

Interactive comment on “Stress rotation – The impact and interaction of rock stiffness and faults” by Karsten Reiter

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I agree with a number of issues that the reviewer raises, such as length of the intro, more details on the model setup and a better reasoning why the material properties are simplified, i.e. homogenous with depth. However, I think we can learn a lot from a simple model and maybe can derive hypothesis why we observe rotation of the maximum horizontal stress SH_{max} on scales of 50-200 km in intraplate areas where little topography is present (USA: Lund and Zoback, 2020, Nature Communications, doi:10.1038/s41467-020-15841-5 or Australia: Rajabi et al., (2017) Earth Science Reviews, doi:10.1016/j.earscirev.2017.04.003). Putting more complexity into the model has the risk that it may produce ambiguities in the interpretation what causes the observed rotation of the stress tensor. Thus, the generic study of Reiter can help indeed

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to better understand potential sources of these somehow unexpected rotations.

However, as most of the data of the SHmax orientation in intraplate settings are within the upper 15 km (for the above mentioned USA and Australia examples data are to large extend in the upper 5 km from borehole logs) I would focus on the upper elastic part of the crust, i.e. the upper 10 km - than the elastic approach is a reasonable justification.

Another issue raised is the missing variability of the rock properties with depth. I agree that this "feels" like an oversimplification, but the SHmax orientation does not change significantly with depth except where mechanical decoupling due to e.g. evaporate layers occurs. But this has to be explained in more detail and maybe a sensitivity test could show that the key findings are not affected by this simplification.

Thus, I agree that the model is simple, but it is not unrealistic. The question is if the simplifications are justified and sufficient to address the key question that the model is investigating. And to quote George Box' aphorism "All models are wrong, but some are useful" the question in the very end is if this model setup is helpful. The answer from my point of view is yes (after the author shows or better describes that the simplifications do not affect the key findings).

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