

**Biological and environmental drivers of deep-sea benthic ecosystem functioning in  
Canada's Laurentian Channel Area of Interest (AOI)**

Marta Miatta<sup>1</sup>, Paul V. Snelgrove<sup>2</sup>

<sup>1</sup> Department of Ocean Sciences, Memorial University of Newfoundland, St. John's,  
Newfoundland, Canada

<sup>2</sup> Department of Biology and Ocean Sciences, Memorial University of Newfoundland, St. John's,  
Newfoundland, Canada

Corresponding author: Marta Miatta

Email address: mm5655@mun.ca

## 1 Abstract

2 Ongoing environmental changes and accelerating biodiversity loss raise concern and interest  
3 about the role of environmental factors and biodiversity in determining marine ecosystem  
4 functioning. This study aims to identify the main drivers of benthic ecosystem functioning in  
5 deep-sea sedimentary habitats in the Laurentian Channel Area of Interest (AOI), and in particular  
6 the role of sea pens (*Pennatulacea*) as potential keystone species in the area. Using the ROV  
7 ROPOS we collected sediment cores and measured environmental variables from 6 stations  
8 inside the AOI (depths 348–445m) in September 2017. Through 48-hours incubations and flux  
9 measurements (oxygen, inorganic nutrients), we estimated organic matter remineralization, a key  
10 benthic function. Preliminary analyses show no significant variation in fluxes among stations,  
11 despite significant differences in environmental variables. However, the presence/absence of  
12 *Pennatulacea* inside the cores indicated some capability to enhance remineralization and  
13 particularly nitrification. Ongoing analyses will address sediment properties, macrofaunal  
14 biodiversity, prokaryotic abundance, and biological traits as drivers of remineralization.  
15 Shedding new light on the primary drivers of ecosystem functioning in the area will inform the  
16 design or monitoring strategies proposed for this AOI and offer new perspectives and tools for  
17 MPA design.