Programma Nazionale di Ricerche in Antartide (PNRA)

Final project report

Project ID: 2002/3.13
Title: MAGICO (MApping of a COmplete GlacIal depositional system)
Principal investigator: Michele Rebesco
Institution: Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - OGS
Email: mrebesco@ogs.trieste.it
Duration: 2 years
Assigned funding: € 46.000,00

Activities and results

The project started with an acquisition cruise of the R/V OGS-Explora (Ushuaia 19.01.04 -18.02.04 Ushuaia). The cruise had two primary scientific targets: The South Scotia Ridge (Responsible: Nevio Zitellini) and the Drift 7 on the Antarctic Peninsula Pacific Margin (Responsible: Michele Rebesco), and approximately 10 days of investigations were dedicated to each of these. The second target (the objective of the MAGICO project) has previously been studied by OGS and others using multi-channel seismics, shallow cores, and ODP-drillings (Sites 1095 and 1096).

During the cruise nearly 37,000 km² of swath bathymetry and about 5,000 km of sub-bottom (CHIRP) profiles were collected across Sediment Drift 7. The data are part of the large data set (including several thousands km of multichannel seismic data) acquired by R/V OGS-Explora between 1995 and 2004 within the projects MAGICO and SEDANO (Sedimentary Drifts of the Antarctic Offshore) funded by PNRA.

The analysis of the data conducted in Italy revealed that growth of the drift reflects variations in both Antarctic ice sheet and Southern Ocean along-slope bottom-water (contouritic) currents. The ice sheet transported the sediments to the continental margin, and of flow of contouritic currents controlled their deposition. The understanding of contourite systems and of their sedimentary processes is relevant for paleoclimatic studies and for oil-exploration. Moreover, the discovery of a large field of mud volcanoes with significant active fluid escapes represents the new frontier for research in this margin since the presence of cold-water bioherms coupled to bottom current and fluid escapes may not be ruled out.

Of the scientific products, 16 are cited in SCOPUS. Hirsch index (H = 5).

Products

A – papers in scientific magazines


B – book chapters

C - proceedings of international conferences

PNRA – Final project report


D – proceedings of national meetings and conferences


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

1. Rebesco M., Broadcast interview at Telequattro (February 2004)

2. Rebesco M., N/R OGS-EXPLORA and the MAGICO survey, geophysical seminar at OGS, March 2004

3. Rebesco M., Paleoclimatic research in Antarctic Peninsula, seminar for the Master in Science Communication, June 2004

4. Neagu C., The sediment drifts on the continental rise west of Antarctic Peninsula, Master’s Thesis presented at the University of Bucharest, Giungno 2004

5. Rebesco M., Broadcast interview at (July 2004)
7. Rebesco M., Multibeam map of Sediment Drift 7 (Antarctic Peninsula), Poster in PNRA booth at 32 IGC, Firenze, August 2004
8. Neagu C., Interplaying Instability Processes within Sediment Drift 7 (Antarctica), EURODOM Mid Term Meeting, Erlangen, September 2004

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

Raluca Cristina Neagu (pre-doc) has been trained on PNRA data at OGS for 36 months (15/03/2004 – 15/08/2006) within the EURODOM EU project. During these years she performed seismic processing of the data acquired by PNRA in Antarctic Peninsula in the area of sediment drift 7 (continental rise west of Antarctic Peninsula) using FOCUS 4.2 (Paradigm) software and she was also trained in using the free software Seismic Unix.

In order to evaluate the effect of biogenic silica on the submarine slope instability she estimated the concentration of the biogenic silica in the sediments of drift 7 correlating multichannel seismic and log data from the ODP Sites 1095 and 1096 which were drilled during Leg 178.

Using the EMERGE software (Hampson-Russel) she obtained 2-D sections showing the distribution of the physical properties along the seismic profiles which were used to estimate the anomalies of density/porosity produced by the presence of biogenic silica. These anomalies were converted into biogenic silica concentration along the seismic profiles for estimating the gas-hydrates and free gas concentration.

Research units

1. Co-ordinator: Rebesco Michele
   Research task: Data analysis and interpretation
   People involved:
   Name/position/Institute
   Camerlenghi Angelo/Scientist/OGS
   Volpi Valentina/Scientist/OGS
   Caburlotto Andrea/Scientist/OGS
   Donda Federica/Scientist/OGS
   Lucchi Renata/Scientist/OGS
   De Cillia Carla/Tecnologist/OGS
   Time dedicated during the two-year project (man-months): 18

2. Co-ordinator: Wardell Nigel
   Research task: data processing
   People involved:
   Name/position/Institute
   Wardell Nigel/Tecnologist/OGS
   Pelos Claudio/Technician/OGS
   Time dedicated during the two-year project (man-months): 3

Date: