Sedimentary development and correlation of Mid-Late Devonian fore-reef deposits from Central Europe

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INTRODUCTION: Despite the interest for the reconstruction of environmental changes over a long period of time, long-term successions have been relatively poorly investigated using a mutli-disciplinary approach compared to short-term intervals such as Kačák, Taghanic, *punctata*, Kellwasser and Hangenberg events. Recently, Boulvain *et al.* (2010) compared two km-thick Eifelian-Frasnian sections from Belgium and Czech Republic using magnetic susceptibility (MS) technique. Regardless the very different background of palaeogeography, sedimentary rate, facies and local sea-level changes history, a remarkable similarity in the MS trends can be observed between these two sections. These similarities brought questions on the nature of the long-term forcing parameters that were active at the inter-regional scale. In order to get a better understanding of the factors responsible of the inter-regional forcing, a detailed records of microfacies observations, MS measurements, selected trace and major elemental concentrations and conodonts biostratigraphy have been performed on two Middle to Upper Devonian successions from Germany (Sauerland, Burgberg) and Austria (Carnic Alps, Freikofel).

CONODONT BIOSTRATIGRAPHY: In the Burgberg section, conodont biostratigraphy allowed us to confirm that the studied section extend from the Middle Givetian to the Lower Carboniferous. In the Freikofel section, it allowed to precisely identify the Eifelian-Givetian and the Frasnian-Famennian boundaries.

SEDIMENTOLOGY: The field and microfacies observations allowed us to reconstruct the sedimentary environment and to highlight several major variations of this environment. In the Middle Devonian, both sections are mainly characterized by fore-reef sediments. In the Burgberg section, those fore-reef sediments, mainly correspond to bioclastic grainstone and rudstone related to gravity flow deposits derived from the shallow-water area. In the Freikofel section, the fore-reef area is dominated by breccia sediments suggesting a strong debris flow influence. Through the Upper Devonian the sedimentary setting evolves to an off-reef pelagic environment in both sections and even a basinal setting in the Burgberg section. Sediments are then dominated by thin-bedded and nodular limestone. In this Upper Devonian part, locally both sections, debris coming from the shallow-water area are still observed (suggestion: Even in the Upper Devonian, occasionally debris deriving from shallow water areas has been observed in both sections.

MAGNETIC SUSCEPTIBILITY AND GEOCHEMISTRY: The mean MS values for the Burgberg and Freikofel sections are respectively $1{,}88 \times 10^{-8}$ m³/kg and $7{,}72 \times 10^{-9}$ m³/kg. Compared to the $MS_{marine\ standard}$ of 5.5×10^{-8} m³/kg defined by Ellwood *et al.* (2011) on the basis of ~11,000 marine rocks samples, our values are low, mostly in the Freikofel section, which could indicate a low terrestrial influx seaward during the Middle and Upper Devonian. Regarding the magnetic susceptibility curves from these two sections, several large-scaled trends can be highlighted. The evolution curves of some selected clastic input proxies such as Zr, Si, Al, Ti, Sr display similar large-scaled trends. This indicates that clastic input proxies and MS are inherently linked and MS techniques can thus be used here as a proxi for changes in source or amount or type of weathering (Riquier *et al.* 2010).

Most of the long-term MS variations occurring in both sections are interpreted as being related to second order eustatic variations (T-R Cycles).

Through this multi-disciplinary investigation, we would like to get a better idea on the causes of long-term trends in MS variations and to document the sedimentary changes in response to these long-term variations. Further aim is to develop the application of MS techniques as a correlation tools.

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