Geophysical Research Abstracts
Vol. 12, EGU2010-9359-1, 2010
EGU General Assembly 2010

Palaeoenvironmental and geochemical approach of Archaeocyath-rich facies from Lower Cambrian of Western Gondwana margin at Central Iberian Zone (Urda, Toledo Mountains, Spain)

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Archaeocyath-rich facies are located in a quarry close to Urda village, at Toledo Mountains, Spain. The outcrops belong to the Caliza de los Navalucillos Formation and they record a considerably high diverse archaeocyath assemblage in the Lower Cambrian successions from the Central Iberian Zone (Julivert et al. 1972 [1974]). In fact, it is first time recorded the presence of Agyrekocyathus, Dokidocyathus, and Plicocyathus in the Central Iberian Zone. Therefore Plicocyathus is no longer exclusive to biozone VI in Spain. The presence of Anthomorpha is characteristic for the early Botomian, presently early Stage 4 (ICS, 2009), and the assemblage corresponds to the biozone VII (late Ovetian, following the biozonation of Perejón & Moreno-Eiris, 2006).

The fossiliferous part of the succession is formed by seven lithofacies, all of them tectonically folded and with a low grade metamorphic overprint. They are comprised by two main groups of facies: (a) mound-shaped to massive lithofacies (A1, A2, A3, A4) and (b) massive to bedded and nodular lithofacies (B1, B2, B3). Archaeocyaths occur in several facies: (A1) mound-shaped white marble with irregular to stromatactoid cavities; (A2) massive mottled white to grey limestone; (A3) massive grey limestone with slumps levels; (A4) massive archaeocyath-rich orange limestone; as well as in carbonate nodules embedded in siltstones and cherts (B1, B2 and B3). The best preserved assemblage comes from the nodule record, where fossils are partially pyritized. This type of preservation is exceptional and has never been described before. XRD and wavelength-dispersive electron microprobe analyses reveal the presence of pyrite and pyrrotine partially altered to iron oxides and hydroxides (hematite and goethite) surrounding the archaeocyath cups.

In Central Iberian Zone, the development of mounds and nodular facies like those described here is unusual, although the Botomian marks the peak for Early Cambrian archaeocyathan-microbial mounds in Western Gondwana margin.

Powdered microsamples have been analysed for their elemental and isotopic composition (δ13C values range from + 0.41 to + 3.05). Sulphur minerals and silicates where analyzed with XRD and wavelength-dispersive electron microprobe. Major elements were measured with ICP-OES and minor and trace elements were analyzed with ICP-MS.

These are the first palaeontological, sedimetological, geochemical and isotopical data provided to reconstruct the depositional environment of these Archaeocyath-rich facies at the Western Gondwana margin.

References

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