BIOTRANS - A Potential MPA

briefing

Location

BIOTRANS is the acronym for the study site of two successive long term research projects on the carbon flux in the near-bottom water layers and sediments in the deep sea. The research box is situated at 47°-47°30´N, 19°-20° W in the West European Basin, at the foothills of the Mid-Atlantic-Ridge, close to its junction with the Porcupine Abyssal Plain.

Potential Reasons for Selection

The BIOTRANS site was subject to intensive investigations from 1984-1994 and was later revisited several times. The data provide an excellent picture of deep sea abyssal energy flow and an insight into the food webs of the benthic boundary layer and the sediments. This area depicts an example for one type of abyssal plain present in the North-East Atlantic and should be incorporated in a representative network of marine protected areas.

Site description

The BIOTRANS research area in the West European Basin is part of a larger study area investigated by the Northeast Atlantic Monitoring Programme (NOAMP, 1982-1985) in connection with the dumping of nuclear wastes at the Nuclear Energy Agency (NEA) dump site (46° N 17° W). The area is structured by ridges and furrows stretching more or less parallel to the Mid-Atlantic-Ridge (NNE-SSW). Further, a seamount characterized by 3 peaks is rising to about 700 m above the surrounding of an average depth range of 4500-4560 m (Fig.1). The hydrography is characterized by only slight variations of temperature (2.54-2.63° C) and salinity (34.9 PSU). Vertically, the gradients of temperature, salinity and current velocity decrease with decreasing distance to the bottom whereas particle concentration increases. The seafloor shows many „footprints“ of biological activity.

Justification for the Potential Selection of the BIOTRANS Deep Sea Abyssal Plain as an Offshore Marine Protected Area

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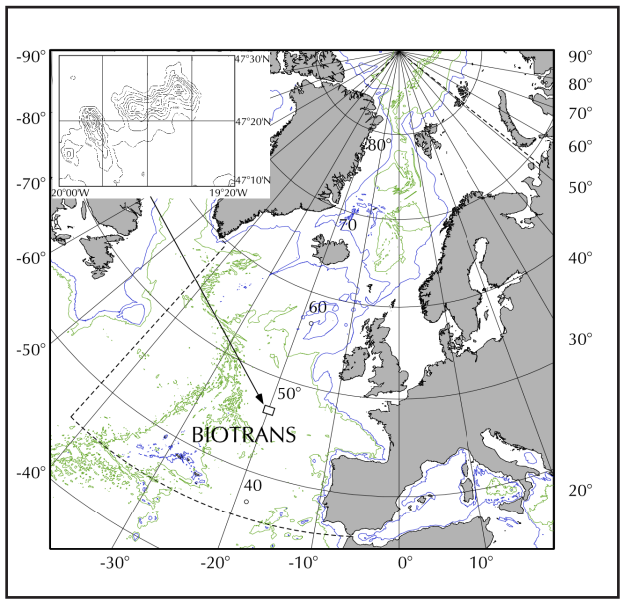

Fig. 1: The BIOTRANS research area. A deep sea abyssal plain in the West European Basin.

Benthic boundary layer

The near-bottom water layer is enriched with suspended matter („marine snow“) up to 1000 m above the seafloor in the plains, caused by the topographically influenced bottom flow resuspending the very fine material, and sometimes significantly enhanced by aperiodic, so-called „benthic storms“. Here, organic material is accumulating as well which seasonally sediments out from the photic zone, finally forming layers or aggregations of phytodetritus on the seafloor. This material is in turn the major food source for the organisms living above, on and in the sediment. Short- and medium-term reactions to pulses of organic material were observed in the benthos and bacteria. In other words, the seasonal pulses of organic matter drive the deep-sea ecosystem.

The fauna of the benthic boundary layer

The deep sea floor is known to support a remarkable faunal biodiversity. At a global scale, deep sea sediments have been estimated to contain between 500,000 and 10 million species of macrobenthos alone. A single square meter of sediment may accomodate 250 species of macro- and meiobenthic invertebrates. Polychaetes, nematodes and copepods are the most abundant groups within the meio- and macrofauna at the usually soft-bottomed BIOTRANS site. Occasional stones and pebbles give substrate to sea anemonies and sea pens which are the most commonly found members of the megafauna, the larger animals living on the sediment. Sponges, sea cucumbers and crinoids also frequently appear on bottom photographs, whereas crustaceans, gastropods, cephalopods, sipunculids and madreporarians only occur in low numbers. The density of the larger animals living on the sediment, the megafauna, amounts to 2.5 per m^2.

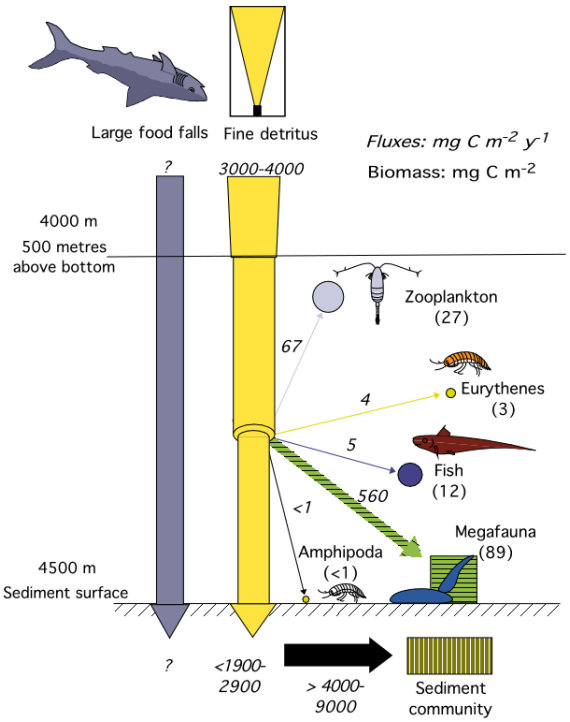

Fig. 2: Carbon flux in the deep sea benthic boundary layer. Episodic large food falls and sedimentation events directly reach the seafloor. Courtesy of B. Christiansen, GEOMAR Kiel.

The benthopelagic community which lives in the water column, but is associated to the seafloor, consists of a wide variety of zooplankton and nekton species, including large scavenging amphipods and fishes. Apart from planktic bacteria, zooplankton accounts for more than 60 % of the total benthopelagic biomass at the BIOTRANS site, whereas fish species contribute 31 % and amphipods 2 %. The fish fauna at BIOTRANS is dominated by several species of rattails, only deep sea eels also occurring in significant numbers. They are generalist feeders with a very low metabolism. Little is known about their reproduction patterns, generation times and longevity. This composition of the megafaunal and benthopelagic communities is site-specific and probably depends on the surface production pattern. At the BIOTRANS site, a fine rain of detritus seems to support a comparatively large biomass of suspension feeding megabenthos and zooplankton, whereas in other deep-sea areas, a more or less regularly occurring input of large food falls, e.g. in the form of dead cephalopods, sustains high abundance of scavenging fish and amphipods.

Threats

At present, no immediate threats are evident. The site is in an (almost) natural state, irrespective of the remainders of ship traffic on the surface. However, options for disposal of wastes of several kind in the deep sea are discussed.

Management Issues

This area should be set aside as a Marine Protected Area (MPA) for research purposes. With regard to the recent developments in climate research, long term datasets from the deep sea are precious reference points for undisturbed natural variability of the ecosystem, particularly in the light of observed long-term faunal changes in the deep sea.

Legal aspects

The BIOTRANS site is located in the OSPAR Maritime Area in international waters - in the „High Sea“ according to the UN Convention on the Law of the Sea (UNCLOS). Special provisions apply to the seabed beyond the continental margin, „the Area“. The Area and its resources are declared to be the „Common Heritage of Mankind“. Contracting parties to UNCLOS have the general obligation to „protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life“ (Article 194(5)). It may adopt appropriate rules, regulations and procedures for, *inter alia*., the protection and conservation of the natural resources of the Area and the prevention of damage to flora and fauna of the marine environment. Furthermore, the Convention on Biological Diversity obliges its Contracting Parties to conserve and sustainably use biodiversity by *inter alia* creating protected areas (Article 8(a)). This obligation is reflected by Annex V of the OSPAR Convention. However, no legal regulations exist for the establishment and implementation of Marine Protected Areas (MPAs) in „the Area“. So far, the mandate of the International Seabed Authority (ISA) is limited to environmental protection in the context of exploitation of mineral resources, having developed a mining code for manganese nodules and being in the state of developing similar codes for the exploitation of polymetallic sulphides and cobalt crusts (by 2001), and further envisaging regulations on genetic resources and gas hydrates to be in place at a later stage.

Action required

Legal regulations for the establishment and implementation of marine protected areas in „the Area“ are required. This should be part of the Law of the Sea, hence it is a matter of the United Nations. In order to raise this at the UN General Assembly in the framework of its debate on „Oceans and the Law of the Sea“, OSPAR should formally support Contracting Parties to put the issue of MPA s in „the Area“ onto the UN agenda.

Text prepared by Sabine Christiansen

References / Further Reading

Christiansen et al. (in press). The structure and carbon demand of the bathyal benthic boundary layer community: a comparison of two oceanic locations in the NE-Atlantic. Deep Sea Research II.

Grassle and Maciolec (1992). Deep-sea species richness: regional and local diversity estimates from quantitative bottom samples. American Naturalist 139, 313-341.

Fig. 3: Deep-sea abyssal plain at the BIOTRANS site. Anemonies and „footprints“ of life. Photograph by B. Christiansen