

OOS2025-1017, updated on 07 May 2025

<https://doi.org/10.5194/oos2025-1017>

One Ocean Science Congress 2025

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What is hidden behind the “deep sea”? Ecosystems, resources and pressures

Pierre-Marie Sarradin, Claire Geslin, Marie-Anne Cambon, and Karine Alain

Univ. Brest, Ifremer, CNRS, BEEP, PLOUZANE, France (pierre.marie.sarradin@ifremer.fr)

The so-called deep sea is usually defined as the ocean deeper than 200m, where the light does not penetrate any longer and the shallow shelf seas ends. Using these depth limits, the deep sea represents 65% of the Earth surface and 95% of its habitable space or biosphere.

What is hidden behind the “deep sea”: the last frontier to explore on earth, an environment with potentially 1 Million of species yet to discover, the least anthropized area to protect, a vast reservoir of biological, energetic and mineral resources to face the increasing worldwide demand, a main part of a single Ocean playing a vital role in the planet's equilibrium, a geo strategic area to monitor, the common heritage of mankind ? The deep sea has long suffered from a lack of knowledge due to its difficult accessibility, which perpetuated to a distorted image of a calm, quiet and nearly desert-like abyssal plain preserved from anthropic pressures.

The exploration of the deep-sea accelerated in the late 1950's thanks to the development of scientific submersibles allowing direct and visual observations. This environment is characterized by a high habitat heterogeneity related to the diversity of geological features (abyssal plains, canyons, seamounts, vents and seeps, deep biosphere...), to the availability of energy sources (photosynthetic vs chemosynthetic) or to its geographical location. The deep seafloor features highly diverse landscapes that host diversified microbial and faunal assemblages.

Human activities have accelerated in the deep ocean with the golden age of oil and gas extractions and deep-sea trawling in the 20th century. Nowadays, these ecosystems may be threatened by emerging activities such as the exploitation of marine mineral resources, the development of blue (bio)technologies and cumulative anthropic pressures to the deepest part of the ocean (global warming, pollution, ...). The international community agrees that this lack of knowledge, including the role of these ecosystems in the functioning of the global ocean, can hinder the sustainable use of the ocean using robust ecosystem-based management, and/or lead to the underestimation of the impacts of any exploitation.

After a quick guided tour of these peculiar ecosystems, the objective of this talk is to have an overview of their functioning and knowledge gaps, associated resources and actual or future pressures.