Geophysical Research Abstracts
Vol. 19, EGU2017-18259, 2017
EGU General Assembly 2017


# The 25 December 2016 Mw 7.7 earthquake, Chile: coseismic and postseismic slip distributions from Sentinel-1 and ALOS-II Interferometry, and GPS

Marcos Moreno (1), Daniel Melnick (2), Sanaz Vajedian (1), Jonathan Bedford (1), Juan Carlos Baez (3), Sergio Ruiz (3), and Mahdi Motagh (1)

(1) Helmholtz Centre Potsdam GFZ German Research Centre for Geosciences, Potsdam, Germany, Potsdam, Germany (marcos@gfz-potsdam.de), (2) Facultad de Ciencias, Universidad Austral de Chile, Casilla 567, Valdivia, Chile., (3) Departamento de Geofísica, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago, Chile.

Resolving spatio-temporal relationships between plate interface kinematics and earthquakes of moderate magnitude can provide direct insights on the slip behavior and stress accumulation-release of larger asperities. The 25 December 2016 southern Chile earthquake (Mw 7.7) ruptured around a previously well- detected locked asperity, which last failed during the giant 1960 Mw 9.5 earthquake. Differential interferometry using Sentinel-1 and ALOS-II data and a decade of continuous GPS are used for determining ground deformation before, during and after the 2016 event, as well as slip distributions at depth. To characterize the relation between slip behavior and stress distribution along the plate interface we built a mechanical finite element model with frictional boundary conditions. Preliminary results indicate that the rupture mainly concentrated in the downdip end of the locked zone, across the transition zone to creeping. Our model indicates that the steady subduction of a mechanically coupled asperity preferentially accumulates shear stress around the downdip border of an asperity. This stress loading can be easily released by moderate-size seismic events that uncouple the downdip end before the entire asperity fails in a major event. The coseismic slip distribution suggests that the core of the asperity did not fail completely, and the accumulated slip deficit (>3m) can produce a ˜Mw 8 event in the near future. Our study, also demonstrates that combining InSAR and GPS data in remote, difficult to access areas can improve our understanding of transient loading on the shallow part of the seismogenic zone.