IGPP Virtual Seminar Series

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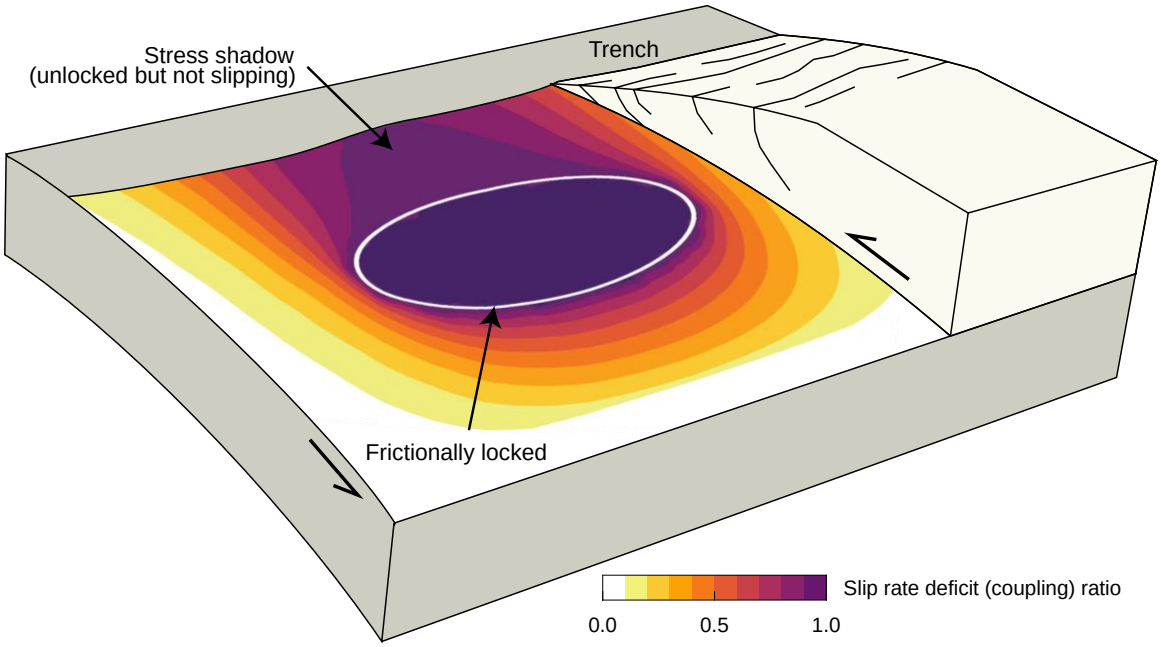
Unlocking the physics of megathrusts: geodetic insights into fault properties, stress and slip near the trench

Date: Tuesday, March 30, 2021
Time: 12:00 pm, Pacific Time
Host: El Knappe (eknappe@ucsd.edu – if you have questions)
Zoom link (password = trench): click here to join meeting
Meeting ID: 993 3824 2850
Because this meeting will be recorded, please make sure that you are comfortable with it before registering



Most destructive tsunamis are caused by seismic slip on the shallow part of offshore megathrusts. The likelihood of this behavior is partly determined by the interseismic slip rate deficit, which is often assumed to be low based on frictional studies of shallow fault material. Here we present a new method for inferring the slip rate deficit from geodetic data that accounts for the stress shadow cast by frictionally locked patches and show that this approach greatly improves our offshore resolution. We apply this technique to the Cascadia and Japan Trench megathrusts and find that wherever locked patches are present, the shallow fault generally has a high slip rate deficit of between 80 and 100% of the plate convergence rate, irrespective of its frictional properties. This finding rules out areas of low kinematic coupling at the trench considered by previous studies. If these areas of the shallow fault can slip seismically, global tsunami hazard could be higher than currently recognized. Our method also identifies critical locations where seafloor observations could yield information about the frictional properties of these faults and allow us to better understand their slip behavior.