autospectra and coherency, 100-1000 kHz



Comparison of plots of apparent resistivity of the gradient method (black) and the RMT one (red)



Selection of radio transmitters involved in the data processing

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