

Post-Variscan Hot Dolomites in Europe: A “Crustal scale Hydrothermal Palaeofield”?

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Post-Variscan hydrothermal dolomites are well known from several regions of Europe (Spain, Italy, Belgium, Germany, Ireland, Czech Republic etc.). Dolomitization affected large areas of Palaeozoic (Cambrian to Carboniferous) carbonates, mostly situated in the external zones of the Variscan orogen. Dolomite/limestone contacts are sharp, irregular in shape, and cut both sedimentary structures and Variscan schistosity. The dolomites are typically sucrosic, and often form banded fabrics similar to “zebra structures”, but also contains rounded, partly irregular vugs. The dolomites share many characteristics, like mineralogy and geochemistry, pervasive replacement patterns, IF with high salinity and temperature, progressive depletion in $\delta^{18}\text{O}$ from their source limestones and radiogenic Sr values.

To reconstruct the dolomitization processes, the following factors are required: (1) a proper tectonic setting for the fluids, creating an effective net of conduits for the dolomitizing fluids to be put into motion, (2) a conspicuous source of Mg creating Mg-rich brines, as shown by the often high Mg content of the dolomite phases, (3) a heat source, as indicated by the high trapping temperatures. These conditions can be assumed for the time of post-Variscan orogenic collapse. Pathways for the fluids were probably created due to this major extensional phase, related with increased heat flow. A gravity driven flow of brines was promoted, which circulated deeply down, underwent heating, were depleted in $\delta^{18}\text{O}$, started to rise and on their way dolomitized more permeable carbonate rocks of the overlying successions, especially those close to major faults.