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Origin of high-frequency cycles on a Sinemurian epeiric platform: pulses of accommodation gain and lateral facies heterogeneities (NE Spain)

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An epeiric carbonate platform covered the interior cratonic area of the NE Iberian Plate (Boreal realm) during the Lower Jurassic. During most of the Sinemurian, the minimum extent of the shallower portion of the platform (that located around or above wave base) was around 300 x 500 km. The internal architecture (i.e., facies and high-frequency cycle distribution) of a 12 x 2 km segment of this platform is revealed from extensive field analysis of a continuously exposed area of outcrop near the Almonacid village (NE Spain). The 30 to 35 m thick analyzed succession is organized in three elementary cycle types: type a cycles, with a clear shallowing-upward evolution, sometimes caped by algal-laminated caps other by grain-supported facies (ooidal, peloidal); type b cycles, give up subtidal cycles, with a well defined deepening-upward evolution; type d cycles, with poorly defined vertical evolution, from shallowing-upward to aggradational, some of which are subtidal cycles.

The cycles originated by episodic pulses of accommodation gain superimposed on a long-term subsidence/sea level rise. These pulses involved stages of loss of carbonate production forming omission surfaces of different range (i.e., cycle, sub-cycle boundaries and transgressive peaks in symmetric cycles). Two possible mechanisms are proposed: repeated tectonic pulses due to extensional faulting, affecting, at least, the study area and/or eustatic changes forced by climatic cycles (i.e. the 100 ky cycle).

The analysis of the Almonacid peritidal Sinemurian carbonates indicates some significant lateral heterogeneities that need to be explored in detail and taken into account when interpreting similar, but less well exposed carbonate successions: (1) in areas

with large carbonate production (i.e., in the shallow, wave influenced carbonate factory dominated by grainy facies), it would be difficult to identify all the stages of accommodation gain in the absence of a good lateral outcrop control; (2) the areas of lower carbonate production (producing give-up subtidal cycles, unable to fill all the accommodation) have a much larger potential to register all the episodes of accommodation gain as laterally traceable omission surfaces; (3) cycles merge laterally to generate wedge-shaped geometries suggesting a tectonic control was probably operating at different times in the accumulation of this section.