**Supplementary Materials**

**The effects of pre-stress assumptions on dynamic rupture with complex fault geometry in the San Gorgonio Pass, CA region**

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This section contains rupture propagation and slip results for alternative nucleation schemes. Figures S1, S2, and S3 correspond to Figures 5, 6, and 7, except using nucleation radii of 5.0 km rather than 7.5 km. Figures S4, S5, and S6 correspond to Figures 5, 6, and 7, except using a reduction of the static frictional coefficient to a level 10% lower than that required for fault failure. Figures S7, S8, and S9 correspond to Figures 5, 6, and 7, except using a reduction of the static frictional coefficient to a level 10% lower than that required for fault failure and nucleation radii of 5.0 km rather than 7.5 km. Please see main text for a brief discussion of these alternate results.

**Figure S1.** Summary Plot of *Constant Traction* models with small (5.0 km) nucleation radius, showing the total slip at the end of the simulation for three different nucleation locations. Nucleation locations are marked with black dots. Note that due to reduced slip near the fault edge, maximum slip is not at the exact position of nucleation. (A) Nucleation on SB. (B) Nucleation on WSG. (C) Nucleation on GH. Total slip magnitude is given in meters. With the exception of nucleation on the WSG, all models result in through-going rupture propagation across the Pass.

**Figure S2.** Summary Plot of *Regional Stress* models with small (5.0 km) nucleation radius, showing the total slip at the end of the simulation for three different nucleation locations. Nucleation locations are marked with black dots. Note that due to reduced slip near the fault edge, maximum slip is not at the exact position of nucleation. (A) Nucleation on SB. (B) Nucleation on WSG. (C) Nucleation on GH. Total slip magnitude is given in meters.

**Figure S3.** Summary Plot of *Evolved Stress* models with small (5.0 km) nucleation radius, showing the total slip at the end of the simulation for three different nucleation locations. Nucleation locations are marked with black dots. Note that due to reduced slip near the fault edge, maximum slip is not at the exact position of nucleation. (A) Nucleation on SB. (B) Nucleation on WSG. (C) Nucleation on GH. Total slip magnitude is given in meters. Nucleation on the GH produces rupture that propagates through the Pass.

**Figure S4.** Summary Plot of *Constant Traction* models with nucleation via reduced static friction, showing the total slip at the end of the simulation for three different nucleation locations. Nucleation locations are marked with black dots. Note that due to reduced slip near the fault edge, maximum slip is not at the exact position of nucleation. (A) Nucleation on SB. (B) Nucleation on WSG. (C) Nucleation on GH. Total slip magnitude is given in meters. With the exception of nucleation on the WSG, all models result in through-going rupture propagation across the Pass.

**Figure S5.** Summary Plot of *Regional Stress* models with nucleation via reduced static friction, showing the total slip at the end of the simulation for three different nucleation locations. Nucleation locations are marked with black dots. Note that due to reduced slip near the fault edge, maximum slip is not at the exact position of nucleation. (A) Nucleation on SB. (B) Nucleation on WSG. (C) Nucleation on GH. Total slip magnitude is given in meters.

**Figure S6.** Summary Plot of *Evolved Stress* models with nucleation via reduced static friction, showing the total slip at the end of the simulation for three different nucleation locations. Nucleation locations are marked with black dots. Note that due to reduced slip near the fault edge, maximum slip is not at the exact position of nucleation. (A) Nucleation on SB. (B) Nucleation on WSG. (C) Nucleation on GH. Total slip magnitude is given in meters. Nucleation on the GH and Nucleation produces rupture that propagates through the Pass.

**Figure S7.** Summary Plot of *Constant Traction* models with nucleation via reduced static friction and small (5.0 km) nucleation radius, showing the total slip at the end of the simulation for three different nucleation locations. Nucleation locations are marked with black dots. Note that due to reduced slip near the fault edge, maximum slip is not at the exact position of nucleation. (A) Nucleation on SB. (B) Nucleation on WSG. (C) Nucleation on GH. Total slip magnitude is given in meters. With the exception of nucleation on the WSG, all models result in through-going rupture propagation across the Pass.

**Figure S8.** Summary Plot of *Regional Stress* models with nucleation via reduced static friction and small (5.0 km) nucleation radius, showing the total slip at the end of the simulation for three different nucleation locations. Nucleation locations are marked with black dots. Note that due to reduced slip near the fault edge, maximum slip is not at the exact position of nucleation. (A) Nucleation on SB. (B) Nucleation on WSG. (C) Nucleation on GH. Total slip magnitude is given in meters.

**Figure S9.** Summary Plot of *Evolved Stress* models with nucleation via reduced static friction and small (5.0 km) nucleation radius, showing the total slip at the end of the simulation for three different nucleation locations. Nucleation locations are marked with black dots. Note that due to reduced slip near the fault edge, maximum slip is not at the exact position of nucleation. (A) Nucleation on SB. (B) Nucleation on WSG. (C) Nucleation on GH. Total slip magnitude is given in meters. Nucleation on the GH produces rupture that propagates through the Pass.