

CHAVES Jessica (2021): Microcodium : investigations on the origin of a dubious continental proxy

Abstract

The study of continental facies is a challenge. Indeed, the common poor preservation of the structures or the complexity of the interactions between living organisms and minerals, make continental facies difficult to understand. The aim of this study is to observe how Microcodium can be used as a proxy to improve the palaeoenvironmental reconstructions of continental environments. However, this is particularly difficult as their origin remains mysterious and controversial. Two major hypotheses best define the origin of this fossil: it could be remains of calcified roots belonging to specialized vascular plants or the product of a symbiosis between two microorganisms.

The results of this study suggest that Microcodium are closely linked to C3-plants roots remains. However, the specific morphology of Microcodium does not look like any calcified roots remains, which make the connexion between Microcodium and calcified roots doubtful. Furthermore, attributing Microcodium formation only to microorganisms does not fit with the obtained results. It is difficult to separate microorganism activity with the vegetation expansion. Therefore, we propose an in-between hypothesis of a mycorrhizal symbiosis between a C3-plant and mycorrhizae, which were capable of dissolving and re-precipitating the carbonate substrate they colonized. Indeed, it seems that Microcodium producers were strongly linked to the C3-plant rhizosphere according to our geochemical data. Furthermore, the analyses of the clay and the detrital fraction of the samples showed that Microcodium producers were living in an alkaline environment, they seemed to propagate best in hydromorphic soils with low detrital input. The collected data point to a warm climate for Microcodium development, with contrasting seasons alternating between dry phases and abundant runoff.