



Influence of large-scale water level fluctuations on stability and earthquake recurrence interval at the Dead Sea fault

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Tectonic motion is addressed as a primary cause of the earthquakes. Can water level fluctuations of order of hundred meters affect local fault systems in a way that modify the behavior of the seismic cycle? Our novel analytical and numerical modelling can explain variability in the paleo-seismic rates of large earthquakes at strike-slip faults, by large-scale water level fluctuations at basins overlying the faults. We demonstrate that water level increase can significantly affect fault stability, generate the immediate and delayed seismic responses, and accelerate seismic events. Fault stability and the decrease in seismic recurrence interval due to the large-scale water level fluctuations, predicted by our study, are significantly affected by interplay between hydro-mechanical properties of the rocks composing the fault. Considering the water level fluctuation of pre-historic lakes at the Dead Sea basin, our simulations show a promising agreement with paleo-seismic rates identified in the field at the Dead Sea fault. The effect of the large-scale water level fluctuations is especially important at the Dead Sea fault, considering its relatively slow tectonic velocity.