The significant seismicity of the 2016 Kumamoto Earthquake sequence

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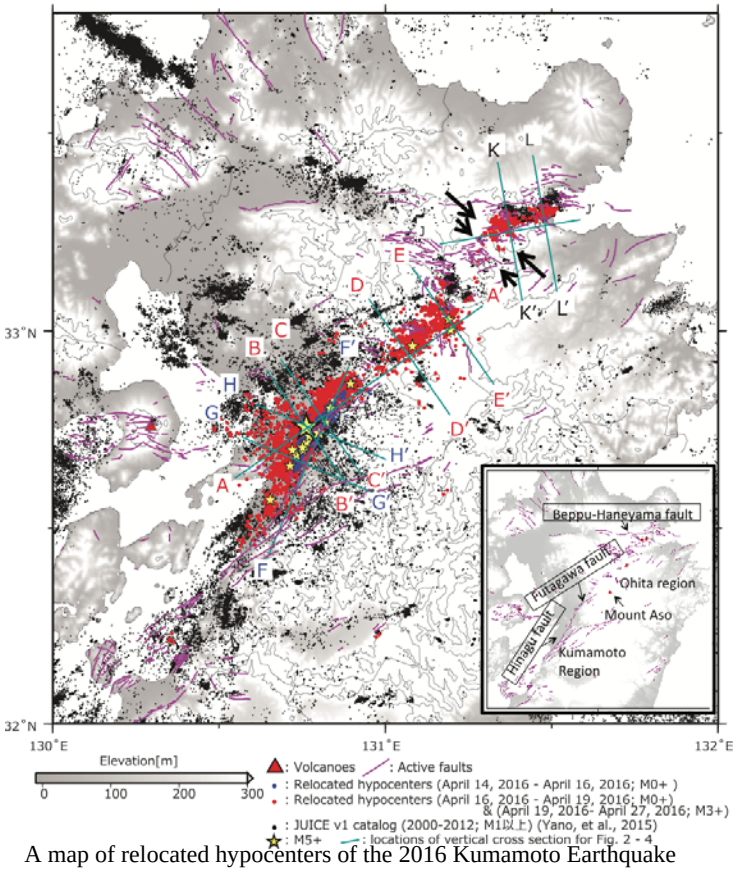
We have applied the double-difference method (hypoDD; Waldhauser and Ellsworth, 2000) using cross-correlation of waveform data as well as the ordinal differential picking time data for the 2016 Kumamoto Earthquake sequence. Our data includes the largest earthquake with magnitude (M) of 7.3 occurred on April 16, 2016 following the second largest earthquake with M6.5 on April 14, 2016. A total 5,272 events are consisted of three different subgroups; 1) events (M > 0) during a period between M6.5 event and the M7.3 event, 2) events (M > 0) after the M7.3 event to April 19, 3) otherwise event (M > 3) from April 19 to April 27, 2016. Waveforms obtained at excellent coverage of station distribution from multi-organizations such as NIED Hi-net, JMA, Kyushu university, and Kagoshima university are adopted for preparing both cross-correlation of their waveform data and ordinal differential picking time data for differential travel times used by hypoDD.

The final relocated earthquake distribution is shown in the figure. It made sharper lines and confined clusters. Particularly for this study area, the final hypocenter distributions are easily traceable following the known active fault traces such as the Hinagu fault range and its surroundings while the Futagawa fault range shows more complicated shapes than the Hinagu fault. Orientations of these planes agree the strike direction of the focal mechanisms estimated by the first motion phase arrivals, which routinely or manually determined by the NIED Hi-net.



A map of relocated hypocenters of the 2016 Kumamoto Earthquake

We will present the significant seismicity during the 2016 Kumamoto earthquake particularly on the Futagawa fault, between the northeastern tip of Futagawa fault, southwest of the caldera of the Mt. Aso, and Ohita region and compared them with seismic velocity tomography (Matsubara and Obara 2011) the background seismicity over 10 years due to JUICE catalog (Yano et al. 2016) in which all inland shallow hypocenters were determined by NIED Hi-net are re-determined by hypoDD.

References

Matsubara M, Obara K (2011) The 2011 off the Pacific coast of Tohoku Earthquake related to a strong velocity gradient with the Pacific plate. Earth, Planets Sp 63:663–667. doi: 10.5047/eps.2011.05.018

Yano TE, Takeda T, Matsubara M, Shiomi K (2016) Japan Unified hIgh-resolution relocated Catalog for Earthquakes (JUICE): Crustal seismicity beneath the Japanese Islands. Tectonophysics submitted.