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Room:Convention Hall

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Coseismic and postseismic slip for the 2011 Tohoku earthquake inferred from inversion of GPS data

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We used GPS data recorded by the continuous GPS network, GEONET, to estimate spatial distribution of coseismic slip and afterslip for the 2011 M=9.0 Tohoku earthquake. We analyzed the GPS data on March 11, 2011, using the GIPSY-OASIS software to estimate station coordinates every 300 seconds. This analysis allows us to separate coseismic displacements due to the mainshock from coseismic displacements due to large aftershocks and early postseismic deformation. The coseismic displacements due to the mainshock were inverted for spatial distribution of slip on the plate interface. Our result shows that the mainshock ruptured primarily the shallower part of the plate interface than asperities of historical M=7-8 earthquakes, where interseismic slip deficit rate was inferred to be low. The estimated maximum slip is 33.6 m and the moment magnitude from the estimated slip distribution is Mw=8.9.

We also analyzed GPS data after March 11 with the GIPSY-OASIS software to estimate daily station coordinates. The daily GPS time series show significant postseismic deformation. We inverted the data for distribution of afterslip on the plate interface. The inferred afterslip is mainly located in the deeper and southern parts of the coseismic rupture region. As of April 2, 2011, the estimated maximum afterslip is 0.9 m and the moment magnitude from the estimated slip distribution is Mw=8.2.