**Geochemical study of stromatolites through geological time:**

**new perspectives from the MNHN Microbialite Collection**

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By their presence through geological time and deposition in a wide range of aqueous environments, microbialites, which are accreted under biological influence as chemically cemented (usually carbonate) structures, are exceptional geochemical archives. The MNHN Microbialite Collection gathers a large diversity of specimens, representative of a wide variety of depositional ages and environments, with significant promise for advancing our understanding of both the evolution of microbial life on Earth and of major changes in ocean and atmospheric composition through geological time.

The collection contains more than 250 specimens spanning 3.5 Ga of Earth history and representing all continents. A descriptive work was performed together with microscopic observation to evaluate the lithology, biogenicity, and depositional environments of the specimens. Then, several different geochemical analyses, including for carbonate C and O stable isotope compositions (d13Ccarb and d18Ocarb), as well as major and trace element compositions, were performed to evaluate links between depositional environments and geochemical signals preserved in both modern and ancient stromatolites.

Bulk d13Ccarb in the collection varies between -9.17 and +15.57 ‰ (VPDB) and d18Ocarb between -19.12 and +6.63 ‰ (VPDB). This large variability is related to the different local phenomena that can influence stromatolite depositional environments (i.e., evaporation, biomass production, diagenesis). We present in this poster examples using geochemical signals in modern stromatolites, such from Shark Bay (Australia), some Mexican lakes, or Dziani lake (Mayotte) that provide useful tools for understanding paleoenvironmental and geochemical perturbations in deep time, as the positive carbon isotopic excursion characterizing the Lomagundi event.

Finally, we also explore global oxygenation trends recorded by trace metal variations in microbialites throughout Earth history.