



19 May 2011 Simav Earthquake Sequence : Western Turkey

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ABSTRACT In Western Anatolia as a result of the current tectonic regime normal faults occurred and they are good examples of extensional tectonic regime. The earthquake which occurred on the 19 May 2011 at local time 23:00 (M_L=5.9) in NE of Simav caused destructive damage in this town. After the earthquake for a 1 month period only 1250 earthquakes are located and thousands of micro earthquakes occurred in the region. As they are examined seismotectonically Simav earthquake has shallow epicenter which is characterized by dip slip fault. The dominant direction of the fault plane is W-NW/E-SE, which is characterized with S-SW downthrown normal fault. The depth of the earthquakes show that the seismogenic zone is changed 5-10 km. The aftershocks recorded between 19 May-20 June 2011 dates occurred on the SW block of the W-NW/E-SE aligned fault. The 19 focal mechanism solutions show the system is in an extensional regime. The solutions from the fault parameters of these 19 earthquakes show that T_{max} axis is on N-S dominant direction and P_{max} axis is on E-W direction. In the region the M=5.0 earthquake occurred on the 17 February 2009 have almost the same properties however from the aftershock distribution it is seen that it has a character of the north dipping normal fault character. The magnitude completeness of the current network in the region is M_c=2.7, the b-value which shows the seismic activity is b=1.57. The high b value shows that the stress release is fast. b-value shows that the seismic activity is high, the stress is releasing continuously. In other words, the region is subject to frequent earthquakes and the energy of the earthquakes are frequently released. There are many fault segments defined by many researchers and in general all these active fault segments are evaluated within Simav Fault Zone (SFZ). Mainly the whole part of Simav is graben which is surrounded by active faults. In the north there are listric normal faults parallel to each other which are aligned on E-W direction and fault segments in different directions were triggered by earthquake sequences and this caused higher earthquake activity than normal. As result of the 19 May Simav earthquake the dynamic strain and the dense earthquake activity as a result of it is good example of the faulting trigger mechanism system. This affected the aftershock process and caused the occurrence of the earthquakes for a long time. Simav earthquake shows that the N-S extensional regime in the Western Anatolia is recently active and is a good example of the evolution of the graben system.

Key Words : extensional tectonic, T_{max}., Simav Fault Zone