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RUPTURE MODELS OF MICRO-EARTHQUAKES IN WEST BOHEMIA FROM DIRECTIVITY OF P AND S WAVES

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We study directivity of P and S waves of six micro-earthquakes with magnitudes 2.7-3.7 that occurred during the 2008 West Bohemia earthquake swarm (Fischer et al., 2010; Vavryčuk et al., 2013). The micro-earthquakes were recorded at 22 three-component local seismic stations of the WEBNET network in the frequency range of 0.6-60 Hz with sampling frequency of 250 Hz. We measure durations of first P- and S-wave pulses at the stations, project them on the focal sphere and construct the so-called directivity maps. The observed maps are compared with synthetic maps of theoretically computed apparent rupture time produced by finite-source models. We employ three source models: the linear unilateral model, the linear symmetrical bilateral model and the circular fault model (Chung and Kanamori, 1980). We show that the observations are consistent mostly with the unilateral or bilateral rupture models; no P-wave directivity map and only one of six S-wave directivity maps matches the pattern of the circular rupture model. Finally the results obtained from the analysis of the P- and S-wave directivity are checked by the source-scanning algorithm (Kao and Shan, 2004).

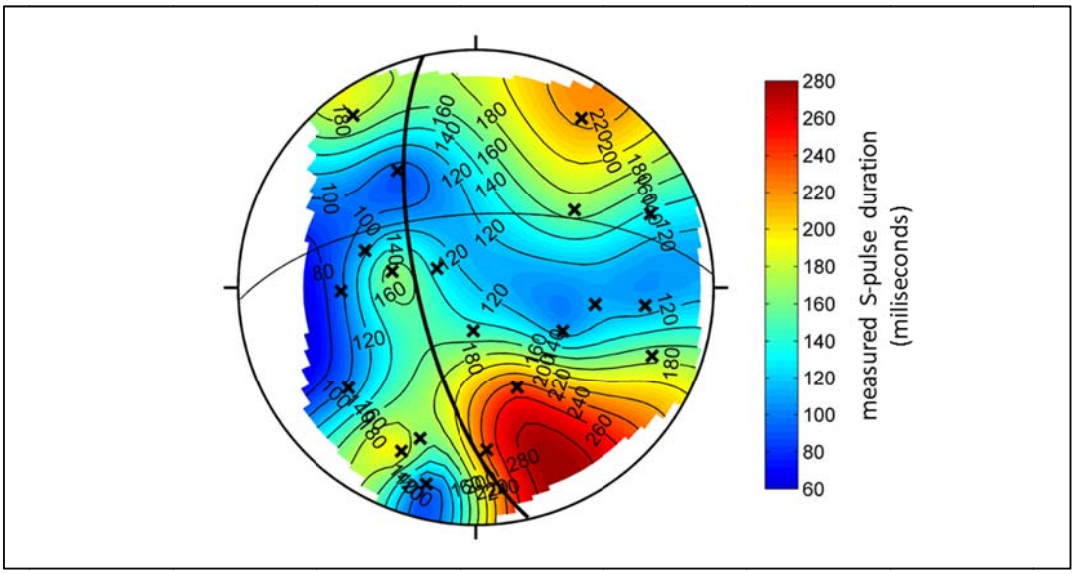

Figure 1. S-wave directivity map for event X1466A (M_L = 3.6). Measured S-pulse durations at individual stations are indicated by black crosses. The fault plane is represented by the thick nodal line. Lower hemisphere equal-area projection is used.

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