

Final project report

Project ID: 2002/8.01
Title: CLIMA - Variabilita', processi ed interazioni nel Mare di Ross in relazione alle pulsazioni climatiche

Principal investigator: prof. Giancarlo Spezie
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Duration: 2 years
Assigned funding: €

Activities and results

The CLIMA project, in this third edition, focused on the oceanic ventilation processes which happen at the Ross Sea shelf break, where the interaction between shelf waters and circumpolar water related to Ross Gyre are more obvious and characteristic. The processes of transformation of coastal water masses and their biogeochemical signals associated with these transformations have been studied with particular attention to assessing their response to climatic pulsations in place. The two-year plan has allowed the execution of a single oceanographic campaign in late austral summer.

During December 2002, a researcher of the CLIMA project participated in the field activity of the IVARS (inter Variations in the Ross Sea Antarctica) on the researcher vessel Polar Sea in the framework of the collaboration with the Virginia Marine Institute.

The scientific activity has been carried on in close collaboration with the most extensive program of ANSLOPE SCOR / IANZONE which provides activities in the Ross Sea until 2005 (p.i. A. Gordon of Lamont-Doherty Earth Observatory, Columbia Univ. – USA).

During 2003 the scientific activities were substantially focused on experimental operations on board of oceanographic Italian and foreign ships, on the data processing, and participation in scientific meetings and conferences.

The oceanographic cruise on board the ship *Italica* were planned for the scientific activities of the Sectors 8 and 9 of the PNRA, it began on January 18 and ended on 18 February 2003 with a total period of 31 days. The field activity may be divided in three periods.

First period

99 XBT launches along the P14 section of WOCE

Launches of 7 surface drifter from the project IPAB; 3 hydrological deep casts, ongoing acquisition of surface temperature (SST) and salinity (SSS) data.

Second period

Mooring activities: mooring D was lost cause iceberg collision, H1 and H2 not recovered for the presence of ice, F1, F2 and H3 not positioned for the presence of ice, L recovered and repositioned, D and G positioned.

Hydrographic activities: 126 casts, and XBT drops in the shelf break area. Ongoing SST and SSS data collection.

Third period

During comeback sailing were partly repeated the activity of the first period, for an assessment of seasonal variability along the same transect.

- a) Launch of XBT near the escarpment of the Campbell Plateau
- b) Measure continuous physical parameters of the surface layer

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The observational activity of the CLIMA project continued in March and April 2003 on board the N/R Palmer in partnership with the project AnSlope of Columbia University. Moreover a scientific collaboration with the chemical oceanographic team of the LDEO (Columbia University, New York, USA) to implement a new instrument for the CFC measurements in sea water samples started in 2003 and is still active.

Products

A – papers in scientific magazines

- G.Budillon, S.Gremes Cordero, E.Salusti.
- 2002 "ON THE DENSE WATER SPREADING OFF THE ROSS SEA SHELF (SOUTHERN OCEAN)"**
Journal of Marine Systems. Vol 35, pagg: 207-227.
V.Saggiomo, G.Catalano, O.Mangoni, G.Budillon, G.C.Carrada.
- 2002 "PRIMARY PRODUCTION PROCESSES IN ICE-FREE WATERS OF THE ROSS SEA (ANTARCTICA) DURING THE AUSTRAL SUMMER 1996"**
Deep-Sea Research II, Vol. 49, pagg.: 1787-1801.
G.Fusco, D.Flocco, G.Budillon, G.Spezie, E.Zambianchi.
- 2002 "DYNAMICS AND VARIABILITY OF TERRA NOVA BAY POLYNYA"**
Marine Ecology PSZNI, 23, Supplement I, pagg: 201-209.
S.Fonda Umani, A.Accornero, G.Budillon, M.Capello, S.Tucci, M.Cabrini, P.Del Negro, M.Monti, C.De Vittor.
- 2002 "PARTICULATE MATTER AND PLANKTON DYNAMICS IN THE ROSS SEA POLYNYA OF TERRA NOVA BAY DURING THE AUSTRAL SUMMER 1997/98"**
Journal of Marine Systems. Vol. 36/1-2, pagg.: 29-49.
M.Kurgansky, G.Budillon, E.Salusti.
- 2002 "ON TRACERS AND POTENTIAL VORTICITIES IN OCEAN DYNAMICS"**
Journal of Physical Oceanography. Vol. 32, N° 12, pagg: 3562-3577.
Tucci S., Bergamasco A., Capello M., S. Carniell
- 2002 "PARTICULATE MATTER IN THE ROSS SEA: A SPREADING MODEL."**
Marine Ecology, 23/1, 395-410.
Bergamasco, V. Defendi, E. Zambianchi, G. Spezie.
- 2002 "EVIDENCE OF DENSE WATER OVERFLOW ON THE ROSS SEA SHELF-BREAK",.**
Antarctic Science, 14 (3), 271-277.
Fonda Umani S, Monti M.
- 2002 "MICROZOOPLANKTON POPULATIONS IN THE ROSS SEA: CAMPAIGN 1994/95".**
TERRA ANTARCTICA REP., B1: 29 – 54.
C.Ianni, P.Rivaro, R.Frache
- 2002 "DISTRIBUTION OF DISSOLVED AND PARTICULATE IRON, COPPER AND MANGANESE IN THE SHELF WATERS OF THE ROSS SEA (ANTARCTICA)".**
Marine Ecology, 23, 210.
Accornero A., Manno C., Esposito F., Gambi M.C.
- 2003 "THE VERTICAL FLUX OF PARTICULATE MATTER IN THE POLYNYA OF TERRA NOVA BAY. PART II: BIOLOGICAL COMPONENTS".**
Antarctic Science, 15(2): 175-188
Accornero A., Gowing M.M.
- 2003 "ANNUAL SEDIMENTATION PATTERN OF ZOOPLANKTON FECAL PELLETS IN THE SOUTHERN ROSS SEA: WHAT FOOD WEBS AND PROCESSES DOES THE RECORD IMPLY? BIOGEOCHEMISTRY OF THE ROSS SEA".**
Antarctic Research Series 78, 261-278, Di Tullio J. & Dunbar R. (Eds.), American Geophysical Union (10.1029/078ARS17).
Accornero A., Manno C., Arrigo K.R., Martini A., Tucci S.
- 2003 "THE VERTICAL FLUX OF PARTICULATE MATTER IN THE POLYNYA OF TERRA NOVA BAY: RESULTS FROM MOORED SEDIMENT TRAPS (1995-1997).**
Antarctic Science Part I. Chemical constituents. 15 (1), 119-132.
Frignani M., Giglio F., Accornero A., Ravaioli M., Langone L.
- 2003 "SEDIMENT CHARACTERISTICS AT SELECTED SITES OF THE ROSS SEA CONTINENTAL SHELF: DOES THE SEDIMENTARY RECORD REFLECT WATER COLUMN FLUXES?"**
Antarctic Science, 15 (1), 133-139.

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- G.Budillon, S.Rintoul.
- 2003 "FRONTS AND UPPER OCEAN THERMAL VARIABILITY SOUTH OF NEW ZEALAND"**
Antarctic Science. Vol. 15, 1, pagg: 141-152.
G.Budillon, M.Pacciaroni, S.Cozzi, P.Rivarò, G.Catalano, C.Ianni, C.Cantoni.
- 2003 "AN OPTIMUM MULTIPARAMETER MIXING ANALYSIS OF THE SHELF WATERS IN THE ROSS SEA"**
Antarctic Science. Vol. 15, 1; pagg: 105-118.
A.Rubino, G.Budillon, S.Pierini, G.Spezie.
- 2003 "A MODEL FOR THE SPREADING AND SINKING OF THE DEEP ICE SHELF WATER IN THE ROSS SEA"**
Antarctic Science. Vol. 15, 1; pagg: 25-30.
D. Flocco, P. Falco, P. Wadhams, G. Spezie.
- 2003 "SURFACE CURRENT MEASUREMENTS IN TERRA NOVA BAY BY HF RADAR".**
Antarctic Science. Vol. 15, 1 pagg: 55-62
Accornero A., Manno C., Arrigo Kr., Martini A., Tucci S.
- 2003 "THE VERTICAL FLUX OF PARTICULATE MATTER IN THE POLYNIA OF TERRA NOVA BAY: PART I. CHEMICAL CONSTITUENTS".**
Antarctic Science 15 (1): 119-132.
Bergamasco A, Defendi V, Del Negro P, Fonda Umani S.
- 2003 "BACTERIAL ACTIVITY AND PHYSICAL STRUCTURE DURING AN ISW OVERFLOW EVENT AT THE ROSS SEA CONTINENTAL SHELF-BREAK".**
Antarctic Science 15(3): 405-411
P.Rivarò, R.Frache, A. Bergamasco, R.Hohmann
- 2003 "DISSOLVED OXYGEN, NO AND PO AS TRACERS FOR ROSS SEA ICE SHELF WATER OVERFLOW".**
Antarctic Science, 15, 399.
- B – book chapters**
- G.Budillon, S.Tucci, A.Artegianni, G.Spezie.
- 2000 "WATER MASSES AND SUSPENDED MATTER CHARACTERISTICS OF THE WESTERN ROSS SEA"**
In *"Ross Sea Ecology"*. FM.Faranda, L.Guglielmo and A.Ianora Editors. Springer-Verlag, pagg.: 63-81. (ISBN 3-540-65372-4).
P.Rivarò, R.Frache.
- 2002 "STUDIES OF WATER MASSES MIXING IN THE ROSS SEA (ANTARCTICA) USING CHEMICAL TRACERS".**
In *"Chemistry of marine water and sediments"* A.Gianguzza, E.Pelizzetti, S.Sammartano (Eds.)_Springer Verlag, pp 445-454.
K. A. Arrigo, S. Jacobs, G.Spezie, M., Van Woert, E. Zambianchi Editors.
- 2003** *Special issue of Antarctic Science (Cambridge University Press).*
- G.Budillon.
- 2006 "ENCYCLOPEDIA OF THE ANTARCTIC – THE ROSS SEA"**
Encyclopedia of the Antarctic, 2 vols., ed. Beau Riffenburgh. New York: Routledge.
Copyright © Routledge, an Imprint of the Taylor and Francis Group.
- C - proceedings of international conferences**
- A.Russo, G.Budillon, E.Paschini, A.Artegianni, G.Spezie.
- 2000 "FIVE-YEARS AUSTRAL SUMMER VARIABILITY OF THE UPPER OCEAN THERMAL STRUCTURE ALONG A TRANSECT BETWEEN NEW ZEALAND AND THE ROSS SEA (ANTARCTICA)".**
EGS XXV General Assembly, Nice, FRANCE, 25-28 April 2000.
G.Budillon, G.Fusco, G.Spezie.
- 2000 "OCEAN-ATMOSPHERE HEAT EXCHANGE IN THE ROSS SEA (ANTARCTICA)".**
EGS XXV General Assembly, Nice, France, 25-28 April 2000.
G.Budillon, S.Gremes Cordero, E.Salusti.
- 2000 "ON REMOVING MECHANISMS OF THE DENSE WATER OFF THE ROSS SEA SHELF (SOUTHERN OCEAN)".**
EGS XXV General Assembly, Nice, France, 25-28 April 2000.
G.Budillon, D.Flocco, G. Fusco, G.Spezie, E.Zambianchi
- 2000 "WINTERTIME VARIABILITY OF TERRA NOVA BAY POLYNIA".**
International Symposium of the "International Glaciological Society". Fairbanks, Alaska, U.S.A., 19-23 June 2000.
G.Budillon, S.Cordero Gremes, E.Salusti
- 2000 "ON THE DENSE WATER SPREADING OFF THE ROSS SEA SHELF (SOUTHERN OCEAN)".**
Southern Ocean - JGOFS Symposium Brest, France, 8-12 July 2000.

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- G.Budillon, A.Artegianni, E.Paschini, A.Russo, G.Spezie.
- 2000 "UPPER OCEAN THERMAL VARIABILITY BETWEEN NEW ZEALAND AND ANTARCTICA (P14 WOCE LINE)".**
Southern Ocean - JGOFS Symposium Brest, France, 8-12 July 2000.
A.Accornero, G.Budillon, C.Manno, R.Meloni.
- 2000 "WATER COLUMN DYNAMICS AND BIOGENIC FLUXES IN A COASTAL POLYNYA OF THE WESTERN ROSS SEA (ANTARCTICA)".**
American Society of Limnology and Oceanography. Copenhagen, Denmark, 5-9 June 2000. Abstract SS38-03p.
A.Cappelletti, G.Fusco, P.Picco, R.Meloni, G.Budillon
- 2001 "AIR-SEA INTERACTION IN TERRA NOVA BAY POLYNYA (ANTARCTICA)".**
EGS XXVI General Assembly, Nice, France, 25-28 April 2001.
A. Bergamasco, G.Budillon, E. Paschini, G. Spezie.
- 2001 "HSSW VARIABILITÀ AND SPREADING IN THE WESTERN ROSS SEA"**
IAPSO, Mar de Plata, ARGENTINA, October 2001.
G.Budillon, D.Flocco, S.Kern, F.Napoli.
- 2002 "OBSERVATIONS ON THE OPENING AND CLOSURE OF THE ROSS SEA POLYNYA IN 1995-1999"**
EGS XXVII General Assembly, Nice, France, 21 - 26 April 2002.
G.Fusco, G.Budillon.
- 2002 "AIR-SEA FORCING AND THERMOHALINE CHANGES IN THE ROSS SEA"**
EGS XXVII General Assembly, Nice, France, 21 - 26 April 2002.
A.Rubino, G.Budillon, S.Pierini, G.Spezie.
- 2002 "A MODEL FOR THE SINKING AND SPREADING OF THE DISW IN THE ROSS SEA"**
EGS XXVII General Assembly, Nice, France, 21 - 26 April 2002.
G.Budillon, S.Cordero Gremes, E.Salusti.
- 2002 "ON THE DENSE WATER SPREADING OFF THE ROSS SEA SHELF"**
EGS XXVII General Assembly, Nice, France, 21 - 26 April 2002.
A.Bergamasco, V.Defendi, G. Spezie, G.Budillon, S.Carniel.
- 2002 "NOTE ON THE ROSS SEA SHELF WATER DOWNFLOW PROCESSES (ANTARCTICA)"**
EGS XXVII General Assembly, Nice, France, 21 - 26 April 2002.
G.Budillon, S.Massolo, P.Rivarò, G.Spezie.
- 2002 "STUDIES OF DEEP WATER FORMATION AND MIXING IN THE ROSS SEA USING ANTHROPOGENIC TRACERS"**
II GLOBEC Open Science Meeting, "Comparative Ecosystems and Climate Change", 15-18 October 2002, Qingdao, P. R. China.
G.Catalano, G. Budillon, R. La Ferla, P. Povero, M. Ravaioli, V. Saggiomo, A. Accornero, M. Azzaro, G. C. Carrada, F. Giglio, L. Langone, O. Mangoni, C. Misic, M. Modigh.
- 2003 "A GLOBAL BUDGET OF CARBON AND NITROGEN IN THE ROSS SEA (SOUTHERN OCEAN)"**
U.S. JGOFS Open Science Conference, 5-8 May 2003.
G.Spezie et CLIMA Group
- 2003 "THE ITALIAN CONTRIBUTION TO THE OCEANOGRAPHY OF THE ROSS SEA"**
IUGG, IAPSO Joint Assembly – Sapporo, Japan, 31 June – 11 July 2003.
P.Rivarò, A.Bergamasco, G.Budillon, S.Massolo, G.Spezie.
- 2003 "THE TRACER SIGNATURE OF SHELF WATERS IN THE ROSS SEA (ANTARCTICA)"**
IUGG, IAPSO Joint Assembly – Sapporo, Japan, 31 June – 11 July 2003.

D – proceedings of national meetings and conferences

- Accornero A., Tucci S, Monaco A.
- 2000 "INFLUENZA DEL GRAZING MESOZOOPLANKTONICO SUI FLUSSI DI SEDIMENTAZIONE NEL MARE DI ROSS MERIDIONALE: RISULTATI OTTENUTI DA TRAPPOLE PER SEDIMENTI."**
Atti Ass. It. Oceanol. Limnol., Vol. 13 (2) 259-268. Genova.
Del Negro P., Ramani P., Rivarò P.
- 2000 "BACTERIAL ACTIVITY DURING SEA ICE FORMATION IN THE ROSS SEA (ANTARCTICA)".** Atti della Associazione Italiana di Oceanologia e Limnologia, 13(2), 317.
De Vittor C, Cabrini M, Crevatin E, Fonda Umani S.
- 2000 "DISTRIBUZIONE DELLA CLOROFILLA NELLA POLYNYA DEL MARE DI ROSS NELL'ESTATE AUSTRALE 1997-98".** Atti dell'AIOL 13 (2): 249 – 258.
- Ferrari M., Capello M., Martini A.
- 2000 "VARIABILITÀ DEI SEDIMENTI SOSPESI NELLE ACQUE COMPRESSE TRA BAIJA TERRA NOVA E CAPO ADARE (MARE DI ROSS - ANTARTIDE)".** Atti Ass. It. Oceanol. Limnol., Vol. 13 (2), 323-331. Genova.

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- Martini A., Accornero A, Ferrari M, Manno C.
- 2001 **"VARIABILITÀ INTERANNUALE DEI FLUSSI DI SEDIMENTAZIONE NELLA POLYNIA DI BAIJA TERRA NOVA (MARE DI ROSS – ANTARTIDE)."** Atti Ass. It. Oceanol. Limnol., Vol. 14 , 349-360. Genova.
- A.Bergamasco, E.Paschini, G.Spezie, G.Budillon, M.De Stefano.
- 2001 **"RAPPORTO DI ATTIVITÀ - XVI CAMPAGNA ANTARTICA 2000-2001. PROGETTO 2B.3"**
MURST-PNRA, ROMA; http://www.pnra.it/biblioteca/docs/rapporti_campagna/CA00-01.pdf; pagg.: 177 – 186.
A.A.V.V. G.Budillon.
- 2003 **"RAPPORTO DI ATTIVITÀ - XVI CAMPAGNA ANTARTICA 2002-2003. PROGETTO 2B.3"**
MURST-PNRA, ROMA; http://www.pnra.it/biblioteca/docs/rapporti_campagna/CA02-03.pdf; pagg.: 193 – 201.
Sandrini S., N.Ait-Ameur, Goyet C., Tositti L., Bettoli M.G.
- 2003 **"THE CO2 PROPERTIES IN THE ROSS SEA (ANTARCTICA)"** - Proceedings of the X workshop on Italian Researches on Antarctic Atmosphere and Scar Workshop, Roma, ottobre 2003.

E – thematic maps

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F – patents, prototypes and data bases

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G – exhibits, organization of conferences, editing and similar

- G.Budillon, S.Rintoul.
- 2000 **"AN ESTIMATION OF THE ACC BAROCLINIC TRANSPORT SOUTH OF NEW ZEALAND FROM XBT MEASUREMENTS".**
2° Convegno Nazionale del CoNISMa , Genova, ITALY, 22-25 November 2000.
G.Fusco, D.Flocco, G.Budillon, G.Spezie, E.Zambianchi.
- 2000 **"DINAMICA E VARIABILITÀ DELLA POLYNIA DI BAIJA TERRA NOVA".**
2° Convegno Nazionale del CoNISMa , Genova, ITALY, 22-25 November 2000.
S.Fonda Umani, M.Cabrini, P.Del Negro, C.De Vittor, M.Monti, P.Ramani, S.Tucci, M.Capello, A.Martini, R.Frache, P.Rivarò, E.Zambianchi, G.Budillon.
- 2000 **"AREA MARINA PROTETTA DI BAIJA TERRA NOVA: STRUTTURA FISICO-CHIMICO-BIOLOGICA DELLA COLONNA D'ACQUA DURANTE L'ESTATE AUSTRALE DEL 1998".**
2° Convegno Nazionale del CoNISMa , Genova, ITALY, 22-25 November 2000.
G.Budillon, S.Rintoul.
- 2001 **"UPPER OCEAN THERMAL STRUCTURE AND VARIABILITY BETWEEN NEW ZEALAND AND ANTARCTICA".**
II International Conference "The Oceanography of the Ross Sea". Ischia, ITALY, October 2001.
G.Budillon, G.Fusco.
- 2001 **"AIR-SEA INTERACTIONS AND THERMOHALINE VARIABILITY IN THE WESTERN ROSS SEA".**
II International Conference "The Oceanography of the Ross Sea". Ischia, ITALY, October 2001.
G.Budillon, G.Catalano, S.Cozzi, L.Greco, C.Ianni, M.Pacciaroni, A.Ortona, P.Rivarò.
- 2001 **"A MULTIPARAMETER MIXING ANALYSIS OF THE SHELF WATERS IN THE ROSS SEA, PRELIMINARY RESULTS"**
II International Conference "The Oceanography of the Ross Sea". Ischia, ITALY, October 2001.
A.Rubino, G.Budillon, S.Pierini, G.Spezie.
- 2001 **"A MODEL FOR THE SINKING AND SPREADING OF THE DISW IN THE ROSS SEA"**
II International Conference "The Oceanography of the Ross Sea". Ischia, ITALY, October 2001.
A.Bergamasco, G.Budillon, E.Paschini, G.Spezie.
- 2001 **"ANTARCTIC DOWNSLOPE FLOW ALONG THE WESTERN ROSS SEA CONTINENTAL SHELF-BREAK".**
II International Conference "The Oceanography of the Ross Sea". Ischia, ITALY, October 2001.
R.Meloni, G.Fusco, G.Budillon, A.Bergamasco, S.Aliani.
- 2001 **"SEEMGLY ANOMALOUS BEHAVIOUR SUBSURFACE WATERS IN TERRA NOVA BAY POLYNIA DURING AUSTRAL AUTUMN"**
II International Conference "The Oceanography of the Ross Sea". Ischia, ITALY, October 2001.
R.Meloni, E.Paschini, S.Aliani, G.Budillon, G.Fusco.
- 2001 **"SIX YEARS OF MOORED MEASUREMENTS IN THE ROSS SEA, CLIMA PROJECT"**
II International Conference "The Oceanography of the Ross Sea". Ischia, ITALY, October 2001.

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- G.Budillon, M.Gabellini, S.Tucci, F.Arghittu, L.Grieco, L.Nicoletti.
- 2002** **"UNO STUDIO DI IMPATTO AMBIENTALE RELATIVO AD ATTIVITÀ DI DRAGAGGIO DI DEPOSITI SABBIOSI SOMMERSI. APPROCCIO SPERIMENTALE E MODELLISTICO"**
XV Congresso Nazionale dell'A.I.O.L.. Roma, ITALY, 23-25 September 2002.
P.Rivaro, G.Budillon, S.Massolo, W.M.Smethie, G.Spezie.
- 2002** **"DISTRIBUZIONE DI CLORO FLUORO CARBURI NEL MARE DI ROSS (ANTARTIDE) IN RELAZIONE A PROCESSI DI MESCOLAMENTO DI MASSE D'ACQUA IN AREA DI SCARPATA"**
XV Congresso Nazionale dell'A.I.O.L.. Roma, ITALY, 23-25 September 2002.
G.Budillon, D.Flocco, S.Kern, F.Napoli.
- 2002** **"OSSERVAZIONI SULLA DINAMICA DELLA POLYNIA DEL MARE DI ROSS DURANTE GLI ANNI 1995 – 1999"**
III Convegno Nazionale di Scienze del Mare (CoNISMa). Bari, ITALY, 27 - 30 November 2002.
G.Catalano, G.Budillon, R.LaFerla, P.Povero, M.Ravaioli, V.Saggiomo, A.Accornero, G.C.Carrada, F.Giglio, L.Langone, O.Mangoni, C.Misic, M.Modigh.
- 2002** **"STIMA DEI FLUSSI BIOCHIMICI TRA IL MARE DI ROSS E L'OCEANO MERIDIONALE"**
III Convegno Nazionale di Scienze del Mare (CoNISMa). Bari, ITALY, 27 - 30 November 2002.
P.Rivaro, A.Bergamasco, G.Budillon, R.Frache, R.Hohmann, S.Massolo, G.Spezie.
- 2002** **"STUDIO DEI PROCESSI DI MESCOLAMENTO E DI VENTILAZIONE DELLE MASSE D'ACQUA NEL MARE DI ROSS (ANTARTIDE) MEDIANTE CLOROFUOROCARBURI"**
III Convegno Nazionale di Scienze del Mare (CoNISMa). Bari, ITALY, 27 - 30 November 2002.
M.Capello, M.Ferrari, S.Tucci, G.Budillon.
- 2002** **"VARIABILITA' SPAZIALE E TEMPORALE DEL MATERIALE PARTICELLATO PRESENTE NELLE ACQUE COMPRESSE TRA BAIJA TERRA NOVA E CAPE ADARE (MARE DI ROSS-ANTARTIDE)"**
III Convegno Nazionale di Scienze del Mare (CoNISMa). Bari, ITALY, 27 - 30 November 2002.
G.Budillon, S.Rintoul, G.Spezie.
- 2003** **"UPPER OCEAN THERMAL STRUCTURE, BAROCLINIC TRANSPORTS, AND VARIABILITY BETWEEN NEW ZEALAND AND ANTARCTICA"**
Workshop "Fisica e chimica dell'atmosfera antartica", CNR – Roma 22-24 October 2003.
G.Budillon, G.Fusco, G.Spezie.
- 2003** **"AIR-SEA FLUXES IN TERRA NOVA BAY POLYNIA AND THERMOHALINE VARIABILITY IN THE WESTERN ROSS SEA"**
Workshop "Fisica e chimica dell'atmosfera antartica", CNR – Roma 22-24 October 2003.
P.Rivaro, G.Budillon, S.Massolo, A.Bergamasco, G.Spezie.
- 2003** **"IMPIEGO DI CLORO FLUORO CARBURI COME TRACCIANTI CHIMICI DELLE ACQUE DI PIATTAFORMA NEL MARE DI ROSS"**
Workshop "Fisica e chimica dell'atmosfera antartica", CNR – Roma 22-24 October 2003.
A.Bergamasco, G.Budillon, A.Carniel, V.Defendi, R.Meloni, E.Paschini, M.Sclavo, G.Spezie.
- 2003** **"DOWNSLOPE FLOW ACROSS THE ROSS SEA SHELF BREAK (ANTARCTICA)"**
American Geophysical Union. Fall Meeting. San Francisco, USA, 8-12 December 2003.

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

- 1999-2002** Daniela Cianelli - DOTTORATO IN SCIENZE POLARI UNIV. SIENA
2000-2003 Clara Manno - DOTTORATO IN SCIENZE POLARI UNIV. SIENA
2002 Silvia Sandrini – BORSA DI STUDIO
2000-2003 Paola Petrelli - DOTTORATO IN SCIENZE POLARI UNIV. SIENA

Research units

1. Research groups

1. *Principal investigator:* Andrea BERGAMASCO

Nome/Name	Qualifica/Role	Istituto/Institution
Bergamasco Andrea	Primo Ricercatore	ISDGM - CNR
Umgiesser Georg	Ricercatore	ISDGM - CNR
Arcari Giancarlo	Tecnico	ISDGM - CNR
Gaza Stefania	Dottoranda	ISDGM - CNR , Univ. Venezia
Defendi Valentina	Dottoranda	ISDGM - CNR , Univ. Venezia

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Ortona Annalisa	Borsista	Univ. di Napoli PARTHENOPE
Grieco Luisa	Dottoranda	Univ. di Napoli PARTHENOPE
Cianelli Daniela	Dottoranda	Univ. di Napoli PARTHENOPE

2. *Principal investigator:* Giorgio BUDILLON

Nome/Name	Qualifica/Role	Istituto/Institution
Accornero Alessandra	Ricercatore	Univ. di Napoli PARTHENOPE
Budillon Giorgio	Ricercatore	Univ. di Napoli PARTHENOPE
De Alteris Arturo	Tecnico	Univ. di Napoli PARTHENOPE
De Stefano Massimo	Tecnico	Univ. di Napoli PARTHENOPE
Fusco Giannetta	Ricercatore	CRAM - ENEA - La Spezia
Gallarato Antonio	Tecnico	Univ. di Napoli PARTHENOPE
Manno Clara	Dottoranda	Univ. di Napoli PARTHENOPE
Pierini Stefano	Professore Associato	Univ. L'Aquila
Rubino Angelo	Ricercatore	Univ. Venezia
Spezie Giancarlo	Professore Ordinario	Univ. di Napoli PARTHENOPE
Testa Gennaro	Tecnico	Univ. di Napoli PARTHENOPE
Zambianchi Enrico	Professore Associato	Univ. di Napoli PARTHENOPE

3. *Principal investigator:* Roberto FRACHE

Nome/Name	Qualifica/Role	Istituto/Institution
Frache Roberto	Professore Ordinario	Univ. Genova
Ianni Carmela	Professore Associato	Univ. Genova
Rivaro Paola	Ricercatore	Univ. Genova
Schlosser Peter	Ricercatore	Columbia Univ., New York (USA)
Smethie William M.	Ricercatore	Columbia Univ., New York (USA)
Hohmann Roland	Ricercatore	Columbia Univ., New York (USA)

4. *Principal investigator:* Serena FONDA UMANI

Nome/Name	Qualifica/Role	Istituto/Institution
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7. *Principal investigator:* Ottavio TUBERTINI

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Sandrini Silvia	Dottoranda	Univer. di Bologna
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8. *Principal investigator:* Sergio TUCCI

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