Accepted Manuscript

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PII: S0191-8141(18)30100-7

DOI: 10.1016/j.jsg.2018.02.007

Reference: SG 3601

To appear in: Journal of Structural Geology

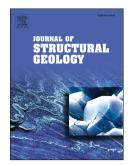
Received Date: 7 June 2017

Revised Date: 5 February 2018

Accepted Date: 20 February 2018

Please cite this article as: Francesco, F., Donato Stefano, G., Fabrizio, A., Giacomo, P., Space-time evolution of cataclasis in carbonate fault zones, *Journal of Structural Geology* (2018), doi: 10.1016/j.jsg.2018.02.007.

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ACCEPTED MANUSCRIPT

Space-time evolution of cataclasis in carbonate fault zones

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10 Keywords: limestones, dolostones, fault rock, central Apennines, southern Apennines.

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12 Abstract

The present contribution focuses on the micro-mechanisms associated to cataclasis of both calcite-13 and dolomite-rich fault rocks. This work combines field and laboratory data of carbonate fault cores 14 currently exposed in central and southern Italy. By first deciphering the main fault rock textures, 15 their spatial distribution, crosscutting relationships and multi-scale dimensional properties, the 16 17 relative timing of Intragranular Extensional Fracturing (IEF), chipping, and localized shear is inferred. IEF was predominant within already fractured carbonates, forming coarse and angular rock 18 19 fragments, and likely lasted for a longer period within the dolomitic fault rocks. Chipping occurred 20 in both lithologies, and was activated by grain rolling forming minute, sub-rounded survivor grains embedded in a powder-like carbonate matrix. The largest fault zones, which crosscut either 21 22 limestones or dolostones, were subjected to localized shear and, eventually, to flash temperature 23 increase which caused thermal decomposition of calcite within narrow (cm-thick) slip zones. Results are organized in a synoptic panel including the main dimensional properties of survivor 24 grains. Finally, a conceptual model of the time-dependant evolution of cataclastic deformation in 25 carbonate rocks is proposed. 26

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