

Foreword

The second IBMANT Symposium & Workshop was held in Ushuaia (Argentina) between October 19 and 24, 2003. It was organised jointly by the Alfred Wegener Institute for Polar and Marine Research (AWI, Bremerhaven, Germany) and the Centro Austral de Investigaciones Científicas y Técnicas (CADIC, Ushuaia, Argentina), and was combined with the ANDEEP Symposium dealing with recent deep-sea research in the Weddell and Scotia seas (see Deep-Sea Res. II Vol. 51, 2004). IBMANT II, following a first conference held in Punta Arenas, Chile in 1997 (see *Scientia Marina* Vol. 63, Suppl. 1, 1999) focussed on continental shelf and slope work over a wide latitudinal gradient between the northern Magellan region and the high Antarctic continental coasts. A total of 117 scientists from 13 countries participated in the combined meeting, and presentations were offered from 17 countries.

The idea of combining Antarctic deep-sea with shelf and slope studies, and including a wider geologic and oceanographic background, turned out to be very useful during this conference. The IBMANT/ANDEEP meeting was the first in which the two aspects were combined, leading to novel insights and innovative perspectives for research in the years to come.

The presentations and discussions during the meeting focussed on various central issues, most of which emerged repeatedly. In summary, major subjects discussed during the conference included the following items:

The final separation and isolation of the Antarctic continent, going along with the establishment of a vigorous circum-Antarctic current system and the origin of the Polar Front. These key events are supposed to have shaped the evolution, biogeography and biodiversity of the Southern Ocean. However, the various geological alternatives for these processes—in particular the opening of Drake Passage—have yet to be reconciled with molecular data on major extinction and radiation events. Perhaps the much greater similarity between the Antarctic and Magellan marine biota, as compared to the overlap between the Antarctic and Australia, could be a biological key in this context.

Advances and retreats of the Antarctic and Patagonian ice caps as further major driving forces on evolutionary time scales, and the impact of sea ice, glaciers and icebergs, i.e. present disturbance leading to ecological change. How much do we know about these processes?

The “barrier” effect of the Polar Front (Antarctic Convergence). To what extent is it reduced by eddies causing a certain amount of cross circulation? What role in these processes do the northern and southern branches of the Scotia Arc play? Do they act as stepping stones for biotic exchange between the Magellan region and the Antarctic?

The Circumpolar Current (West Wind Drift) and its role as an efficient transport vehicle towards the east. Is this function restricted to species with well-developed dispersal stages such as pelagic larvae? Are there other (including anthropogenic) means of dispersal? Is there any transport in E-W direction, e.g. by the East Wind Drift?

The degree of similarity between the marine biota of the Magellan region and their Antarctic relatives. How much overlap is there at species (genus, family) level in different taxa? What is the age of the present marine ecosystems on either side of the Drake Passage? Are there still effects resulting from the last glaciation?

The predominantly circum-Antarctic benthic distribution pattern on the Antarctic continental shelf has become a paradigm. However, what percentage of this “identical” fauna are cryptic species, as suggested by molecular methods? Is the high Antarctic an isolated ecosystem under present conditions, with speciation occurring rather by isolation than by exchange?

The ways of biotic exchange in the past, the role of the deep sea in these processes, emergence and submergence, radiation *in situ*. What was the respective role of these processes, particularly that of the deep-sea floor for Antarctic benthos?

The possibility of increased invasions due to global climate change. Present warming might enhance invasions into areas south of the Polar Front, because survival might be favoured due to reduced temperature differences. Are there any indications for such a development? In what way might it influence the existing communities, and what are the timescales we are dealing with?

Latitudinal clines in species richness. There does not seem to be a common pattern for all taxa, but is the paradigm of the “bell-shaped curve” with decreasing species numbers toward the pole true for some groups? To what extent do regional hotspots refer to sampling intensity rather than real differences in species diversity?

Characteristics of cold-water life histories, population dynamics and reproduction. Are there particular patterns in the Antarctic, and is there a latitudinal gradient from the Magellan region to the high Antarctic shelf? How strict are these rules?

Characteristics of cold-water physiology, especially stenothermy vs. eurythermy. What are the advantages and disadvantages of increasing stenothermy on the latitudinal gradient? Are there exceptions to such a cline, and how do species manage? Do things differ under the aspect of global warming? To what extent may temperature tolerance have influenced biogeography and biodiversity of the Southern Ocean in Earth history?

The impact of increased UV-B radiation on marine biota along the latitudinal gradient. Have increased UV values led to damage in shallow water organisms? What are the protective mechanisms? Are such mechanisms more frequent at higher latitudes?

Benthic assemblage structure along the latitudinal gradient. Are there consistent clines along this gradient, e.g. in abundance, biomass, productivity, distribution and diversity? Can data banks be helpful in managing the enormous amount of data assembled in the last few years?

Of course, not all of these questions were answered comprehensively during the Conference, but many of them received some clarification during the presentations and the discussions following them, and most were discussed in detail during the workshop that followed the oral and poster sessions (see Summary Review at the end of this volume). While it turned out advantageous to have colleagues from a wider frame of disciplines included in these discussions, it was felt that a future IBMANT meeting should be even more multidisciplinary, including an adequate share of physical oceanographers, geologists, palaeontologists and glaciologists.

The editors of this volume hope that the Ushuaia IBMANT Symposium and Workshop will have a strong impact on future activities in ecological and evolutionary research in the Southern Ocean. They would like to express their sincere thanks to all the organisations and institutions that contributed substantially to the success of the meeting and these proceedings.

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