Expected slip direction on assumed fault planes of large earthquakes inferred from stress field after the 2016 Kumamoto earthquake sequence, in central Kyushu, Japan

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In order to understand generation of earthquake, knowing the force acting on a fault plane is the great interest problem for us. We should find with which direction and magnitude a fault plane slips. Shear and normal stresses on a fault plane can be estimated from the stress field around a fault. Maximum shear stress direction on a fault plane constrains the slip direction of an earthquake on the fault based on Wallace-Bott hypothesis. In this study, we estimated the maximum shear stress directions on some fault planes from the stress field at hypocentral area of the 2016 Kumamoto earthquake sequence.
The 2016 Kumamoto earthquake sequence occurred at Hinagu and Futagawa fault zones in Kumamoto prefecture, central Kyushu Island, Japan. The area was high seismicity area before the sequence. The largest foreshock with Mj 6.5 (Mj: magnitude by Japan Metrological Agency) on April 14, 2016 was located in Hingau fault zone. The mainshock (Mj 7.3) occurred on April 16, 2016. Many earthquakes occurred around these faults after the mainshock and continue until now. Some fault planes are determined from the aftershock hypocenter distribution.
Maximum shear stress direction on a fault is a projection of a traction vector that is calculated from the fault geometry and the stress field. In other word, we can consider slip direction on a fault from stress tensor and fault geometry. In the hypocentral area of the 2016 Kumamoto Earthquake sequence, evaluation of strong ground motion is important to mitigate damage of further coming earthquake. Slip direction is one of the key for the evaluation. Here, we showed expected slip direction on fault plane proposed by Iwata et al. [2019] from their geometry and the stress field estimated by Mitsuoka et al. [2019] using the seismic moment tensors.Most of the expected slip direction on the assumed faults reveal either simple strike slip or normal fault types. However the maximum shear stress directions on some faults change to have large upward component at shallow depth. The result suggests complicated slip could occur on the candidate faults in a case of large earthquake faulting.

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