

Final project report

<i>Project ID</i>	2004/8.5
<i>Title</i>	Marine Observatory of Antarctic Specially Protected Area - Terra Nova Bay (MOA-TNB)
<i>Principal investigator</i>	Paolo Povero
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<i>Duration</i>	3 years
<i>Assigned funding</i>	100.000,00 Euro

Activities and results

The shelf area of Terra Nova Bay is one of the few temporary ice free areas in the Ross Sea and presents peculiar ecological features, compared to other areas of the Victoria Land coast: higher productivity and abundance in zooplankton and a benthic community characterized by a remarkable species richness. For this reason, since 2003, part of this coastal marine environment is an Antarctic Specially Protected Area ASPA (n.161).

During the austral summer, research activities were carried out in several stations on the shelf area of Terra Nova Bay (Faraglione, Portofino and other locations inside and outside the ASPA) in order to study the most relevant environmental variables (physical, chemical and biological) along the water column and main coastal coenosis structures over time.

The study, in Terra Nova Bay and Italy, focuses on the pelagic and benthic marine ecosystems and the ecological processes which link meteorological conditions and the pack ice evolution to the biological dynamics at different trophic levels. Interannual cycles and/or trends in the annual extent of pack ice impact all levels of the food web, from total annual primary production to higher trophic levels (zooplankton, nektonic and benthic community). In order to assess the importance of these processes on the sediment features, special emphasis was placed on the benthic community, with detailed studies related to sponge, polychaete, mollusc and echinoderm community structure (species composition and biomass).

In order to manage the multidisciplinary environmental data (data acquired during PNRA Expeditions in TNB area and Ross Sea), a dedicated WebGIS, MACISTE ICE system (MARine Coastal Information SYSTEm, <http://www.ice.macisteweb.com>), has been developed. This system (Portal, Geodatabase, GISClient) offers suitable outputs and cartographic products specialized for polar regions. It allows the insertion of new sections dedicated to data elaboration and modelling with the new open source software. In the next future, this system will be also implemented to manage the data acquired by means of automatic instruments.

It is important to have a significant data-base of the main marine environmental variables in a pristine coastal area, as Terra Nova Bay, for the understanding the current changes and to provide short and medium term forecasting. Thanks to this multidisciplinary approach (start in the 1990) since 2007 TBN it is also an International Long Term Ecological Research (ILTER) site. LTER Program supports fundamental research on ecological phenomena occurring over long time periods and across a wide range of geographical scales.

Products

A – papers in scientific magazines

1. Mangoni O., Modigh M., Conversano F., Carrada G.C. and Saggiomo V. 2004. Exceptional summer ice coverage in the Ross Sea, Antarctica: implications for phytoplankton composition and biomass. Deep Sea Res. I, 51,1601-1617.
2. Schiaparelli S., R. Cattaneo-Vietti, P. Mierzejewski 2004 A "protective shell" around the larval cocoon of *Cephalodiscus densus* Andersson, 1907 Graptolithoidea (Hemichordata). Polar Biology, 27: 813-817.
3. La Mesa M., M. Dalù, M. Vacchi, 2004. Trophic ecology of the emerald notothen *Trematomus bernacchii* (Pisces, Nototheniidae) from Terra Nova Bay, Ross Sea, Antarctica. Polar Biol. 27: 721-728.

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4. Regoli F., Nigro M., Chierici E., Cerrano C., Schiaparelli S., Totti C., Bavestrello G., 2004 Variations of antioxidant efficiency and presence of endosymbiotic diatoms in the Antarctic porifera *Haliclona dancoi*. *Marine Environmental Research*, 58: 637–640.
5. Vacchi M., M. La Mesa, M. Dalù, J. MacDonald, 2004. Early life stages in the life cycle of Antarctic silverfish, *Pleuragramma antarcticum* in Terra Nova Bay, Ross Sea. *Antarctic Science* 16 (3): 299305.
6. Chiantore M., M. Guidetti, M. Cavallero, F. De Domenico, G. Albertelli, R. Cattaneo-Vietti, 2005. Sea urchins, sea stars and brittle stars from Terra Nova Bay (Ross Sea, Antarctica). *Polar Biology*, 29: 467475.
7. Heilmayer O., C. Honnen, U. Jacob, M. Chiantore, R. Cattaneo-Vietti & T. Brey, 2005. Temperature effects on summer growth rates in the Antarctic scallop, *Adamussium colbecki*. *Polar Biology*, 28: 523527.
8. Dalla Riva S., Abelmoschi M. L., Grotti M., Soggia F., Bottaro M., Vacchi M., 2006. The occurrence of lead in the bone tissues of *Trematomus bernacchii* (Terra Nova Bay, Ross Sea, Antarctica). *Antarctic Science*, 18(1): 75-80.
9. Guidetti M., S. Marcato, M. Chiantore, T. Patarnello, G. Albertelli & R. Cattaneo-Vietti, 2006. *Adamussium colbecki* population structure in the Ross Sea. *Antarctic Science*, 18: 645-653. IF 1.265
10. Misic C., Castellano M., Ruggieri N., Povero P. 2006. Dissolved organic matter characterisation and temporal trends in Terra Nova Bay (Ross Sea, Antarctica). *Estuarine, Coastal and Shelf Science* 70, 405-414.
11. Povero P., Castellano M., Ruggieri N., Ponticelli S.L., Saggiomo V., Chiantore M., Guidetti M., and Cattaneo-Vietti R. 2006 Water column features and their relationship with sediments and benthic communities along the Victoria Land coast, Ross Sea, summer 2004. *Antarctic Science* 18(4), 603-613.
12. Schiaparelli S., Ghirardo C., Bohn J., Chiantore M., Albertelli G., Cattaneo-Vietti R. 2007 Antarctic associations: the parasitic relationship between the gastropod *Bathycrinicola tumidula* (Thiele, 1912) (Ptenoglossa: Eulimidae) and the comatulid *Notocrinus virilis* Mortensen, 1917 (Crinoidea: Notocrinidae) in the Ross Sea. *Polar Biology*, 30: 1545-1555.
13. Schiaparelli S., & Linse K. 2006 A reassessment of the distribution of the common Antarctic scallop *Adamussium colbecki* (Smith, 1902). *Deep-Sea Research II*, 53: 912–920.
14. Thrush, S., Dayton, P., Cattaneo-Vietti, R., Chiantore, M., Cummings, V., Andrew, N., Hawes, I., Kim, S., Kvitek, R., Schwarz, A.M., 2006. Broad-scale factors influencing the biodiversity of coastal benthic communities of the Ross Sea. *Deep-Sea Research II*, 53: 959-971.

B – book chapters

1. Catalano G., Budillon G., La Ferla R., Povero P., Ravaioli M., Saggiomo V., Accornero A., Azzaro M., Carrada G.C., Giglio F., Langone L., Mangoni O., Misic C. and Modigh M. (in press). The Ross Sea. In: "*Carbon and nutrient fluxes in continental margins: a global synthesis*", Part II. Kon-Kee Liu, L. Atkinson, R. Quiñones and L. Talaue-McManus (Editors), Regional synthesis, Book Proposal for Springer Verlag, Global Change: The IGBP Series. 304-318

C - proceedings of international conferences

1. Povero P, Castellano M, Ruggieri M, Misic C, Cattaneo Vietti R. (2004) Interannual changes of nutrients, phytoplankton biomass, particulate and dissolved organic matter related to meteorological conditions in a shelf area of Terra Nova Bay (Ross Sea, Antarctica). EASIZ Final Symposium, Korkula, Croazia 27 sept – 1 oct 2004.
2. Povero P, Misic C, Ossola C, Castellano M, Ruggieri N, Sartorio T, Cattaneo Vietti R (2004) Environmental and trophic features influence on zooplankton community in Terra Nova Bay (Ross Sea, Antarctica). EASIZ Final Symposium, Korkula, Croazia 27 sept- 1 oct 2004.
3. Povero P., Cattaneo-Vietti R., Chiantore M., Castellano M., Misic C., Ruggieri N., Bono R., Modigh M., Saggiomo V. (2005) Long Term Ecological Research In Terra Nova Bay (Ross Sea, Antarctica): the Marine Observatory of Antarctic Specially Protected Area (MOA-TNB). 3rd International Conference on the Oceanography of the Ross Sea Antarctica, Venezia, 10-14 oct 2005.
4. R. Cattaneo-Vietti, M. Chiantore, S. Thrush, M.R. Kvitek, M. Guidetti, S. Schiaparelli, M. Castellano, N. Ruggieri and P. Povero (2005) Benthic communities and environmental variables along a latitudinal gradient: Victoria Land Latitudinal Gradient Project 2004 (Ross Sea, Antarctica). 3rd International Conference on the Oceanography of the Ross Sea Antarctica, Venezia, 10-14 oct 2005
5. Modigh M., Catalano G., Guglielmo L., Mangoni O., Misic C., Povero P., Saggiomo V. (2007) A Global Budget of carbon and Nitrogen in the Ross sea (Southern Ocean). Open Science conference, Polar Dynamics: Monitoring, Understanding and prediction. 29-31 August 2007, Bergen Norway. p.77
6. Castellano M., Cattaneo-Vietti R., Chiantore M., Misic C., Mangoni O., Modigh M., Ruggieri N., Saggiomo V., Povero P. (2007) Marine Observatory In Terra Nova Bay (Ross Sea, Antarctica – MOA-TNB): Long Term Ecological Research, Open Science conference, Polar Dynamics: Monitoring, Understanding and prediction. 29-31 August 2007, Bergen Norway p.76

D – proceedings of national meetings and conferences

1. Castellano M., Ruggieri N., Misic C., Cattaneo-Vietti R., Povero P. (2006) Variazioni interannuali della sostanza organica particellata e disciolta nell'area marina costiera di Baia Terra Nova (Mare di Ross, Antartide). 5° convegno nazionale per le Scienze del Mare CoNISMa: Il Mare, centralità di interessi nel XXI secolo, Viareggio 14 -18 novembre 2006

E – thematic maps

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F – patents, prototypes and data bases

1. MACISTE-ICE (MARine Coastal Information SysTEm, <http://www.ice.macisteweb.com>), a dedicated WebGIS developed in order to manage the multidisciplinary environmental data (data acquired during PNRA Expeditions in TNB area and Ross Sea)

G – exhibits, organization of conferences, editing and similar

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H - formation (PhD thesis, research fellowships, etc.)

1. Research fellowship "Ecosistemi marini costieri ed oceanici: ciclo del carbonio ed effetti dei cambiamenti meteorologici" - Università degli Studi di Genova (D.R.419/25.06.2007)
2. PhD thesis School in Polar Sciences (XVII cycle). Michela Castellano (2006) "Aspetti trofo-funzionali dell'ecosistema marino antartico: sostanza organica particellata e disciolta" - Università degli Studi di Siena

Research units

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Notes