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GIGAMAP
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Museo Nazionale dell'Antartide
Sezione di Scienze della Terra - Siena (Italy)

ANTARCTIC GEOLOGICAL 1:250,000 MAP SERIES

COULMAN ISLAND QUADRANGLE (VICTORIA LAND)

1997

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co - Authors:
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EXPLANATION

CENOZOIC MAGMATISM AT THE ROSS SEA MARGIN

McMURDO IGNEOUS COMPLEX

Hv HALLETT BASALT TO TRACHYBASALT (Hv)
Predominantly mafic alkaline lavas and scoriae consisting of basal palagonitic and pillow breccias followed by ultramafic basanite, alkali-olivine basalt, trachybasalt and plagioclase basalt. Phonolitic and trachytic stocks occur as well. The radiometric ages range from 7 to 14 Ma.

Mav MALTA PERALKALINE TRACHYTE AND RHYOLITE (Mav)
Felsic trachyte to rhyolite peralkaline sequence forming large masses of multicoloured lava, tuff, ignimbrite and minor volcanic breccia and obsidian in the Malta Plateau area. The radiometric ages of these rocks range from 7 to 18 Ma.

Mg MEANDER ALKALI-GRANITE AND SYENITE (Mg)
Alkali-feldspar granite and granophyre, alkali-granite and alkali-syenite with local transitions to volcanic-subvolcanic types. In several cases gabbroic rocks occur in close association. The age of these rocks spans from 22 to 48 Ma.

POST-ROSS MAGMATISM AND SEDIMENTATION

ADMIRALTY IGNEOUS COMPLEX

Agr ADMIRALTY GRANODIORITE SUITE (Agr)
High level, I-type granitoid suite ranging in composition from tonalite to monzogranite, with major granodiorite. The emplacement took place between 380 and 400 Ma and cooling ages generally fall before 350 Ma.

TERRANES AND UNITS OF THE ROSS OROGEN

WILSON TERRANE

GRANITE HARBOUR IGNEOUS COMPLEX

GHgr GRANITE HARBOUR GRANODIORITE AND GRANITE (GHgr)
Syn- to post-kinematic biotite granite, granodiorite and tonalite intruded in the Wilson metamorphic units before 480±20 Ma (cooling ages).

GHt GRANITE HARBOUR TONALITE (GHt)
Gabbro, tonalite, diorite and granodiorite suite affected by a more developed foliation. An age of 505.0±8.3 Ma has been obtained from samples south of Whitcomb Ridge (Mount Murchison quadrangle).

WILSON METAMORPHIC COMPLEX

Wmg MIGMATITE GNEISS (Wmg)
Stromatic migmatite with minor agmatitic, horneblende gneiss, amphibolite layers and calc-silicate horizons. Biotite cooling ages fall around 475 - 480 Ma. Local name: Murchison Formation.

DESSENT RIDGE UNIT

Dm DESSENT METASEDIMENTARY SUITE (Dm)
Amphibolite facies metasediments derived from siliceous, carbonatic, pelitic and basic protoliths. Phillonitic bands mark several thrust planes. The metamorphic conditions are characterized by T = 520 - 600°C and P = 6 - 8 Kb. Biotite ages range from 459 - 473 Ma (K/Ar) to 475 - 477 (^{40}Ar/^{39}Ar, single grain).

BOWERS TERRANE

Tg TIGER GABBRO (Tg)
At the southeastern end of Spatulate Ridge, the layered Tiger Gabbro is formed by alternating cumulate layers of clinopyroxene, basic plagioclase and orthopyroxene with accessory olivine. An age of 521±10 Ma has been obtained from hornblende of these rocks.

Bbs BLACK SPIDER GREENSCHIST (Bbs)
Grey-greenish schist, black shale and phyllite, mafic metavolcanites, with major metaconglomerate bodies formed by dominant mafic and acid volcanic clasts in a green quartz-chlorite matrix. Occasional interbeds of psammitic and calc-silicate types also occur. The metamorphic grade is referrable to the biotite zone of the greenschist facies.

BOWERS SUPERGROUP

Bly LEAP YEAR GROUP (Bly)
Thickly-bedded, whitish to reddish, fluvial to deltaic quartz-pebble conglomerate and quartzite, with minor intercalations of red silty mudstone. A Late Cambrian age is hypothesised.

SLEDGERS GROUP
In the mapped area both units constituting this group, the sedimentary Molar Formation and the Glasgow Spilite, are present.

Bmo MOLAR FORMATION (Bmo) - Well bedded graywacke-mudstone sequence with volcanoclastic detrital lenses and minor siltstone interbeds. Rare limestone nodules are also present. Lenticular bodies of mostly matrix-supported coarse conglomerate and slide breccia are very prominent in some areas, e.g. at the Spatulate Ridge. The fossil content found north of this sheet (at Neall Massif in the Freyberg Mountains quadrangle) provided a Middle Cambrian or older age.

Bgl GLASGOW SPILITE, VOLCANIC BRECCIA and TUFF (Bgl) - Submarine volcanic sequence constituted by massive and banded lava flows, pillow lava, volcanic breccia, tuff and tuffite layers, with subordinate interbeds of slate, tuffitic graywacke and minor quartzite, chert and limestone. The interfingering relations with the Molar Formation indicate a similar age.

ROBERTSON BAY TERRANE

Rb ROBERTSON BAY GROUP (Rb) - This group is represented by a thick sequence of quartzose turbidite graywacke with silty mudstone intercalations, locally quite similar to the Molar Formation sandstone. Age is Cambrian to Tremadocian.

SYMBOLS

- Bedding, (a) inclined, (b) vertical.
- Regional schistosity and cleavage, (a) inclined, (b) vertical.
- Mineral and stretching lineation, (a) inclined, (b) horizontal.
- Axial plane trace, (a) anticline, (b) syncline. Arrow approximates the plunging of axis.
- Fold axis, (a) inclined, (b) horizontal.
- Geological boundary.
- Thrust; teeth on overthrust side.
- Crater, sink-hole, caldera rim.
- Spatter and cinder cone

TOPOGRAPHIC BASE:
U.S. GEOLOGICAL SURVEY MAPS, ANTARCTICA , 1:250,000 RECONNAISSANCE SERIES
Provided by courtesy of the U.S. Geological Survey

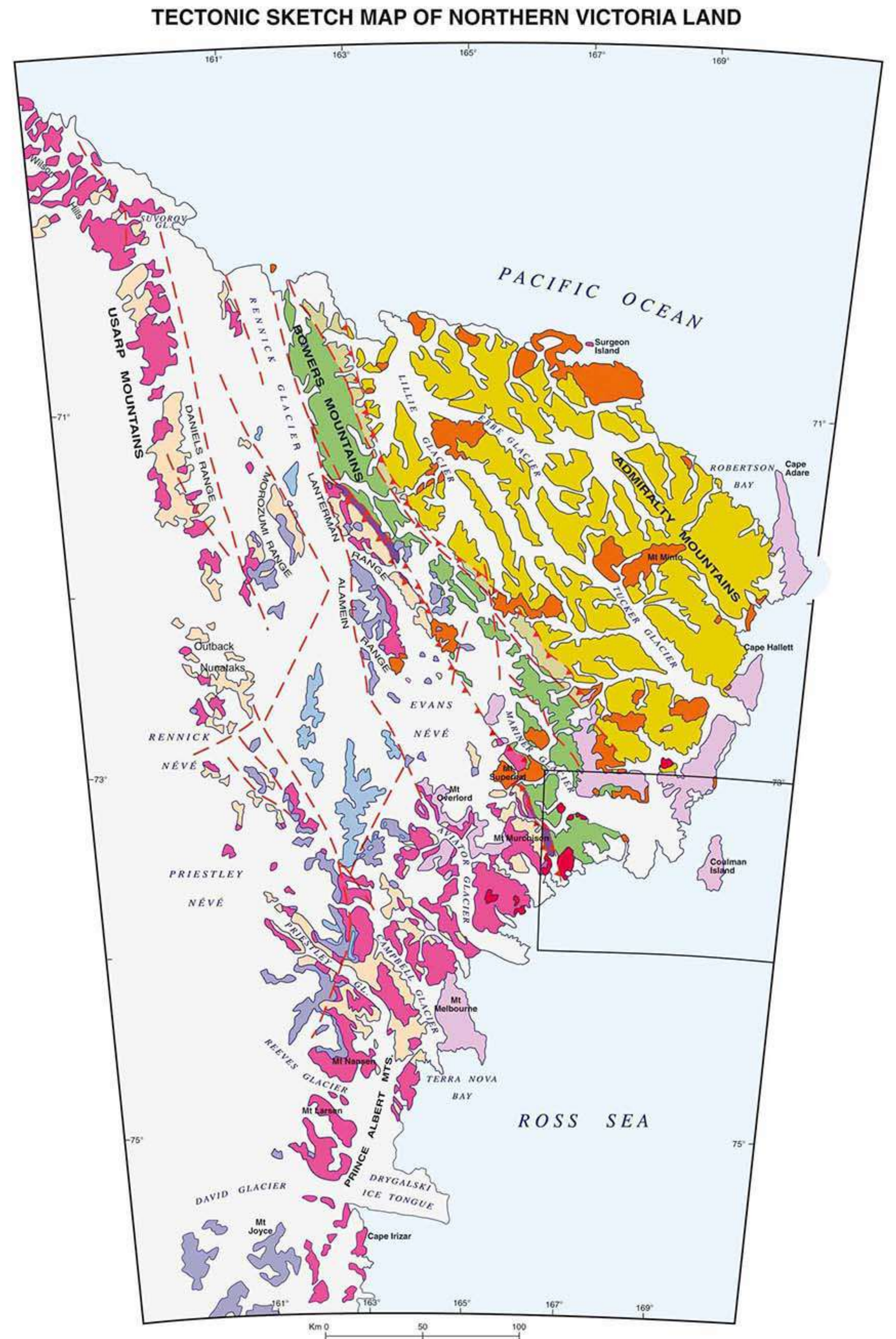
SCALE 1:250,000

5 0 5 10 15 20 Statute Miles

5 0 5 10 15 20 25 30 Kilometres

Lambert Conformal Conic Projection - Standard Parallels 72°40' and 75° 20' - Contour Interval 200 Meters - Datum is mean sea level

TECTONIC SKETCH MAP OF NORTHERN VICTORIA LAND

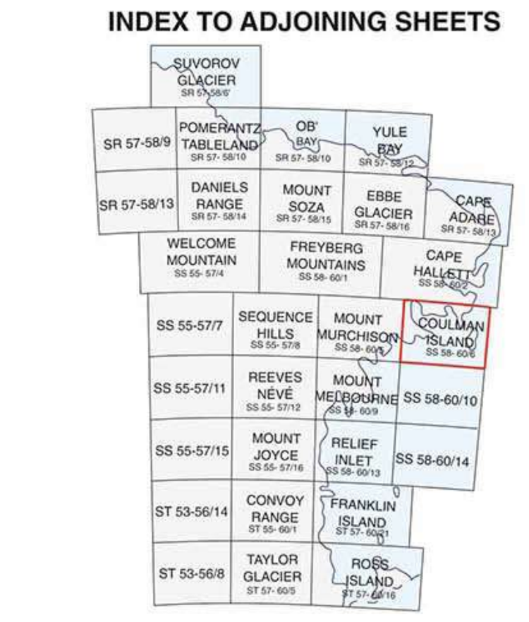


CENOZOIC MAGMATISM AT THE ROSS SEA MARGIN
- McMurdo Igneous Complex: Meander Granite and Syenite (a); Malta, Hallett and Melbourne Volcanic Suites (b)

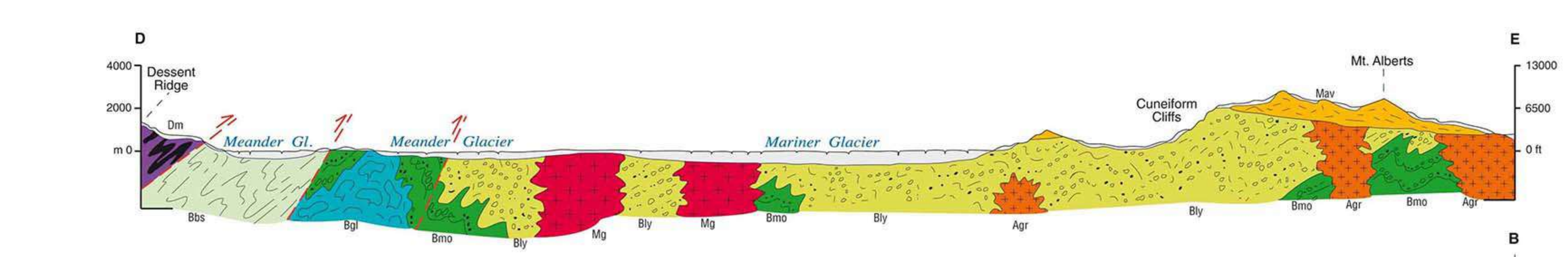
POST-ROSS MAGMATISM AND SEDIMENTATION
- Kirkpatrick Basalt (a); Ferrar Dolerite and Beacon Supergroup (b)
- Admiralty Igneous Complex
- Thrusts
- Faults

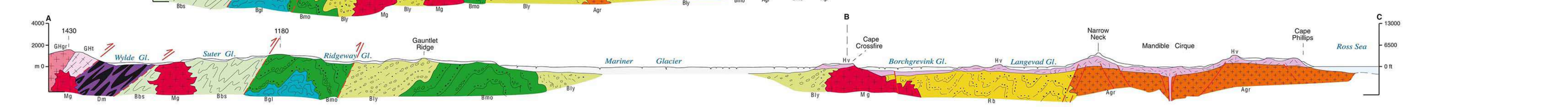
TERRANES AND UNITS OF THE ROSS OROGEN
- Wilson Terrane: Wilson Metamorphic Complex (a); Granite Harbour Igneous Complex (b)
- Dessent Ridge Unit in the Mountaineer Range and possible correlatives at the eastern
- Bowers Terrane
- Millen Schist
- Robertson Bay Terrane

INDEX TO ADJOINING SHEETS

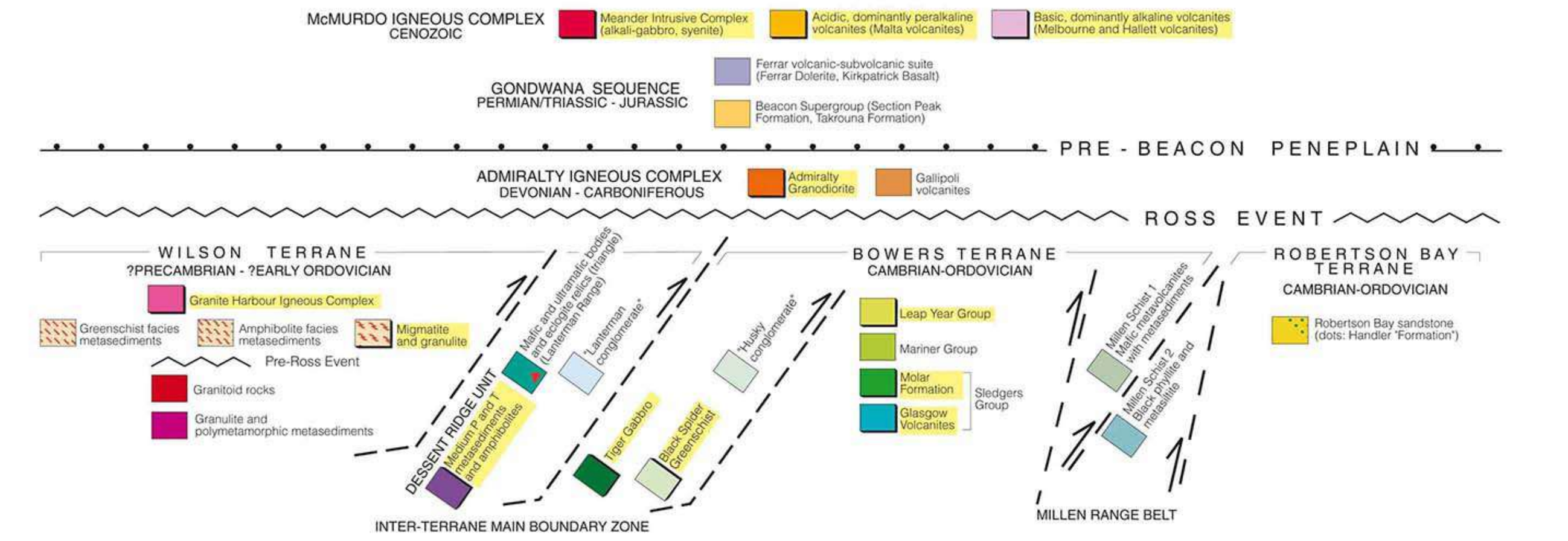


LOCATION DIAGRAM





SYNOPTIC TABLE OF STRATIGRAPHIC AND TECTONIC RELATIONSHIPS IN NORTHERN VICTORIA LAND
Units occurring in the quadrangle are highlighted in yellow



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Computer Graphic and GIS by Department of Earth Sciences University of Siena - Drawn by B.Graziosi

GEOLOGICAL OUTLINES

PREVIOUS WORK

This region was visited in the sixties by several New Zealand field parties which allowed recognition of the overall framework of regional geology (see Gair et al., 1969, and Nathan & Skinner, 1972, for geological maps and discussion of earlier work). During the 1981-82 International Northern Victoria Land (NVL) Project, the field relations, petrology and geochemistry of the granitoids were investigated (Borg et al., 1986, 1987). In summer 1982-83 NVL was visited by members of GANOVEX III (Roland, 1984). Investigations focused on the geology and petrology of the metamorphic basement complex in the Mountaineer Range (Kleinschmidt et al. 1984), on the regional metamorphic patterns (Grew et al., 1984) and especially on the geology and tectonic implications of the newly discovered extension of the Bowers Structural Zone (Adams & Kreuzer, Gibson et al., Mortimer et al., Tessensohn, 1984). The GANOVEX Team (1987) also produced a 1:500000 geological map of northern Victoria Land. From 1985-86 season Italian geologists began to investigate the region between David Gl. and Mariner Gl, and a 1:500,000 geological map of the same area (Carmignani et al., 1987) was produced. GANOVEX and ItaliAntartide expeditions of the following years led to publication of a number of papers. Contributions by Engel (1987), Laird (1987), Lombardo et al. (1987), Capponi et al. (1988), Flöttmann & Kleinschmidt (1989), Kleinschmidt et al. (1989), Lanzafame & Villari (1989), Lombardo et al. (1989), Müller et al. (1989), Flöttmann & Kleinschmidt (1991), Castelli et al. (1994), Musumeci et al. (1994), Rocchi et al. (1994), Vita-Scaillet et al. (1994), Bozzo et al. (1995), Capponi et al. (1997), Casnedi & Di Giulio (1997), Ricci & Tessensohn (1997), Scambelluri et al. (1997) and Tessensohn & Lombardo (1997) are specifically related to the Coulman Island quadrangle. The GANOVEX and Italiantartide Teams (1989) produced also a geological map of the area between Aviator and Tucker Gl.. A 1:250000 color map of the same area was showed at the Lira meeting held in Dallas (October 1994) and is going to be published soon (Geol. Jb., 1997).

SHORT DESCRIPTION OF GEOLOGY

The Coulman Island quadrangle encopasses an Early Paleozoic basement, which refers to the Ross Orogen, and intrusive and volcanic rocks spanning in age from Devonian to Quaternary with large time gaps. The basement consists of two terranes, the Wilson Terrane and the Bowers Terrane. The Wilson Terrane (WT) occurs in the western part of the quadrangle and includes low to high grade metamorphic rocks, intruded by bodies of Late Cambrian Granite Harbour plutonites. The Bowers Terrane (BT) is prevalent in the quadrangle and is constituted by low grade sedimentary and volcanic rocks, Middle to Late Cambrian in age. The boundary between WT and BT is marked by a minor tectonic body, the Dessent Ridge Unit (DRU). The Robertson Bay Terrane (RBT) widely outcrops more north, but in this quadrangle it occurs only as not mappable slices vand rafts within same Meander intrusion in the Borchgrevink Gl. area. All the regional contacts dip SW. The Devonian Admiralty intrusive and Gallipoli volcanic rocks are emplaced in both terranes and supply an upper time limit for the WT-BT docking. After the Admiralty magmatic event, the area was uplifted and eroded, but the resulting peneplain surface does not occur in this quadrangle. The youngest event is the emplacement of the Cenozoic McMurdo igneous complex consisting of older intrusive bodies (Meander Intrusives) and younger volcanic rocks (Malta and Melbourne alkali-volcanic suite).

LITHOSTRATIGRAPHY

WILSON TERRANE
Metamorphic rocks
They form few and little outcrops of migmatite gneiss (Wmg), stromatic migmatite and minor agmatitic varieties. Other lithotypes are hornblende gneiss, amphibolite and calc-silicate layers, no granulitic rocks were found. No P-T determination was carried out on these outcrops, but on the same rocks in the adjoining Mount Murchison quadrangle Castelli et al. (1997) provide temperatures of 742°C and 695°C, respectively referring to the pairs core garnet/along-foliation biotite and rim garnet/core biotite. As to the pressure, referring to the metamorphic assemblages garnet-plagioclase-sillimanite-quartz, cordierite-garnet-sillimanite-quartz, and cordierite-garnet-biotite-sillimanite-quartz, the data vary between 6.5 Kb (at 740°C) and 4.9 Kb (at 695°C).

Granite Harbour Igneous Complex
In this quadrangle the Granite Harbour plutonic rocks, intruded in the Wilson migmatites, occur only in small outcrops north of Cape King. In spite of this, their syn- to post-kinematic character is evident, and two groups, the Granite Harbour Granodiorite and Granite (GHgr) and the Granite Harbour Tonalite (GHt), are recognizable. Within the latter, Musumeci et al. (1994) describe a more or less well developed foliation evolving from magmatic to high temperature solid-state deformation.

DESSENT RIDGE UNIT
Along the Dessent Ridge this unit (Dm) forms several outcrops, the largest of which, along the southern side of the Meander Gl., was named Kyanite Wall for the occurrence of kyanite crystal in quartz veins (Kleinschmidt et al., 1984). At Kyanite Wall para-amphibolite, muscovitic quartzite and quartzitic schist, with interlayers of marble, biotite gneiss and calc-silicate rocks, are present. The upper part of Kyanite Wall is formed by a thick horizon of coarse metaconglomerate with calc-silicate, quartzitic and carbonatic pebbles in a dominant amphibolitic matrix. The amphibolite facies metamorphism is characterized by pressures considerably higher (P = 6-8 Kb at T = 520-600°) than the WT (Kleinschmidt et al., 1984; Capponi et al., 1988), and shows a retrogressive imprinting to greenschist facies. Plutonic bodies with a major gabbroic composition intrude the DRU rocks at the southern cliff (east edge) of the Dessent Ridge. In places, these intrusives are strongly foliated along shear zones and transformed in ampibolite facies metagabbros. In the westernmost outcrop (western side of Wylde Gl.) bodies of mafic and ultramafic rocks are incorporated in the DRU amphibolite. These rocks are related to the mafites and ultramafites occurring extensively in the Niagara Icefall area (Freyberg Mountains quadrangle) and in some other sites at the eastern border of the Wilson Terrane. The presence of these rocks inside the DRU might be referred to as a primary intrusion, or a result of the tectonic evolution of the Wilson-Dessent boundary; the question is under debate.

BOWERS TERRANE
In this quadrangle the BT comprises the Tiger Gabbro, an intrusion of problematic attribution, the Black Spider Greenschist and the Bowers Supergroup.

Tiger Gabbro
This mafic-ultramafic plutonite (Tg) (GANOVEX Team, 1987) is a layered intrusion at the southeastern edge of Spaturate Ridge close to the tectonic boundary between the Black Spider Greenschist and the Bowers Supergroup. According to Engel (1987), this intrusion shows a primary contact with original clastic sedimentary sequence and probable Glasgow volcanites, which appear to have been severely deformed and contact-metamorphosed. Large schist enclaves are present along the border of the intrusion, and the contact is not sheared or otherwise strongly deformed. Only one K/Ar age of 521±10 Ma has been obtained for a hornblende from a shear zone crosscutting the Tiger Gabbro (Kreuzer et al., 1987). Some basic questions arise from these features, and many aspects (geochemical affinity, geodynamic meaning, etc.) of this intrusion are still under analysis and discussion.

Black Spider Greenschist
These rocks (Bbs) form a narrow belt along the SW border of the BT, from Meander Gl. to the coast; major outcrops are at the type locality (Black Spider Ridge). As discussed by Gibson et al. (1984), the Bbs appear to be higher grade (biotite zone of the greenschist facies) equivalents of the Bowers Supergroup (especially the Sledgers Group), from which they differ in metamorphic grade and degree of deformation; biotite is abundant in the westernmost outcrops, close to the contact with the DRU.

Bowers Supergroup
The rocks of this supergroup show a metamorphic grade between the prehnite-pumpellyite facies and the chlorite zone of the greenschist facies. Sledgers Group - This group was proposed by Laird & Bradshaw (1983) and comprises two heterogeneous formations, the Glasgow spilite, volcanic breccia and tuff (Bgl) and the Molar Formation (Bmo). The Glasgow volcanic rocks (Laird & Bradshaw 1982) were also called the Glasgow Formation by Laird & Bradshaw (1983) and occur at the Spatulate Ridge and in the area between Argonaut Gl. and Meander Gl. The Molar Formation was defined by Laird et al. (1982) and occurs at the Spatulate Ridge and in the area between Argonaut and Meander Gl.
Leap Year Group (Bly) - This group represents a generally upward-fining sequence and comprises (1) a lower dark brown unit of coarse pebble and cobble conglomerate; (2) a middle rose-coloured unit of quartzite, pebble conglomerate and pebbly sandstone, and (3) a upper white unit of quartzite and sandstone (GANOVEX Team, 1987). In this quadrangle, this group occurs along both sides of Mariner Gl., at Cuneiform Cliffs, in the area between Argonaut and Meander Gl., at Eagle's Bluff and Gauntlet Ridge.

ROBERTSON BAY TERRANE
Robertson Bay Group
This group (Rb) was first described by Harrington et al. (1964) and its base is nowhere exposed. Tremadocian fossil content reported from the top of the sequence (Handler Ridge, Cape Hallett quadrangle; GANOVEX Team, 1987) makes it likely that the bulk of the Rb is Cambrian in age. On the whole, the metamorphism is of very low grade. In this quadrangle the Rb sandstones occur only as rafts in a small outcrop of Meander plutonites at the eastern side of the Borchgrevink Gl., and are inferred at depth in the cross-section BC.

ADMIRALTY IGNEOUS COMPLEX
Admiralty Granodiorite Suite
These rocks (Agr) form discordant plutons and minor batholiths mainly within the RBT and BT. They are I-type plutonites ranging from tonalite to monzogranite, with a clear prevalence of granodiorite. In this quadrangle the Admiralty Granodiorite occur only in scattered outcrops at the southern slopes of Malta Plateau, and north of Cape Phillips. Another small outcrop is at Emerging Island. In the outcrops north of Cape Phillips the Agr include rafts and xenoliths of foliated gneiss very similar to the WT high grade metamorphic rocks (GANOVEX Team, 1987). This occurrence was interpreted by Kleinschmidt (1992) as linked to an original tectonic cover of WT-related units over the BT and RBT.

MCMURDO IGNEOUS COMPLEX
This complex comprises plutonic and volcanic rocks of general alkaline character and bimodal composition. The plutonic rocks are partly associated with explosive peralkaline lithotypes, or they occur as isolated plugs in the basement; however, they are distributed along a line parallel to the general NE trend of the Borchgrevink Coast. The volcanic rocks occur as: (a) fissure eruptions forming extensive lava plateaus along the coast (eastern area of the map), usually cut by calderas and trachytic dikes and stocks; (b) scattered stratovolcanoes with a bimodal composition; (c) explosive peralkaline tuffs, breccias and plugs on the Malta Plateau.

Meander Alkali Granite and Syenite
These rocks (Mg) provide ages from 22 to 28 Ma. The first Tertiary granite was discovered by Stump et al. (1983); the entire suite was defined by GANOVEX Team (1987) and geochemically characterized by Müller et al. (1989). The close relationship to strong magnetic anomalies in the area (Bosum et al., 1989) was discussed by Schmidt-Thomé et al. (1990). In this quadrangle the Mg plutonites occur at Cape King, No Ridge (between Wylde and Suter Gl.), Eagle's and Engberg Bluff, and at Cape Crossfire. Xenoliths of mafic and ultramafic rocks occur in the outcrop of Cape King; they are probably related to the Niagara Icefall mafites and ultramafites.

Malta Peralkaline Trachyte and Rhyolite
These rocks (Mav) occur mainly in the Malta Plateau area (Schmidt-Thomé et al., 1990; Müller et al. 1989); their ages vary from 7 to 18 Ma. Some isolated vents of peralkaline volcanic breccia occur at No Ridge.

Hallett Basalt and Trachybasalt
In this quadrangle, these rocks (Hv) occur at the Daniell Peninsula and the cliffs on the Mariner Gl. side of the Malta Plateau (Kyle et al. 1982; Schmidt-Thomé et al. 1990; McIntosh & Kyle, 1990; Müller et al., 1989), and constitute the whole Coulman Island. The suggestion by Hamilton (1972) that the arcuate morphology at Mandible Cirque is an eroded caldera seems to be confirmed by the attitudes of the volcanic layers which form a divergent fan along the external slopes of the main crest. Unlike Hamilton (1972) and McIntosh & Kyle (1990), we consider that the southern branch of Mandible Cirque is only a relief inside the caldera, which extends more south and embraces also the cirque north of Mt. Lubbock. The age of these rocks ranges from 7 to 14 Ma (Hamilton, 1972; Jordan, 1981, Armienti et al., 1997).

TECTONICS

ROSS TECTONICS

WILSON TERRANE
The structural framework of the Wilson metasediments was worked out by Kleinschmidt et al. (1984) and Castelli et al. (1997) for the adjoining area (Mount Murchison quadrangle). They indicate that the regional schistosity is the axial plane foliation of isoclinal folds, which deform an earlier metamorphic layering, with a severe (in places complete) transposition of the older foliation. This tectonic setting developed synchronous to amphibolite facies metamorphism. Deformation produced stretching lineations and S-C surface systems, which indicate a northeastward tectonic transport. These kinematic indicators show the same character and attitude as those within the underlying DRU.

DESSENT RIDGE UNIT
In the DRU the most common structural feature is the occurrence of a pervasive and penetrative schistosity with a marked stretching lineation. The schistosity meanly dips SW with medium to high and medium to low inclinations, respectively north and south of the Meander Gl. The stretching lineation has a prevalent down-dip attitude on the schistosity, being chiefly outlined by sharp elongation of the metamorfic minerals and isorientation and segmentation of big amphiboles (up to 5 cm in size). The same stretching is very evident in the metaconglomerate that crops out in the upper part of the Kyanite Wall: its pebbles have a prolate shape with major axes parallel to the mineralogic lineation on the amphibolitic layering. The general tectonic setting of these rocks recalls the overall structure of the Wilson metasediments, and is best exposed at Kyanite Wall. Here, Kleinschmidt et al. (1984) described at least three deformation events, the first two responsible for folding (F1 and F2) with a pervasive axial plane schistosity (S1 and S2), and the third related to shearing and phyllonitization along discrete bands. S2 is the most evident surface in the field and the S1 is preserved only inside the microlythons. Relics of the sedimentary bedding are only represented by the alternation of marble, quartzite and amphibolite levels, even if the contacts between these rocks were severely transposed by the S1 and S2 schistosities. Meso- and megascale F1 and F2 folds are rather uncommon, as well as their interference patterns. The attitude of the detected fold axes is usually parallel to the stretching lineation, suggesting a non-cylindrical folding style. As to the metamorphic conditions syn-kinematic to the deformation phases, the amphibolitic metamorphism can easily be linked to the first deformation phase; the folding of the amphibolitic layering is obviously subsequent, that is, referrable to a second deformation episode (may be with no break in time with respect to the first one), but it must have developed under the same thermal conditions. The following greenschist facies imprinting could be referred to the third, shear-related deformation, which formed regional scale shear bands with S-C mylonite structures, widely linked to the greenschist retrogression. The greenschist related deformations are more developed and widespread approaching the contact with the BT and indicate a top-to-NE tectonic motion. Additional structural observations are in (Capponi et al., 1997) and in Flöttmann (1997).

BOWERS TERRANE
Black Spider Greenschist
This low grade metamorphic belt is more complexly deformed and more highly metamorphosed than the bulk of the terrane. The higher metamorphic conditions are pointed out by the occurrence of widespread biotite in the westernmost outcrops, close to the contact with the DRU. A first deformation episode generated isoclinal folds with a pervasive axial plane slaty cleavage and high angle axial plunges; the axes show a mean NW-SE trend. Metamorphic minerals synkinematic to these structures (muscovite+chlorite+quartz+biotite±epidote) are aligned along the cleavage surfaces, and the pebbles of the conglomeratic levels are strongly elongated parallel to the local fold axes. The second deformation event appears coaxial with respect to the previous one and produced a locally pervasive crenulation cleavage, which is the axial plane foliation of chevron to isoclinal folds; the latter have short limbs and thickened hinges. Locally, this foliation may become the most important planar anisotropy in the field.

Bowers Supergroup
Unlike the WT and the DRU, the well defined lithostratigraphic units and the internal bedding drove us to reconstruct some anticlines and synclines with sizes ranging from few to several kilometres. The lenghts of the axial plane traces reported in the map have been drawn on the basis of the bedding attitudes and field distribution of the formations. In this quadrangle only three major structures occur, in the area between the Gair Gl. and the Ross Sea. They are two anticlines and the syncline in between, which continue to the NW in the adjacent quadrangle (Mount Murchison). The Molar Formation constitutes the core of the antclines whereas the Leap Year Group is involved at the core of the synclines. The folds are mainly parallel and have a major closed shape. An axial plane staty cleavage is well developed mainly within the fine-grained levels of these folds. The foliation and the axial planes have medium to steep dips toward the southwest, and the facing of the folds is toward the northeast. The axes show a mean NW-SE trend, with both northwestward and southeastward plunge variations. This first phase tectonic frame is weakly deformed by late and coaxial crenulation.

THE WILSON-DESSENT BOUNDARY
The boundary between WT and the DRU is slightly affected by greenschist facies retrogression imprint, thus the evidence that this contact was formed under high T conditions is even more strong than in the adjacent Mount Murchison quadrangle. This is also supported by the high T solid-state deformation in the tonalite belt (GHt) near the contact with the DRU.
Finally, in the southern slopes of the Dessent Ridge a foliated gabbroic rock was observed to intrude the DRU amphibolites. No radiometric age data are available for this intrusion, but some feaures (deformation and foliation) might suggest that it belongs to the Granite Harbour cycle. If this is the case, the WT-DRU coupling predates the emplacement of the Granite Harbour plutonites.

THE WILSON-BOWERS BOUNDARY
The most outstanding feature of the eastern part of the quadrangle is the contact between the WT and the BT, with the interposition of the DRU. This boundary was studied in detail during the GANOVEX and ItaliAntartide expeditions of the past years, and the results are going to be published (Capponi et al., 1997). Along this contact, the contrast in metamorphic grade between the high-grade WT+DRU and the low-grade BT, as well as the occurrence of the magmatic arc granites close to the suture, requires that a major part of the crust in between has been cut out by the suture fault. A greenschist facies retrogression affected the eastern margin of the high-grade units: greenschist facies shear zones cut the DRU in the Gair-Meander block, and on the Mariner Plateau the WT tonalitic intrusions are sheared under greenschist facies conditions and transformed into S-C tectonites. In both cases this retrogression is confined to the vicinity of the contact with the BT. In the BT, the western contact zone is characterized by the occurrence of the Black Spider Greenschist (i.e. the higher grade equivalents of the rocks of the Sledgers Group). Therefore, in both the high-grade units (WT+DRU) and in the low-grade BT, the greenschist assemblages are better developed near the contact; this clearly points to a dynamically activated metamorphic event along thrust surfaces, and shows that the docking of the units took place under greenschist facies conditions, which can be considered as the climax of metamorphism for the BT and as a retrogression for the WT and DRU. On the basis of field relationships between deformation and metamorphism, it seems quite clear there were two major events. The early one, responsible for the amphibolite facies metamorphism and the generation of a granitic arc, can be dated with some confidence around 500 Ma. This event can be related to the bulk of granite magmatism all along the Ross fold belt. The second event, accompanied by greenschist facies metamorphism along the suture fault, was definitely later but cannot be dated precisely at the present.

POST - ROSS TECTONICS

No structure related to the post-Ross tectonics is directly visible in this quadrangle. Tessensohn (1994) proposed that a NE-SW basement uplift along the Borchgrevink Coast separates the Rennick Graben from the Victoria Land Basin, which can be considered its continuation in the Ross Sea. This quadrangle is comprised in the Admiralty block (the triangular block between Cape Adare, the mouth of the Rennick Gl. and Mt. Melbourne) for which Fitzgerald and Gleadow (1988) indicate very high uplift rates for the last 40 Ma, derived from apatite fission tracks. In this hypothesis, the alignment of Cenozoic intrusives and volcanic rocks along a NE-SW direction in the No Ridge-Cape King area ("Borchgrevink Trend", Roland & Tessensohn, 1987) is linked to the uplift history of the basement.

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