

Multiple active faults triggered the 2016 M_w 7.1 Kumamoto earthquakes

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The M_w 7.1 (Mj7.3) Kumamoto earthquake occurred on 16 April 2015 in Kyushu Island, west Japan, resulting in extensive damage in the Kyushu Island, Japan. The M_w 7.1 (Mj7.3) Kumamoto earthquake occurred on 16 April 2016 in Kyushu Island, west Japan, with **three large foreshocks of $M > 5.5$** , M_w 6.2 (Mj6.5) and M_w 5.5 (M5.7) on 14 April, and M_w 6.0 (Mj6.4) on 15 April, respectively. There are also four large aftershocks of $M > 5.0$, M_w 5.8 (Mj6.0), two M_w 5.6 (Mj5.8) and M_w 5.2 (Mj5.3) occurred immediately within 6 hours after the main shock on 16 April (Japan Meteorological Agency, 2016). These foreshocks and aftershocks show a migration from the southwest to the northeast, mostly along the pre-existing active faults. To determine the motion of seismogenic fault, ground deformation features, and the relationship between the co-seismic rupturing process and crustal structure of the Aso volcano cluster, our survey group went to the epicentral area one day after the event and worked for 10 days.

Field investigations, seismic data, and analysis of high-resolution Google earth images acquired before and after the earthquake, reveal that a ~40-km-long surface rupture zone occurred mostly along the NE-SW-striking Hinagu-Futagawa fault zone, with dominantly right-lateral strike-slipping displacement in the central-southwest segment and multiple newly-identified faults in northeast segment that formed a graben structure and crosscut throughout the western side of the Aso caldera. In this presentation, we will report the detail distribution patterns of co-seismic ruptures and offset amounts, and the structural features of the newly found active faults along which the co-seismic surface ruptures occurred.

Keywords: 2016 M_w 7.1 Kumamoto earthquake, co-seismic surface rupture, Hinagu-Futagawa Fault Zone, Aso caldera, co-seismic graben, strike-slip fault