The foreshock sequence and source process of the 2002 Eastern Tottori Earthquake

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In order to understand the earthquake nucleation process, it is important to know how foreshocks occur. Dodge *et al*. (1996) pointed out that foreshock sequences are not compatible with the cascade model in which the foreshocks all occur on a single fault plane and trigger the mainshock by static stress transfer. Instead, they noted that foreshocks seem to concentrate near structural discontinuities in the fault and may be a product of an aseismic nucleation process. In this study, we investigated the foreshock sequence of the 2002 Mj 5.5 Eastern Tottori Earthquake. This event was about 40 km west of the 2000 Mj 7.3 Western Tottori Earthquake and the focal mechanism was a strike-slip fault with a nearly horizontal P axis striking NW-SE. The mainshock was preceded by about 30 foreshocks with similar waveforms and the largest foreshock occurred 11 days before the mainshock. We estimated relative locations of the mainshock, similar foreshocks and aftershsocks with cross correlation analysis and HYPO71 (Lee and Valdes, 1985). We found that foreshocks were concentrated 0.5 km SSW and 1.5 km shallower from the mainshock. The aftershock distribution suggested that the fault plane of the mainshock was along N105W, but the foreshocks' row was aligned in the direction of N125W. This suggests that the foreshocks might not be related to aseismic nucleation process. Next we estimated the relative source time functions (RSTFs) of the mainshock with an empirical Green's function (EGF) method and projected Landweber deconvolution (Bertero *et al*, 1997). The largest foreshock (Mj 2.5) was chosen as an EGF and we found two clear peaks in the RSTF's of stations west of the mainshock. This suggests that the mainshock rupture might to propagate to the west.