

---

# The pockmarks-Haploops relationship in south-Brittany

Jean-Baptiste Champilou\*<sup>1</sup>, Agnès Baltzer<sup>2</sup>, Gwendoline Grégoire<sup>3</sup>, Anne Murat<sup>3</sup>,  
Marine Reynaud<sup>4</sup>, Quentin Dupuy, Maria Pia Nardelli<sup>1</sup>, and Edouard Metzger<sup>1</sup>

<sup>1</sup>LPG-BIAF (Bio-Indicateurs Actuels et Fossiles) – Université d’Angers, CNRS : UMR6112, Université d’Angers, Université d’Angers, Université d’Angers, Université d’Angers, Université d’Angers – France

<sup>2</sup>Littoral, Environnement, Télédétection, Géomatique – CNRS : UMR6554, Université de Nantes – France

<sup>3</sup>Cnam - Intechmer – CNAM-INTECHMER, LUSAC Laboratory, Caen Normandy University – France

<sup>4</sup>École Centrale de Nantes - SEM-REV – École Centrale de Nantes – France

## Résumé

In at least 3 bays of south Brittany, in the Concarneau bay, offshore Le Croisic archipelago and in the external part of the Loire river estuary, dense settlements of several thousands individuals per square meters, of tubes dwelling amphipods, *Haploops antennata*, have been reported as being perfectly superimposed to fields of pockmarks (crater-like figures visible in soft sediment seafloor that mark fluids expulsions). This ecosystem’s engineer species plays a sedimentological key role in the environmental processes and increases local biodiversity. This work presents results of the investigation of these 3 pockmarks-*Haploops* fields, where each area is characterized by different hydrodynamics and rivers inputs conditions, allowing us to strictly link the presence and development of *Haploops* to the venting activity of the pockmarks fields. Indeed, whatever the external inputs of organic and inorganic particles, the *Haploops* strictly developed inside the area of the pockmarks field.

Focusing on the settlement offshore Le Croisic, a two year space-time evolution monitoring (between 2017 and 2018) of the *Haploops* settlement, pockmarks field and gas movements into the sedimentary column have been conducted. Boundaries limits of the *Haploops* settlement have been defined and compared over these two years and a large expansion have been determined in the southwestern part of the settlement. There, around 1.7 square kilometer have been colonized by the amphipods. Manual count of the pockmarks have been carried out on representative areas and positive correlation were obtained between expansion zones and pockmarks apparitions. Moreover, pockmarks apparitions and activities may be linked with the depth of acoustic mask into the sedimentary column. The areas where the *Haploops* are expanding corresponds to the areas where numerous pockmarks already exist or appear, and these pockmarks are located where the enhanced gas reflector (trading the gas stopped under an impermeable layer) is shallower in the sedimentary column.

As *Haploops* seem to not contain the necessary bacteria to directly consume methane, indirect explanation should be proposed. Pockmarks should thus either (i) directly expulse some nutrients necessary for *Haploops* development, or (ii) the upcoming methane induce chemical reactions at seafloor surface, which may be used to locally increase the primary production of phytoplankton.

---

\*Intervenant