

Solid Earth Discuss., author comment AC1
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Reply on RC1

Juliette Grosset et al.

Author comment on "Postglacial strain rate – stress paradox, example of the Western Alps active faults" by Juliette Grosset et al., Solid Earth Discuss.,
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Dear editor, dear colleagues,

We wish to provide a quick comment in response to review RC1. Although we recognize (and will address) many of the reviewer's comments regarding the lack of details and specifics in our manuscript, we wish to rebut the main comment regarding the appropriateness of the model that we use here. This model (thin elastic plate over a uniform viscous medium) is indeed very simple, but contrary to the reviewer's comment, we are convinced that it provides appropriate information and results for the Alpine GIA study. For several reasons:

- Such a model has already been used, including in recent publications for this kind of study (e.g., Mey et al., 2016; Sternai et al. 2019).
- Although it lacks the technical developments of more complex GIA models, the thin-plate model provides reasonable first-order predictions of deformation and stress that are enough to address the point made in our study (apparent opposition between extensive strain rates and compressive stress).
- The issue of stress migration pointed out by the reviewer is primarily a function of the sensitivity to mantle visco-elastic behavior. In the Western Alps, the small size of the icecap limits this sensitivity to the uppermost mantle, at most, and thus the potential stress migration issue is likely very small if not negligible (e.g., Steffen et al., 2015).
- Finally, on a more general note, we wish to point out that a model is as valid as any other models as long as it provides realistic testable predictions based on physically sound hypothesis. Simply stating that a contribution is "missing" does not render a model inappropriate.

We are in the process of running several finite-element models to show that, in this particular study, the thin-plate model provides useful predictions and that our conclusions are robust. Once these tests are done, we hope that we will have the opportunity to provide a detailed reply to the reviewer's comments.

References

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