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1 Dynamics of an interfacial crack propagation: analyses of quake catalogs

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To study the dynamics of an interfacial crack propagation, we developed a laboratory experiment which implies a mode I fracturation between two annealed Plexiglas plates. The two annealed surfaces were sand-blasted, thus making the roughness on the interface fluctuate spatially. The propagating rupture front can be followed optically with a fast camera thanks to the transparency of the PMMA plates. Image processing of crack pictures aims at extracting the shape of the crack front which is irregular because of the pinning by local zones of high toughness during its propagation. Local high velocity zones, or bursts are considered as quakes. Hypocenter, time of occurence and rupture area of each quake are collected in a quake catalog that is examined in the same manner as done for natural seismicity catalogs. We focused on the analyses of spatial and temporal distributions of the events. Basic statistical features such as a Gutenberg-Richter relationship and more complex analyses like record breaking processes are investigated (Bak *et al.*, PRL, 2002; Corral, PRL, 2004; Davidsen *et al.*, GRL, 2006). The scaling laws established for our experimental quake catalogs are reproducible and independent of the experiment and parameters used to define the events, thus proving their robustness. Moreover they are similar to those observed for large scale, real seismicity data, suggesting a tight link between this laboratory model

and natural events, possibly due to the role of heterogeneities in the rupture plane.