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Geoscientific Model Development Discussions

Interactive comment on "Comparison of the glacial isostatic adjustment behaviour in glacially induced fault models" *by* Rebekka Steffen et al.

Anonymous Referee #1

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Review of manuscript "Comparison of the glacial isostatic adjustment behaviour in glacially induced fault models" by Steffen et al, submitted to Geosci. Model Dev. Discuss., 2016.

Dear Editor,

this work compares two GIA (glacial isostatic adjustment) models. The first (named WU) has been developed by the authors (Steffen et al., 2014), the second (HA) has been proposed by Heizel and Hampel in 2005. Both models have the purpose of describing the behaviour of faults in regions subject to deglaciation. Using various quantitative arguments, Steffen et al. aim at showing that the HA model is "not recommended" due to "poor performance" and argue that WU has "rigorous support" while HA has not. The authors conclude that "thorough modelling" of the GIA process is

a prerequisite to understand the faults response to changes in surface loads. Note that here, the movement of glacially induced faults is not explicitly modelled; rather the concern is about the GIA models setup.

In general, since the WU and HA models are indeed showing marked differences, I am not very surprised that their outcomes in terms of displacements and stresses differ. I also agree with the authors that thorough modelling is fundamental in order to obtain meaningful results, but this is certainly not new. I definitively cannot capture the usefulness of this study, which appears to have the narrow purpose of showing the limitations of the HA approach (which certainly exist, as in any modelling approaches). In the recent past, there has been a robust discussion between the two groups (see DOI 10.1002/2013TC003450 and DOI 10.1002/2014TC003772). During that discussion, some of the points presented in the present work have already been made, like the one about the suitability of the HA methodology for GIA studies. Furthermore, the discussion has also gone into details about the differences between the WU and HA models, which is also one of the purposes of present study.

My general impression (but of course I might be wrong) is that the present work is mostly aimed to reignite the debate between the two groups, without clearly identifiable benefits for the Geosci. Model Dev. community.

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