



Interactive
Comment

Interactive comment on “Electromagnetic signals of crust creep motion” by V. N. Uvarov et al.

Anonymous Referee #1

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I. General comments

The paper describes a novel approach to the problem of electromagnetic monitoring of hazardous processes in the Earth's crust. The interest of scientific community in this area of research is quite understandable. The authors of paper are the experienced geophysicists. Their opinion concerning the problem is interesting. At first glance, the overall assessment of this paper is favorable. The paper contains a description of all the main elements of the pilot study. Method, device, observations, data analysis and data interpretation are described clearly enough. However, criticisms and objections arise after careful study of the text.

II. Specific comments

1. On the one hand the authors examine the “electromagnetic radiation” (p. 336, lines 3, 18, ..., ..., p. 343, line 4). On the other hand, they believe that the “increase in

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“multipolarity” leads to a more rapid attenuation of the field with distance (p. 338, lines 5–10). At this point I have the serious remark. I believe that the authors are mistaken. The attenuation of the electromagnetic radiation with distance does not depend on polarity, i.e. amplitude of the field attenuates as $1/r$ for dipole, quadrupole, octupole, etc. radiation.

2. The device is placed in the near-field zone of the terrestrial currents. Hence it is responsive to the variation of the quasi-static magnetic field of lithospheric origin, and not to radiation.

3. Can we allocate the quadrupole moment of the system of terrestrial currents by using this device? I think no. I think that the device allow us to measure only one (of the three) partial derivative of only one (of the three) component of the magnetic field in the near-field region.

Is this a lot or a little? It is possible that it might be useful from a practical point of view, but it does little for understanding the physical nature of the field sources. Let me draw an analogy with the Fitzroy’s storm-glass (weather forecasting instrument used on Darwin’s Beagle). Even if the storm-glass really predicts the weather, we do not know at what specific combination of humidity, pressure and temperature it reacts in some way. Similarly, we do not obtain important information about the actual structure of the subsurface electric currents, using the so-called quadrupole antenna.

Interactive comment on Solid Earth Discuss., 3, 335, 2011.

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