



Rupture process of the 2003 Tokachi-oki earthquake inferred from 1-Hz GPS

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The 2003 Tokachi-Oki earthquake ($M \sim 8.2$) produced static displacements of nearly a meter on the island of Hokkaido, Japan, as measured by the GPS network, GEONET, which is operated by GSI (Geographical Survey Institute). The GSI network records observations at 30-second sampling rates, but a large subset of the network also recorded at 1-Hz during the Tokachi-Oki earthquake. Thus, we are able to use GPS to measure both the static and dynamic displacements from this earthquake.

Firstly, we processed 1-Hz GPS data with kinematic GPS analysis [Larson et al., 2003] to obtain the displacement waveform. Then we inverted those waveform to infer the rupture process of the main shock using multi time window inversion method. We use the Freq-Wavenumber (FK) codes developed by Zhu and Rivera [2003] to calculate the green's function. We find the slip is not significant in the epicenter. The rupture propagated downdip, and maximum slip as large as ~ 9 m is found ~ 50 km downdip. This result is consistent with those inferred from teleseismic and strong motion inversions, demonstrating a new application of high-rate GPS as a low frequency seismometer record.