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Introducing dolomite seams: hybrid compaction-dissolution bands in dolomitic limestones

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Anastomosing dolomite seams occur at different stratigraphic levels of a clay-poor Mesozoic carbonate platform succession of the Apennines. Millimeter-thick seams, roughly parallel to bedding, are composed of a high concentration of dolomite crystals compared to the hosting dolomitic limestone micrite. Rare calcite veins emanating from the seams are observed in thin-section, while [U+F06D]m-thick micro-stylolites frequently occur within the seams. Veins and micro-stylolites are perpendicular and parallel to the dolomite seams, respectively. Scanning electron microscope images and energy dispersive x-ray spectroscopy analysis document crushing and fragmentation of dolomite crystals, and accumulation of non-carbonate insoluble material along stylolites and around dolomite crystals of the seams. All these features suggest that the described seams are hybrid structures between pressure dissolution seams and compaction bands, and formed parallel to bedding during sedimentary burial. The dolomite crystals scattered in the micritic matrix represent the main body of the insoluble residue produced by the progressive dissolution of calcite. As calcite dissolution proceeds, the concentration of dolomite crystals increases, eventually resulting in a dolomite seam in which locally a dolomite crystal-supported texture is attained. At this stage, the dolomite crystals within the seam start to collide, crush and fragment, so that the dolomite seam behaves like a compaction band for high dolomite crystals concentrations. This new type of compaction structure is likely to be widespread in clay-poor dolomitic limestones, where it may have a significant role in controlling syn-burial porosity evolution and post-dolomitization calcite to dolomite ratio decrease.