Synchronization of Small Scale Seismic Clusters Reveal Large Scale Plate Deformation

Hayrullah Karabulut[1], Michel Bouchon[2], Jean Schmittbuhl[3]

Supplementary Information

Magnitude Completness

The magnitude completeness is computed as 2.9 based on the completeness analysis through time (Fig. S1). Figure S1 shows the normalized cumulative number of earthquakes vs magnitude for the clusters displayed in Figure 1. We used 0.1 bin size and %25 overlapping windows. Completeness is changing through time and the lowest is between 2011 and 2017 when the seismic network was significantly improved.
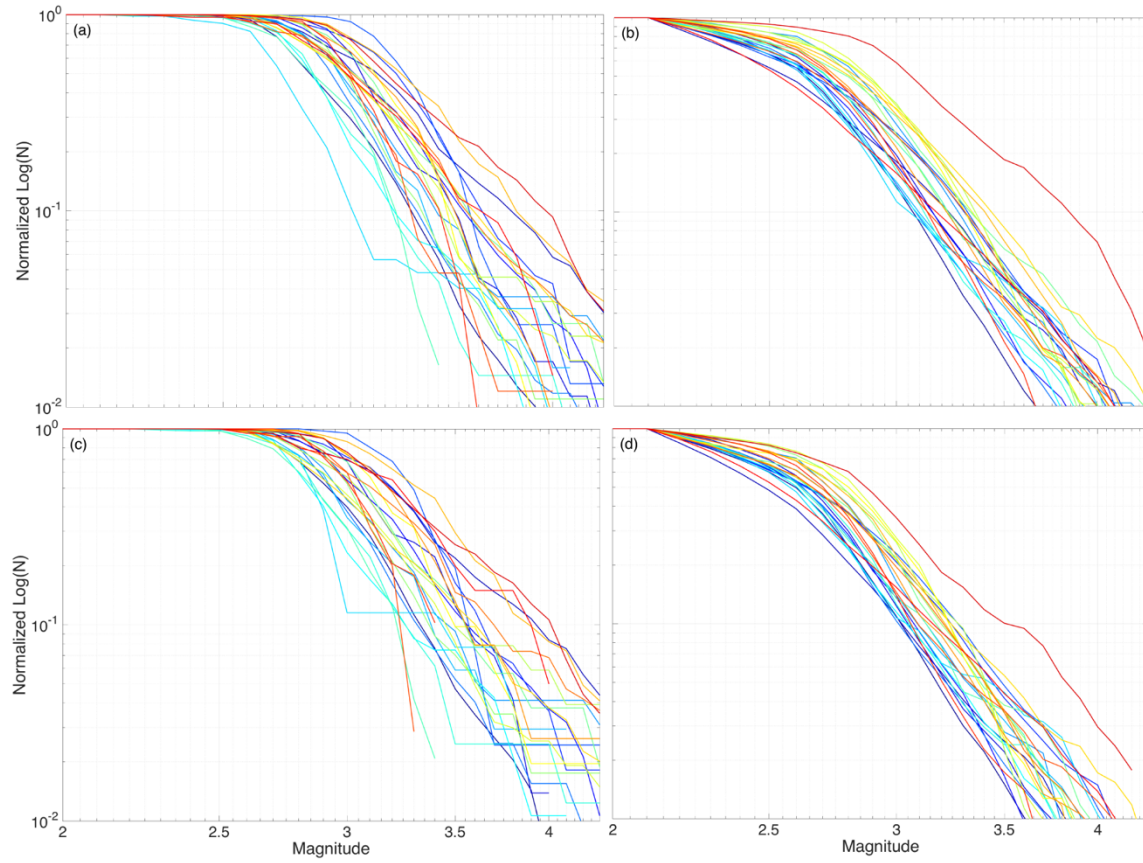
Figure S1 : Normalized cumulative distributions of the magnitude of earthquakes for each cluster using the same color coding as in Fig.2. Magnitude completeness of the clusters for 4 different time windows a) 2003 – 2008 (Mc=2.9) b) 2003 – 2017 (Mc=2.7) c) 2004 – 2006 (Mc=2.9) d) 2007-2017 (Mc=2.7) .

Cumulative Seismicity

The cumulative number of earthquakes with magnitutes greater than 2.9 is computed in each cluster displayed in Figure 1. The traces are interpolated in time using nearest neighboors in order to have a uniform sampling. We present in Figure S2a the cumulative seismicity for the period from 1998 to 2017 as the completeness was significantly higher before 1998 (>3.2) (Figure S2). The influence of 1999 Izmit and Duzce earthquakes (coseismic and postseismic) has been dominant on the clusters close to the Marmara region and lasted for several years. To analyze the interactions between seismic clusters over the whole Anatolian plate, we used the time period from August 2003 (4 years after Izmit earthquake) to 2017, when activity is spread over all clusters.
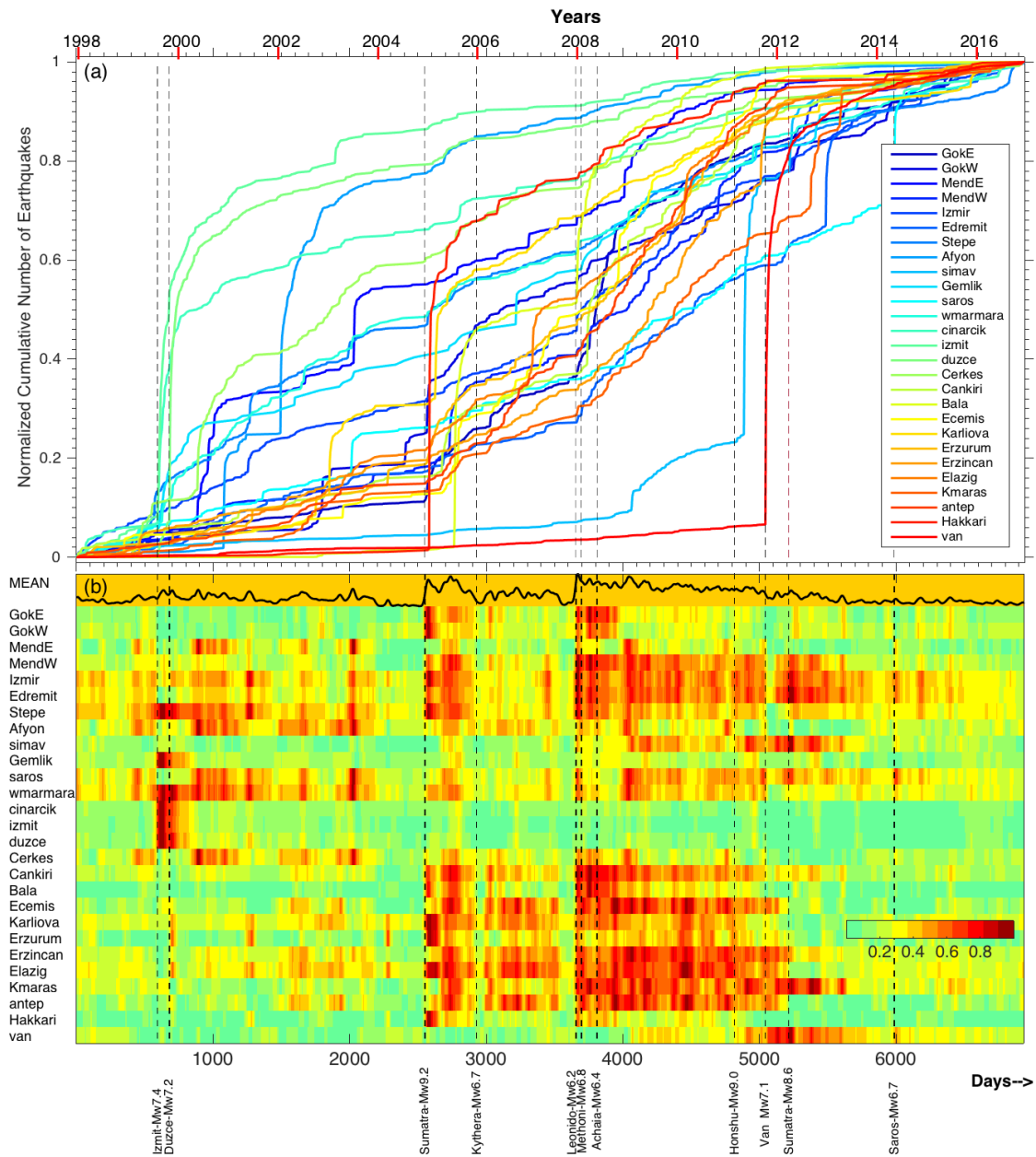
.

Figure S2: a) Evolution of cumulative number of events in the seismic clusters shown in Figure 1. Time is measured from 1998 and each curve is normalized to its final value. b) The occurrence times of giant earthquakes worldwide and of large regional earthquakes are shown. The colorscale is shown on the lower right corner.