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Clusters of Cataclastic Deformation Bands in porous sandstones

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ABSTRACT

Clusters of cataclastic deformation bands represent potential barriers or baffles to reservoir fluid flow, and their processes of formation remain debated. In this work, we rely on an integrated field study at seven sites to describe the extent of clusters, their morphology and their density of deformation as a function of several parameters: the tectonic loading, the burial depth of deformation, the Andersonian stress regime and the lithology of the sandstone. We perform porosity, sorting and grain shape analyses of the deformed material to improve the understanding of microscopic process of cluster development. In agreement with previous works on cataclastic deformation bands, our results reveal that the tectonic loading constrains the extent and the morphology of the clusters. Extensional tectonics favors the formation in normal-fault Andersonian regime of series of hundreds of meter long, rather thin and dense clusters, forming kilometer long networks associated to faults. We find that the formation of major slip-surfaces