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Reconstructing the paleoseismic history of the Priene-Sazli Fault using ^{36}Cl cosmogenic nuclide dating method, Western Anatolia, Turkey

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The 300-km wide West Anatolian Extensional Province is one of the regions of intense seismic activity in the world within the Alpine-Himalayan belt. Deformation pattern in the area is controlled by three major E-W trending graben systems of Gediz, Küçük Menderes and Büyük Menderes which have been formed as a result of roughly N-S extensional tectonic regime since the early Miocene. These graben systems show evidences of surface faulting during the Pleistocene-Holocene and are geomorphologically characterized by well-exposed limestone normal fault scarps with a relief of tens of meters and well-preserved slickenlines.
Since limestones are resistant to weathering, the limestone scarps can efficiently record several past earthquakes. Cosmogenic ^{36}Cl is the only element to identify and date the rupture events. Each rupture causes exposure of previously buried section of the scarp to the surface. Accordingly, due to being well enough exposed to cosmic rays, accumulation of ^{36}Cl accelerates during period of quiescence. Thus, distribution of measured ^{36}Cl concentrations can be applied to investigate periods of seismic activity and inactivity and also to calculate the vertical displacement along the fault plane in association with each rupture.
In this study, we focus on the Priene-Sazlı Fault, located on the most western part of Büyük Menderes graben. Along the active fault zone, well exposed archaeological sites (e.g. Priene) have been discovered, where destructive historical earthquakes have left evidence of ancient damages in the historical period and during the 20th century. The Priene-Sazlı Fault caused the July 16, 1955 Söke-Balat earthquake (M=6.8) with fault-plane solution indicating of normal southeast downthrow along with subsidiary dextral motion. We collected 117 samples from four continuous strips on the Priene-Sazlı Fault to measure ^{36}Cl concentrations. We used a new Matlab code to identify the significant ruptures and their timing. Our preliminary results reveal the evidence of enhanced seismic activities along the Priene-Sazlı Fault during the early Holocene.