

FROGS: FRONTAL ORGANIC MATTER GOVERNING BENTHIC ECOSYSTEM STRUCTURES (NEW ZEALAND)

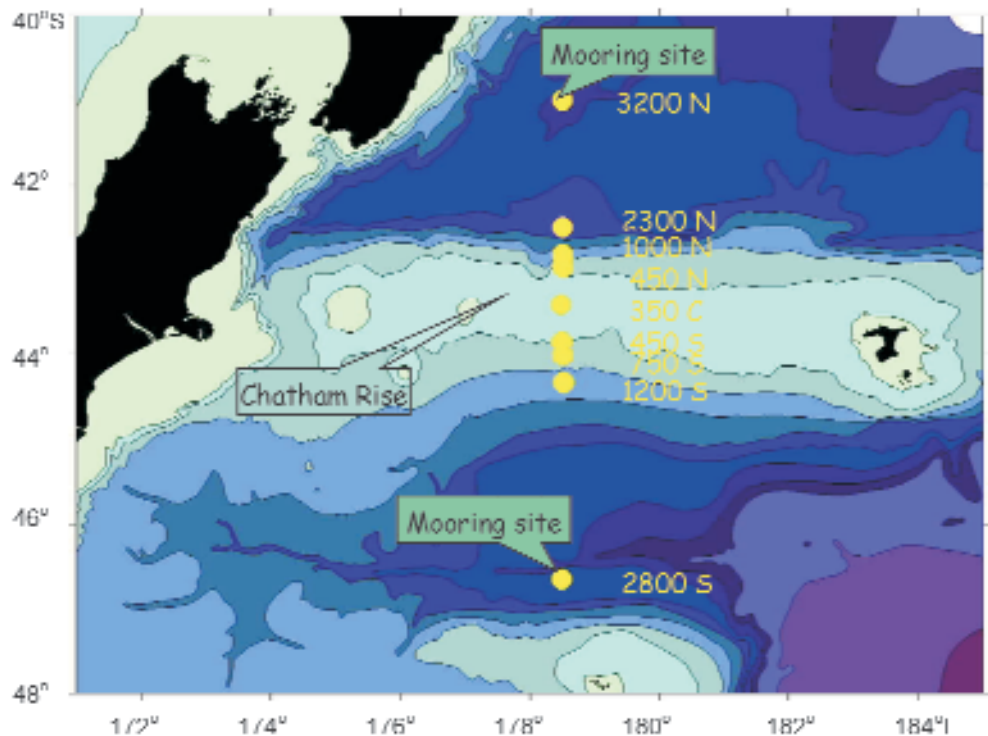
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In a cooperation between NIWA (National Institute of Water and Atmospheric Research, New Zealand) and NIOZ, 3 cruises with the RV. Tangaroa were carried out in Oct. 2001 and in March and November 2002 to the oceanic Subtropical Front east of New Zealand. The purpose of this multi-annual NIWA project is to study the spatial and temporal variation in the particle export from the front to the deep sea floor and the ways in which this affects the composition and activity of the benthic community. As these frontal zones are considered to act as a strong regional carbon sink in the global carbon cycle, it also serves a global interest to study these systems in much more detail. The study area was east of New Zealand where the STF is topographically fixed by the relatively shallow Chatham Rise (CR). Above the Chatham Rise warm nutrient-poor but Fe-rich subtropical water meets colder nutrient rich, and Fe-poor subantarctic water. The Chatham Rise is an important area of deep-sea fisheries, which is indicative of the high biological production in the overlying waters. Apart from the commercial fish stocks, however, little was known on the sediment and the infauna at the rise and about the influence of the overlying front on biodiversity in general.



A strange isopod (*Acutiserolis* sp.) of 4 cm from 2300 m depth.

The Chatham Rise, east of New Zealand, with the sampled stations on a north-south transect. The ALBEX-landers have been deployed at about 3000m for more than a year at the two "mooring-sites".



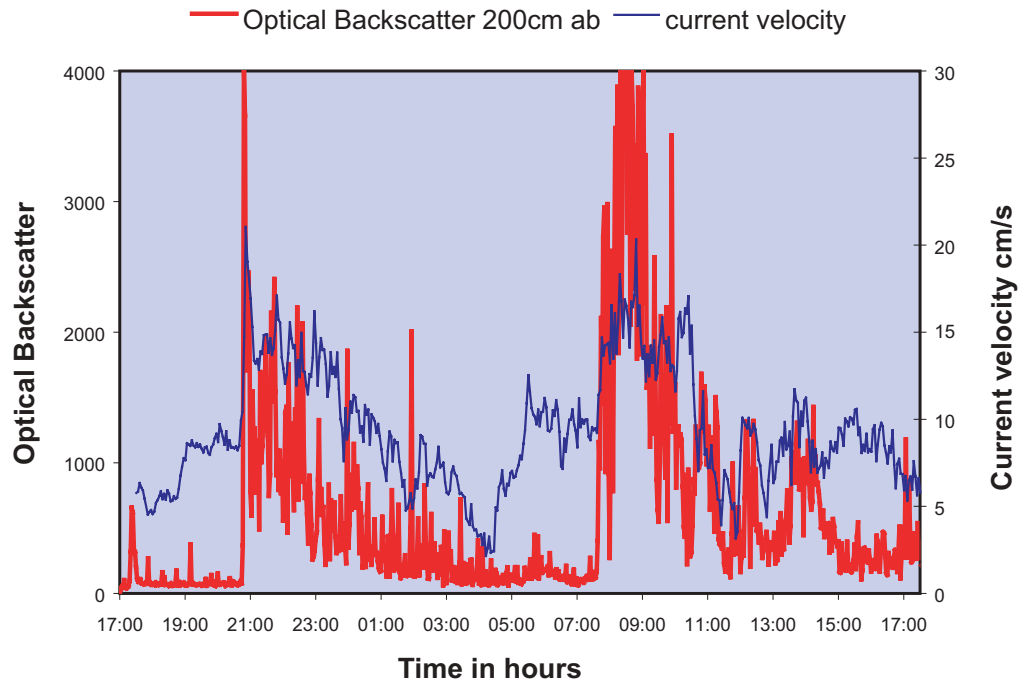
In combination with and in close vicinity of NIWA sediment trap moorings, two ALBEX landers were deployed for a total period of 1 year. Instrument packages on the NIOZ landers consisted of flux chambers, sediment trap, optical backscattering sensors, current meters and video. The combined deployments of NIWA and NIOZ instruments will enable us to trace the fate of particles and events occurring in the top of the water column down to the seafloor. In conjunction with these measurements, an inventory was made of the benthic infauna and epifauna across Chatham Rise by scientists of NIWA, Dunedin University and NIOZ using grabs and trawls. The role of individual taxa in the sequestering algal carbon was assessed by in-situ experiments with labeled algal tracers and gut contents analyses of algal pigments and derivatives.

The benthic epifauna on the slopes of Chatham Rise was sampled and filmed with a NIOZ video trawl at depths between 350 m and 2800 m the latter being the first records from these large depth. Not surprisingly several species new to the New Zealand fauna were found. Trawling showed an enhanced epifauna biomass on the upper part of the southern slope of CR between 350 and 1200 m depths. The



The Orange Roughy, a commercial deep-sea fish in New Zealand waters

A one day record of the optical backscatter and currentmeter signal measured with the ALBEX-lander at the 750S station to show the close relation between resuspension and current velocity.



same zone was found to be covered with an exceptionally thick layer of diatomaceous fluff during the cruise. Such dumps had not been recorded previously and might not be incidental judging from the elevated biomass. Part of the phytodetritus is consumed by the benthic organisms, as we found in animal guts and in the level of sediment oxygen fluxes. However, we observed that tidal currents caused rhythmic resuspension of the fluffy layer (Fig. #) and further transport most likely to much deeper water surrounding CR. Downward transport of the phytodetritus implies a delayed transfer of carbon back to the productive surface layer. The data from the 1 y deployment of the NIOZ landers at 3000 m depth north and south of CR will show whether this transport takes place and the effect it has on the activity of the abyssal sediments.



A seacucumber (Elpidiidae) recorded swimming at 3000 m depth.



The two ALBEX-landers on board of the RV Tangaroa (NIWA, New Zealand)