



## **Ephemeral cataclastic fabrics in loose carbonate fault breccia and the reliability of laser diffraction particle size distribution data**

Fabrizio Storti and Fabrizio Balsamo

Università Roma Tre, Dipartimento di Scienze Geologiche, Roma, Italy (storti@uniroma3.it, 0039 0657338201)

Cataclastic rocks exert a primary control on the frictional strength, stability, seismic velocity, and permeability properties of fault zones. Particle size distributions are central to these studies and have been widely used to investigate on the evolution of cataclasis. Despite the large amount of available data, interpretation of particle size distributions from poorly cohesive cataclastic rocks is still controversial, particularly because results from microscopic and sieve analyses, and from laser diffraction granulometry have been used to support either fractal or non fractal behaviours, respectively. Given the fundamental importance of grain fragmentation on fault friction and hydrology, further studies are necessary to better understand the main reasons governing the difference between results obtained from microscopic and sieve analyses, and from laser diffraction granulometry, respectively. We performed specific tests on poorly coherent carbonate platform cataclastic rocks from a fault zone in the Central Apennines, Italy, by combining laser diffraction granulometry, thin section analysis, and optical morphometry. During laser diffraction granulometry tests, we used several wet and dry operating procedures that included different pump speeds, analyses with and without sample ultrasonication, and different dispersant liquids. The variability of particle size distributions from a given sample, as a function of the adopted operating procedure, has the same magnitude of that theoretically predicted in natural cataclastic rocks, from low- to high-deformation shear zones. Thin section image analysis and optical morphometry support mechanical disintegration of internally microfractured coarser particles in ephemeral cataclastic fabrics as the major cause of such a size variability.