
Source Model for the Mw 6.5, 29 March 2017 Kamchatka Peninsula Earthquake from InSAR geodetic technique

Magdalena Vassileva^{*†1}, Mahdi Motagh^{‡1}, and Thomas Walter^{§1}

¹GeoForschungsZentrum - Helmholtz-Zentrum Potsdam – Telegrafenberg, D-14473 Potsdam, Germany

Abstract

We explore the InSAR geodetic techniques to study the fault geometry of the 29 March 2017 Mw 6.6 Kamchatka earthquake. Kamchatka Peninsula, located on the far eastern edge of Russia, hosts some of the most active volcanoes and is one of the most seismologically active regions in the world. It is situated at a triple junction area where the Pacific, Bering and Okhotsk plates come together. Nevertheless, the aforementioned tectonic process is not well understood and several different theories have been proposed. The 29 March 2017 Kamchatka earthquake was triggered precisely in this faulted region and it may contribute to interpret this complex setting. ALOS-II ascending and descending acquisitions, respectively from 19th January 2017 (before the event) and 4th January 2018 (after the earthquake) and from 6th March 2017 (before the event) and 1st May 2017 (after the earthquake), and Sentinel-1 descending data, acquired on 17th March 2017 (before the event) and 29th March 2017 (after the main event), were used to perform the interferometric analysis and combined to detect the coseismic surface displacement. The special feature of the ALOS-II L-band radio wave, with wavelength of about 24 cm, allowed to overcome some of the decorrelation issues due to the strong vegetation presence over the area of interest. The source focal mechanism was retrieved and compared to that from seismological analysis. The distributed slip and the stress changes induced by this event were also modeled. Uplift deformation was detected amounting to a maximum of 23 mm near the shoreline. Nonlinear inversion using elastic half-space modeling suggests a north-west-dipping oblique thrust faulting with right-lateral rupture. The fault geometry is consistent with that determined from the seismological analysis. However, some disagreements are present regarding the epicenter location and depth.

*Speaker

†Corresponding author: magda88@gfz-potsdam.de

‡Corresponding author: motagh@gfz-potsdam.de

§Corresponding author: twalter@gfz-potsdam.de