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Rb-sr isotopic studies relating to problems of geochronology on the Nelspruit and Mpageni granites

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the biotite which is fresher in this sample and less in quantity - only about 2%.

AA13I:

Type: medium grained, homogeneous granitic rock with some large crystals of pink microcline.

Occurrence: on the Umhloti Farm road, approximately three miles from the main granite contact.

Microscopy: the grain size varies from 1 to 6 mm. The composition is oligoclase 40%, quartz 30%, microcline 28%, biotite; accessories (muscovite, apatite, zircon). The oligoclase is sericitized but some crystals are still fresh and they are normally twinned. Some myrmekite was noticed.

AA13M:

Type: fine grained, dark grey rock from a mafic band in the migmatite.

Occurrence: only a few feet away from AA13I.

Microscopy: granitic texture, fairly regular grain size between 1 and ½ mm. The composition is 30% light greenish brown biotite, often altered to chlorite; 40% plagioclase, altered and untwinned; 30% quartz, presenting mosaic texture. Accessories are sphene and black opaque minerals.

AA13P:

Type: light coloured, coarse grained pegmatitic rock.

Occurrence: same as AA13I.

Microscopy: because of the coarseness of the rock the composition could not be accurately estimated. Microcline crystals occur frequently. They are fresh and present gridiron twinning. Forty per cent of the total rock is possibly microcline. Plagioclase occurs in altered, untwinned crystals and in more fresh, twinned crystals Quartz with undulose extinction is present. Chloritised biotite comprises 5% of the total rock.

AA13G:

Type: light grey, medium grained granitic rock.

Occurrence: as in AA13I.

Microscopy: this rock is similar to AA13I except that the microcline is white, the amount of biotite is less than 4% and there is an appreciable quantity of iron ore.

AA15F:

Type: light grey, medium grained granitic rock.

Occurrence: approximately one mile north of the main granite contact, north of the Consort Mine.

Microscopy: it has granular texture. The composition is 40% microcline, 30% plagioclase, 28% quartz, green chloritised mica and iron ore.
Oligoclase is twinned and untwinned and both varieties are sericitized. Some myrmekite occurs in places.
Microcline appears in two varieties: gridiron twins and Carlsbad, or untwinned with hairline perthite.
Quartz has a cataclastic fabric.

AA19:

Type: light grey, fine grained homogeneous rock.

Occurrence: collected at road side on Rhenosterkop, approximately a third to half a mile south of the sign post Curri - Rhenosterkop.

Microscopy: the rock has granular texture, the grain size varies from 0.5 to 2 mm. approximately. The composition is approximately 40% microcline, 30% oligoclase, 28% quartz, 2% chloritised biotite; accessories - sphene and apatite in small needle-like crystals.
The plagioclase is altered and albite twins are recognizable only in a few crystals. Some myrmekite occurs in places. Microcline is generally gridiron twinned.

2. MPAGENI GRANITE

AA2:

Type: homogeneous, medium grained, pinkish granite with pink microcline.

Occurrence: approximately half a mile west of the Mpageni-Nelspruit contact, on the new road cut in the Crocodile river gorge.

Microscopy: the composition is approximately 35% quartz, 35% microcline, 25% oligoclase, 4% biotite.

Quartz has mosaic structure with marked undulose extinction. It contains rare needle-like inclusions, probably of rutile or sillimanite.

Microcline is frequently twinned; Carlsbad twins also occur. Hairline perthite, usually in two directions at slightly less than 90° to one another, bleb perthite and myrmekite occur.

Oligoclase is moderately sericitized; it shows albite twinning rarely combined with pericline. The twin planes are commonly bent and many crystals show fracturing.

Biotite is generally chloritised.

Of the accessories muscovite (or sericite?) is the most abundant, then iron ore, and in lesser amounts, sphene, allanite, zircon, apatite and rutile.

AA3:

Type: homogeneous, coarse grained granite, pinkish in colour from the microcline.

Occurrence: one-and-a-quarter miles west of the Mpageni-Nelspruit contact in the Crocodile river gorge, on the new road cutting.

Microscopy: AA3 has similar composition and texture as AA2 except that the microcline is slightly more than 35% in amount and the quartz is less. Oligoclase sometimes has rims from 0.2 to 0.4 mm. wide of slightly different composition or orientation that do not extinguish at the same time as the crystal.

Biotite is 5% or more - the amount of this mineral could only be estimated roughly because of the coarseness of the rock. Accessories are muscovite, sphene,

allanite, zircon, apatite, iron ore (ilmenite?) and pirite.

AA4B, AA4A, AA4C:

These three samples were collected at the contact between the Mpageni granite and a fine grained, grey rock (syenite?) intrusive in it. They occur approximately two miles from the Mpageni - Nelspruit contact on the new road cut in the Crocodile river gorge.

AA4B: is Mpageni typical and has composition and texture very close to AA2 and AA3.

AA4A: comes from the contact Mpageni - syenite which seems to be gradational over a distance of a few feet.

Type: grey, porphyritic rock composed of a fine grained, grey matrix and pink microcline phenocrysts.

Microscopy: the grain size in the matrix varies from a maximum of about 2 mm. to very fine. The grains are disposed with the longer axes subparallel suggesting a flow structure.

The composition of the matrix is plagioclase 35%, K-felspar 30%, quartz 20%, biotite 10%, sphene 4 - 5%.

Plagioclase is generally sericitized. Only in a few crystals was it possible to see the twinning, and measurement of extinction angles between the lamellae indicates a composition of oligoclase.

K-felspar is in anhedral crystals with gridiron twinning, or appears untwinned with hairline perthite and myrmekite.

Quartz shows mosaic structure and wavy extinction.

Biotite is greenish pleochroic often altered to green chlorite.

Sphene occurs in light brown euhedral crystals varying in size from 0.5 to 1.5 mm.

Accessories are muscovite, considerable amount of black opaque mineral and apatite.

AA4C: is a sample of the syenitic rock.

Type: homogeneous, fine grained and pink-grey in colour.

Microscopy: porphyritic texture with phenocrysts of plagioclase and K-felspar.

The composition is approximately 60% felspars, 15% biotite, 15% quartz, 5% black opaque ore.
The felspars are very altered and therefore difficult to identify. From the few visible twin crystals of the plagioclase this mineral seems to be slightly more calcic than the one observed in the previous samples.
Quartz occurs in small grains with interlocking boundaries.
Biotite is greenish-brown often altered to green chlorite.
Sphene is present but to a lesser extent than in AA4A.
Pyroxene is also present and probably a very small amount of amphibole.

AA5A:

Type: fine to medium grained, grey granite with felspar phenocrysts.

Occurrence: approximately a third of a mile north-west of the Crocodile river gorge station on the new road cutting, approximately a hundred feet from the contact with the Nelspruit migmatite.

Microscopy: the approximate composition is 40% microcline, 30% quartz, 25% oligoclase, 5% biotite.
Microcline is twinned (gridiron) or untwinned with hairline perthite.
Oligoclase is altered and cloudy in appearance, twins (albite) can often be recognized.
Quartz in interlocking grains shows undulose extinction.
Biotite is chloritised to a large extent.
Accessories are iron ore minerals and apatite.

AA5B:

Type: medium grained, pink-grey granite.

Occurrence: a few feet from AA5A.

Microscopy: The grain size varies from more than 6 mm. to very fine. Cracked crystals and patches of cataclastic quartz point to pressure stress. The composition differs from AA2 in the fact that the more abundant mica is muscovite, and K-felspar occurs in a lightly higher percentage.



1 Characteristic striped appearance of the migmatite



2 Relic of a basic dyke?



3 Basic inclusion from area of sample AA15



4 An example of folds in the migmatite



5 Nebulitic phase



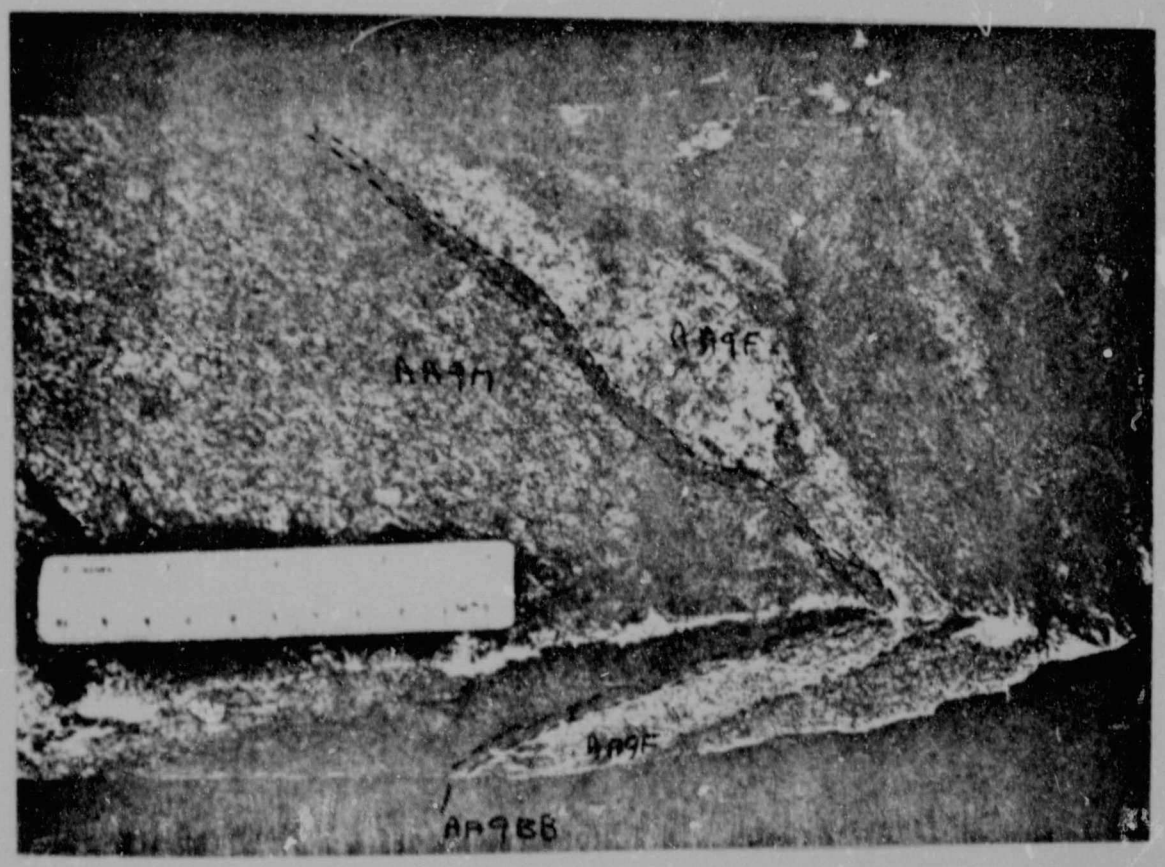
6 Nebulitic phase



7 Krokodilpoort mafic and felsic phase - the rock was sawn along the dotted line



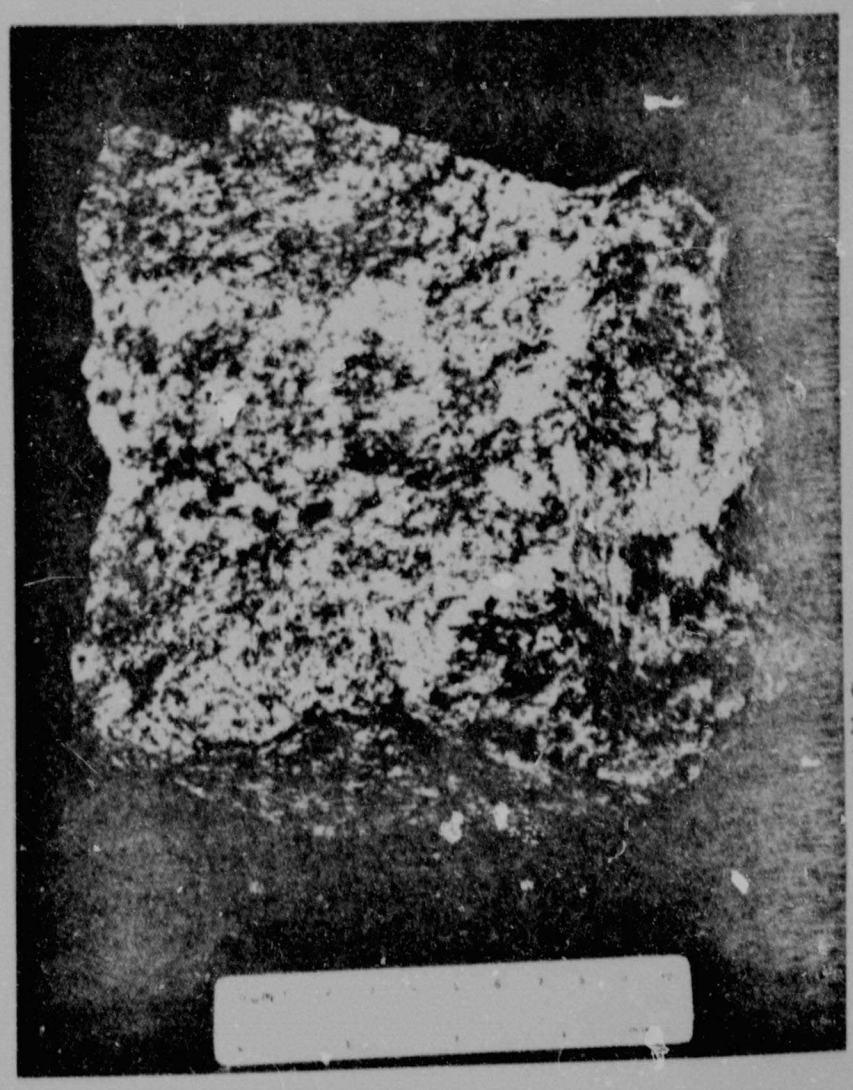
8 B143 was also cut along the dotted line



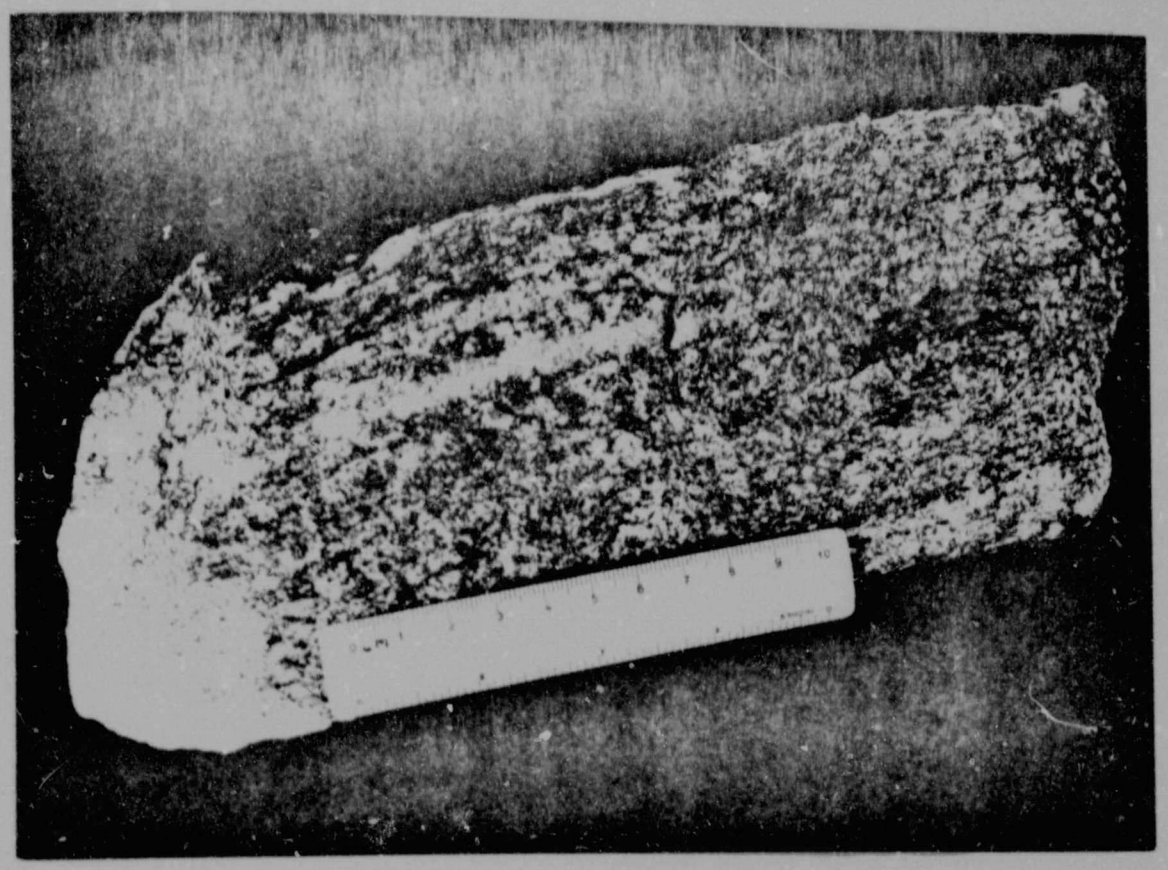
9 AA9 - "Basic behind" at the
border of a felsic band



10
"Basic behind"



11
Coarse grained
more homogeneous
phase



12 and 13 Examples of gneissic structures in the "contact phase"



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