Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06192, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06192
EGU General Assembly 2008

Multi-proxies analysis of the evolution of the early Cretaceous northern Tethyan helvetic carbonate platform: the Barremian-Aptian boundary time interval

M. Stein , T. Adatte and K. B. Föllmi

Institute of geology and hydrogeology, University of Neuchâtel, Switzerland

(melody.stein@unine.ch)

In the helvetic Alps, the late Barremian is characterized by the deposition of the lower member of the Urgonian (lower Schrattenkalk member) which is predominantly composed of photozoan platform carbonate. During the earliest Aptian, the development of the northern Tethyan carbonate platform was perturbed by an increased in detrital input leading to the deposition of the so-called “Lower Orbitolina Beds”, which where recently baptized as Rawil Member). This member includes a shallow-water, marl- and sand-bearing succession with paleosoils containing wood fragments. These sediments are dominated by heterozoan carbonates.

According to Pittet *et al.* (2002) and Burla *et al.* (2008), an increase in terrigenous run-off may have increased nutrient supply, which favoured fast-growing organisms with asexual reproduction (Birkeland, 1988) as is proposed by Vilas et al. (1995) for large foraminifera such as orbitolinids. Conversely, Hallock (1985) and Hottinger (1997) proposed that benthic foraminifera grow to large sizes under stable, oligotrophic conditions. However, no geochemical study has hitherto been performed to confirm this hypothesis for the Rawil member. This is why we study three representative outcrops in the helvetic thrust-and-fold belt, in the northern part of the Alps: Lopper, Pilatus and Säntis. We aim at extracting paleoenvironmental information by routinely measuring phosphorus (P) contents and establishing a detrital index based on thin-section

and XRD analyses.

The P record is characterized by relatively low values. In the lower and upper calcareous part of the sections, average values are lower than in the middle part (10 and 30 ppm against 40 ppm in the middle). The most important peaks (around 115 ppm) are also in this part and correspond to marl beds. The preliminary results in P content suggest that the sediments associated with the Rawil member are slightly enriched in P, which is likely related to the associated increase in detrital material.

In summary, the detrital influx, the slight enrichment in P, the biotic association of orbitolinids, green algae and echinoderms and frequent sediment reworking, suggest a depositional environment for the Rawil Member in a shallow-platform with intermittent high-energy conditions and episodes of increased detrital and nutrient input from the land.

Birkeland, C. (1988). "Second-order ecological effects of nutrient input into coral communities." Galaxea 7: 91-100.

Burla, S., Heimhofer, U., Hochuli, P. A., Weissert, H. and Skelton, P. (2008). "Changes in sedimentary patterns of coastal and deep-sea successions from the Nort Atlantic (Portugal) linked to Early Cretaceous envrironmental change." Paleogeography, Paleoclimatology, Paleoecology 257: 38-57.

Hallock, P. (1985). "Why are larger Foraminifera large?" Paleobiology 11(2): 195-208.

Hottinger, L. (1997). "Shallow benthic foraminiferal assemblages as signals for depth of their deposition and their limitations." Bull. Soc. géol. de France 168(4): 491-505.

Pittet, B., Van Buchem, F. S. P., Hillgärtner, H., Razin, P., Grötsch, J. and Droste, H. (2002). "Ecological succession, paleoenviromental change, and depositional sequences of Barremian-Aptian shaloow-water carbonates in northern Oman." Sedimentology 49: 555-581.

Vilas, L., Masse, J.-P. and Arias, C. (1995). "Orbitolina episodes in carbonate platform evolution: the early Aptian model from SE Spain." Paleogeography, Paleoclimatology, Paleoecology 119: 35-45.