Drivers of polychaetes functional α- and β-diversity at regional scale: Disentangling the role of biogenic habitats and environmental variability

Aurélien Boyé¹,², Éric Thiébaut³, Jacques Grall¹,⁴, Pierre Legendre², Caroline Broudin⁵, Céline Houbin⁵, Vincent Le Garrec⁴, Marion Maguer⁴, Gabin Droual⁴, Olivier Gauthier¹,⁴

¹Laboratoire des Sciences de l'Environnement Marin (LEMAR) UMR 6539 CNRS UBO IRD IFREMER, Institut Universitaire Européen de la Mer, Université de Bretagne Occidentale, 29280 Plouzané, France

²Département de Sciences Biologiques, Université de Montréal, C.P. 6128, Succursale Centre-Ville, Montréal, Québec H3C 3J7, Canada

³Sorbonne Universités, UPMC Université Paris 06, CNRS, Station Biologique de Roscoff, UMR 7144, CS90074, 29688 Roscoff Cedex, France

⁴Observatoire Marin, UMS 3113 CNRS, Institut Universitaire Européen de la Mer, Université de Bretagne Occidentale, 29280 Plouzané, France

⁵Sorbonne Universités, UPMC Université Paris 06, CNRS, FR 2424, Place Georges Teissier, 29680 Roscoff, France

Corresponding Author:

Aurélien Boyé¹,²

¹Laboratoire des Sciences de l'Environnement Marin (LEMAR) UMR 6539 CNRS UBO IRD IFREMER, Institut Universitaire Européen de la Mer, Université de Bretagne Occidentale, 29280 Plouzané, France

²Département de Sciences Biologiques, Université de Montréal, C.P. 6128, Succursale Centre-Ville, Montréal, Québec H3C 3J7, Canada

Email address: aurelien.tj.boy@gmail.com

Alterations of the seafloor, particularly loss of biogenic habitats, are homogenizing benthic environments and their associated biota. Apprehending the functional consequences of these changes is critical but requires a thorough understanding of the functional β-diversity of benthic communities. Here, using data from 3 years (2007, 2010, 2013) of the REBENT monitoring programme and 51 sampling locations along Brittany’s coastline (France), we assess taxonomic and functional α- and β-diversity of polychaetes assemblages and disentangle their drivers at the regional scale and over four habitats: subtidal and intertidal...
bare sediments, subtidal maerl (coralline red algae) beds and intertidal *Zostera marina* meadows. The 1061 sediment samples yielded 137,319 polychaetes belonging to 242 species. Eleven traits and 43 modalities were used to describe the functional effect and response of these species. Among the highly contrasted environments of Brittany, strong within-habitat taxonomic variability was observed, which blurred among-habitat differences. Here, we relate taxonomic patterns and functional variations, in order to propose a model linking environmental and habitat conditions to taxonomic and functional $\alpha$- and $\beta$-diversity. Linking these various facets of diversity facilitates the identification of sites with particular conservation interests.