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CALCULATING FAULT DISPLACEMENT RATES, IN-SITU COSMOGENIC CHLORINE-36 CONCENTRATIONS OF A LIMESTONE NORMAL FAULT SCARP, NORTHERN ISRAEL

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To calculate the rates of the most recent displacements of a fault near Karmiel, northern Israel, we measured in-situ cosmogenic ^{36}Cl in rock samples extracted from the well preserved fault scarp surface. These isotope concentrations, considered in the context of an interpretive numerical model, indicate both the long-term exposure rate of the limestone due to normal fault displacement and the date that fault motion ended.

We sampled the 1 km long, NW-SE trending Nahef East fault scarp. The samples were collected along a ~10 m down-dip scarp transect. The planar fault surface dips 55° , resulting in a total vertical displacement of ~7 m. Sampling included: 1 sample from the upper fault block surface, 26 samples at consistent 30 cm down-dip intervals from the lower 9.6 meters, 2 replicate samples one meter laterally from the main sample profile, and 3 samples from the fault surface below the current base of the scarp. In addition, we have created a detailed map of the scarp topography and surveyed a series of thirty 50 to 200 m-long topographic cross sections oriented perpendicular to the scarp surface.

Initial ^{36}Cl concentration estimates from 8 samples range from 6×10^4 atoms $^{36}\text{Cl} \text{ gm}^{-1}$ of limestone at the base of the scarp to 5×10^5 atoms $^{36}\text{Cl} \text{ gm}^{-1}$ of limestone at the top of scarp. These data, when interpreted with our model, indicate that the long-term displacement rate was approximately 0.07 cm yr^{-1} , and that the last fault motion was between 7-5.5 Ka. This is probably the first indication for Holocene faulting activity outside the Dead Sea Transform in northern Israel.

cosmogenic, chlorine-36, fault-scarp, Israel, Quaternary

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