



SACROSS

M133

(15.12.2016 – 13.01.2017)



4. weekly report from 08. Jan. 2017

The east-west XBT section was completed on January 4 with the 169th drop at the edge of the Patagonian shelf.

Since then we are working in the third and last scientific area of the M133 cruise. We are surveying



M133 crew at the stern of METEOR.

the cold northward flowing Malvinas current and its confluence with the warm and southward moving Brasil current. The confluence zone is characterized with energetic turbulence and sharp fronts between the two water masses. We traversed the front along a section parallel to the shelf and witnessed a drop of sea surface temperatures



Albatros are abundant near the shelf.

of almost 10°C over a 20 nautical mile distance. The main Malvinas current flows along the continental slope as the eastern boundary of the Patagonian shelf region and carried cold and nutrient rich waters on to the shelf. There the intensive sun light and strong stratification yields a strong plankton bloom. The ocean there has an amazingly green color.

Small fish grow rapidly and are the favorite prey of the albatross, which we see here in large numbers. Strong gradients in water mass properties are also visible in the chemical and surface gas measurements we are taking.

Continuous underway measurements have been running almost the whole cruise between South Africa and the Falkland Islands. One part of that is concerned with chemical properties of the ocean. We use well established systems to document the surface gas tension for parameters such as oxygen, carbon and methane. In addition we are testing new sensor systems. The comparison between different systems allows us to determine sensor specific key performance indicators such as accuracy, delays, reliability and stability.



Systems to continuously observe the surface parameter such as carbon dioxide, oxygen and methane. Foto Tobias Hahn.

The underway systems are few with sea water that is pumped from about 6m below the water line into a central distribution unit. Daily discrete samples serve as reference values that are analyzed partly on ship and partly back home in the lab. A large number of parameter can be measured while steaming such as temperature, salinity, water depths, currents, winds and chlorophyll.

Continuous observations of the surface ocean increasingly gains popularity and relevance to better document complex ocean processes of the physical, chemical and biological systems and climate induced long term change. Improved knowledge of the gas exchange of CO₂ between the atmosphere and the ocean allows to estimate regional sources and sinks with improved accuracy and certainty. Today an increasing number of autonomous observing system can be found not only on research vessels but also on cargo and passengers ships. Those additional platforms allow for an improved spatial and temporal coverage.

An additional goal of this cruise is research into the distribution of planktonic foraminifers in the South Atlantic. The carbonate shells of these abundant single cell organisms sink to the ocean floor once the organisms die and contribute to the sediment accumulation and the associated rock formation. Both relative abundance between species and their chemical composition allows to estimate ocean conditions of the past back several tens of thousands of years.

Improved understanding of the habitat of living forams today will help to improve the reconstructions of past ocean climates. We take samples of the upper ocean layers by employing a plankton net system that allows to sample the living forams and at



The Multinet is deployed.

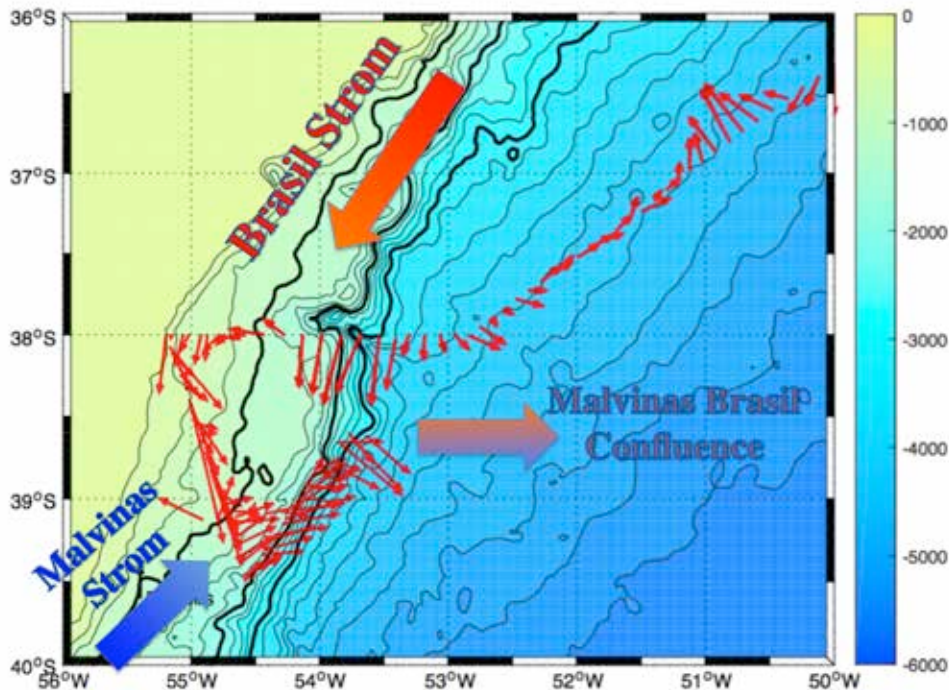


Picking forams.

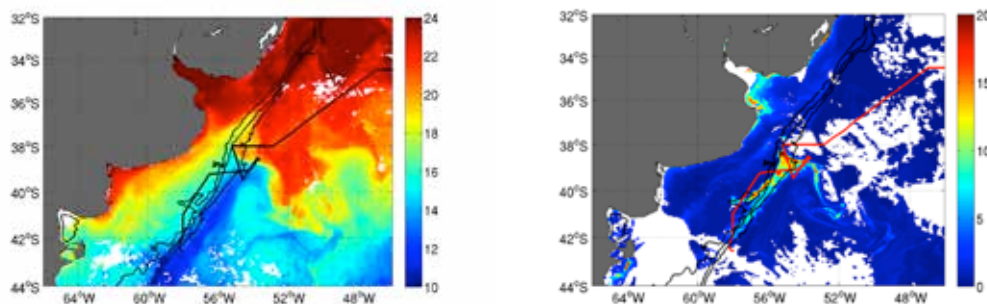
the same time document the environmental conditions in which they are living.

The attribution and classification of different types of forams is done by classical taxonomic analysis under the microscope but also using modern genetic DNA barcoding for marine organisms.

The survey of the Malvinas current brought us south into colder regimes. The sea surface temperatures have dropped this week by 10°C and reached values near 13°C. The air has cooled as well, became clearer and the weather brings every other day some strong and stormy winds.



Map of the water depth and ADCP currents in 20m depths. Typical velocities range from 0.5 to 1.0 m/s. The highly dynamic nature of the currents near the shelf are visible.



Map of surface temperature (left) and chlorophyll (right) and the ship track.

The mood on board remains excellent and the food is still enjoyable. The collaboration with the captain and his crew remains outstanding.

With best wishes from 44° South and 58° West,

Martin Visbeck and the Crew of the M133 expedition.

More information can be found in the blog:

<http://www.oceanblogs.org/mysciencescruise>