Tsunami potential of the 2018 Sulawesi earthquake from GNSS constrained source mechanism

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Since 1994, a large group of scientists from different institutions, including BAKOSURTANAL (now BIG), ITB and BMKG in Indonesia, and TU Delft (NL), U. Utrecht (NL), U. Leeds (UK), ENS-Paris (FR) in Europe, have been involved in the installation and maintenance of an extensive GNSS network on the Island of Sulawesi, Indonesia. The current network involves 13 continuous GPS stations and 50 GPS survey sites scattered around the Island, where 5 cGPS and 30 survey sites are near and around the Palu-Koro fault, in the area of the 28 September 2018 event. All but one continuous stations sample GPS data at high rate (1 s) and were operational before, during and after the earthquake. Co-seismic displacements are constrained further from re-visiting the campaign stations (yearly re-measured since 1997) two to five weeks after the event. We combine our GNSS observations with optical and InSAR observations in order to constrain the fault model. The rupture is fully compatible with pre-seismic findings of a shallow-coupled strike-slip fault with a slight component of normal opening, which corresponds to the local pull-apart geometry. Our moment magnitude agrees well with seismological estimates (eg. USGS, INGV, GFZ). We investigate the possibility of a super-shear rupture based on near-field cGPS records and the potential of vertical and horizontal fault slip for generating the Palu tsunami. We compare the results obtained with tsunami modelling to tide gauge records and visual observations.