Short cruise report ANT-XXVII/3 (08.02.2010-18.04.2010 / Punta Arenas - Cape Town)

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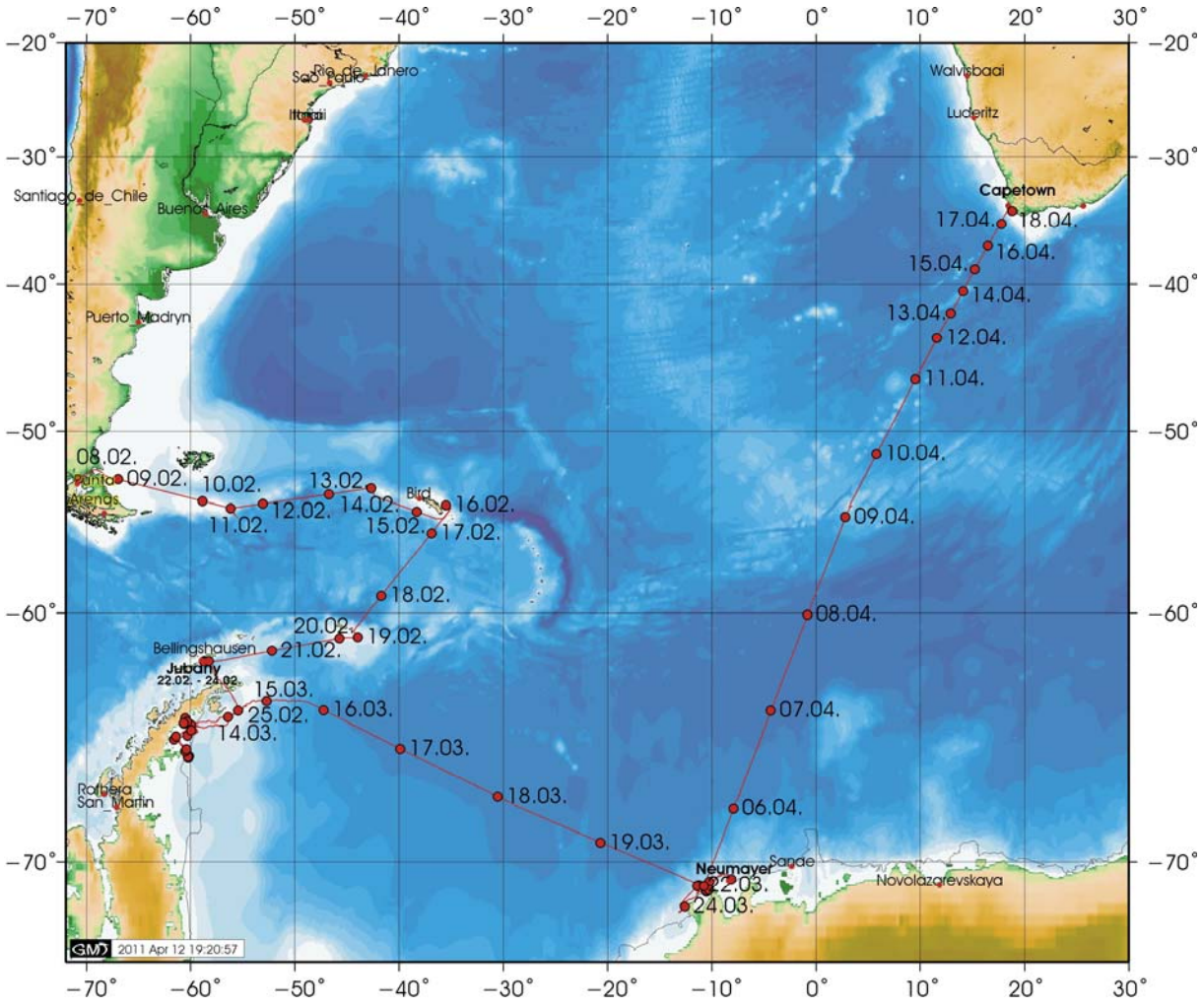
The expedition ANT-XXVII/3 aims on investigating the potential effects of climate change on biodiversity and ecosystem functioning in sub- and high-Antarctic regions and was part of the international SCAR program “Biodiversity and Evolution in the Antarctic: The response of life to change” (EBA). Based on data and results obtained during former expeditions, this expedition focused on three main topics:

1. Zoogeography and biodiversity in the sub- and high-Antarctic and the genetic and physiological processes regulating species diversity and dispersion.
2. Pelago-benthic-coupling processes and impact of climate induced changes on the food web.
3. Impact of changing shelf ice dynamics on the biodiversity of the benthic and demersal fish communities on the self.

With the exception of some deeper plankton stations, the studies concentrated on shelf and slope communities down to about 600 m water depth. Investigation areas included the sub-Antarctic islands in the Scotia Sea and Bouvet Island, as well as high-Antarctic shelf areas in the western and eastern Weddell Sea. In all areas studies on biogeography, genetics, ecology and physiology of zooplankton, benthos and fishes were carried out. For specific long-term experiments live animals were caught and will be transferred to the AWI laboratories in Bremerhaven. The 3rd leg of "Polarstern" expedition ANT-XXVII started on the 8th of February 2011 20:00 in Punta Arenas, Chile. Under good weather conditions the ship sailed towards the first sampling location on Burdwood Bank, where scientific work started at the 11.02.2011. The planned sampling work in the Scotia Sea was fulfilled and Polarstern reached the Dallmann Laboratory at Jubany Station (King George Island) on the 22.02.2011. During day time the Dallmann supply was done including personnel exchange (two geophysicists from board / one biologist on board). After two days of field work off King George Island, Polarstern sailed through the Antarctic Sound and reached the former Larsen AB ice shelf areas on the 26.02.11 where an intensive working program started. Nearly all sampling sites from a former expedition in 2006/07 could be resampled and two additional new sites at the edge of the Larsen C ice shelf were investigated. During our work in the Larsen embayments we experienced exceptional weather phenomena in form of foen situations with air temperatures up to +9°C. Helicopter flights gave evidence for a progressive melting of the remaining ice shelf indicated by large lakes and water run offs from the ice shelf edge. The Larsen C area is characterized by a very poor benthic community. In Larsen B no visible changes took place between 2006 and now. In the area of Larsen A early succession stages of the benthic community became obviously. On the 13.03.2011 we finished our work at Larsen and Polarstern sailed to the eastern part of the Weddell Sea where we reached our experiment field 'BENDEX' in the vicinity of Austaasen on the 20th of March. Here another intensive working program was carried out. ROV videos and the videos from the multicorer showed that after our artificial disturbance experiment in 2003 no significant recolonisation has taken place, although adult benthic species are living directly adjacent to the study site. As also seen in the Larsen embayments recolonisation of the sea floor seems to be a very long lasting process in high-Antarctic waters. On the 26.03.2011 Polarstern was heading towards the Atka Bight to supply the Neumayer III station. The next day the scientific program was continued in the BENDEX area. From the Atka Bight to Kapp Norvegia the ice shelf edge was measured by Helicopter GPS. A comparison with data from 1996, 2000 and 2003 showed a highly dynamic ice shelf situation. In some areas the ice shelf decreased between 1996 and 2000, but increased again between 2000 and 2011. During our work, the air temperature decreased significantly. The working conditions on deck at -27°C (wind chill -53°C) became difficult and the very quick development of fast ice required the full nautical ability of the ship. On the 05.04.2011 the work in the eastern Weddell Sea was successfully finished. After a deep plankton station at 2000m on the 06.04.2011 Polarstern headed to Bouvet Island, where the scientific program had to be reduced to one CTD and two bottom trawls, due to stormy weather conditions. A storm with hurricane force wind, approaching the area of

Bouvet, forced us to leave the area immediately. Polarstern arrived in Cape Town on the 18.04.2011 in the early morning and the 3rd leg of ANT-XXVII/3 finished.



Course plot of ANT-XXVII/3 (Red points are daily positions and do not indicate working areas)