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Preliminary Palaeomagnetic Results from the Devono-Carboniferous Admiralty Intrusives (Northern Victoria Land, Antarctica)

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Abstract - This paper reports the results of a preliminary palaeomagnetic investigation of the Admiralty Intrusives complex of northern Victoria Land, Antarctica. The samples were collected at Mt. Supernal and Inferno Peak, two plutons mainly formed of granodiorite and minor tonalite and emplaced at ≈350 Ma at a high crustal level, as shown by amphibole geobarometric data and occurrence of miarolitic cavities. Microprobe and isothermal remanence analyses showed that magnetite, characterized by low coercivity and Curie point in the range 550-570 °C, is the only primary ferromagnetic mineral. Stepwise thermal demagnetization succeeded in isolating a magnetization component, stable up to 530 °C.

The virtual geomagnetic poles (VGPs) of the two plutons are different. That of Inferno Peak is consistent with the Australian palaeopoles of late Devonian-early Carboniferous age, whereas the location of the Mt. Supernal VGP probably results from the tectonic activity which affected the Ross Sea region during the Cenozoic.

INTRODUCTION

The apparent polar wander (APW) path for East Antarctica consists of very few points, obtained from rocks formed during the major tectonic events of the region: the Cambro-Ordovician Ross orogeny (Lanza & Tonarini, 1998; Grunow & Encarnación, 2000, and references therein), the middle Jurassic Ferrar basaltic magmatism (Lanza & Zanella, 1993, and references therein) and, in Victoria Land, the Cenozoic to Recent Meander Intrusives and McMurdo volcanics (Mankinen & Cox, 1988; Belluso & Lanza, 1996). No poles are available for the ≈300 Ma elapsed from the Cambro-Ordovician to the late early Jurassic, although a thick sequence of Devonian to Triassic continental sediments crops out along the Transantarctic Mountains. Widespread intrusion of Ferrar dolerite sills thermally reset the NRM of these rocks and gave them a magnetization overprint directed according to the early Jurassic Earth's field (Funaki, 1984; Wooler et al., 1995).

During the late Devonian-early Carboniferous, the crystalline basement of northern Victoria Land was intruded by several undeformed, high-level, discordant plutons, which have been grouped into the Admiralty Intrusives (Grindley & Warren, 1964; Borg et al., 1987, Ganovex-ItaliAntartide, 1995; Fioretti et al., 1997a) (Fig. 1). They mainly consist of granodiorite with minor tonalite and granite, and their chemical features are typical of calc-alkaline, mainly I-type rocks (Chappel and White, 1974). A reconnaissance palaeomagnetic sampling of the Admiralty Intrusives was done by Delisle (1983) in the Yule Bay region (Fig. 1) and provided a preliminary VGP not very well constrained statistically. A pole from the Admiralty Intrusives would add a valuable point to a part of the APW path which at present can only be computed by rotating palaeopoles from other Gondwanan continents to East Antarctica. This computation, however, is not straightforward, because the palaeopoles are few and not all of them are well-dated or structurally constrained. Therefore, various hypotheses about the mid-Palaeozoic Gondwana APW path continue to be debated in the literature (*e.g.* Schmidt et al., 1990; Grunow, 1999).

The present study was undertaken in the framework of a geological and petrographical investigation and aimed at testing the possibility of deriving reliable palaeomagnetic data from the Admiralty Intrusives rocks.

GEOLOGICAL, PETROGRAPHICAL AND GEOCHEMICAL SETTING

Northern Victoria Land represents the Pacific side termination of the Transantarctic Mountains. It consists of three tectonic units, known as Wilson, Bowers and Robertson Bay Terranes, whose amalgamation preceded the extensive, late Devonian-early Carboniferous magmatism which gave rise to the Admiralty Intrusives and the effusive Gallipoli andesite-rhyolite suite (Ganovex-ItaliAntartide, 1995). Most of the Admiralty Intrusives crop out in the Bowers and Robertson Bay Terranes. However, two plutons (Mt. Supernal and Salamander) are known to intrude also the Wilson Terrane (Ganovex-

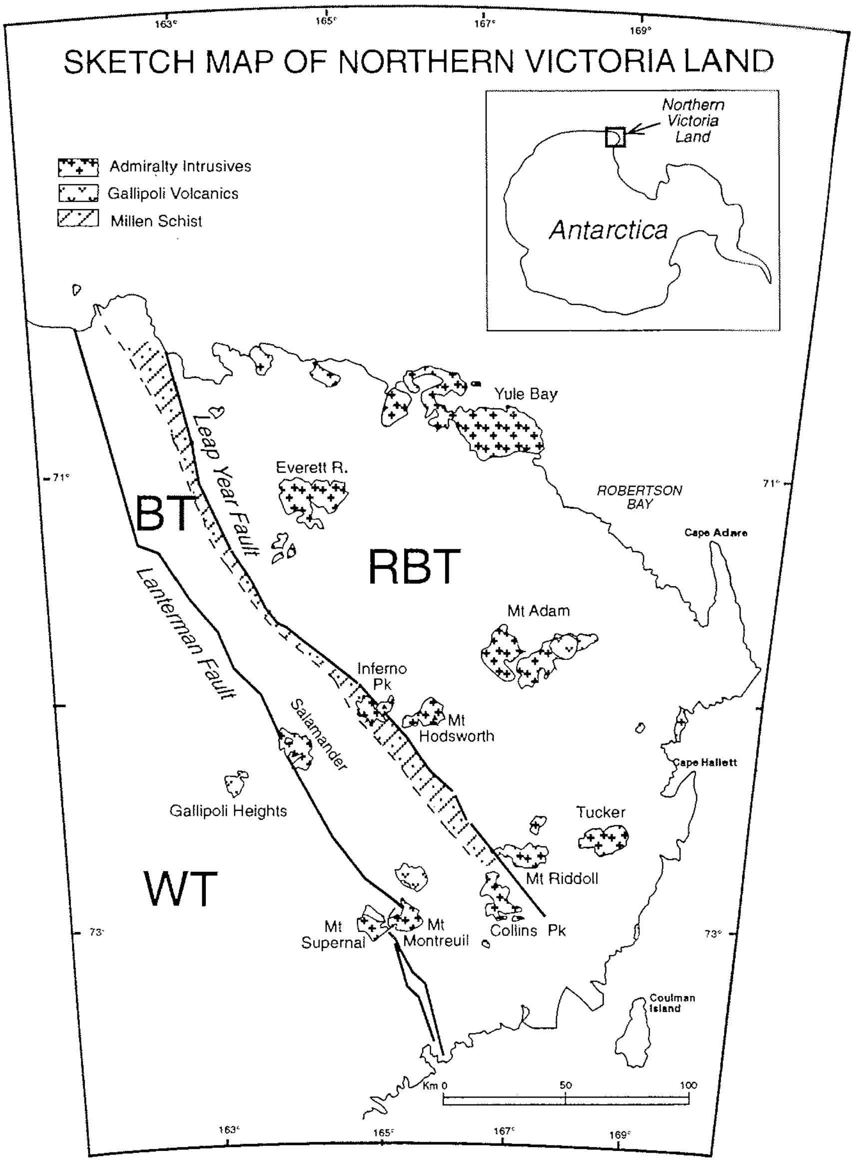

Fig. 1 - Sketch map of northern Victoria Land with Terranes boundaries and location of Admiralty Intrusives. Symbols: WT = Wilson Terrane; BT = Bowers Terrane; RBT = Robertson Bay Terrane. (Simplified after the "Tectonic Sketch Map of Northern Victoria Land, Ganovex-ItaliAntartide, 1995).

ItaliAntartide, 1995; Fioretti et al., 1997b) and bear witness to the fact that amalgamation of the Bowers and Robertson Bay Terranes with the Wilson Terrane predated the early Carboniferous. The two areas investigated in the present work (Fig.1) are located at Mt. Supernal (Lat. 73°1'S, Long. 165°45'E) and Inferno Peak (Lat. 72°8'S, Long. 165°45'E).

Mt. Supernal-Mt. Montreuil pluton crops out astride the thrust separating the Wilson and Bowers terranes, known as the Lanterman fault. The thrust is early Palaeozoic in age (Gibson & Wright, 1985; Ricci et al., 1997; Capponi et al., 1999) and was reactivated in the Cenozoic (Salvini et al., 1997). North of Mt. Supernal and west of the sampling region, the pluton is intruded by Cenozoic lavas of the McMurdo Igneous Complex (Ganovex-ItaliAntartide, 1995), which constitute small preserved volcanic cones and narrow flows lying on the surface of the granitic rocks. The pluton comprises two petrographically distinct bodies. The main mass is composed of amphibole-bearing, equigranular, medium-grained granodiorite to tonalite, with frequent clots of mafic minerals and microgranular enclaves. The second body forms the upper part of Mt. Supernal and is composed of porphyritic, hornblende-bearing, biotite monzogranite, pinkish-grey in colour and a with a fine-grained groundmass of round quartz and interstitial K-feldspar (Fioretti et al., 1998). Hand-picked samples for palaeomagnetic study were collected from the granodiorite, at six spots located along a spur to the north of Mt. Supernal. At the sampling site, the granodiorite consists of zoned plagioclase (core An45; rim An19), quartz, Mg-biotite, green Fe-hornblende with brown Mg-rich cores, and K-feldspar. Some hornblendes include relics of clinopyroxene with thin rims of orthopyroxene and pale actinolitic patches. Apatite, zircon, magnetite and ilmenite (Tab. 1) occur as accessory minerals. Ilmenite, with a high pyrophanite component, is mainly found as thin lamellae exsolved from magnetite. Major and trace element compositions (Tab. 2) are within the range typical of the Admiralty Intrusives (Borg, 1984; Fioretti et al., 1997b, and unpublished data).

Inferno Peak pluton crops out astride the lower Palaeozoic Leap Year fault and intrudes both the rocks of the Robertson Bay Terrane and the Millen Schist, at the border of the Bowers Terrane. The upper part of the

Tab. 1 - Microprobe analyses of opaque minerals in selected samples from Mt. Supernal and Inferno Peak.

Magnetite and Cr-Spinel

	Mt Supernal			**Inferno Peak**		
	15.1.97	31.12.96	31.12.96	25.12.96	25.12.96	25.12.96
	A 2	A1	A1	AML 12	A 8	AML14
TiO2	0.18	0.44	0.13	0.01	5.18	3.63
Al2O3	0.34	0.09	0.06	0.01	0.96	2.45
Cr2O3	0.14	0.17	0.16	0.97	19.7	23.97
FeO	91.44	92.17	91.61	90.92	63.77	64.04
MnO	0.04	0.02	0.11	0.09	1.97	0.59
MgO	0.01	0.01	0.01	0.01	0.02	0.2
SiO2	0.08	0.04	0.01	0.03	0.01	0.04
Sum	92.23	92.97	92.07	92.02	91.7	94.92
Fe2O3	67.16	67.57	67.66	67.07	34.26	33.58
FeO	31.01	31.37	30.72	30.57	32.95	33.83
Total*	98.96	99.74	98.85	98.74	95.13	98.29
Structural formulae on the basis of 4 oxygens						
Ti	0.005	0.013	0.004	0.000	0.154	0.104
Al	0.016	0.004	0.003	0.000	0.045	0.110
Cr	0.004	0.005	0.005	0.030	0.617	0.720
Fe3+	1.963	1.962	1.984	1.968	1.021	0.960
Fe2+	1.007	1.012	1.001	0.997	1.091	1.075
Mn	0.001	0.001	0.003	0.003	0.066	0.019
Mg	0.000	0.002	0.000	0.001	0.001	0.011
Si	0.003	0.002	0.000	0.001	0.004	0.002
Cat. Sum	3.000	3.000	3.000	3.000	3.000	3.000
Ulvosp.	0.53	1.28	0.39	0.00	15.48	10.38
Spinel	0.79	0.21	0.13	0.00	2.26	5.49
Chrom.	0.22	0.26	0.24	1.50	30.99	36.06
Magnet.	98.46	98.26	99.24	98.50	51.27	48.07

Ilmenite

	Mt Supernal		**Inferno Peak**	
	31.12.96	15.1.97	25.12.96	25.12.96
	A1	A 2	A8	AML14
TiO2	43.19	48.66	52.43	51.18
Cr2O3	0.12	0.01	0.01	0.02
FeO	48.99	42.82	43.39	46.64
MnO	7.46	6.48	3.21	0.87
MgO	0.02	0.04	0.03	0.06
CaO	0.51	0.06	0.05	0.06
Sum	100.3	98.07	99.11	98.83
Fe2O3	8.08	2.56	0.01	0.73
FeO	41.72	40.52	43.39	45.98
Total*	101.11	98.33	99.11	98.91
Structural formulae on the basis of 3 oxygens				
Ti	0.840	0.950	1.003	0.985
Cr	0.002	0.000	0.000	0.000
Fe3+	0.157	0.050	0.000	0.014
Fe2+	0.902	0.879	0.923	0.984
Mn	0.163	0.142	0.069	0.019
Mg	0.001	0.002	0.001	0.002
Ca	0.014	0.002	0.001	0.002
Cat. Sum	2.080	2.025	1.997	2.007
Mg No	0.08	0.18	0.12	0.23
XTiO3	83.99	94.99	100	98.55
Hem.	15.72	5.01	0.00	1.41
Ilm.	70.14	81.49	92.80	96.31
Pyroph.	12.70	13.20	6.94	1.84
Geikiel.	0.05	0.15	0.11	0.22

Goethite

	Inferno Peak	
	25.12.96	25.12.96
	A8	AML12
TiO2	0.03	0.01
Al2O3	0.01	0.01
Cr2O3	0.01	0.01
FeO	79.78	73.47
MnO	0.04	0.07
MgO	0.22	0.43
SiO2	2.48	2.6
Sum	82.54	76.6

Tab. 2 - Bulk chemical composition of selected samples from Mt. Supernal and Inferno Peak.

	Mt Supernal		**Inferno Peak**			
	15.1.97	31.12.96	25.12.96	25.12.96	25.12.96	25.12.96
	A2	A1-A3	AML12	AML13	AML14	A8
major elements (wt%)						
SiO2	67.27	66.36	66.19	63.04	58.55	63.91
TiO2	0.51	0.58	0.40	0.63	0.80	0.62
Al2O3	14.88	14.69	15.93	14.99	15.40	15.23
Fe2O3	0.75	0.77	0.65	0.75	0.72	0.42
FeO	3.11	3.50	2.81	4.65	6.38	4.61
MnO	0.07	0.07	0.05	0.08	0.11	0.08
MgO	1.75	1.91	1.76	3.42	4.91	3.35
CaO	3.83	3.56	3.90	4.77	6.35	4.40
Na2O	3.70	3.85	4.03	3.12	3.22	3.28
K2O	2.75	2.84	2.37	2.07	1.32	2.05
P2O5	0.14	0.15	0.08	0.12	0.12	0.13
LOI	0.81	1.27	1.44	1.75	1.36	1.65
Total	99.58	99.55	99.62	99.41	99.23	99.72
trace elements (ppm)						
Cr	62	58	91	218	280	145
Ni	67	59	60	87	71	61
Co	10	12	9	16	23	15
Sc	11	14	11	14	18	14
V	65	76	59	111	155	109
Cu	43	27	12	39	52	19
Pb	10	13	14	11	11	10
Zn	62	52	56	77	81	61
Rb	124	117	105	87	47	93
Ba	461	442	399	467	307	470
Sr	220	184	237	232	218	227
Ga	16	17	18	17	16	18
Nb	10	11	6	7	7	8
Zr	140	206	116	145	121	159
Y	21	27	19	20	22	20
Th	10	14	9	6	7	11
U	4	4	4	3	2	3
La	20	40	12	26	26	21
Ce	48	48	41	54	37	50
Nd	12	15	11	18	16	16

pluton, near the contact with the country rocks, is composed of medium- to fine-grained, slightly porphyritic leucogranite with crystals of black, smoky, subhedral quartz up to 6-7 mm in size and small miarolitic cavities, which indicate a shallow emplacement level. Contacts with the metamorphic country rocks are clearly discordant and characterized by the presence of intrusion breccias. At a lower altitude, west of the Inferno Peak ridge, equigranular, medium-grained, biotite-amphibole granodiorite crops out. Mafic microgranular enclaves and clots of mafic minerals are common, as it is typical in most of the Admiralty Intrusives. The palaeomagnetic sampling site is located west of the Leap Year fault, in the Bowers terrane, on one of the north-western ends of the pluton. At the site, a small, medium- to fine-grained tonalite to diorite body occurs, together with abundant mafic microgranular enclaves similar to those observed in the granodiorite of the main mass. The most basic rocks among the examined outcrops were sampled for the purpose of this palaeomagnetic study. The petrographical and geochemical features reported here therefore differ from those typical of the Inferno Peak pluton, which usually has a more restricted compositional range and a more acidic composition (Capponi et al., 1995). The

Tab. 3 - Chemical composition of selected green hornblende crystals from Mt. Supernal and Inferno Peak. P(kb) values are tentative, since the very low Al_{tot} content prevents reliable application of the Al-in geobarometer (Schmidt, 1992).

	Mt Supernal				Inferno Peak			
	15.1.97	15.1.97	31.12.96	31.12.96	15.1.97	25.12.96	25.12.96	25.12.96
	A2	A2	A1	A1	A 2	A8	A8	AML 14
SiO2	49.20	49.83	53.92	47.77	48.47	46.94	47.35	47.62
TiO2	1.12	0.70	0.14	1.28	1.15	1.85	1.76	1.50
Al2O3	4.94	4.31	1.12	5.59	5.45	6.92	6.50	6.58
FeO	0.60	0.58	1.38	0.40	15.31	15.78	15.19	16.16
MnO	12.61	13.95	15.95	11.95	0.65	0.29	0.25	0.23
MgO	17.11	15.46	22.64	17.39	13.19	12.46	12.65	12.56
CaO	11.39	11.13	2.99	11.16	11.30	11.34	11.13	11.33
Na2O	1.09	0.75	0.16	1.31	1.26	1.26	1.28	1.09
K2O	0.46	0.32	0.07	0.52	0.37	0.79	0.63	0.61
Sum	98.52	97.03	98.36	97.37	97.15	97.63	96.74	97.68
Structural formulae on the basis of 23 oxygens								
Si	7.203	7.357	7.879	7.104	7.098	6.895	6.986	6.961
Al iv	0.797	0.643	0.121	0.896	0.902	1.105	1.014	1.039
Al vi	0.056	0.108	0.072	0.083	0.038	0.093	0.117	0.094
Ti	0.123	0.078	0.015	0.144	0.127	0.204	0.195	0.165
Fe3+	0.324	0.105	0.031	0.315	0.638	0.528	0.503	0.644
Fe2+	1.771	1.803	2.735	1.848	1.237	1.411	1.372	1.332
Mn	0.074	0.073	0.171	0.051	0.081	0.036	0.031	0.028
Mg	2.753	3.072	3.473	2.649	2.879	2.728	2.782	2.737
Ca	1.787	1.761	0.476	1.778	1.773	1.785	1.759	1.774
Na	0.309	0.215	0.045	0.377	0.358	0.359	0.366	0.309
K	0.085	0.059	0.013	0.099	0.069	0.148	0.119	0.114
Al tot	0.853	0.751	0.193	0.979	0.941	1.198	1.130	1.134
P(kb)	1.1	0.6	----	1.7	1.5	2.7	2.4	2.4

diorite is composed of green Fe-hornblende with brown cores of Mg-hornblende, euhedral zoned plagioclase (core An55; rim An38), orthopyroxene En80, diopsidic clinopyroxene, Mg-biotite, quartz and minor, interstitial K-feldspar. Orthopyroxene is surrounded by rims of cummingtonite and clinopyroxene by patches of pale green, actinolitic hornblende which grades to green hornblende. Accessory minerals are apatite, zircon, sphene and ilmenite, together with rare magnetite and Cr-spinel.

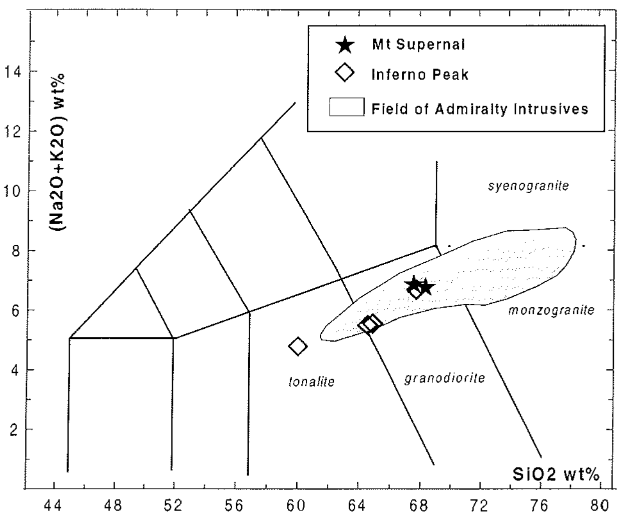

Fig. 2 - Total Alkali Silica (TAS) classification diagram (Bellieni et al., 1995) for palaeomagnetic samples from Inferno Peak and Mt. Supernal.

Small grains of goethite sometimes replace magnetite. The mafic microgranular enclaves show a typical quenched texture and a mineral assemblage similar to that of the dioritic body. The granodiorite is composed of Fe-hornblende, which includes rare relics of clinopyroxene surrounded by pale actinolitic patches, zoned plagioclase (core An50; rim An30), Mg-biotite, quartz and perthitic K-feldspar. Apatite, zircon, ilmenite and rare magnetite in small euhedral crystals occur as accessory minerals.

In the samples of both plutons, the Al_{tot} content of hornblende in equilibrium with the appropriate assemblage (Tab. 3, and Fioretti et al., 1997c), although outside the calibration range of the Al-in geobarometer (2.5-13 Kbar; Schmidt, 1992), is indicative of a shallow emplacement level, consistent with the presence of miarolitic cavities. Both plutons show major and trace element compositions (Tab. 2) typical of the Admiralty Intrusives (Borg, 1984; Fioretti et al., 1997b, and unpublished data) and plot within the field defined by the rocks of the other Admiralty plutons (Fig. 2). The composition of the small dioritic-tonalitic body at Inferno Peak is more mafic than usual. However, field and petrographic evidence such as local chilled margins, lobate interfaces and the abundance of mafic microgranular enclaves indicate that it pertains to the Admiralty Intrusives magmatic suite.

At both plutons, hand samples were collected from six spots some 20 to 50 m apart. They were oriented with both magnetic and solar compasses, and then cored and cut to standard cylindrical specimens in the laboratory.

GEOCHRONOLOGY

Geochronological study of the Admiralty Intrusives is far from complete, as only some plutons have been dated. Moreover, different methods have been used for different plutons (Fioretti et al., 1997a, and references therein) and their results are not in full agreement. Based on Rb/Sr whole-rock age determinations, the Admiralty Intrusives have been suggested to represent two distinct magmatic pulses. The older (380-390 Ma) and younger (350-360 Ma) plutons appear to crop out in the easternmost sector of northern Victoria Land and within the Bowers and Wilson Terranes respectively (Fioretti et al. 1997a). However, K/Ar ages on both biotite and amphibole do not support this hypothesis and suggest a single magmatic episode within a time-span of 370 to 340 Ma (Stump, 1995). The Rb/Sr whole-rock age of Mt. Supernal is 364±20 Ma (Stump, 1995) and the biotite K/Ar age of the nearby Mt. Montreuil is 346 Ma (Capponi et al., in press). The two ages are indistinguishable within experimental error, in agreement with geological and petrographical evidence which indicates that the two plutons are part of a single body. SHRIMP determinations still in progress on samples from Mt. Supernal have confirmed its late Devonian to early Carboniferous crystallization age (Fioretti et al., unpublished data). No isotopic age are available for the Inferno Peak pluton. However, it crops out in the western sector of the distribution area of the Admiralty Intrusives, where the plutons are the youngest (Fioretti et al., 1997a),

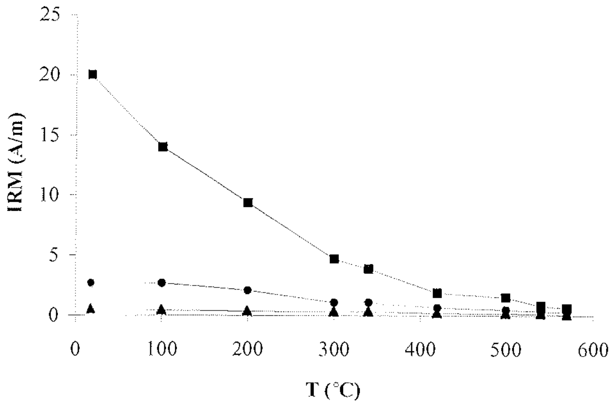

Fig. 3 - Thermal demagnetization of the IRM components (Lowrie, 1990). Symbols: square = low- ; dot = intermediate; triangle = high-coercivity component.

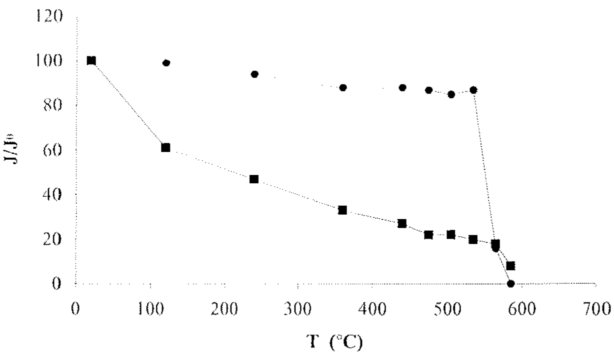

Fig. 4 - Normalized intensity decay during thermal demagnetization. Curves: dot = Inferno Peak; square = Mt. Supernal.

regardless of whether the Admiralty Intrusives consist of one magmatic episode or two. An early Carboniferous age may also be inferred from its strong petrographic and geochemical similarity with other dated plutons, such as Collin Peak-Mt. Burril (358±14 Ma, Fioretti et al., 1997b) and the Salamander granitic complex (347±3 Ma, Ganovex-Itali Antartide, 1995).

PALAEOMAGNETISM

Thermal demagnetization of the isothermal remanent magnetization (IRM) shows that the main ferromagnetic mineral in both plutons is characterized by low coercivity and has Curie point in the range of 550-570 °C (Fig. 3). These results point to magnetite as the main carrier of natural remanent magnetization (NRM) and are confirmed by mineralogical analyses. The amount of magnetite in the Mt. Supernal rocks appears to be higher than in those of Inferno Peak based on the large difference in the bulk susceptibility (k) and NRM intensity (J), whose values at Mt. Supernal ($k = 16.9 \times 10^{-3}$ SI units, $J = 1.1 \times 10^{-1}$ A/m) are much higher than at Inferno Peak ($k = 0.6 \times 10^{-3}$ SI units, $J = 5 \times 10^{-3}$ A/m).

Twelve specimens from the six hand samples collected at each pluton were measured. Some of them broke up during heating and the total number reduced to 11 specimens for Mt. Supernal and 9 for Inferno Peak. The NRM directions are rather dispersed, since their site mean values have a semi-angle of confidence $\alpha_{95} > 18°$ (Tab. 4). Stepwise thermal demagnetization (Fig. 4) shows that, at Mt. Supernal, about 50% of the NRM initial intensity is removed by heating at temperatures of 230-250 °C, whereas at Inferno Peak some 80-85% of it stands up to 500 °C . This suggests that the NRM dispersion is due to secondary magnetization components, particularly at Mt. Supernal. Systematic thermal demagnetization at 7 to 11 steps, in the temperature range 200-530 °C for Inferno Peak (Fig. 5) and 360-530 °C for Mt. Supernal, succeeded in isolating a stable, characteristic magnetization (ChRM). The directions are of normal polarity and well grouped at both sites, as shown by the values of Fisher's statistics parameters (Tab. 4). The mean site directions share a similar inclination, whereas declination is directed NE at Inferno Peak and NW at Mt. Supernal (Fig. 6). The positions of the two southern VGPs are therefore different: lat. 48°S, long. 5°E for Inferno Peak, and lat. 44°S, long. 317°E for Mt. Supernal. The Inferno Peak VGP is very close to that (lat. 46°S, long. 8°E) obtained from granitic rocks with age of 361±1.5 Ma at Birthday Ridge near Yule Bay (Delisle, 1983), which has however been derived from a poorly defined ChRM mean direction ($\alpha_{95} = 24°$).

Tab. 4 - Palaeomagnetic results from Admiralty Intrusives.

Site		n	D , I	*k*	a95	VGP Lat. Long.
Mt. Supernal	NRM	11	324.9, -30.8	4	26.2°	
	ChRM 360-530 °C	11	336.9, -48.1	43	7.0°	44°S, 317°E
Inferno Peak	NRM	9	14.2, -46.9	9	18.6°	
	ChRM 200-530 °C	9	15.4, -50.1	41	8.1°	48°S, 5°E
Birthday Ridge	ChRM 1000 Oe	10	16, -47	--	24°	46°S, 8°E

Symbols: NRM/ChRM = natural/characteristic remanent magnetization, with demagnetization range; n = number of specimens; D, I = declination, inclination; *k* = Fisher's precision; α_{95} = semi-angle of confidence; Lat., Long. = latitude, longitude of southern virtual geomagnetic pole (VGP). Data for Birthday Ridge from Delisle (1983).

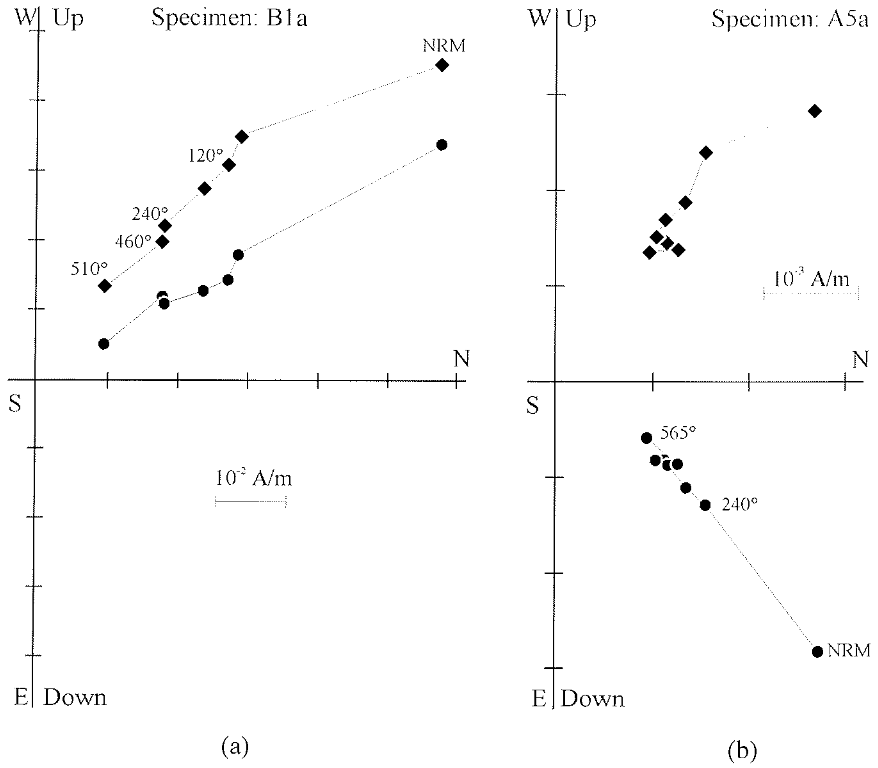

Fig. 5 - Zijderveld diagram for thermal demagnetization for specimen B1a (Mt. Supernal) and A5a (Inferno Peak). Symbols: dot = declination; square = apparent inclination; figures = temperature (°C).

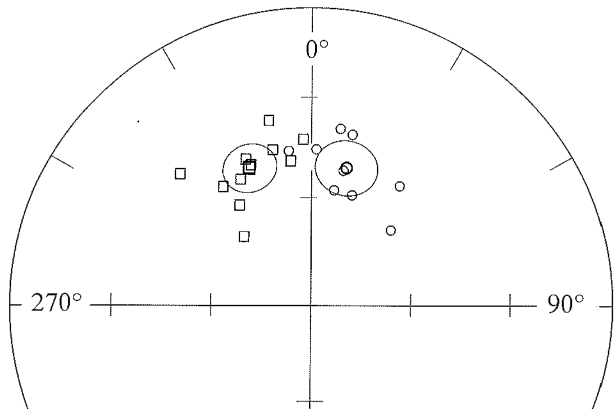

Fig. 6 - Equal-area projection of the ChRM directions from Admiralty Intrusives. Symbols: dot = Inferno Peak; square = Mt. Supernal; small symbol = single specimen direction; large symbol and ellipse = mean site value and α_{95} circle of confidence.

DISCUSSION AND CONCLUSIONS

The ChRM of both plutons is carried by magnetite and proved to be stable up to temperature values of 530-560 °C. The occurrence of miarolitic cavities and geobarometric data from amphiboles (less than 2.7 kbar) indicate emplacement at a high crustal level and hence a relatively fast cooling rate. The ChRM may therefore be regarded as a primary TRM and its age assumed to be the same as that of rock emplacement, *i.e.* about 350 Ma. The hypothesis of a later Jurassic or Cretaceous overprint may be discarded, since the Admiralty Intrusives VGP's are more than 50° away from the Jurassic palaeopole (Lanza & Zanella, 1993) and the Cretaceous part of the synthetic APW path for East Antarctica (Di Venere et al., 1994). On the other hand, the possibility of a magnetic overprint due to a thermal anomaly related to the Cenozoic magmatism which affected northern Victoria Land cannot be discarded a priori. This hypothesis may be checked at Mt. Supernal, where apatite fission track analyses yield much older ages than Cenozoic (Balestrieri & Bigazzi, 2000). Since the temperature at which the apatite fission track system is completely reset (Gleadow & Duddy, 1981) is 120 ± 10 °C and the ChRM directions were derived after demagnetization in the range 360-530 °C, it may be concluded that the rocks retained their primary magnetization, and that Cenozoic reheating, if any, may only have produced low-temperature, secondary magnetization components. Moreover, East Antarctica was located at high southern latitudes throughout Cenozoic (DiVenere et al., 1994) and this location is incompatible with the ChRM inclination values of about -50° at both plutons and the VGPs latitudes of 44°S to 48°S.

At this point, the only possible explanation for the discrepancy in the two VGP positions must be sought in post-emplacement tectonic movements, which however are difficult to trace back because of the absence of Beacon sediments in the neighbourhood of the plutons. They may be supposed to be Cenozoic in age, since both plutons crop out close to one of the main faults which cross northern Victoria Land (Fig. 1) and correspond to terrane boundaries of early Palaeozoic age reactivated in the Cenozoic as right-

Tab. 5 - Late Devonian-Carboniferous southern VGPs from East Antarctica and selected palaeopoles from Australia (Schmidt et al., 1990) rotated to East Antarctica reference system.

Pole	Age	Lat. S	Long. E	Reference
East Antarctica VGPs				
A Inferno Peak	eC	48°	5°	This paper
B Mt. Supernal	eC	44°	317°	This paper
C Birthday Ridge	lD-eC	46°	8°	Delisle, 1983
Australian Palaeopoles				
D Canning Basin Limestone	lD	47°	17°	Hurley and Van der Voo, 1987
E Hervey Group	lD-eC	46°	3°	Li et al., 1988
F Worange Point Form.	lD-eC	58°	342°	Thrupp et al., 1991
G Snowy River Volcanics	mC?	86°	201°	Schmidt et al., 1987
H Buchan cave Limestones	mC?	84°	248°	Schmidt et al., 1987
I Main Glacial Stage	mC	70°	187°	Irving, 1966
J Rocky Creek Conglomerate	mC	73°	169°	Irving, 1966

Symbols: lD = late Devonian; eC = early Carboniferous; mC = middle Carboniferous. Rotation parameters according to Tikku (1999, in Cande et al., 2000).

lateral, strike-slip faults (Salvini et al., 1997; Capponi et al., 1999). Comparison of the Admiralty Intrusives VGPs with Australian palaeopoles (Schmidt et al., 1990) rotated to the East Antarctica reference frame (Tab. 5, Fig. 7), shows that the Inferno Peak and Birthday Ridge VGP's fit the late Devonian to early Carboniferous palaeopoles. The latitude of the Mt. Supernal VGP is also very similar to that of the Australian palaeopoles, but the longitude is deviated westwards. This deviation may be explained by tectonic movements that have mainly affected the ChRM declination, leaving substantially unchanged the inclination, such as local rotation around a vertical axis.

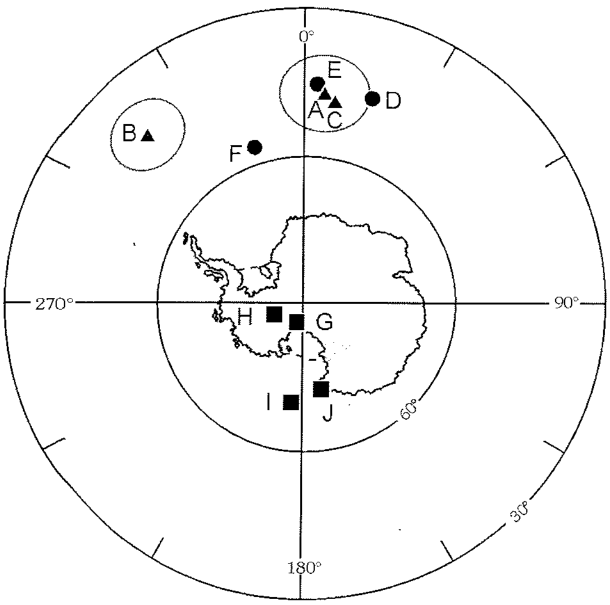

Fig. 7 - Equal-area projection of early Carboniferous VGPs from East Antarctica (triangles), late Devonian-early Carboniferous (dots) and middle Carboniferous (squares) palaeopoles from Australia. Letters refer to table 5.

This rotation may have resulted from complex interplay between reactivation of the Lanterman fault and extensional faulting related to the Cenozoic magmatism along the Ross Sea coast (Salvini et al., 1997; Capponi et al. 1999).

In conclusion, this preliminary palaeomagnetic study of the Admiralty Intrusives shows that the rocks of both investigated plutons retain their primary thermal remanence. The VGP calculated from Inferno Peak data (48°S, 5°E) substantiates the previous result from Birthday Ridge (46°S, 8°E) (Delisle, 1983) Both are consistent with the coeval Australian VGPs. Results from Mt. Supernal have shown that future work on the Admiralty Intrusives needs to be paired up with structural and tectonic studies, in order to take into account the possible local tectonic effects on the palaeomagnetic directions.

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