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A genetic link between syndimentary tectonics-expelled fluids, microbial sulfate reduction and cone-in-cone structures

Nicolas TRIBOVILLARD<sup>(1)\*</sup>, Anélia PETIT<sup>(1)</sup>, Melesio QUIJADA<sup>(1)</sup>, Armelle RIBOULLEAU<sup>(1)</sup>, Pierre SANSJOFRE<sup>(2)</sup>, Christophe THOMAZO<sup>(3)</sup>, Arnaud HUGUET<sup>(4)</sup>, Daniel BIRGEL<sup>(5)</sup>, Olivier AVERBUCH<sup>(1)</sup>

<sup>(1)</sup> Laboratoire LOG, UMR université de Lille-ULCO-CNRS, F-59655 Villeneuve d'Ascq cedex

<sup>(2)</sup> Laboratoire Domaines océaniques, Université Bretagne Occidentale & CNRS

<sup>(3)</sup> Laboratoire Biogéosciences, Université de Bourgogne-Franche Comté & CNRS

<sup>(4)</sup> Laboratoire METIS, Université Paris 6 & CNRS

<sup>(5)</sup> Institute of Earth Sciences, University of Hamburg

\* Corresponding author: nicolas.tribovillard@univ-lille1.fr

**Key-words:** early diagenesis, carbonate nodules, Boulonnais area, late Jurassic, hydrocarbon source-rocks, anaerobic oxidation of methane

**Abstract:** The late Jurassic (Tithonian) marlstones of the Boulonnais area (English Channel, France) contains diagenetic carbonate beds and nodules. Some nodules exhibit cone-in-cone structures on their lower face. We studied such nodules using various techniques of imaging and chemical (major and trace-elements) and isotopic analyses ( $C_{carb}$ ,  $C_{org}$ , O and S stable isotopes). We interpret the cone-in-cone to be the end product of carbonate-nodule formation during early diagenesis. The diagenetic carbonate precipitation was induced by microbial activity (bacteria and(?) archaea) fueled by upward-migrating fluids. Fluid expulsion was itself triggered by syndimentary fault movements. Under such circumstances, cone-in-

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