FACTORS CONTROLLING DEVELOPMENT OF MICROBIALITES IN THE MERANTAISE RIVER (FRANCE)

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The study of modern sedimentary microbial carbonate systems contributes to the knowledge of environmental conditions required for (i) the formation of microbial mats and microbialites, and (ii) the development of their particular morphologies. Understanding the formation of these specific morphologies in extant modern microbial mats and microbialites may facilitate interpretation of past microbial-dominated systems. To increase this understanding, the relationship between environmental conditions and modern microbial mats was investigated in a small river in Villiers le Bâcle, France.

Our study site is found in a continental temperate climate and is supplied by a freshwater spring. In our system, mineralization is driven by changes in water-level which are related to stream-discharge fluctuations. The distribution of the microbial mats and microbialites was mapped along a 1 km-long transect. We focus on potentially causal correlations exist between (1) the mineralogical, chemical and isotopic composition of microbialites and the physicochemical conditions prevailing in the river where they form and (2) the spatial distribution of microbial mats and microbialites in relation to multiple controlling external parameters (hydrogeology, hydrodynamics, vegetation, substrate) and their mineralization potential. The microbialites consist of dense, porous and macrocrystalline composite calcitic laminae showing filamentous structures. The network of calcified filaments acts as a filter that traps suspended particles, which together with calcification, contributes to the process of microbialite development. We discuss the microbialite formation, showing that laminations may record different-order, periodic and non-periodic changes in magnitude of varied environmental, principally climatic parameters; ranging from seasonal to monthly and even shorter time spans. Therefore, specific environmental conditions may affect the cyanobacterial growth and development as well as the calcite saturation index resulting from environmental fluctuations.