

Subject for the 2017 VENAM doctoral school contest

If you are interested in this topic please contact Prof. Emmanuelle Geslin (emmanuelle.geslin@univ-angers.fr) before 26 May 2017.

For more information about the application procedures and schedule: <http://www.univ-angers.fr/fr/recherche/formation-doctorale/ecoles-doctorales/ed-venam.html>

### **Study of biological and geochemical interactions in intertidal mudflats: multidisciplinary approach at different scales**

Supervisor: E. Geslin, LPG, University of Angers

Co-supervision: A. Mouret (University of Angers) B. Jesus (University of Nantes)

It is important to understand the biogeochemical functioning of intertidal mud flats, as they are complex and strategic socio-ecosystems. In the French region Pays de la Loire, they provide many ecosystem services as oyster farming and fishing. They also serve as buffer zones, protecting the coastline from extreme climatic events, which are becoming more and more frequent in the context of global climate changes and increasing sea level rise.

This PhD project proposes a multidisciplinary work focusing on ecology and biology of microphytobenthos and foraminifers, as well as sediment geochemistry. Innovative high-resolution measurement methods will be used, as microscopy imaging PAM, FLEC cores (Bernhard et al., 2014), 2D DET gels (Cesbron et al., 2014, Metzger et al., 2016, Thibault de Chanvalon et al., 2015). Microphytobenthos is composed of microscopic algae and photosynthetic bacteria (e.g. diatoms, euglenas, cyanobacteria) used as food by different mudflat organisms (e.g. foraminifers, oysters). The interactions between foraminifera and microphytobenthos are poorly known and their impact on geochemical cycles was rarely quantified. Ecosystem balance is intimately linked to availability of some chemical compounds (C, N, P, O ...) which in turn are strongly controlled by biological activity. In this PhD work, we propose: 1) to study foraminifera food strategies and investigate if they select diatoms according to their size during grazing. To test this hypothesis, experimental approaches with isotopically labelled diatoms and foraminifera isotopic analyzes will be carried out at LPG-BIAF in collaboration with H. Nomaki (Jamtec, Japan); 2) to characterize microphytobenthos and foraminifera microhabitats at a micrometric scale using very innovative methods (e.g. PAM fluorometry, FLEC coring, 2d DET gels); 3) to study foraminifera distribution at a kilometric scale in Bourgneuf Bay intertidal mudflats.

This original and innovative subject is based on a strong collaboration between the supervisors, specialists in the different involved disciplines: ecology of foraminifera for E. Geslin, sediment geochemistry for A. Mouret and ecology and biology of microphytobenthos for B. Jesus. These collaborations exist since 2014 and have resulted in 7 co-signed publications.

This project is part of an international program (FRESCO: Foraminiferal Research Consortim) and will benefit from FRESCO network with international collaborations, particularly with WHOI (USA) and Jamstec (Japan). The work will be included in the context of several existing research grants, such as Manga 2D (A. Mouret, funded by a French national agency), Bio-Tide (B. Jesus, funded by H2020) and FRESCO (E. Geslin, funded by the French region Pays de la Loire).