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Interactive comment on "On the directions and structure of the short-term magnetic variations" *by* Andrey Khokhlov et al.

Anonymous Referee #1

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The paper offers visualization tools for geomagnetic field variations applied to data from selected stations at middle latitudes. However, these tools do not provide any quantitative measurements.

Major.

2D polar diagrams simply confirm the well-known fact that the X-component disturbance is somewhat larger than Y-component.

3D diagrams demonstrate the occurrence of an inclined plane with preferred directions of magnetic disturbance vectors. The occurrence of this plane is presented as the main achievement of the paper. In my view, this result is not very significant either as a method or as a scientific result. In fact, methods to determine a plane of specific mag-

netic field fluctuations are widely used in space physics, e.g. the minimum variance analysis (MVA). In contrast to the presented visualization tool, the MVA method determines important quantative parameters, such as orientation angles of normal vector to the plane. The authors are strongly advised to compare their visualization tool with the MVA.

The observed tilt of the "polarization plane" may be caused simply by a lateral gradient of the geoelectric structure of the crust. However, the authors chose not to reveal actual physical reasons of the observed feature. The easiest way to do this is to compare 3D diagrams for two extreme cases: a station above a laterally homogeneous crust and a station with a strong crust gradient (e.g. near the coastline).

The selection of intervals for the study is quite baffling. The authors state that geomagnetically quiet intervals have been selected for investigation. However, magnetograms in Fig. 4 show a disturbance of the B magnitude >100 nT, which is rather high for middle latitudes. At the same time, the authors claim that their effect is more visible for magnetic storms but fail to present any experimental substantiation for this claim.

Minor. 1.16. In fact, variations of geomagnetic field both in magnitude and direction either in space or on the ground were examined in numerous studies.

2.18. Nobody expects magnetic variations to be isotropic above a high conductive Earth's surface.

In summation, from the presented m/s it seems that the described "polarization plane" effect is trivial. The authors failed to demonstrate anything new beyond that. I am convinced that a large team of eight authors can do much better work and produce more rigorous results.

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