Is advective feeding on gelatinous prey at depth in the dark a low-cost, low-risk, low-reward strategy?

We are looking for organized, self-motivated candidate(s) interested in coding and ecological projects. This opportunity involves diverse tasks, including reading otoliths, data wrangling, analysis, and working with bioenergetic and visual detection models, with the potential for multiple publications.

Background

The Greater Argentine (*Argentina silus*) is a commercially fished yet understudied species with a broad distribution along North Atlantic continental slopes. Significant knowledge gaps persist regarding its ecology and life history.

Our goal is to comprehend the niche, feeding behavior, and life-history strategy of the Greater Argentine. They primarily inhabit a narrow band along the continental slope at depths of 200-600m, with vertical distribution confined to a few meters above the seafloor. The largest individuals, characterized by the largest eyes, are most abundant at the greatest depth. Previous results suggest they thrive in areas too dark for predators, with advected mesopelagic organisms providing a constant food supply. Collaborative diet analysis with colleagues at the University Museum indicates a potential specialization in gelatinous prey and krill, supported by their relatively small mouths.


Hypothesis

Greater Argentine occupy a benthopelagic niche at mesopelagic depth, predominantly found along slopes facing currents. They feed on advected mesopelagic organisms, such as gelatinous organisms and krill, transported onto the shelf, where their large eyes can detect translucent prey in dim light. We hypothesize that feeding on low-energy gelatinous plankton is facilitated by advection, offering a continuous food supply without the need for active prey search. The strategy may be more efficient when feeding on gelatinous organisms that have caught prey or are invested with parasites, enhancing energetic density per ingested prey item, and making them more visible and easier to detect.

Available Data

During the annual BIO325 student fall surveys (2019-2023), our focus has been on Greater Argentine data collection. Trawl samples from depths of 100 to 1000 meters cover six regions (Faroe Trench West, Faroe Trench East, North Sea Plateau, Norwegian Trench, Møre Plateau, and West Norwegian Fjords). Data from years before 2019 may be available but require digitization. Samples include community

composition (incl. length frequencies), and information on length, weight, sex, age, eye diameter, and maturity status for the Greater Argentine. Additionally, surface (and in some cases *in situ*) light measurements and CTD data are available.
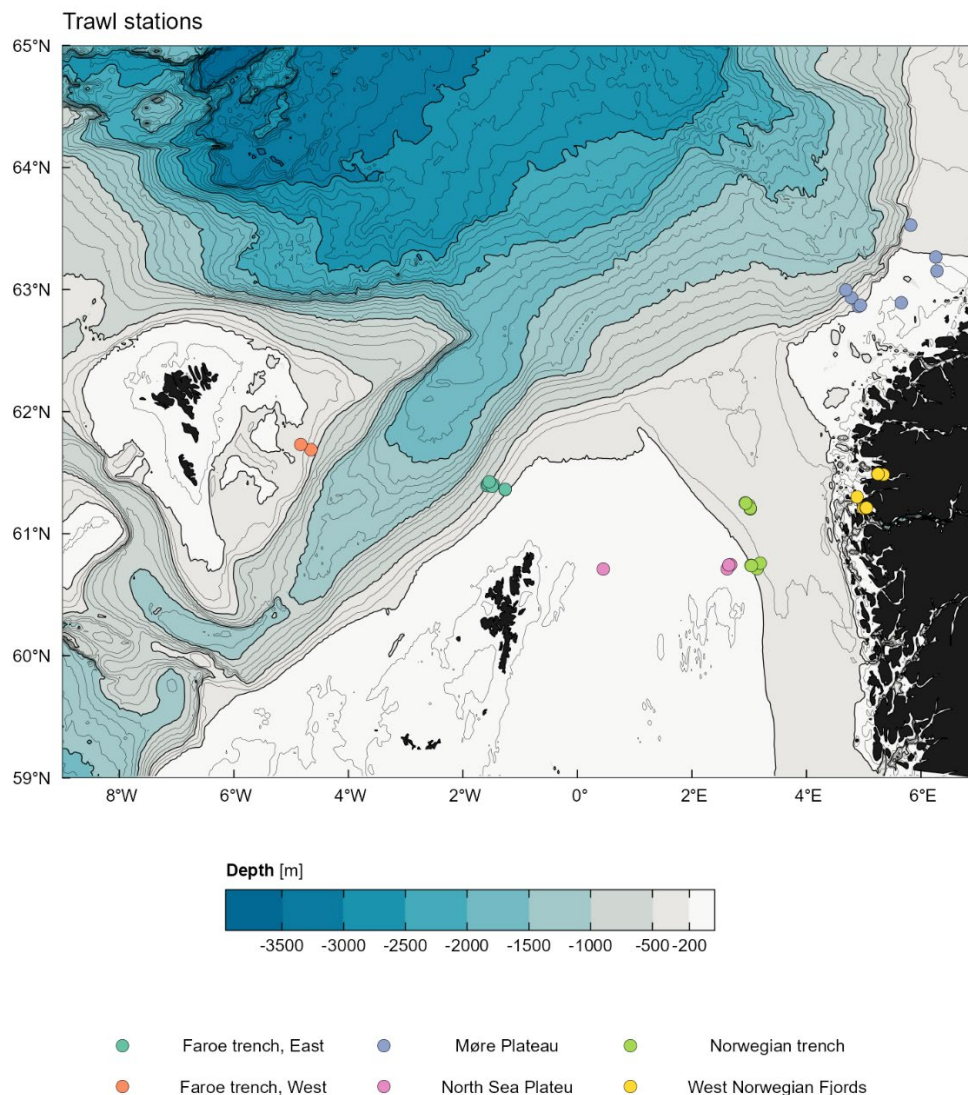
Suggested Work

1. Conduct a literature review.
2. Re-read otoliths for accurate age confirmation, aggregate and quality control the dataset. Candidates are encouraged to publish data with supervisors as a data paper.
3. Analyze the depth distribution of Greater Argentine relative to eye size.
4. Utilize simple bioenergetic models coupled with a visual detection model (e.g. Nilsson et al. 2014, doi: 10.1098/rstb.2013.0038) to calculate surplus energy under various scenarios (e.g., different current speeds) for gelatinous prey with and without prey.

Supervisors

Main supervisor would be Tom Langbehn (tom.langbehn@uib.no) with the co-supervision of Katja Enberg (Katja.Enberg@uib.no) and/or Christian Jørgensen (Christian.Jorgensen@uib.no)