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# Fault-related Fe-oxide concretions and Liesegang bands in sandstones: insights into advective versus diffusive fluid flow in deforming porous media

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In this contribution we describe the occurrence and geometry of different types of iron oxide deposits in conjunction with the structural architecture and petrophysical-mineralogical properties of segmented strike-slip fault zone developed in poorly lithified, quartz-dominated, heterolithic sandy sediments in the Paraíba Basin, NE Brazil. Development of highly-permeable damage zones surrounding low-permeable mixed zones and fault cores promotes physical mixing of advective Fe2+-rich waters and oxygenated groundwater, favoring iron oxide precipitation as m-scale sand impregnations, cm- to dm-scale concretions, and well cemented dm- to m-thick mineral masses. The formation of hydraulically isolated compartments along segmented strike-slip fault system promotes (i) development of Liesegang bands by pore-water molecular diffusion of $O_2$ into Fe2+-rich stagnant water in a m-thick reaction zone, and (ii) precipitation of iron oxide impregnations and concretions in the fault core-mixed zone boundaries. This study support the role of fault zone architecture and geometry in determining the dominant mode of solutions interaction in porous media, thus leading to the formation of either Fe-Liesegang bands and Fe-concretions in diffusion-dominated and diffusion + advection systems, respectively.