

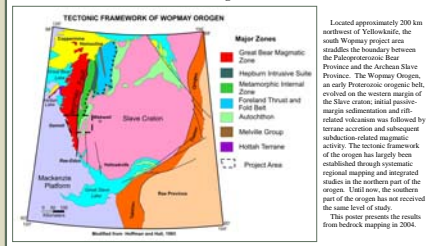
South Wopmay Bedrock Mapping Project and Integrated Studies: Preliminary Results From the 2004 Field Season

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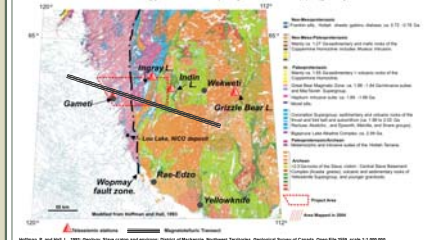
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Location and Background



General Geology of South Wopmay Bedrock Mapping Project



The south Wopmay bedrock mapping project is a multi-disciplinary project involving detailed geological and geochemical studies that will attempt to constrain the evolution of the southern Wopmay Orogen. The project will also coordinate with geophysical programs, with aims to characterize the deep crustal and lithospheric architecture of the southern Wopmay Orogen and the western Slave craton and lower detritals at depth, the westernmost extent of Archean rocks within Wopmay Orogen. The above map shows the area covered in 2004, the approximate position of the magnetotelluric transect (see Spratt et al. in the abstract volume), and the POK-ARIS placed teleseismic stations.

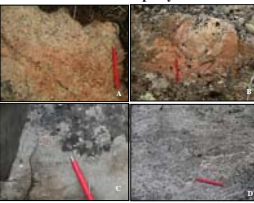
The south Wopmay project will address questions such as:

- Do the major tectonic zones defined in the north apply to southern parts of the orogen?
- How extensive are Archean Slave rocks within the area previously thought to be part of Wopmay Orogen?
- Can the metagneiss of south Wopmay Orogen be related to specific events or to proximity to Slave basement?
- What is the nature of Wopmay fault zone in the south?
- Does the Slave craton extend westward beyond the Wopmay fault, and if so in three dimensions potential to the west?



The Northwest Territories Geoscience Office gratefully acknowledges the support of the Polar Continental Shelf Project during the first field season of the south Wopmay project.

Proterozoic Supracrustal and Related Rocks West of the Wopmay Fault Zone



Rhyolite porphyry (A) is associated with volcanic rocks of the ca. 1870-1866 Ma Fair Lake Group. Field observations are conflicting, although in some examples porphyry dykes clearly cut granitic rocks of the Great Bear Magmatic Zone. Rocks of the Treasure Lake Group (B-E) consist of a magmatic, arkose, psammite and felsic gneiss. They are poorly preserved and highly dissected by rocks of the magmatic zone. In B, felsic porphyry contains a wealth of sandstone; in C the sandstone contains a granitic clast. D shows a typical outcrop of arkose granite that is highly deformed by granitic veins. Felsic gneiss (E) implies evidence of at least two phases of deformation. Previous work by S. Gaudin has suggested the Treasure Lake Group is part of the Hothot Terrain.

Proterozoic Intrusive Rocks of the Great Bear Magmatic Zone

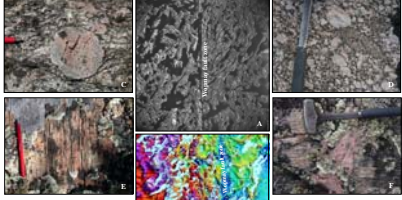


Mafic rocks of the area west of the Wopmay Fault zone is subdivided by weakly trans-foliated intrusive rocks of the ca. 1880-1840 Ma Great Bear Magmatic Zone. Some of these granoids form part of the ca 1866 Ma Marston River batholith. The rocks are mainly magnetic bearing and can be subdivided into two main phases (as shown on the map). The biotite hornblende-bearing phase varies from granitic, quartz monzonitic, monzonitic to monodioritic, and commonly contains sparse K-feldspar phenocrysts (A and B). A highly more leucocratic phase (C) contains biotite and generally lacks feldspar phenocrysts and hornblende.

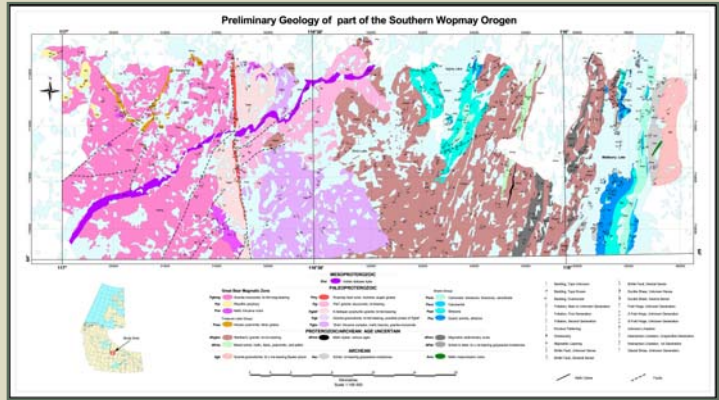


The following field prepared and studied for their assistance and bedrock mapping talents, Alan Towne, Kirsten Rasmussen, Albert Soffers, Ivan Yvon-Lundy, Bill Pyles, and of course, Kimber.

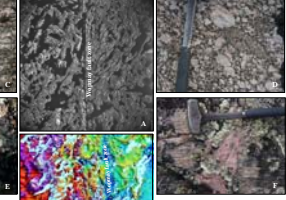
Wopmay Fault Zone



The Wopmay Orogen is dissected by the east-west-trending Wopmay fault zone, which has previously been suggested to represent the eastern limit of the Great Bear Magmatic Zone, and the westernmost limit of the Slave craton. The fault zone is a prominent feature in both aerial photographs (A) and aeromagnetic maps (B). K-feldspar porphyritic hornblende granite occurs on either side of the Wopmay fault zone (C and D). This granite locally contains asymmetric K-feldspar porphyroblasts that show evidence of clockwise rotation, consistent with dextral shear that was demonstrated by workers in the northern Wopmay Orogen. However, in most localities, dextral asymmetric structures are not observed and hence a sense of motion can not be determined (e.g., the large round K-feldspar porphyroblasts (C) and the silty quartzite (E)), which marks the highest strain state within the fault zone). In northern parts of the orogen, dextral deformation at about 1840 Ma has previously been associated with the fault zone. Within the map area the age of movement along the fault is poorly constrained; the ca. 780 Ma Hothot batholith is clearly younger. Near the Wopmay fault zone, a granite dyke (F) crosses a foliation that is tentatively correlated with the mylonitic fabric of the fault zone. The age of this granite may better define the age of some of the movement within the fault zone.



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'Zaito' Intrusive Complex and 'Peri' Granite



The 'Zaito' intrusive complex consists of a diverse suite of mafic phases, ranging from granitic to gabbroic and rarely ultramafic. Mafic phases are characterized by breccia textures (B-E), with the younger more felsic phases supporting angular or sub-angular mafic fragments. Many of the felsic phases are quartz poor, such as the monzonitic rocks in A. Typically, rocks within the complex are isotropic to weakly foliated. 'Zaito' rocks are intruded by aplitic and granitic dykes (F) that may be related to 'Peri' granite (F). Currently the complex is restricted to occurrences east of the Wopmay fault zone. Mafic rocks on the west side of the fault are similar in composition to those of the 'Zaito' complex, but lack the distinctive breccia textures. The 'Peri' granite is one of the most leucocratic, and potentially one of the youngest, magmatic phases in the area.

The Snare Group: Proterozoic Supracrustal Rocks East of the Wopmay Fault Zone



Previous work has established that Proterozoic strata of the Snare Group rest unconformably on a basement of Archean Slave craton rocks. In the study area 'Matherly' granitic, orthogneiss, and amphibolite have been tentatively identified as basement magmatic, sedimentary rocks (C) contrast markedly with the nearby greenschist-grade Snare Group rocks. These gneisses are crossed by, and hence older than, the 'Matherly' granite. The age of the highly-strained mafic rock (D) is suspect because it contains layered mafic rocks that may have a volcanic protolith, and volcanic rocks are typical of the Snare Group. The gneiss-mylonite, depicted in E, are comparable to some of the fine-grained silty clastics of the Snare Group, but are also similar to adjacent Archean sedimentary rocks. In this area they are thick bedded, and more highly strained, containing domeshaped and boudinaged quartz veins within the existing prograde foliation.

Mineralization



Extensive gossans are developed at Injary Lake (A and B); one gossan vein within the center-belt of the eastern lobe. The gossan mark the presence of disseminated sulfides within black, commonly graphitic and gabbroic, gneiss. Magnetotelluric mafic dykes with are spatially associated with the gossans. Many faults are associated with quartz veins and shaly rocks (C). No significant mineralization has been found associated with the vein.

Proterozoic/Archean Rocks East of the Wopmay Fault Zone: Age Uncertain



'Matherly' granitic, magmatic sedimentary rocks, biotite + cordierite pyroxene-mylonites and a mixed suite are of uncertain age. The K-feldspar porphyritic 'Matherly' granite (A) is the only major magmatic phase containing muscovite. The granite is characterized by a porphyroblast foliation and a locally intense mineral leucation (B), in contrast to the relatively isotropic, and presumably younger, adjacent rocks of the Zaito complex, and 'Peri' granitic. 'Matherly' granite may be Proterozoic, however if Archean in age, as some previous workers have suggested, then Archean rocks underlie a large part of the area west of the presently defined margin of the Slave craton. The middle to upper amphibolite-grade magmatic, sedimentary rocks (C) contrast markedly with the nearby greenschist-grade Snare Group rocks. These gneisses are crossed by, and hence older than, the 'Matherly' granite. The age of the highly-strained mafic rock (D) is suspect because it contains layered mafic rocks that may have a volcanic protolith, and volcanic rocks are typical of the Snare Group. The gneiss-mylonite, depicted in E, are comparable to some of the fine-grained silty clastics of the Snare Group, but are also similar to adjacent Archean sedimentary rocks. In this area they are thick bedded, and more highly strained, containing domeshaped and boudinaged quartz veins within the existing prograde foliation.

Mafic Dykes



The most prominent mafic dyke in the shallow northwest-dipping diabase that has been correlated with the ca. 780 Ma Hothot 'thrust' mafic dykes that are northeast to south-southwest striking and of various ages and textures crosscut most rock types in the area. Even if these dykes are wider than 1 metre, consequently they are not shown on the map. The 'Matherly' granite is crossed by a network of mafic dykes (A) and aplitic and granitic dykes (B) which is speculated to be one of the youngest magmatic phases. Dykes within both 'Matherly' granite and magnetotelluric sedimentary rocks (B) are deformed and metamorphosed. In C, a deformed mafic dyke that has intruded 'Matherly' granite, is cut by a granitic vein that is in turn truncated by a millilitre, undeformed, phenocryst-rich dyke.