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Primary and diagenetic bedding at different-scales in hemipelagic successions (Pliensbachian of Asturias, NE Spain)

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The identification of sedimentary and diagenetic contribution in limestone-marl couplets formed in hemipelagic environments may be difficult when the primary couplet or cycle is enhanced by diagenesis originating a secondary couplet of similar scale. Primary cycles and secondary diagenetic couplets of different-scale recognized in the limestone-marl/shale alternations of the lower Pliensbachian of Asturias (NW Spain) provide some clues about the interaction between primary signals and diagenetic overprint. A 10 to 13 m thick interval has been studied and correlated in two 20 km distant sections, which represent relatively shallow and deep locations of the outer carbonate ramp areas (i.e., below storm wave base).

Primary cycles include decimetre-scale distal tempestites and decimetre to meter-scale bundles of tempestites. Tempestites are formed by laterally continuous centimetre-thick light and dark intervals. Basal light interval corresponds to a wackestone-packstone bioclastic level. Dark interval includes a wackestone bioclastic level burrow-mottled (mainly with Chondrites and Thalassinoides). In some of the cycles, this dark interval starts with a non-burrowed laminated organic-rich level ranging from few centimetres to near 1 m thick. Bundles of tempestites correlatable in the two studied successions display thicker laminated intervals in the lower part and increase of bioturbation towards the top, reflecting episodes of increase of bottom oxygenation and/or reduction of the sedimentation rates.

Primary cycles do not precisely match the limestone-marl/shale couplets. Marly intervals normally include several tempestites. Limestone beds are nearly equivalent to

some of the bioclastic levels, which are more abundant in the shallower succession. Therefore, the number of limestone-marl/shale couplets decreases from the shallow to the relatively deep succession, although in both successions bundles culminate with one or two correlatable limestone beds. In conclusion, the diagenetic overprint enhanced the primary signal originated by the decrease of the competence of tempestite flows: from shallower enviroments (thicker and carbonate-richer bioclastic levels) to deeper environments (more diluted bioclastic levels).