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Solid Earth Discussions

Interactive comment on "A critical discussion of the electromagnetic radiation (EMR) method to determine stress orientations within the crust" *by* M. Krumbholz et al.

Anonymous Referee #2

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Comments on the manuscript SE-2012-24 entitled "A critical discussion of the Electro-Magnetic Radiation (EMR) method to determine stress orientations within the crust" by Krumbholz et al.

The manuscript is well-written and organized properly. There is enough information about the EMR method given in the introduction. The authors show good examples of data collected over a reasonably long period of time to study the possibility of recording EMR signals. The results are well demonstrated where the reader can follow the steps taken to draw the main conclusions. The effect of signal from VLF transmitter on the BEMR measurements is one of the most significant effects that can lead any interpreter

to make completely wrong judgments about the stress field and existing geological structures. Showing the bias introduced at different time periods during a day and over a year and even from different VLF transmitters is a strong evidence indicating that the EMR technique cannot be utilized at least in this frequency band.

A point that I would like to ask the authors to include in their paper is, if possible, to show a figure of amplitude of the signal as a function of frequency. In this way one can see even though they have used a filter that passes signal in the narrow frequency band of 30-35 kHz they still have strong effects from 23.4 kHz (DHO38). There are two items to consider in this context:

a) Is there a problem with their measuring system? Which they have also mentioned. I would like to see what is the band-pass effect? How much does that reduce the signal from 23.4 kHz.

b) There is very weak background signal that even the filtered 23.4 kHz is still dominating.

Of course there are different types of band-pass filters and it is complementary if the authors can show some of the technical specifications. In Figure 1 I show an example of the measured electromagnetic signal in an area in Sweden where the complete frequency band between 10-250 kHz is registered by an instrument called EnviroMT that belongs to the Department of Geophysics at Uppsala University. One can easily see the strong peaks from the VLF as well as LF transmitters with signal to noise ratios as high as 40 dB. Using such a device one can easily measure the signal over a long period and I know that the instrument provides the directions to the transmitters at the measuring station in an automatic sense. I also recommend the authors to refer to the publications below where use of VLF and RMT methods has shown existing fracture zones within for example crystalline bedrocks in Sweden.

Persson L., I. Antal Lundin, L. B. Pedersen, and Dick Claeson,2011, Combined magnetic, electromagnetic and resistivity study over a highly conductive formation in Or-

rivaara, Northern Sweden, Geophysical Prospecting, 59, 1155-1163.

BastaniM. 2001. EnviroMT – A new controlled source/radio magnetotelluric system. PhD thesis, Acta Universitatis Upsaliensis.

Persson L. 2001. Plane wave methods for imaging fracture zones. PhD thesis, Acta Universatis Upsaliensis.

A typo correction: In the conclusions VFL has to be changed to VLF.

Interactive comment on Solid Earth Discuss., 4, 993, 2012.

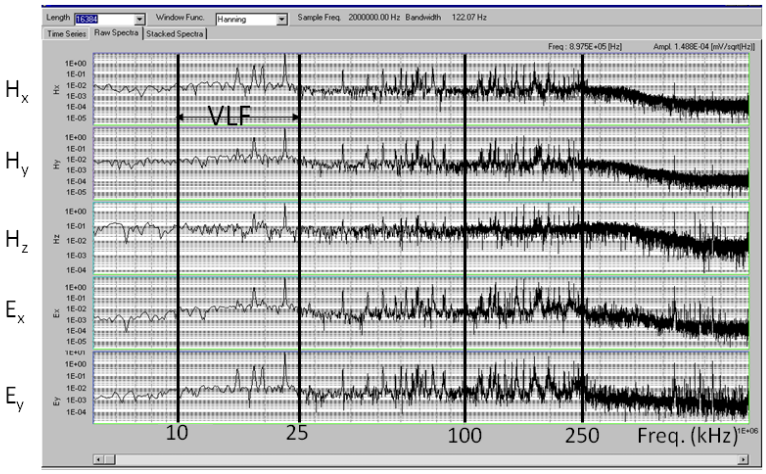

Fig. 1. Spectrum of electromagentic signal as function of frequency in the range 10-1000 kHz. The data are measured close to Uppsala, Sweden 2001.