

Final project report

<i>Project ID</i>	2002/4.3
<i>Title</i>	<i>Paleozoic magmatism along the Paleopacific Margin of Gondwana. Investigation on the deep crustal source and time-space evolution of the magmatism in northern Victoria Land (Antartica), South Tasman Rise, and East Tasman Plateau</i>
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<i>Duration</i>	2 years
<i>Assigned funding</i>	57662,00 Euro

Activities and results

During Middle Paleozoic, the paleopacific margin of Gondwana was affected by a widespread magmatic activity. The geodynamic setting that triggered this magmatism is controversial. A precise definition of the space-time evolution of magmatism in northern Victoria Land would help making this point clear.

The petrographic, chemical and geochronological characterization of Admiralty Intrusive and Gallipoli Volcanic rocks was carried out. Dredges magmatic samples from the South Tasman Rise - (Australia) were also investigated because due to its position the South Tasman Rise represent a key point in the correlation between Australia and Antartica. Both magmatic and inherited zircon (SHRIMP) ages were obtained. Detrital zircon ages were obtained from sediments of the Robertson Bay Group and from a metamorphic xenolith within the Admiralty Intrusive (Cape Phillips).

Inherited zircon component is scarce in the Admiralty Intrusive (consistent with the I-type nature of this magmatic suite) however the age pattern is different from that of West Tasmania and similar to that of E-Tasmania and Lachlan Fold Belt plutons confirming a common crustal source component of the last two sectors and northern Victoria land.

1 - An updated geochemical-geochronological picture of the Admiralty Intrusive and Gallipoli volcanic rocks has been obtained. The new data show that the volcanic rocks belongs to two distinct magmatic cycles. The first volcanic episode, about 370 Ma old, include rocks from Mt Black Prince and Mt Anakiwa. The second volcanic pulse is represented by the Gallipoli volcanic rocks and is about 356 Ma old. The "old" magmatic pulse of the AI (380-400 Ma, mainly based on Rb-Sr whole-rock dating), is not confirmed. The zircon age of Yule Bay pluton is ca 366 Ma. Almost all emplacement ages are in the range of 368-352 Ma. These ages fit well with the age-pattern of granites in the central sector of the Lachlan fold Belt and in West-Tasmania. The only exception is a Inferno Peak pluton at ca. 345 Ma.

2 – No variation in the inherited zircon age patterns is observed within the Admiralty Intrusives and Gallipoli Volcanics across the three terranes (Wilson, Bowers and Robertson Bay) they intrude. The inherited patterns displayed by the Admiralty Intrusive are similar to those in NE Tasmania strengthening the idea that they originated from similar sources. The new data do not contrast with the presence of a metamorphic basement below the Robertson Bay sediments.

3 - The inherited zircon age pattern of the Admiralty intrusive and Gallipoli volcanic rocks has been compared with that of the Granite Harbour cropping out in the eastern part of the Wilson terrane. No significant difference has been observed that allow to detect lateral variation in the deep crustal source of these granites.

4 - The detrital zircon age pattern of three samples of Robertson bay sediments indicates that the deposition

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age is younger than 480 Ma. No systematic lateral variation in the inherited age patterns was observed that could indicate significant changes in the source of the sediments.

5 – New geochronological and chemical data on samples from the East South Tasman Rise revealed the presence of Grenville-age magmatic rocks. It is the first occurrence in this area of rock similar to Grenville granite of the Llano Uplift (Texas).

Products

A – papers in scientific magazines

1. Black L.P., Everard J.L., McClenaghan M.P., Foden J.D., Korsch R.J., Fioretti A.M., Brown A.V., Foudoulis C. - Controls on Devonian-Carboniferous magmatism in Tasmania, as derived from inherited zircon age patterns, Sr, Nd and Pb isotopes, and major and trace element concentrations. Australian Journal of Geology. In prep.
2. Fioretti A.M., Black L.P., Foden J., Visonà D. (2005) - Grenville-age magmatism at the South Tasman Rise (Australia): a new piercing point for the reconstruction of Rodinia. *Geology*, 33-10; p. 769-772.
3. Fioretti A.M., Capponi G., Black L.P., Varne R., Visonà D. (2005) - Surgeon Island granite SHRIMP zircon ages: a clue for the Cambrian tectonic setting and evolution of the Palaeopacific margin of Gondwana (northern Victoria Land, Antarctica). *Terra Nova*, 17-3; p. 242-249.
4. Fioretti A.M., Capponi G., Black L.P., Visonà D. (2003) - Surgeon Island granite: implications for regional geological evolution from structural observations and SHRIMP zircon dating. *Proceedings in Terra Antarctica Reports* 9, p. 171-175.
5. Fioretti A.M., Black L.P., Visonà D. (2003) - Dating Middle Paleozoic magmatism in Northern Victoria Land (Antarctica): State of the Art and future Plans. *Proceedings in Terra Antarctica Reports* 9, p. 155-158.

B – book chapters

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C - proceedings of international conferences

1. Fioretti A.M. & Visonà D. (2008) Reassembling the dispersed fragments of Rodinia: the case of South Tasman Rise (Australia). International Workshop "Geological and Geophysical investigations from the Transantarctic Mountains to Dome C". Genova, 26th September.
2. Rocchi S., Di Vincenzo G., Fioretti A.M., Ghezzo C. (2003) - Igneous activity during the waning stage of the Ross Orogeny in Victoria Land. 9th ISAES Potsdam (D), *Terra Nostra Schriften der Alfred Wegener Stiftung* 2003-2004, p. 276-277.
3. Fioretti A.M., Black L., Henies-Kunst F., Visonà D. (2003) - Detrital zircon age patterns from a large gneissic xenolith from Cape Phillips granite and from Robertson Bay Group metasediments, Northern Victoria Land, Antarctica. 9th ISAES Potsdam (D), *Terra Nostra Schriften der Alfred Wegener Stiftung* 2003-2004, p. 94-95.

D – proceedings of national meetings and conferences

1. Fioretti A.M., Visonà D. (2005) - The role of petrology and geochronology in reassembling dispersed fragments of Rodinia: the case of South Tasman Rise (Australia). *GeoItalia* 2005. Epitome 30-19 p. 196.
2. Fioretti A.M., Capponi G., Black L.P., Visonà D. (2003) - Surgeon Island granite: implications for regional geological evolution from structural observations and SHRIMP zircon dating. *Proceedings in Terra Antarctica Reports* 9, p. 171-175.
3. Fioretti A.M., Black L.P., Visonà D. (2003) - Dating Middle Paleozoic magmatism in Northern Victoria Land (Antarctica): State of the Art and future Plans. *Proceedings in Terra Antarctica Reports* 9, p. 155-158.

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. 2008 – "Geologi a caccia di meteoriti in Antartide". Università di Padova, settimana della Cultura Scientifica. (*marzo 2008*).
2. 2008 – "Storia dell'Anno Polare Internazionale: un progetto scientifico che coinvolge 63 Nazioni e 50 mila persone". Università di Padova, settimana della Cultura Scientifica (*marzo 2008*).
3. 2008 – "Italy in Antarctic during the Fourth International Polar Year" Istituto Italiano di Cultura, Sydney, Australia. (*Febbraio 2008*).

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4. 2008 – “Italy in Antarctic during the Fourth International Polar Year” Istituto Italiano di Cultura, Melbourne, Australia. (*Febbraio 2008*).
5. 2005 – “A trip to Antarctica: past, present and future”. St Bedes Primary School, Red Hill, Canberra, Australia.
6. 2005 – “Antarctica: what a continent!”. Dante Alighieri Association, Canberra, Australia.

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

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Research units

GHE-VIS

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Guido ROGHI (CNR - IGG)

Anna CARRARO (Uni-PD)

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Date:

24/12/2008

Notes