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Interactive comment on "Fault slip envelope: A new parametric investigation tool for fault slip based on geomechanics and 3D fault geometry" *by* Roger Soliva et al.

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Dear Editor, we have now corrected the manuscript and made significant changes both in the text and the figures (Figures 1, 3, 4 and 7) to improve the method and understanding of the figures. To avoid overstatement in the conclusion, we have removed some text and irrelevant terms (e.g. proxy, probability, hazard assessment) and better supported some conclusions with additional explanation about fault displacement. These changes are tracked in yellow in the revised manuscript and are detailed and explained below, in the reply of the 2 reviewers. The authors would like to thank both reviewers and the editor for these constructive comments. We hope that the revision

improves the quality of the manuscript.

Please also note the supplement to this comment:
https://www.solid-earth-discuss.net/se-2019-61/se-2019-61-AC3-supplement.pdf

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Interactive comment on Solid Earth Discuss., https://doi.org/10.5194/se-2019-61, 2019.

Figure 1

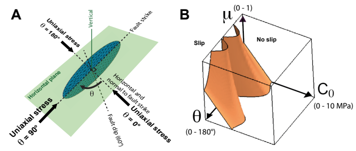

Figure 1 (2 column fitting image). Fault slip envelope of a simple-planar elliptical fault of 60° dip. (a) Scheme of the relationship between fault strike, dip and remote uniaxial stress orientation. (b) Fault slip envelope expressed as static friction (μ), cohesion (C0) and uniaxial stress angle (θ). The stable (No slip) and unstable (Slip) graphical domains are shown on either side of the fault slip envelope.

Fig. 1.

Figure 3

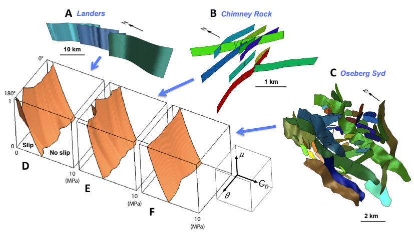

Figure 3 (2 column fitting image). Examples of 3D fault system geometry, from a simple to a very complex case, and related fault slip envelopes. (a) The Landers strike-slip fault segments. (b) The Chimney rock conjugate strike-slip fault system. (c) The Oseberg Syd normal fault system. (d), (e) and (f) are fault slip envelopes for each fault system, defining fault system stability for variable uniaxial stress orientation (θ), static friction (μ) and cohesion (C0) on fault surfaces. Colours in (a, b and c) correspond to different fault surfaces and allow an individual fault to be identified.

Fig. 2.

Figure 4

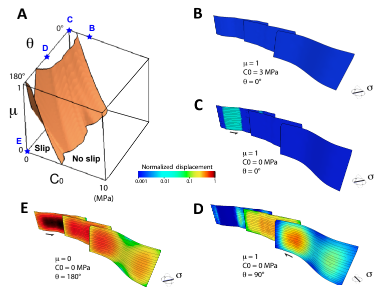

Figure 4 (2 column fitting image). Examples of 3D quasi-static fault displacement distribution on the Landers model for different mechanical conditions and uniaxial stress orientation. (a) Fault slip envelope shown in Figure 3d with reported specific model conditions used for figure parts b, c, d and e (bleu stars). (b) Displacement distribution for μ = 1, C0 = 0 MPa and θ = 0°. (c) Displacement distribution for μ = 1, C0 = 3 MPa and θ = 0°. (d) Displacement distribution for μ = 1, C0 = 0 MPa and θ = 90°. (e) Displacement distribution for μ = 0, C0 = 0 MPa and θ = 180°. The colour bar scale for displacement is logarithmic.

Fig. 3.

Figure 7

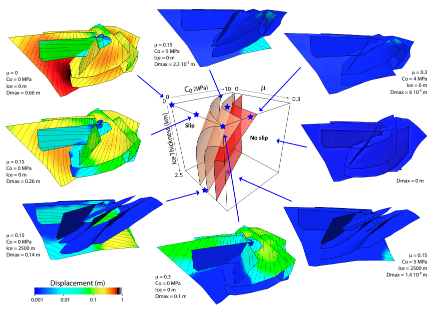

Figure 7 (2 column fitting image). Examples of 3D quasi-static fault displacement distribution on the Olkiluoto model for different loading and fault properties conditions indicated on the fault slip diagram by blue stars. Stream lines on fault surfaces are slickenlines. The colour bar scale for displacement is logarithmic.

Fig. 4.