



Aftershock activity at the easternmost part of the Mw7.4 1999 Izmit rupture and implications for the Mw7.1 Düzce event

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The 1999 Aug17 Mw7.4 Izmit, Turkey, earthquake ruptured a 140 km long segment of the North Anatolian Fault and was followed by a second major earthquake near Düzce that extended the rupture by 60 km towards the East only three months later (1999 Nov12, Mw7.1). These two events were the last of a series of $M > 7$ earthquakes that systematically propagated westwards starting near Erzincan (Eastern Anatolia) in 1939. In this study we analyse the spatiotemporal distribution and focal mechanisms of Izmit aftershocks focussing on the Karadere segment that represents the easternmost part of the rupture. There, high activity was observed that is bounded to the East by a sharp and steeply dipping line. It was exactly on this easternmost termination of the aftershock activity where the Düzce mainshock occurred after 87 days at a depth of 13 km. Furthermore, this area hosts four $M > 4$ aftershocks that all occurred within the first hours following the Izmit mainshock. These four events all reflect a similar faulting mechanism that is almost identical to that of the Düzce mainshock. We analyse variations of the local stress field orientation in this area and find systematic rotations with respect to the regional long-term stress field. Furthermore, we discuss the role of Izmit aftershocks along the Karadere segment as precursor phenomena of the Düzce event.