Programma Nazionale di Ricerche in Antartide (PNRA)

Final project report

Project ID	2005/3.02
Title	Silica diagenesis: petrophyical characterization and influence on stability of polar margins (SCARPS)
Principal investigator	Valentina Volpi
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Duration	2 years
Assigned funding	35.000,00 Euro

Activities and results

The aim of this project is to analyze the effect of biogenic silica and its diagenesis (opal A/opal CT transition) on the eastern Antarctica continental margin in the Prydz Bay region. In the first of the project duration, all the available date were collected. The petrophysical characterization will be conducted making use of logs and laboratory measurements. Seismic characterization of the BSR, which represents the base of biogenic silica bearing zone, will be performed extrapolating physical properties along seismic profiles, properly processed using True Amplitude Recovery techniques.
Among the various seismic profiles crossing the Prudz Bay offsore, has been selected the profile crossing ODP 1165 well, on the continental rise. Well logs identified physical properties variations related to the presence of silica diagenesis. Correlating well logs and seismic data we have characterized a seismic reflector, interpreted as a silica diagenesis BSR.
Seismic data have been reprocessed with true amplitude techniques, to preserve all the true amplitude particularly of the shallow reflectors. Seismic data have been processed using FOCUS software (Paradigm). Some specific physical properties have been selected to perform the seismic/logs correlation, they are: p-wave velocity, density and porosity. The analysis consists in predicting the above properties in a 2D direction along the seismic profile. This analysis has been performed using the EMERGE™ and eLOG™ softwares (Hampson-Russell - Calgary, Alberta, Canada). From this analysis we obtained the effects of biogenic silica on the petrophysical properties and and they were sta starting point for the evaluation of the silica amount in the sediments.
It has been applied a method for estimating silica concentration based on a theoretical approach. The theory consists in modelling silica-bearing sediments and their effect on seismic velocities. Seismic velocities (both P-wave and S-wave) will be expressed in terms of silica concentration, fixing the other petrophysical parameters involved. In this way,velocities obtained from analyses of seismic sections can be converted as silica concentrations where increases in velocities can not be attributed to other geological effects.
The obtained results from interpretation and modelling phase, led to the creation of a geological model where the variations in silica concentration has been related to the presence of the BSR on seismics. As indentified on other high latitude margins, the BSR represent a weak surface along which episode of slope instability occures.

Products

PAPERS IN SCIENTIFIC MAGAZINES

1. **Rebesco, M.**, Camerlenghi, A., 2008. Late Pliocene margin development and mega debris flow deposits on the Antarctic continental margins: Evidence of the onset of the modern Antarctic Ice Sheet, Palaeogeography, Palaeoclimatology, Palaeoecology, 260, 149-167.
2. **Volpi, V.**, **Rebesco, M.** and **Diviacco, P.**, 2008. New insights in the evolution of Antarctic glaciation from depth conversion of well-log calibrated seismic section of Prydz Bay. International Journal of Earth Sciences, doi: 10.1007/s00531-008-0356-6.

PROCEEDINGS OF INTERNATIONAL CONFERENCES

1. **Volpi, V., Rebesco, M., Diviacco, P**., 2007. New insights in the evoution of antarctic glaciation from depth conversion of well-calibrated seismic section of Prydz Bay. Poster presentation EGU General Assembly 2007. Vienna 15 – 20 Aprile 2007.
2. **Volpi** V., **Rebesco** M., and **Diviacco** P., 2007. New insights in the evolution of Antarctic glaciation from depth conversion of well-log calibrated seismic section of Prydz Bay. Poster presentation, 10th international Symposium on Anatrctic Earth Sciences, Univ. California, Santa Barbara Aug. 26 – Aug. 31, 2007.

Research units

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Date:
19/05/2009

Notes

DISCLOSURE
Seminar presented at the University of Trieste, Geoscience Department, to introduce to master-degree students the interpretation of seismic data and the geophysical acquisition tools (multichannel seismics, sub-bottom chirp and multibeam). Particular emphasis was given to the slope instability processes in the high latitute margins.