

2nd Weekly Report on the Cruise Leg SO308/2 from Fremantle, Australia, to Wellington, New Zealand, covering the period from 30th of December 2024 to 5th of January 2025

Current Position: 39°19.2'S 143°52.3'O in Bass Strait between Australia and Tasmania

In the last week, we continued our station work with one station per day along the cruise track eastwards off the southern Australian coast. We saw substantial differences in biomass, species composition and vertical distribution of phytoplankton algae and zooplankton species between the different stations.

At the first three westernmost stations, zooplankton biomass was rather low, and the majority of phytoplankton algae occurred relatively deep between 50 and 100 m water depth forming a deep chlorophyll maximum. In contrast, the phytoplankton production was highest in the surface layer at the following three stations, and large masses of copepods (tiny crustaceans) fed on phytoplankton algae.

From Saturday to Sunday morning, we conducted a 24 hours station over the continental rise with repetitive sampling at the same position during daytime and night in order to study diel vertical migrations of zooplankton organisms and other mesopelagic animals.

Small problems with the water sampler rosette and at one of our Multinets could be solved by the very skilled and helpful technicians of the Scientific Technical Service (WTD).

With this weekly report, the researchers from the University of Hamburg would like to report about their studies on the smallest plankton organisms and on primary production by phytoplankton.

Pico-, nano- and microplankton (size classes from 0.2 to 200 µm) form the base of the food web in the ocean. In order to analyse the different communities of these organisms and their dependence on physical factors and the available nutrients, we use a variety of methods. We collect water from different depths with the rosette water sampler attached to the CTD sonde, from the surface layer, from the chlorophyll maximum and from 10 metres above and below the chlorophyll maximum. In the lab on board, the primary production potential of phytoplankton is estimated with a special device based on the fluorescence characteristics of the phytoplankton at different light intensities. Together with the light measurements of the CTD, it is then possible to estimate the potential primary production of the phytoplankton community.



Ein spezielles Fluorometer zur Abschätzung der potentiellen Primärproduktion des Phytoplanktons bei verschiedenen Lichtintensitäten.

A special fluorometer (LABSTAF, Chelsea Technologies) designed to estimate the primary production potential of phytoplankton at different light intensities.

Foto: van Beusekom

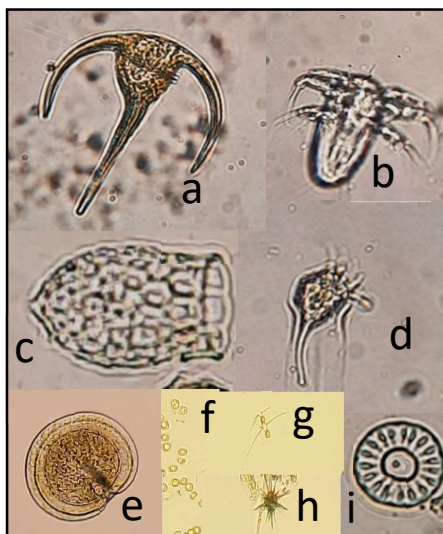
Part of the water samples is filtered in order to subsequently determine the chlorophyll a content at different depths on board. The chlorophyll a content can be taken as a measure for the phytoplankton biomass. In addition, these measurements can be used to calibrate the fluorescence sensor on the CTD.

Further water samples are preserved in order to determine the phytoplankton species composition in the home laboratory. Water samples from the four depth layers are deep-frozen for later analysis of nutrients. To determine picoplankton composition, small quantities of water are sent deep-frozen to the institute in Hamburg.

The microplankton is caught with nets. One of these nets, the “Bottle Net” with 20 µm mesh size, is integrated into the CTD/rosette water sampler frame and can fish any previously selected depth range by opening and closing using the CTD. The Apstein net (0-10 m, 20 µm mesh size) is used to collect samples for the analysis of the stable isotopes of nitrogen and carbon as well as for studying biodiversity and abundance of microplankton organisms in the upper 10 metres.

In addition, a multiple opening and closing net Multinet Midi with five nets, with a mesh size of 55 µm, is deployed to a depth of 200 metres, at two stations on the continental slope down to 1000 metres, to study the vertical distribution of the organisms. The samples are preserved and later weighed, counted and taxonomically analysed in the home laboratory.

Organismen aus dem “Bottle Net”/ Organisms sampled with the “Bottle Net”:



a: Ceratium (Dinoflagellata), b: Nauplius (Crustacea),
c + d: Tintinnida, e: *Noctiluca* (Dinoflagellata),
f + g + i: Bacillariophyta, h: Radiolaria

Fotos: Kofler

Probe aus dem Multinetz aus 1000 bis 800 m Tiefe
Multinet sample from 1000 to 800 meter depth



Foto: Winterhof

Besides the smallest organisms in the sea, we also observe the largest. During our seabird and marine mammal sighting survey, we spotted several albatross species following RV SONNE. We also saw seals and different whale species including a large group of about 50 pilot whales, which approached the vessel during station work on New Year. The whales seemed to be as much interested in us as we were in them.

Best regards and a Happy New Year 2025

On behalf of all cruise participants,

Holger Auel

Chief Scientist SO308/2