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Mississippian siliceous deposits: origin and importance for the estimation of biodiversity

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During Phanerozoic times, there are several hypersiliceous periods, sometimes associated with icehouse conditions. These biogenic siliceous deposits are particularly widespread in the Mississippian of Central Europe. They consist of regularly-bedded deposits within limestone successions and are mostly composed of radiolarian tests. These radiolarian cherts are variously coloured red, green or black, but the black varieties have the more specific name of 'lydites'. Despite being easily identified and ubiquitous in nature, there are few studies addressing their age and origin. These Mississippian radiolarites have often been interpreted as evidence for deepening and/or upwelling conditions and therefore classed as basinal deposits due to the presence of abundant radiolarians. Nevertheless, the presence or even abundance of radiolarian remains in sediment is not necessarily bathymetry-related. In fact, the relative abundance of radiolarian skeletons can be affected by their high preservation rate relative to other allochems.

These radiolarites are studied to characterize the signature of this 'siliceous period' and its significance, particularly in the Hercynian history of Europe and its relation with D/C climate change. Therefore, a multidisciplinary approach was conducted, using analysis of conodont faunas, lithologic and microfacies analyses, and the study of inorganic geochemistry, from outcrops in the French Pyrénées and Spanish Cantabric Chain.

The Mississippian siliceous deposits in the studied sections are of two types: (1) black radiolarites (called 'lydites') deposited during the lower *crenulata* to the *anchoralis-latus* zones interval; and (2) green or red jaspers poor in radiolarians and deposited during the end of the *anchoralis-latus* Zone to the beginning of the *bilineatus* Zone interval.

The sedimentological study shows that the sediments were deposited on an external continental shelf, at a depth of less than 300 m. The change from a carbonate to a siliceous sedimentation corresponds to a relative and progressive deepening.

Analysis of major and trace elements does not show particular trends, and there is no discernible change in the ocean water chemistry (detrital input, redox conditions or paleoproductivity) to explain the change of sediment type.

The disappearance of limestone deposits and the formation of radiolarites are interpreted as a combination of several factors including a transgression that changes the oceanic circulation, and eutrophication linked to the circulation of nutrient-rich cold currents. These factors have allowed the development of a planktonic fauna and the preservation of silica in the sediment and, above all, were unfavourable to the carbonate deposits (an essential condition so that biogenic silica is not diluted).

This study also permits to discuss about the biodiversity variations through times and point out the importance of the understanding of the taphonomy before discussing the biodiversity increase or mass extinction.