

# ***Interactive comment on “A high resolution lithospheric magnetic field model over southern Africa based on a joint inversion of CHAMP, Swarm, WDMAM and ground magnetic field data” by Foteini Vervelidou et al.***

**Anonymous Referee #1**

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The manuscript “A high resolution lithospheric magnetic field model over southern Africa based on a joint inversion of CHAMP, Swarm, WDMAM and ground magnetic field data” was submitted by three highly known scientists: Foteini Vervelidou, Erwan Thébault and Monika Korte. The overall impression after reading this manuscript The paper addresses relevant scientific topics and fall in the scope of SE. An inversion of different magnetic field sources (CHAMP, SWARM, WDMAM and three South African observatories) is described and applied to derive the field of lithospheric field. After an introduction and outline of motivation the used method and mathematical formalism

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are carefully explained. For used inversion scheme the “revised spherical cap harmonics” have been applied to handle measurements which were observed at different heights. The quality of the different data sets and the methodology itself are explained in an understandable way. The general impression after reading the manuscript is positive; the styling in which the manuscript was written corresponds to a good language level - as far as I can judge this as a non-native speaker. The overall presentation is well structured and clear. Figs. 4a – d present the results and show that the (new) lithospheric field, calculated from the mentioned sources provide new insights in the magnetic properties of the rocks in South Africa. The geological-tectonic interpretation and also the discussion of the rock parameters of the earth are reduced in favor of an assessment of the performance and quality of the mathematical algorithms. This is understandable from the authors' view point, who are more physicists than geologists. But in this direction it would have been interesting to learn more about the interpretation of the new acquired field and how far it can reflect the magnetic effect of previously unknown structures. The number and quality of references are appropriate and the description of experiments and calculations are sufficiently complete and precise to allow their reproduction by fellow scientists at any time.

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