

Titre: Mega-earthquakes and their relationship to fault properties.

Résumé: The 2004 moment magnitude 9.3 Sumatra-Andaman and 2011 moment magnitude 9.0 Tohoku-Oki earthquakes highlighted gaps in our understanding of mega-earthquake rupture processes and the factors controlling their global distribution: A fast convergence rate and young buoyant lithosphere are not required to produce mega-earthquakes. We calculated the curvature along the major subduction zones of the world, showing that mega-earthquakes preferentially rupture flat (low-curvature) interfaces. A simplified analytic model demonstrates that heterogeneity in shear strength increases with curvature. Shear strength on flat megathrusts is more homogeneous, and hence more likely to be exceeded simultaneously over large areas, than on highly curved faults.