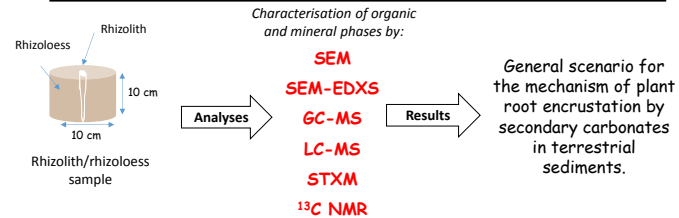
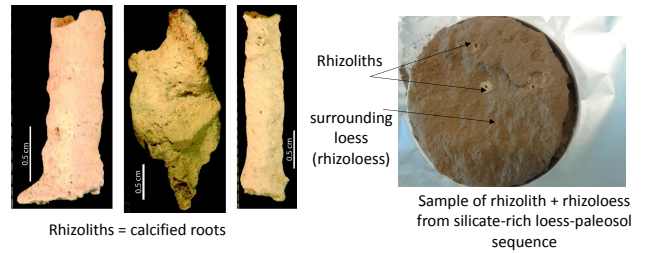


# Labex MATISSE

## Biomineralization - AXE 1

« Plant root encrustation processes: insights from a multitechnique

characterization strategy » El Khatib Rime, Arnaud Huguet, Sylvain Bernard



### Hosting laboratories, teams and and thesis supervisors names:

1. Laboratory : METIS, CNRS/UPMC UMR 7619. Supervisor : Arnaud Huguet
2. Laboratory : IMPMC, CNRS/UPMC/MNHN 7590 & IRD UMR 206. Supervisor: Sylvain Bernard

### Research project

Rhizoliths are organomineral structures resulting from root and root remain preservation in secondary carbonates. The precise mechanisms of their formation remain unclear. It is generally assumed that encrustation is controlled or induced by complex organic-inorganic interactions at the plant tissue scale. The aim of our work is to carry out a multiscale and multitechnique characterization of natural rhizoliths at different stages of encrustation, in order to evidence the relationships existing between organic and inorganic phases and propose a general scenario for the mechanism of plant root encrustation by secondary carbonates in terrestrial sediments. Organic geochemistry tools (GC-MS, <sup>13</sup>C solid state NMR) in addition to STXM technique were used to analyse organic matter remains, whereas SEM coupled to EDXS analyses were performed to obtain morphological and structural information at nanometric scale.

### Summarize your scientific results & impacts

SEM analysis revealed the preservation of root cellular ultrastructure with remarkable integrity for all samples, suggesting that calcification has likely been promoted by intra-cellular carbonate precipitation before tissue degradation. This was confirmed by <sup>13</sup>C NMR and STXM analyses of recent and calcified roots. Biomarker investigation showed predominance of microbial biomarkers in the former roots, in contrast with the surrounding sediment, dominated by plant biomarkers.

### Main key facts (for instance publications / pri ces / oral presentations)

#### Oral presentation :

R. El Khatib, A. Huguet, S. Bernard, M. Gocke, G.L.B. Wiesenberg, S. Derenne. Etude multi-échelles et multi-techniques des mécanismes de formation des racines calcifiées dans les sédiments terrestres. French Researchers in Organic Geochemistry meeting, 3-4 July 2014, Bourget-du-Lac (France).

#### Poster presentations:

1) R. El Khatib, A. Huguet, S. Bernard, M. Gocke, G.L.B. Wiesenberg, S. Derenne. Plant root encrustation processes: insights from a multitechnique characterization strategy. Goldschmidt, 8-13 June 2014, Sacramento (USA).

2) R. El Khatib, A. Huguet, S. Bernard, M. Gocke, G.L.B. Wiesenberg, S. Derenne. Formation mechanism of calcified roots in terrestrial sediments: insights from a multitechnique and multiscale characterization strategy .