

## **From 1D to 3D: MT/MV inversion results of new synchronous profile data across Lake Ladoga conductivity anomaly**

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Conflict Declaration : no conflict of interests

Content Motivation : Our research was initiated in response to actual demand of the Precambrian studies in solid geophysical constraints for understanding the deep architecture and evolution of the Baltic Shield

Additional Information : Ladoga Workgroup community of researchers involved in Ladoga project are our co-authors too

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Lake Ladoga anomaly was originally discovered by MV soundings in 1980s on the SE of the Baltic (Fennoscandian) Shield at the boundary between Archaean Karelian craton and Paleoproterozoic Svecofennian accretionary orogen. Modern stage of LLA investigations has been initiated in 2013 responding to actual demand of the Precambrian studies in solid geophysical constraints for understanding the deep architecture and evolution of the Shield in this key region, which were still absent. New MT/MV sounding experiment has overcome serious restrictions of previous phases of the studies: it is characterized by synchronous scheme of broad-band and basic long-period recording and application of advanced data processing and inversion techniques for adequate analyses of the observations. About 50 Phoenix and 20 LEMI soundings have been accomplished by "Nord-West" Ltd, MSU and KRS RAS along 200 km long Vyborg-Suoyarvi profile and supported by Finnish geomagnetic observatories, providing new reliable MT/MV data ensemble. The paper is focused on the methodology and results of Vyborg-Suoyarvi MT/MV data set interpretation, extending limits of earlier 1D approaches and proceeding to 2D and 3D analyses. New ideas on LLA deep conductivity structure have appeared already at the stage of invariant analyses of new MT/MV response function estimates, including synchronous two-sites ones. Then, in the result of application of effective 2D inversion tools and different regularization and weighting strategy testing, a geoelectrical model of the LLA cross-section has been constructed and gone through a resolution analyses with a help of synthetic inversions. At the latest stage of our interpretation, with kind support of Finnish colleagues, we have extended our collection of MT/MV data by their earlier MV responses on the territory adjacent to Lake Ladoga and then have performed full multi-component 3D inversion. The inversion results have generally approved former approach model, meanwhile showing obvious

advances of extension of the area data coverage and more adequate model approximation. Finally, the verification of latest geoelectrical models by the interpretation of regional potential fields is presented and new insights into nature of LLA and regional deep tectonic structure are discussed in comparison with old conceptions taken shape by pioneer investigators.