

Interactive comment on “Correcting for Static Shift of Magnetotelluric Data with Airborne Electromagnetic Measurements: A Case Study from Rathlin Basin, Northern Ireland” by Robert Delhaye et al.

Anonymous Referee #2

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The authors have investigated whether 1-D FDEM resistivity inversions could be a potentially useful method for making static corrections in MT surveys. The work presented here shows some promise in this direction, but I don't think the conclusions stated by the authors are truly justified. They state that FDEM static corrections could be used as a "matter of course" in MT inversion; this is far too optimistic based on the limited evidence presented. Also, they state that the static-corrected MT model fits better to the borehole log than the uncorrected MT model. But I don't see a robust, appreciable improvement in the fit to the borehole data. Basically, I think that the authors should scale back their conclusions and simply present this work as an exploration of the potential

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use of FDEM as a static shift correction mechanism, but that definitive conclusions cannot be made on the basis of this one case study. Minor comments: (1) EM cannot resolve permeability, as decades of experience by petroleum well log analysts and groundwater hydrologists has clearly shown. (2) The new part of the paper concerns the use of FDEM data, but the MT forward problem and inverse algorithm are described in depth while the FDEM forward and inverse algorithms are hardly described at all. (3) The MT source is energized by atmospheric electricity in general, does not have to be a lightning strike, nor does it need to generate a Schumann resonance. (4) There are a large number of assertions in the paper that are not properly justified, rather they are simply conjectures (deep geology of Cascades is more complex than that of Ireland; broad structure in models is not associated with local minima in misfit, whereas fine-scale structures are, etc...) In general, much of the static shift analysis and associated discussion is not strongly supported by the evidence presented.

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