

Space-time evolution of le Croisic *Haploops* settlement (Bay of Biscay)

JB. Champilou (1), A. Baltzer (2), M. Reynaud (3), Q. Dupuy (2), G.M. Maillet (1), J. Badelle (1), M.P. Nardelli (1), E. Metzger (1)

¹CNRS : UMR 6112, Laboratoire de Planétologie et Géodynamique – Bio-Indicateur Actuels et Fossiles (LPG-BIAF) – UFR Sciences, Université d'Angers, 2 Boulevard Lavoisier 49000 Angers, France

²Littoral - Environnement - Télédétection - Géomatique (LETG Nantes) – Université de Nantes, CNRS: UMR6554 – Campus Tertre BP 81227 44312 Nantes Cedex 3, France

³Ecole Centrale de Nantes - SEM-REV -1 Rue de la noë BP 92101 44321 Nantes Cedex 3, France

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.

Offshore Le Croisic, a two year space-time evolution monitoring (between 2017 and 2018) of the *Haploops* settlement and pockmarks field 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.

Sedimentary characteristics and tubes length and densities (measured and calculation from a grab volume) of 4 different colonization step of the settlement have been compared. In the ancient cover, differences can be made between the center and the edge of the cover. Newly colonized area show the growth rate of the tube as well as the colonization rate of these new areas. The presence of the *Haploops* settlement transformed the seafloor sediments by aggregating fine grain particle as soon as they colonized it. The muddy environment appears not to be a prerequisite for the settlement but a consequence of it.

Manual count of the pockmarks have been carried out on representative areas and positive correlation were obtained between expansion zones and pockmarks apparitions. The areas where the *Haploops* are expending 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.