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GPS evidence for northward motion of the Sinai block: Implications for E. Mediterranean tectonics

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GPS survey sites in the Sinai Peninsula show northerly motion relative to Nubia at 1.5 $\pm$ 1 mm/yr north and -0.8 $\pm$ 1 mm/yr west**.** Continuous IGS GPS sites in Israel, west of the Dead Sea fault show a similar northerly sense of motion relative to Africa (2.7 $\pm$ 1mm/yr north and –0.9 $\pm$ 1 mm/yr west), suggesting that the entire Sinai Block south of Lebanon is characterized by northward translation relative to Nubia. We develop an elastic block model constrained by the GPS results that is consistent with the regional tectonics and allows us to estimate slip rates for Sinai bounding faults, including the Gulf of Aqaba – southern Dead Sea fault system (5.1 $\pm$ 0.7 mm/yr, left lateral), the Gulf of Suez (3.0 $\pm$ 0.5 mm/yr left lateral), and the Cyprus Arc (predominantly convergence at $\sim$13 $\pm$ 1 mm/yr along the western segment, and $\sim$ 7 $\pm$ 1 mm/yr left-lateral, strike-slip along the eastern segment). Present-day opening of the Gulf of Suez is less than 1 mm/yr. These observations imply that the Sinai Peninsula and Levant region comprise a separate sub-plate sandwiched between the Arabian and Nubian plates.