

Final project report

<i>Project ID</i>	2004/4.03
<i>Title</i>	QUASAR (QUAternary Sedimentary processes on the east Antarctic continental Rise)
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<i>Duration</i>	3 years
<i>Assigned funding</i>	80.000,00 Euro

Activities and results

The aim of the project is the study of the sedimentary processes in the Eastern Antarctic margin and their changes during the Quaternary fluctuations of the Antarctic Ice Sheets. The project focused on sedimentological, geochemical, biostratigraphic and paleomagnetic analyses of the 35 meters long "MD03-2595" core, collected in the 2003. The core sampled a sedimentary ridge formed by the interplay of turbiditic and contouritic processes, in the continental rise off George V Land. The core sampled an expanded and continuous quaternary sedimentary sequence allowing us a detailed sedimentological-biostratigraphic analysis of the different depositional processes that occurred during the last glacial cycles.

Sediments deposited on the Wilkes Land continental margin (East Antarctica) contain detailed information about environmental changes during the past glacial and interglacial cycles in the form of variations of : terrigenous delivery from the continental area, velocity and direction of bottom currents, and bio-productivity in the water column. Furthermore, the Mertz glacier coastal polynya is one of the most important areas of high salinity shelf water (HSSW) production.

Multiproxy analyses (facies description, grain size, clay minerals assemblage, organic carbon, biogenic component, physical and magnetic properties of the sediments) permitted us to identify the sedimentary environment and the glacial and glacial-marine depositional processes occurred in this area of the continental rise.

The analysis of magnetic properties of sediments allowed to obtain a continuous record at high resolution of the relative paleointensity of geomagnetic field. The construction of paleointensity curves, therefore, allowed us to date the sediments by comparison with paleointensity reference curves (SINT-200, SINT-800).

The good preservation of the biogenic component inside the sediments of the core gave us a detailed biostratigraphic chronostratigraphy, which allowed us also to confirm the age model from the paleomagnetic analysis. In detail, we distinguished the M.I.S. 11 within the sediment core: previous studies on deep-water sediment and ice cores demonstrated that M.I.S. 11 marks an important change in the glacial-interglacial ciclicity, with longer and warmer interglacial alternated to shorter and colder glacial periods since that time.

Textural and sedimentological facies analysis on the MD03-2595 core correlated with geophysical and previous collected geological data (PNRA WEGA project) indicates intensity of depositional processes along the Wilkes land continental margin decreased since M.I.S. 11, indicating a change in the glacial dynamic occurred in this area.

Products

A – papers in scientific magazines

1. Macrì P., Sagnotti L., Dinarès-Turell J., and Caburlotto A., (2010). Relative geomagnetic paleointensity of the Brunhes Chron and the Matuyama-Brunhes precursor as recorded in sediment core from Wilkes Land Basin (Antarctica). *PHYSICS OF THE EARTH AND PLANETARY INTERIORS* 179, 72-86.
2. Caburlotto A., Lucchi R.G., De Santis L., Macrì P., Tolotti R., (2009). Sedimentary processes on the Wilkes Land continental rise reflect changes in glacial dynamic and bottom water flow. *INTERNATIONAL JOURNAL OF EARTH SCIENCES*, In press, doi_10.1007/s00531-009-0422-8

B – book chapters

C - proceedings of international conferences

1. Macrì P., Sagnotti L., Dinarès-Turell J., and Caburlotto A., (2009). Relative geomagnetic paleointensity of the Brunhes Chron and the Matuyama-Brunhes precursor as recorded in sediment core from Wilkes Land Basin (Antarctica). *Eos Trans. AGU*, 90(52), Fall Meet. Suppl., Abstract GP11A-0733.
2. DeSantis L., Caburlotto A., Presti M., Accettella D., Cova A., 2007 – Submarine Geomorphology and bottom current signature on Antarctic sediment: examples from the George Vth continental shelf and slope (East Antarctica). XXIV IUGG, Perugia (Italy), 2-13 July 2007.
3. Caburlotto A., DeSantis L., Giorgetti G., Macrì P., Tolotti R., Rebesco M., 2007 - Glacial dynamic changes inferred from marine sediments on the Wilkes Land continental margin (East Antarctica) – POSTER. EGU General Assembly, Vienna (Austria), 15-20 April 2007. Poster

D – proceedings of national meetings and conferences

1. Caburlotto A., De Santis L., Camerlenghi A., Lucchi R.G., Macrì P., Tolotti R., , Giorgetti G., Damiano D. 2005 – *Sedimentary processes on the continental rise of the Wilkes Land Continental Margin (East Antarctica): a record of Quaternary Glacial Dynamic Changes*. East Antarctic Workshop, Spoleto (Italy), 18-20 September 2005
2. Caburlotto A., De Santis L., Camerlenghi A., Lucchi R.G., Macrì P., Tolotti R., , Giorgetti G., Damiano D. 2005 – *Bottom Water Production and Quaternary Glacial Dynamic Changes recorded on the Wilkes Land Continental Margin (East Antarctica)*. Quinto Forum Italiano di Scienze della Terra, Spoleto (Italy), 21-23 September 2005

E – thematic maps

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F – patents, prototypes and data bases

G – exhibits, organization of conferences, editing and similar

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

1. Post doc fellowship about "Physical properties and sedimentology of Polar continental margins (Proprietà fisiche e sedimentologia dei margini continentali polari)" at OGS (12 months)
2. Research Fellowship about "Laboratory measurements and data analysis (Misura di laboratorio ed analisi dati)" regarding paleomagnetic measurements and data analysis at INGV (4 months)

Research units

Research Unit 1
Andrea Caburlotto - OGS Trieste (P.I.)
Renata Lucchi – OGS Trieste

Research Unit 2
Laura De Santis – OGS Trieste
Andrea Caburlotto - OGS Trieste

Programma Nazionale di Ricerche in Antartide (PNRA)

Research Unit 3

Giovanna Giorgetti – Univ. Siena

Damiano Damiani – Univ. Siena

Annabella Nagi – Univ. Siena

Isabella Memmi – Univ. Siena

Research Unit 4

Patrizia Macrì – INGV Roma

Leonardo Sagnotti – INGV Roma

Date: 31/12/2009

Notes