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A diagenetic origin of non-diagenetic marl-limestone alternations ? a test of applicability of the diagenetic model of Munnecke et al. (2001)

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The Valanginian of the Vocontian Basin (SE France) displays thick series of marl-limestone alternations that, bed-by-bed, can be correlated over more than 100 km. They correspond to changes in carbonate content of 30 to 40 wt% that are cyclical, as shown by spectral analysis (Giraud et al., 1995). Moreover, shorter-term fluctuations in carbonate content of 10-20%wt CaCO3, well-expressed in the weathering profile, can also be traced from one locality to another (Vergol, La Charce, Angles). Consequently, the Valanginian marl-limestone alternations of the Vocontian Basin have a primary rather than a diagenetic origin.

Oxfordian marl-limestone alternations of southern Germany (Plettenberg) are deposited contemporaneously to sponge bioherms, which exhibit a larger size laterally to limestone beds than to marls, suggesting that growth of these bioherms were favoured in time of carbonate deposition and reduced when clay-richer sediments were deposited (Olivier et al., 2004). Also, changes in nannofossil assemblages in tune with marl-limestone alternations and bundles of marl-limestone alternations suggest changes in trophic conditions, and assemblages dominated by *Biscutum* spp., *Zeugrhabdotus* spp., *Lotharingius hauffii* and small *Watznaueria britannica* are recorded in marls while large *W. britannica*, *W. manivitae* and *Schizosphaerella* spp. have their higher abundance in limestones (Olivier et al., 2004). All these patterns suggest a primary rather than a diagenetic origin for the Oxfordian marl-limestone alternations of Plettenberg.

Both Valanginian and Oxfordian marl-limestone alternations offer the opportunity to test the applicability of the diagenetic model of Munnecke et al. (2001) to decipher a

primary from a diagenetic origin of marl-limestone alternations, and the characteristics of 35 alternations (%wtCaCO3 of the marls and of the limestones, thickness ratios between marl and limestone) were introduced in the diagenetic model of Munnecke et al. (2001). Sixteen of the 35 marl-limestone alternations are identified as diagenetic by the model, and 10 alternations as primary. The last 9 alternations are identified as possibly diagenetic but a rather low initial porosity of $\sim$30% would be requested.

The present work evidences that the diagenetic model will attribute a diagenetic origin to marl-limestone alternations having a primary origin. Consequently, this model cannot be used to determine the origin, primary or diagenetic, of marl-limestone alternations.

Giraud et al. (1995) - Geological Society Special Publication 85, pp. 143-164.

Munnecke et al. (2001) - International Journal of Earth Sciences 90, 795-812.

Olivier et al. (2004) - Palaeogeography, Palaeoclimatology, Palaeoecology 212, 233-263.