



Analysis, results and conclusion of magnetotelluric data acquired in northern Switzerland

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In early 2016, a magnetotelluric (MT) survey of the Aargau region of northern Switzerland was performed in order to understand the potential of the magnetotelluric method to characterise the electrical resistivity properties of the subsurface in Switzerland, and more widely, in areas with high amounts of cultural electromagnetic (EM) noise. Subsurface electrical resistivity properties are interesting as they can help identify underground aquifers or geothermal resources and possibly provide insight into the large-scale movement of fluid. The north of Switzerland is a challenging and representative environment, with significant EM infrastructure, including powerlines and numerous other sources of noise related to human activity and use of industrial equipment. Here, we present the results of the survey together with detailed analysis of the issues encountered and challenges faced when doing this survey. In particular, we concentrate on data quality issues in the raw time series, the impact of using a remote reference over single site processing and the distribution of transfer functions. The final set of transfer functions for the survey, which includes twelve successful sites, is shown to suffer from noise issues in certain frequency ranges. A 1-D inversion of SSQ averaged transfer functions and comparison to existing borehole data demonstrates that geologic data is captured in the MT data recorded in northern Switzerland. Further, 2-D forward modelling supports the idea that good geologic information exists in the data despite the noise issues, which for now, impede a robust multi-dimensional inversion. Finally, suggestions for future work and methods to improve the quality of data when surveying in high EM noise environments are offered with a view to being able to reliably perform MT surveys closer to urban environments.