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Coupled fragmentation and silicification processes in fault zones.

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We explore some possible interactions of mechanical and chemical processes which may have led to the patterns of fragmentation and quartz precipitation observed at the Fountain Range Fault at Fountain Springs. Seybold et al. (this session) describe features which indicate a multiphase fragmentation and quartz precipitation history of the Fountain Range Fault (Mt Isa Inlier, Australia). They infer that intense fragmentation, together with fluid infiltration and quartz crystallization in pore space, led to fine-grained cataclastic and silicified masses, followed by numerous events of quartz-vein formation and, again, cataclasis probably leading to flow of particle-fluid suspensions. They proposed the macro- and microstructures to reflect the interaction of repeated processes of fragmentation, fluid flux, quartz precipitation and cataclastic flow during the long-lasting history of the fault zone. We compare and contrast the patterns arising from the modelled interactions with the observed patterns in a quantitative manner through the application of wavelets. There are all sorts of wavelets, each useful for different patterns. The point is that all of them are localised wave packets of some kind the wavelet is scanned across the image with different magnifications and we look to see how closely the wavelet matches the image at a particular scale. It is a “fabric microscope” that enables one to zoom into the details of any deformation fabric and extract information on the ways in which the geometry of every part of the fabric scales with size. This enables a scalogram to be constructed and from that the singularity spectrum with its many measures of features of the geometry. The wavelet analysis enables us to compare in a quantitative manner the results of numerical modeling based on a coupled damage quartz precipitation model with field observations.