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Long-term slip rate of the southern San Andreas Fault, from 10Be-26Al surface exposure dating of an offset alluvial fan

Jérôme van der Woerd(1,2), Yann Klinger(3,4), Kerry Sieh(3), Paul Tapponnier(4), Frederick J. Ryerson(1), Anne-Sophie Mériaux(1,3,5)

(1) IGPP-LLNL, L202, 7000 East Avenue, CA94550 Livermore, USA (2) EOST-IPGS, 5 Rue R. Descartes, 67000 Strasbourg, France, jeromev@eost.u-strasbg.fr (3) Division of Geological and Planetary Sciences 100-23, Caltech, Pasadena, CA 91125, USA(4) Laboratoire de Tectonique, IPG Paris, 4 place Jussieu, 75252 Paris Cedex 05, 75252, France (5) School of Geosciences, Institute of Geography, Drummond Street, EH8 9XP, Edinburgh, UK

We determine the long-term slip rate of the southern San Andreas Fault in the south-eastern Indio Hills using 10Be and 26Al isotopes to date an offset alluvial fan surface. Field mapping complemented with topographic data, air photos and satellite images allow to precisely determine piercing points across the fault zone that are used to measure an offset of 565 $\pm$ 80 m. A total of twenty-six quartz-rich cobbles from three different fan surfaces were collected and dated. The tight cluster of nuclide concentrations from 19 samples out of 20 from the offset fan surface implies a simple exposure history, negligible prior exposure and erosion, and yield an age of 35.5 $\pm$ 2.5 ka. The long-term slip rate of the San Andreas Fault south of Biskra Palms is thus 15.9 $\pm$ 3.4 mm/yr. This rate is about 10 mm/yr slower than geological (0-14 ka) and short-term geodetic estimates for this part of the San Andreas Fault implying changes in slip rate or in faulting behavior. This result puts new constraints on the slip rate of the San Jacinto and on the Eastern California Shear Zone for the last 35 ka. Our study shows that more sites along the major faults of southern California need to be targeted to better constrain the slip-rates over different time scales.