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GNSS 搬送波位相から直接断層すべりを推定する手法による地震すべり分布のリアルタイム推定

田中優介[1]・#太田雄策[1]・宮崎真一[2]

[1]東北大学大学院理学研究科地震・噴火予知研究観測センター

[2]京都大学理学部

We investigate the feasibility of Global Navigation Satellite System-based (GNSS-based) deformation monitoring that detects coseismic fault slip directly from GNSS carrier phases without conventional positioning analysis. This method, which we call the phase-to-slip (PTS) method, does not require high-quality orbital information because it relies only on changes in azimuthal site-to-satellite ranges. With this method, computational costs for real-time seismic monitoring can be reduced. Here we applied the PTS method to the mainshock of the 2016 Kumamoto earthquake by modifying the original algorithm and using both precise orbits by International GNSS Service (IGS) and broadcast orbits. In both cases, obtained coseismic slip distributions agree well with previous studies. Calculated surface displacements from inferred slip distributions also agree with traditional positioning analysis. These results suggests that the PTS method may be useful as a supplement to currently operated deformation monitoring system, especially when external orbit and clock information are not accessible.

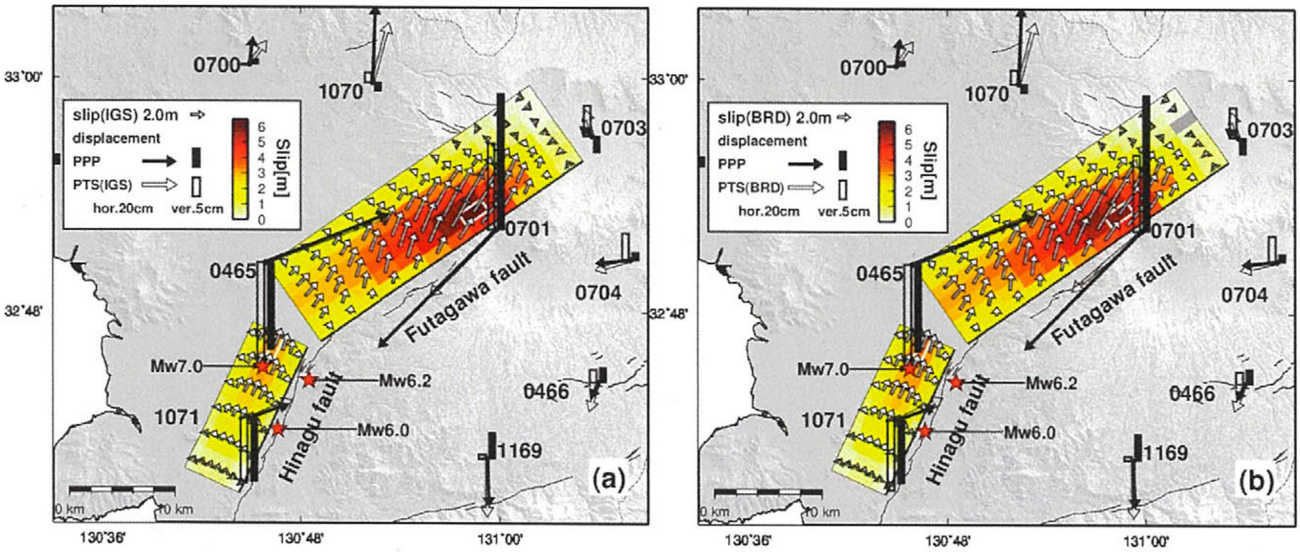

Figure. Slip distribution of the mainshock of the 2016 Kumamoto earthquake estimated by the 386phase-to-slip (PTS) method: (a) relied on International GNSS Service (IGS) orbit information, and (b) relied on broadcast (BRD) orbit information. White arrows represent the coseismic fault slip direction and norm. The slip amount (in meters) of each sub-fault is indicated by the color gradation; darker colors denote greater slip amounts. The red stars are the epicenters of the mainshock and the foreshocks. If the slip norm fell below the estimated uncertainty, the sub-fault was masked in gray. White rectangles indicate sub-faults with the largest slips among each fault.