

Solid Earth Discuss., referee comment RC2  
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## Comment on se-2020-201

Anonymous Referee #2

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Referee comment on "An upward continuation method based on spherical harmonic analysis and its application in the calibration of satellite gravity gradiometry data" by Qingliang Qu et al., Solid Earth Discuss., <https://doi.org/10.5194/se-2020-201-RC2>, 2021

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**"An upward continuation method based on spherical harmonic analysis and its application in the calibration of satellite gravity gradiometry data" by Qingliang Qu, Shengwen Yu, Guangbin Zhu, Xiaotao Chang, Miao Zhou, and Wei Liu**

This paper deals with upward continuation of ground gravity data based on spherical harmonic analysis and its application in the calibration of satellite gravity gradient data. By using the simulated ground gravity anomalies, the accuracy of the proposed upward method is verified. Finally, the calibration of GOCE gravity gradient data is executed with the DTU13 global gravity anomaly data. After calibration, the results show improvement and are slightly better than the EGG\_TRF\_2, which confirm the feasibility of calibration of GOCE gradiometer with the upward continuation of ground gravity data based on spherical harmonic analysis.

The paper is well written for the structure, the introduction provides a fair overview of the existing calibration of GOCE gravity gradient data based on ground gravity data. In addition, the work on the calibration of GOCE gravity gradient data is significant for the GGT's calibration of future satellite gradiometry mission. Summarizing, I recommend the publication of the manuscript after revision according to the following minor remarks.

The paper needs to be polished by a native speaker.

To make it clear, please use the same color bar in Fig.2 and the same bound for vertical

axis (PSD) in Fig.4.

Page 2, line 41, replace "be examined and outlined here" with "be examined and outlined in the following"

Page 2, line 42, replace "Arabelos and Tscherning (Arabelos and Tscherning, 1998)" with "Arabelos and Tscherning (1998)"

Page 2, line 45, replace "was discussed in Bouman et al. and Pail (...)" with "was discussed by Bouman et al. (2003) and Pail (2002)"

Page 2, line 46, replace "Denker (Denker, 2002)" with "Denker (2002)"

Page 2, line 50, replace "compared in Wolf and Denker (Wolf and Denker, 2005)" with "compared in Wolf and Denker (2005)"

Page 2, line 52, replace "on an ellipsoid" with "on an reference ellipsoid"

Page 2, line 54, replace "were applied" with "were used"

Page, line 55, replace "Kern and Haagmans (Kern and Haagmans, 2005)" with "Kern and Haagmans (2005)"

Page 2, line 58-60, change the sentence "To validate ..." to "Bouman et al. (2004, 2009, 2011) did much research about the external calibration model based on the regional ground gravity data to validate the SGG data" better?

Page 2, line 66, replace "in Yildiz et al. (Yildiz, 2012;Yildiz et al., 2016)" with "Yildiz (2012) and Yildiz et al. (2016)"

Page 2, line 68, replace "in the high-precision" with "for the high-precision"

Page 2, line 71, replace "Eshagh (Eshagh, 2011). Å prlÃik et al. (Å prlÃik et al., 2015)" with "Eshagh (2011). Å prlÃik et al. (2015)"

Page, line 76, replace "inverse matrix" with "inverse". It seems that in most cases the "matrix" in "inverse matrix" is omissible.

Page 3, line 79, replace "the possibilities of spherical harmonic analysis for" with "the feasibility of applying spherical harmonic analysis to"

Page 9, line 220, replace "Veicherts et al. (Veicherts et al., 2011)" with "Veicherts et al. (2011)"

Page 14, line 306, replace "than before calibration" with "than that before calibration" ?