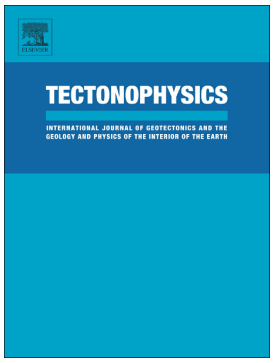

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Evaluating roughness scaling properties of natural active fault surfaces by means of multi-view photogrammetry

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Abstract

Fault roughness is a measure of the dimensions and distribution of fault asperities, which can act as stress concentrators affecting fault frictional behaviour and the dynamics of rupture propagation. Studies aimed at describing fault roughness require the acquisition of extremely detailed and accurate datasets of fault surface topography. Fault surface data have been acquired by methods such as LiDAR, laser profilometers and white light interferometers, each covering different length scales and with only LiDAR available in the field. Here we explore the potential use of multi-view photogrammetric methods in fault roughness studies, which are presently underexplored and offer the advantage of detailed data acquisition directly in the field. We applied the photogrammetric method to reproduce fault topography, by using seven dm-sized fault rock samples photographed in the lab, three fault surfaces photographed in the field, and one control object used to estimate the model error. We studied these topographies estimating their roughness scaling coefficients through a Fourier power spectrum method. Our results show scaling coefficients of 0.84±0.17 along the slip direction