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The permeaiblity of fault-zones:the role of stylolites as incipit of dissolution

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Fault zones and fractures play an important role in fluid circulation and then in dissolution, acting as barriers or conductors depending on the distribution of other features associated with them and on the specific conditions (lithological and structural, as well). The fault zone have a high permeability only in the early stages of the movement but shortly after recrystallization and reprecipitation processes greatly reduce the permeability within them. Indeed the dissolution is a complex phenomenon which involves both several factors that lead to the formation of caves and karst systems often complex. Traditionally, in the field of karst , the dissolution is associated with extensional structures such as faults and joints believing that they are more favorable to the water circulation. In this context compressional tectonic structures, as like the stylolites, are never considered. In fact the stylolites play an important role in the fluid circulation (Rawling, 2001) and in particular in the incipit of dissolution and then of the karst.
We have so focused our research on the study of permeability of four fault zones in a karst area of Alte Murge (South Italy). Through a detailed structural analysis in the field and using the method of Caine (Caine, 1996), we reconstructed the permeability of the four previous fault zones. Our attention was focused on faults, joints and on stylolites.
Contrary to the literature the dissolution and therefore the karst was mainly found along the stylolites and only secondarily along faults. No sign of dissolution was found along the joints. In the context of karst studies, the stylolites, which are structures due to pressure solution has never been taken into account, thinking that in compressional structures is not possible any circulation of water and that therefore there is no fluid-rock interaction. No consideration has been given to the enormous role that the pressure and the microfluidic that are created have in this context. The styololites, the focus of our research open important questions about their exact role as incipit of the dissolution. Through petrophysical analysis and microstructural we are characterizing the porosity and permeability near the stylolites.
Recently, fluid-rock interactions and their impact on carbonate rocks is becoming very important because of an increasing interest it the carbonate reservoirs as a consequence of a progressive deterioration of the quantity and quality of the groundwater due to increasing pollution phenomena. In fact the aquifers represent about 40% of the drinking water resources and their importance will increase in coming years.

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