Physics-based dynamic rupture models, fault interaction and ground motion simulations for the segmented Húsavík–Flatey Fault Zone, Northern Iceland

Bo Li[1,2], Alice-Agnes Gabriel[3,1], Thomas Ulrich[1], Claudia Abril[4,5], Benedikt Halldorsson[4,6]

[1]Department of Earth and Environmental Sciences, Ludwig-Maximilians-University, Munich, Germany.

[2]Physical Science and Engineering Division, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia.

[3]Scripps Institution of Oceanography, UC San Diego, La Jolla, USA.

[4]Division of Processing and Research, Icelandic Meteorological Office, Reykjavík, Iceland.

[5]Department of Earth Sciences, Uppsala University, Uppsala SE-75236, Sweden.

[6]Faculty of Civil and Environmental Engineering, School of Engineering and Natural Sciences, University of Iceland, Reykjavík, Iceland.

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Introduction

The supporting information presented here includes three figures and three animation movies. Figure S1 shows that our dynamic rupture scenarios fit well with the scaling law of P. Mai & Beroza (2000) well when using the effective rupture area. Figure S2 presents an overview of the rupture process of scenario C2 across the simple Model-C fault geometry. In Figure 3, we compare the ground shaking and source spectra of two scenarios of Model-C, one with and the other one without fault roughness. It shows the fault roughness results in lower ground motion level and relatively smaller magnitude rupture scenarios, but is able to generate more high frequency signals. In the end, we attach three rupture animations (Movie S1, S2 and S3) of the Model-A, Model-B and Model-C to demonstrate the rupture evolution across different complexity fault models.
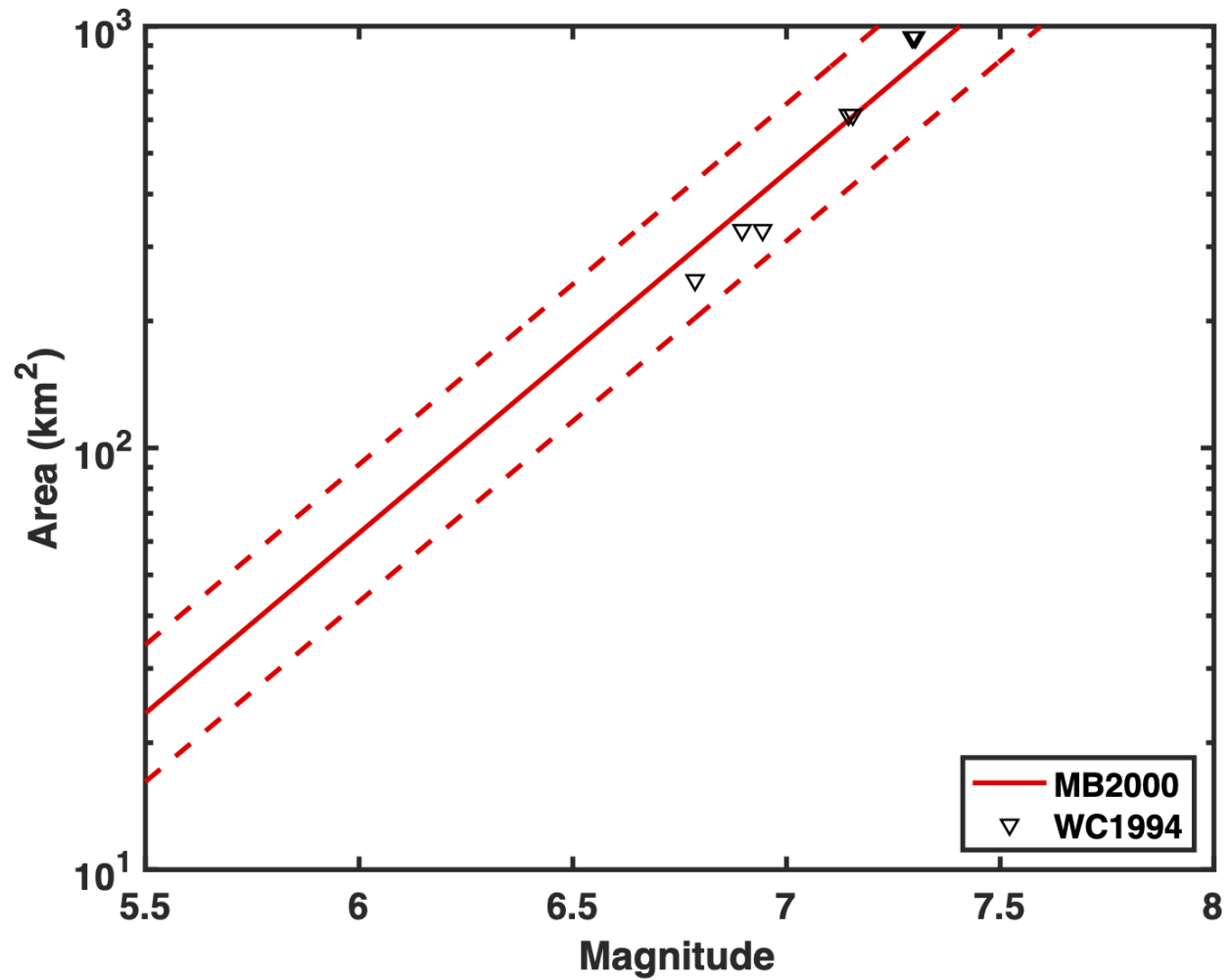
Figure S1. Scaling relationships of moment magnitude with effective rupture area according to P. Mai & Beroza (2000) are presented. Triangles represent values of synthetic simulations across Model B and C.
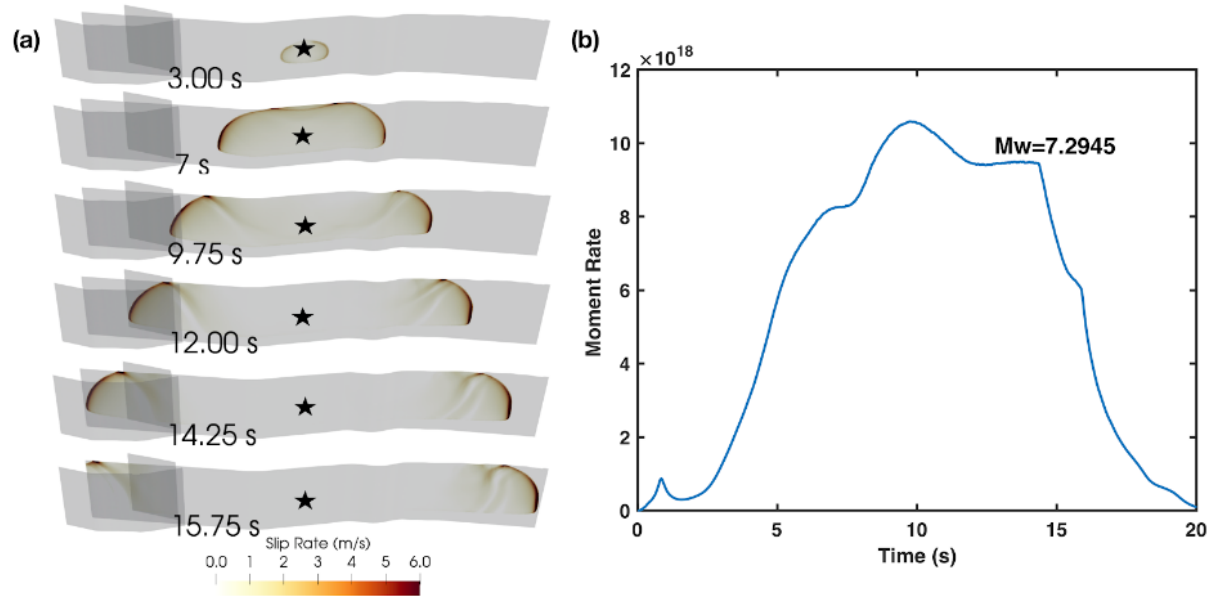
Figure S2. Overview of the simulated rupture propagation of scenario C3 across Model-C. (a) Snapshots of the absolute slip rate are shown at a rupture time of 3.00, 7.00, 9.75, 12.00, 14.25 and 15.75 s. The black circle marks the hypocenter location. (b) Moment rate release of scenario C3.
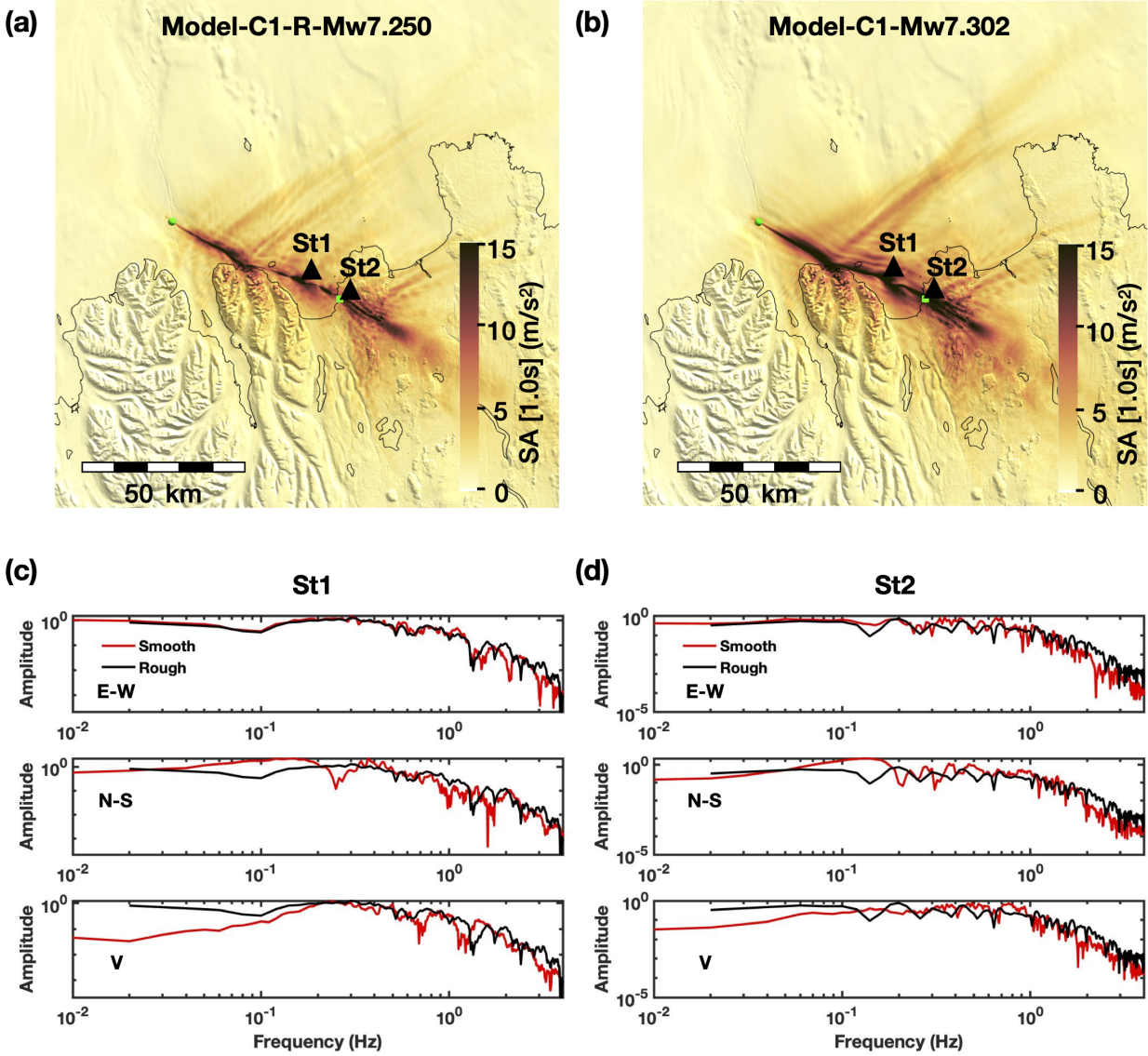
Figure S3. Ground shaking [SA 1.0s] for scenarios C1 (a) with and (c) without fault roughness is shown. The circle denotes the epicenter location and triangles mark location of two near fault receivers. Velocity spectra of the synthetic time series of the two receivers are shown in (b) and (d).

Movie S1: Evolution of absolute slip rate (m/s) across the Húsavík–Flatey Fault system for the rupture scenario A2.
(https://drive.google.com/file/d/1ar8ELVlZHt8L_iSquseLpuiXS9TRjovw/view?usp=sharing).

Movie S2: Evolution of absolute slip rate (m/s) across the Húsavík–Flatey Fault system for the rupture scenario B3.
(https://drive.google.com/file/d/1jIh51YlzolL2jBOPCTnFxefbFB7FVbB1/view?usp=sharing).

Movie S3: Evolution of absolute slip rate (m/s) across the Húsavík–Flatey Fault system for the rupture scenario C3.
(https://drive.google.com/file/d/1VD75r7zSnsGvVhj0ePeSPSTUgK7gz0KX/view?usp=sharing).