



Fossil distribution pattern and trace metal enrichments in the SOM of the deep basin Silurian black shales of Sardinia (Italy)

P. Pittau (1), F. Cotza (1), S. Cristini (1) and M. Del Rio (1)

(1) Dipartimento Scienze della Terra, Università di Cagliari, Italy; e-mails: pittaup@unica.it, cristini@unica.it, delriom@unica.it

The geochemical characterization in terms of metal trace elements (Pb, Co, Ni, Cu, Cd, Fe) is provided either for the Structured Organic Matter (SOM) and the whole rock, throughout the *Cyrtograptus rigidus* – *Pristiograptus dubius parvus* Chron, (Wenlock) of the continuous, condensed, organic rich succession outcropping in eastern Mid-Sardinia (Graptolite Black Shale formation) (Pittau et al., 2006). In general, higher concentrations of Co, Cd, Pb, Cu and, to a lesser extent, Ni are observed in the SOM with respect to the whole rock. Moreover, enrichment of these elements do not follow a linear trend in the section, but show episodes of enrichment and non-enrichment. The graptolite extinctions data recognized, the chitinozoan faunule and microfossils, benthonic and planktonic problematic, distribution pattern observed in the section depict the following picture:

- a first extinction datum (I ED) in the chitinozoan faunule likely occurring at inter-continental scale, and a graptolite extinction apparently with local significance that occurred within the middle part of the *Cy. lundgreni* Zone;
- a second extinction datum (II ED) of regional significance afflicting the chitinozoan faunule that occurred near the boundary of the upper and uppermost *Cy. lundgreni* Zone;
- a third extinction datum (III ED) involving both graptolites and chitinozoans faunas with global significance, which occurred just below the *Cy. lundgreni* – *P. d. parvus* transition;
- two extraordinarily bloomings of problematic planktonics respectively at the I ED

and the II and III ED.

- eclipse of the chitinozoan and microplankton associations for four consecutive graptolite zones.

Trace element concentrations pattern in the samples reveals that the highest metal concentrations in the SOM was recorded just prior to the I ED, during the II ED and immediately after the III ED, thus coinciding with significant compositional changes of the macro- and microfaunas. These bio-geochemical perturbations appear fit with the oceanic regime proposed (Jeppson et al., 1995; Jeppson and Calner, 2003) to explain the Silurian fauna extinctions on a worldwide scale, particularly the Valleviken Event, Hellvi Secundo Episode and Mulde Event. Our results display partial correspondence with sections on Gotland and in Thüringen.

References

Jeppson, L., Aldridge, R. J. & Dorning, K. 1995: Wenlock (Silurian) oceanic episodes and events. *Journal of the Geological Society of London*, 152, 487-498.

Jeppson, L. & Calner, M. 2003: The Silurian Mulde Event and a scenario for a secundo-secundo events. *Transactions of the Royal Society of Edinburgh, Earth Sciences*, 93, 135-154.

Pittau, P., Cotza, F., Cristini, C., Del Rio, M & Loi M., 2006: Paleontologic and bio-geochemical characterization of the *Cyrtograptus lundgreni* event in the black shales of eastern Mid-Sardinia, Italy. *Lethaia*, 39, 111-127.