2008 Fall Meeting
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HR: 0800h
AN: **T21B-1942**
TI: Defining Additional Stratigraphy in Paleosismic Trenches by 2D Logging of Magnetic Susceptibility. A Paleoseismic Investigation Near Lake Ladik, North Anatolian Fault, Turkey.
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AB: The North Anatolian Fault (NAF) is a dextral strike-slip plate-boundary fault zone extending ~1400 km in an arc across northern Turkey. We opened a paleoseismic trench ~2.7 km NW of Destek village on a segment which ruptured (for ~280 km) in the 1943 Ladik Earthquake (Mw:7.7). Sediments exposed in the trench yielded information on the timing of at least 6 paleoearthquake events during the last 3000 years in addition to evidence of the 1943 event. The trench was excavated across an uphill-facing fault scarp caused by an overturned thrust fault splay of the NAF near a localized restraining bend. The uphill-facing scarp trapped sediment derived from a small (~2 ha), non-channelized catchment with erosion in the steeper upper half and deposition in the lower half. Conventional descriptive trench logging of the, southern, up-thrown side of the fault identified weathered rock of various lithologies, grading upwards to residual soil exclusively on the west trench wall, and capped by topsoil on both walls. On the down-thrown, northern side of the fault, we logged a sequence of colluviums and poorly defined paleosols. Conventional trench logs alone do not negate the

possibility that the stratigraphy observed north of the fault formed due to climate cycles or anthropogenic processes, rather than earthquakes. Magnetic susceptibility (MS) measurements provide a link between the sediment trap strata and fault rupture. Two-dimensional logging of magnetic susceptibility, using a MS2E Bartington point sensor, was undertaken on the west wall of the trench. The residual soil on the up-thrown side of the fault displayed low MS values overlying rock with relatively high MS values which we interpret as the result of leaching by supergene processes. Wedges of low MS values were identified on the down-thrown side of the fault in a soil of otherwise intermediate MS values representing colluviums sourced from the catchment. The low MS wedges are interpreted to be colluviums derived from the residual soil on the up-thrown block due to collapse of the fault scarp following fault rupture. The presence of the low MS wedges helps to define a sequence genesis model whereby paleosols are buried following earthquakes. Without the magnetic susceptibility data the link between the cyclic sedimentation pattern and earthquake cycles would be tenuous, relying solely on correlation with known earthquakes.

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MN: 2008 Fall Meeting

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