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A Marie Curie Excellence Team Project at The Royal Observatory of Belgium: Understanding the irregularity of seismic cycles: A case study in Turkey.

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Why do large earthquakes not always occur at regular time interval on a given fault? The observed aperiodic seismic behavior may have different causes, including intrinsic properties of faults, seismic or postseismic interactions between faults, or variations in strain accumulation. To get deeper insights in the mechanisms at work, we propose to establish the seismic history over several thousand of years of a main strike-slip fault system in Turkey. The targeted North Anatolian plate-boundary is particularly suitable because of the type of faulting, its rapid deformation rate (up to 24 mm/yr), its relative structural simplicity and its particularly simple seismic behavior characterized by cascading sequences of M>7 earthquakes. Another remarkable feature is the seeming correlation between the seismicity of the North Anatolian Fault and of adjacent strike-slip plate-boundaries (the East Anatolian Fault and the Dead Sea Fault). This transfer in seismic activity needs to be confirmed and would have broad implications regarding continental-scale seismic coupling.

The Marie Curie Excellence Grant " Seismic Cycles" thus seeks to obtain an extensive chronology of past events along part of the North and the East Anatolian Faults. For that purpose, we use a two complementary techniques involving trenching across the fault and drilling of lake sediments along the fault trace. We have selected 4 main sites along the North Anatolian Fault, east of Istanbul, and one along the East Anatolian Fault (Hazar lake). In each site we will study in parallel the record of earthquakes contained in paleoseismologic trenches and in lake sediments. Up to now we have taken short 1 m long gravity cores in each target lake in order to determine the lacustrine response to the last historical earthquake sequence. We have open one successful paleoseismological trench. An ancillary goal of the project is study the paleoclimatic record of the lake sediments.