**Multidecadal evolution of benthic biodiversity in three Greenlandic fjords**

**Supervision**
Laurent Chauvaud, LEMAR, CNRS
Réjean Tremblay, ISMER, UQAR
Frédéric Olivier, BOREA, MNHN
Jacques Grall, LEMAR, UBO

Generally, Arctic benthic ecosystems are considered to be poorly diversified, but it is clear that this hypothesis is biased by the scarcity of studies at high latitudes. Recent studies estimate that the diversity of the Arctic benthos is highly more important than previous estimates, while several thousand species to be discovered. Although recent considerable progress realized, certain geographic areas remain understudied, including Greenland. These Arctic ecosystems are submitted to significant changes of their abiotic conditions related to climate change increasing water temperatures, decreasing sea ice cover and increasing fresh water supply. Recent studies revealed a strong increase in advection from low latitude areas towards the Arctic, which could modify lower trophic levels having limited mobility and modify the distribution of species. Desalination effects on the pelagic compartment (via changes in primary production, water column stratification, turbidity, nutrient contents, and organic matter quality), could be critical on the structure and functioning of food webs, in particular on the benthos. Understanding the consequences of environmental changes on the structure of coastal ecosystems, including the energy transfer through the food web is essential to improve predictions of marine ecosystems evolution in response to climate change.

In this context, long-term comparisons of benthic assemblages constitute the essential first step to assess the effect of climate change on Arctic biodiversity. Although some few studies reported drastic changes in the hard-substrate polar benthic habitats between last 40 years, there is a critical lack of similar work on soft sediment habitats. With the opportunity to revisit Greenland fiords, where coastal macrofaunal assemblages were determined since 1988 it will be possible to obtain a comparative vision on the scale of Greenland of the long-term evolution of benthic communities under climate impacts. We would like to validate the hypothesis that the flow of glacial meltwater could be a key factor in the structure and functioning of coastal benthic ecosystems. Specifically, we will test if 1) the increase in runoff associated to turbidity and sediment load have had a negative influence on filter feeders and bivalves abundance and 2) the structure of the food web in the internal parts of the fjords will be characterized by a stronger dependence on detrital and/or terrigenous carbon compared to the exterior, which will be more closely linked to the classic phytoplankton food web.

The three specific objectives of the thesis are: 1) Study the long-term evolution (25 years) of benthic marine invertebrate communities on three Greenlandic coastal sites and estimate the respective roles of the different environmental variables in these evolutions; 2) Complete the description of benthic macrofauna species in Greenland in the North-East and in the South-West with barcoding analyzes; 3) Study the transfer pathways of carbon

and organic matter in the benthic food webs using the δ13C and δ15N isotopic signatures and the fatty acid profiles of organisms and sources of organic matter.