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High resolution 3D laser scanner measurements of a strike-slip fault

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The surface roughness of a recently exhumed strike-slip fault plane has been measured by three independent 3D portable laser scanners. Digital elevation models of several fault surface areas, from 1 m² to 600 m², have been measured at a resolution ranging from 5 mm to 80 mm. Out of plane height fluctuations are described by non-Gaussian distribution with exponential long range tails. Statistical scaling analyses show that the striated fault surface exhibits self-affine scaling invariance with a small but significant directional morphological anisotropy that can be described by two scaling roughness exponents, $H_1 = 0.7$ in the direction of slip and $H_2 = 0.8$ perpendicular to the direction of slip. Comparisons with roughness measurements at laboratory scales are studied.