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Evidence of pressure solution processes in the SAFOD 2 samples

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Sedimentary rocks sampled at between 3990.34 and 3993,05 m depth in the San Andreas Fault Observatory at Depth (SAFOD 2 phase) show wide evidence of deformation microstructures: veins, stylolites, compaction bands. Chemical maps of elements distribution have been performed at different scales on core samples from dm-cm (Eagle© X-ray fluorescence) to mm-100μm (SEM) and 100-10μm maps (microprobe) in order to reveal stress-driven mass transfer processes. Chemical maps obtained using X-ray fluorescence show for example, the depletion in calcium as soluble element along well-defined bands and the passive concentration of silicium as insoluble element. Depletion of soluble species in compaction bands, with evidence of grain comminution, is confirmed at smaller scale by SEM analysis. However, some compaction bands do not seem to show the passive concentration of insoluble species. This may be indicative of early mechanical (seismic?) compaction. In parallel, cathodoluminescence studies reveal successive sequences of mineral growth in sealed veins indicative of transitory fluid transfer. All these structures attest of fault related physico-chemical deformation processes at least partially accommodated by pressure solution and sealing processes close to the SAF.