Magnetic susceptibility of Eifelian–Frasnian-Tournaisian carbonate sections (Belgium)

Boulvain F., Bertola C., Da Silva A.-C.

→ fboulvain@ulg.ac.be

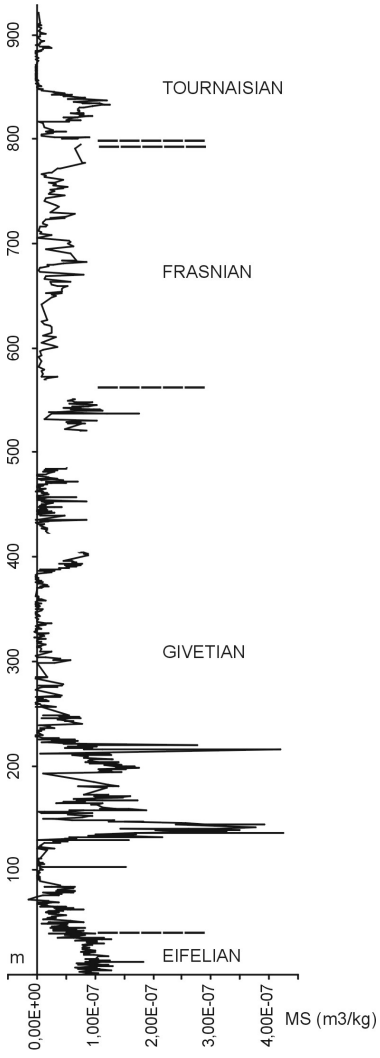
Pétrologie sédimentaire, B20, Université de Liège, B-4000 Liège (Belgium)

Bulk magnetic susceptibility (MS) measurements on sedimentological samples for correlations and reconstruction of climatic or sea-level variations from all geological periods became widely used in the last decades. Studies dealing with the origin of magnetic minerals in sedimentary rocks generally suggest a lithogenic origin for magnetic minerals. The amount of these minerals is supposed to be in relation with sea level changes. A marine regression, increasing erosion rate, increases lithogenic inputs and MS. A transgression has the opposite effect (see Da Silva *et al.*, 2009).

We propose a reflection on a very large scale about the link between MS and environmental parameters. This compilation of MS data and environmental backgrounds is based on 1200 thin sections/MS data from more than 900 m of section ranging from the upper Eifelian to the upper part of the Tournaisian.

The Devonian sections start with an Upper Eifelian mixed detrital-carbonated outer ramp (La Couvinoise), followed by a well-developed Givetian carbonated platform (Fromelennes-Flohimont) with environments ranging from external crinoidal facies to stromatoporoid-dominated biostromes and to lagoonal facies. After the demise of the carbonate factory at the beginning of the Frasnian and the generalization of argillaceous sedimentation, the Middle Frasnian is characterized by the succession of three carbonate mound levels (La Boverie), starting in quiet aphotic water and ending in shallow zone. The Tournaisian section (Rivage, Condroz sedimentation area) is characterized by a bioclastic-dominated sedimentation on a shallow ramp, interrupted by more argillaceous facies related to rapid sea-level rises.

The Devonian part of this section show an extraordinary parallelism of MS curve with a contemporaneous Czech section with different facies (Boulvain *et al*., 2010), characterized by decreasing moderate values during the end of Eifelian (*australis–ensensis* conodont zones), a very strong increase at the beginning of Givetian (*hemiansatus* Zone), very low values during the major part of the Givetian (*varcus* Zone) and increasing moderate values during the end of Givetian and Frasnian (*disparilis*–Lower *rhenana* zones). The Tournaisian part of the section shows relatively high values at the beginning of the stage (lower part of the *Siphonodella* Zone) and then decreasing low values (upper part of the *Siphonodella* and *Carina* zones).



MS data from a composite Eifelian-Tournaisian section (carbonates, Belgium).

Variations of magnetic susceptibility (MS) seem to be related to fluctuations in detrital input and carbonate productivity: external ramp settings have low carbonate productivity, low water agitation and high MS, whereas more proximal environments are characterized by higher carbonate productivity, higher water agitation and lower MS. Carbonate buildups show the lowest MS and highest productivity. MS curves are in agreement with the 3rd-order sequential interpretation. LST show the highest MS values while TST are characterized by decreasing values and HST/FSST by the lowest values.

Boulvain F., Da Silva A.-C., Mabille C., Hladil J., Gersl M., Koptikova L., Schnabl P. (2010). *Magnetic susceptibility correlation of km-thick Eifelian–Frasnian sections (Ardennes and Moravia).* Geologica Belgica, Volume 13, n°3, pp 309-318.