

## Temporal variability of EM transfer functions

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### SUMMARY

This review covers the history of phenomenological observations of time-lapse variations of EM transfer functions (EMTF) from early discrete MT surveys in Germany in the eighties to field line resonance driven disturbances in geomagnetic studies. Although the related bibliography is not very extensive, a conclusion quickly emerges: monitoring subsurface geoelectric variations requires the most complete knowledge of physical processes producing transient variations of EM fields that can induce bias on TFs and reduce their accuracy. The latter one depends on processing schemes, arrays design, time steps, signal to noise ratio variations (solar winds, anthropic or natural noise sources, permanent or transient) and metrology strategy (acquisition cards, coils or fluxgate, electrode types). It is a significant fact that no standardized way of monitoring conductivity changes in the earth exists. Recently, several teams successfully observed EMTF variations on geothermal reservoir, seismic areas and volcano monitoring studies whereas surveys are continuous (permanent monitoring) or discrete (repeated surveys). However, geo-electric changes scenarii explaining the TF variations are rarely proposed whether they consist in forward modeling studies or 1D, 2D or 3D inversions. As manufacturers are now designing MT stations for purposes of monitoring and new projects are initiated, it appears that EMTF temporal variability studies for purposes of subsurface monitoring arouse a growing enthusiasm.

**Keywords:** Geo-electrical variations, monitoring, noise, processing, time resolution

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