

OASIS

Oceanic Seamounts: An Integrated Study
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Meteor / Interview

Dave Billett (left) and Bernd Christiansen (right) on board the RV Meteor November

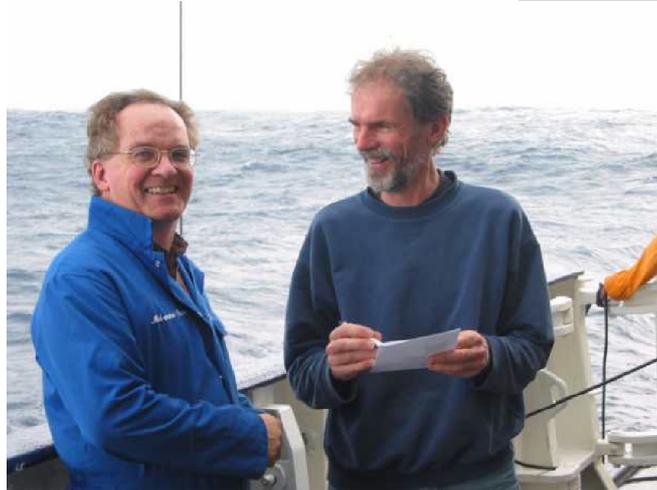


Photo: Tim Beck

Where are you going?

The first leg of this cruise is studying the biology, chemistry and physics of seamounts in the North East Atlantic as part of a EU funded research project called OASIS (Oceanic Seamounts – An Integrated Study)

We are focusing on two study sites: the Sedlo Seamount about km north of the Azores and the Seine Seamount about km northeast of Madeira. We have just finished work at Sedlo and are now heading to Seine.

Who is participating in the cruise?

On board the ship are scientists, technicians and students from European research institutes and universities, among them experts in physical oceanography, biogeochemistry, deep sea biology and feeding ecology.

Why did you choose the Sedlo and Seine Seamounts?

The Sedlo and Seine Seamounts are located within European waters and lie within the same biogeochemical province. They are isolated from other large underwater elevations and so the processes we are studying at each site relate only to that particular seamount. Nevertheless, the seamounts are close to together and may therefore be sampled during one single cruise. Their proximity to Madeira and the Azores means that they can be reached by small vessels.

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interview

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What do the seamounts look like? How do they differ?

The seamounts differ in their shape, summit depths, and degree of exploitation.

Seine is a classical near-circular seamount with a flat summit plateau about 1000 m below the ocean surface and very steep flanks reaching down to a depth of more than 2000 m. It is certainly affected by commercial fisheries.

Sedlo has an elongated shape with three summits rising from nearly 1000 m to a little more than 2000 m below sea level. It is thought to be little, if ever, affected by human activities.

What are you studying during the cruise?

We are studying the currents and water masses around the seamounts, as these have important effects on the seamount ecosystem. The biogeochemists sample organic particles in the water column and analyse their origin, abundance, and quality, e.g. nutritional value. These particles may be an important food source for animals in the water column as well as on the seafloor.

The biologists take samples at various levels of the water column with multiple plankton nets, with a special focus on the vertically migrating animals of the so-called "deep scattering layer" (a horizontal zone of living organisms that migrate towards the ocean surface at night). These pelagic animals are supposed to be very important for maintaining the productivity of the seamount ecosystem. Videos and photographs are used to estimate the abundance and composition of the larger bottom-living organisms, while the smaller animals that live within the sediments are being sampled and analysed on board.

Is there still much to discover in the region in terms of seamounts?

Yes, certainly. Very few seamounts in the North East Atlantic have been studied systematically. Almost no studies exist on the ecology and ecosystem function of these seamounts. There is no information on how the fauna relates to the species found on the Mid Atlantic Ridge or on the continental slope. The seamounts' existence, however, is fairly well known on seabed charts. The difficulties of working in a hostile mountain terrain has meant that there have been few expeditions to features such as seamounts in the past.

Can you describe the seamount scenery you have seen?

We video filmed at different parts and heights of the seamount. A typical scenery on the summit of Sedlo shows large areas of bare rock, sometimes with a thin layer of sediment, and also boulders and stones of different size. On the rock, we find a variety of attached living animals, for example sponges, black corals, stony corals, sea lilies, and sea anemones, as well as moving animals such as seastars and crabs. Shrimps and fish, particularly sharks and deep sea eels, swim close to the seabed. We are not sure yet if the fish and shrimps, which migrate vertically over several hundred metres, reach the water near the bottom and thus come into contact with the fauna living at the bottom. We hope to use marker techniques to see if this occurs.

Did you find any corals growing on the seamounts?

Only a few colonies of coral have been seen on Sedlo, the largest about the size of a frying pan. This may indicate that larger corals occur close by, but we have no evidence of large deep water coral communities. In the time available, we have only been able to photograph an area of seabed equivalent to a few football pitches, so the apparent absence of corals so far may be the result of the amount of sampling effort.

What else have you seen?

We saw only a few animals around the ship at Sedlo Seamount. Single seagulls, shearwaters, and storm petrels were observed, as well as a few sea turtles and dolphins. During the night, we have observed large squid and Atlantic saury being attracted to the lights of the ship. Greater abundance of life around Sedlo is not obvious.

Have you found anything unexpected during the cruise so far?

We were a bit surprised that strong currents sweep over Sedlo at times. This means that most of this seamount is bare rock — there's very little soft sediment. There is some sediment on the top of the seamount, which is rippled, indicating strong currents.

The so called "signal" of the Mediterranean Sea water mass found in a large area of the North East Atlantic between depths of 1000 and 2000 m is mixed very quickly by the currents sweeping around the seamount. There is evidence of Mediterranean Sea water to the east of Sedlo but at stations only a few miles away to the west of the summit the Mediterranean Sea signal has disappeared and the water from the Mediterranean has been mixed with Atlantic water.

Are the seamounts damaged or pristine?

So far we have not seen any damage at Sedlo Seamount. This is not surprising because we could monitor only a small area. To our knowledge, no deep sea trawling has been performed at Sedlo except for an exploratory fishery in

What role do seamounts play in the North East Atlantic Ocean?

Seamounts are isolated environments and as a result are believed to have a high number of endemic species — species that are not found anywhere else in the world. However, the apparent restricted distribution of these species may be because so little sampling has been done in the deep sea. OASIS is trying to find out if this is the case.

Seamounts also act as stepping stones for the dispersal of species across the oceans. OASIS is studying the degree to which the seamount fauna resembles that found on the continental slopes in the western and eastern North Atlantic Ocean.

In addition, seamounts act as stirring rods in the ocean, mixing nutrients such as nitrogen and phosphorous into the surface waters. Consequently, there is greater plankton growth and more food for higher animals. With greater abundance of animals, there is scope for more species, so seamounts are often seen as oases in the ocean.

What is the biggest threat to seamounts in the North East Atlantic and worldwide?

At the moment, the biggest threat to seamounts worldwide is fishing. Examples from several seamounts in the world clearly show that under heavy fishing pressure, commercially valuable seamount fish stocks are depleted in only a few years. Further damage is done by trawling to the benthic communities. The loss of top predators and the physical disturbance of ecosystems affects the balance of life on the seamount and may lead to biodiversity loss.

How can we make sure seamounts are protected for the future?

Exploitation of seamounts in the North East Atlantic should only be carried out once the consequences of fishing on seamount ecosystems are understood, in terms of the loss of unique species and ecosystem function. We need to understand to what extent seamounts are fragmented or inter-related, so that sustainable fisheries can be maintained. It may be necessary to take an ecosystem management approach to the whole of the North East Atlantic rather than only creating management plans for individual seamounts.

Thank you