> Leandro NOLÉ EDUARDO Lighting up the dark side of the ocean: biodiversity and ecology of deep-sea fishes from the Southwestern **Tropical Atlantic**

Soutenance de thèse

Lundi 29 mars 2021 à 17h00 en distanciel Station Ifremer, UMR MARBEC Avenue Jean Monnet, Sète

Abstract

JURY

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Here we propose a comprehensive study on the biodiversity and ecology of mesopelagic fishes from the Southwestern Tropical Atlantic (SWTA). For that, we combined information on the diversity, abundance, distribution, trophic ecology, and physical and chemical habitat of thousands of mesopelagic specimens recently collected on the surveys of the project ABRACOS in 2015 and 2017.

In the first chapter, we addressed the biodiversity, distribution, and morphometrical aspects of mesopelagic fishes, providing the first baseline of mesopelagic fish biodiversity from the SWTA. We showed that a relatively high number of taxa occurs in the study area, including at least 24 orders, 56 families, and 207 species. From those, nine species (4%) are potentially new and 61 (30%) represented new records for Brazilian waters. Five families were predominant and accounted for 52% of the diversity of taxa, 90% of the specimens collected, and 72% of the total biomass: Myctophidae, Stomiidae, Gonostomatidae, Melamphaidae, and Sternoptychidae.

In the second chapter, we addressed the ecology of the most important (in terms of abundance and biomass) species: Sternoptychidae (hatchetfishes), Myctophidae (lanternfishes), and the viperfish Chauliodus sloani. We pointed out which species in the SWTA vertically migrate to the surface to feed at night and actively transport the ingested carbon to deep waters during daylight. Moreover, we showed how such behaviour is related to physical-chemical features. We demonstrated that several species occupy an important trophic position by consuming zooplankton and providing forage for numerous epipelagic and deep-sea predators. Additionally, we showed high consumption of gelatinous organisms, a crucial trophic relationship that has been historically underestimated. By combining all the information, we demonstrated that mesopelagic fishes are segregated into functional groups with different diet preferences, isotopic composition, vertical abundance peaks, and responses to environmental constraints. As an example, we defined five functional groups for hatchetfishes, whereas over three patterns of prey preference and four patterns of migratory behaviour for lanternfishes. These patterns reveal a high resource partitioning and several mechanisms to avoid competitive exclusion.

Finally, through the study case of the viperfish we explored how physical drivers affect the ecology of mesopelagic species and how these relationships are likely to change over large oceanic areas. We showed that the ecology and functional roles of the viperfish are expected to be modulated by the latitudinal change in temperature. For instance, in most tropical regions the viperfish stay full-time feeding, excreting, and serving as prey at deep layers. On the contrary, in temperate regions, the viperfish ascend to superficial waters where it trophically interacts with epipelagic predators and may release carbon where remine-ralization is the greatest.

Key words

Mesopelagic fishes, Biodiversity, Niche partitioning, Diel vertical migration, Trophic relationships, Southwestern Tropical Atlantic

> Soutenance accessible sur ZOOM : https://umontpellier-fr.zoom.us/j/83007838951









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