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Abstracts

products of this episode consist of an extensive veneer of rhyolite and epizonal granite that presumably overlies the older Proterozoic crust (Bickford et al., 1986).

Since 1300 Ma ago continental growth appears to have been primarily to the east and southeast and is represented mainly by units within the Grenville Province to the east and the similar Llano Province of southern Texas, although the Grenville Province also contains re-worked older crustal material. Major intracontinental rifting occurred about 1100 Ma ago, and this Midcontinent Rift System (Van Schmus & Hinze, 1985) may be related to the tectonic regime that produced the Grenville Province.

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Rb-Sr MEASUREMENTS ON METAMORPHIC ROCKS FROM THE BARRO ALTO COMPLEX, GOIÁS, BRAZIL

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The Barro Alto Complex comprises a highly deformed and metamorphosed association of plutonic, volcanic, and sedimentary rocks exposed in a 150 x 25 km boomerang-like strip in Central Goiás, Brazil. It is the southernmost tip of an extensive yet discontinuous belt of granulite and amphibolite facies metamorphic rocks which include the Niquelândia and Cana Brava complexes to the north. At

its eastern/southern border, the complex is thrusted over mylonitic granodiorite/tonalite basement gneisses. At the western/northern border it is in part tectonically overlain by younger low-grade Proterozoic metasediments.

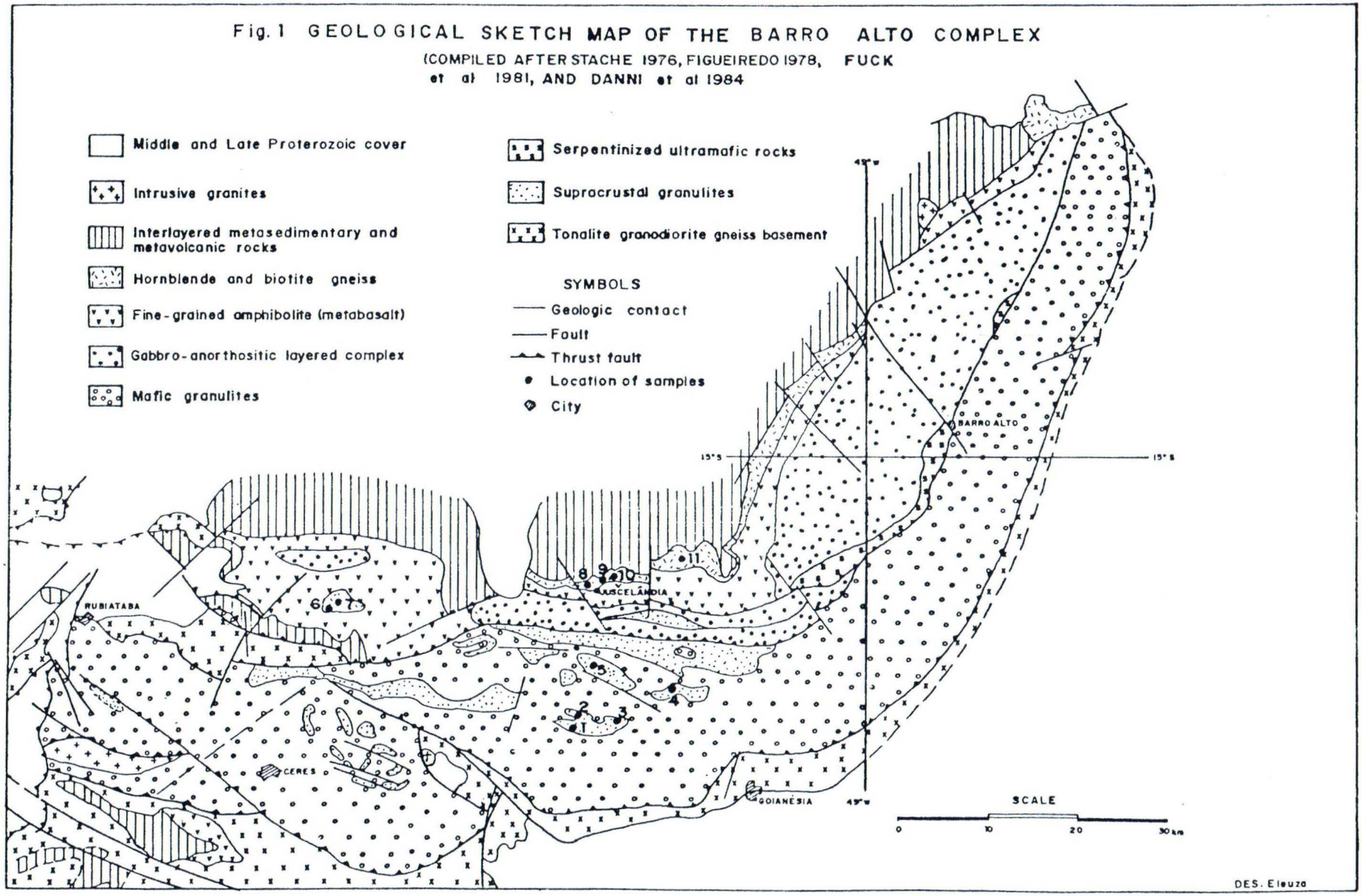
Recent detailed mapping (Fuck et al., 1981; Danni et al., 1984) has lead to the longitudinal division of the complex in two rather distinct units: i) granulite facies rocks form the eastern/southern portion; ii) amphibolite facies rocks, overthrusting the former, appear in the western/northern portion of the complex (Fig. 1).

Two rock associations are distinguished within the granulite belt. The first one comprises a sequence of fine-grained mafic granulite, hypersthene-quartz-feldspar granulite, garnet quartzite, sillimanite-garnet-cordierite gneiss, calc-silicate rock, and magnetite-rich iron formation. These rocks depict an ancient supracrustal succession of chemical (and volcaniclastic?) sediments conformably interlayered with mafic and felsic volcanics. Chemically, the dominant fine-grained mafic granulites (plagioclase, clinopyroxene, hypersthene, hornblende) display a tholeiitic trend, minor and trace elements bearing relations similar to those of oceanic basalt (Fuck et al., 1985). The felsic granulites are SiO_2 (>65%) rich rocks, with high K/Na, and K/Rb similar to typical continental crust; trace elements show considerable dispersion, but Ba, Zr and Rb are consistently high (Fuck et al., 1985). Depletion of LIL elements is thus not observed in the Central Goiás granulites.

The second association comprises medium- to coarse-grained mafic rocks (plagioclase, hypersthene, salitic clinopyroxene, minor hornblende, biotite, garnet, occasional quartz). Locally they contain small layers and/or lenses of websterite, olivine pyroxenite, and peridotite. Hypersthene-bearing gneissic quartz diorite is widespread to the northwest of Goianésia. In spite of pervasive annealing, igneous textures may be locally preserved. Xenoliths of supracrustal material, especially fine-grained mafic granulite, garnet quartzite, and calc-silicate rock are abundant in many places. Ultramafic rocks (serpentinized harzburgite, dunite and orthopyroxenite) form a tectonic slice (20

Fig. 1 GEOLOGICAL SKETCH MAP OF THE BARRO ALTO COMPLEX

(COMPILED AFTER STACHE 1976, FIGUEIREDO 1978, FUCK et al 1981, AND DANNI et al 1984



km long, 2 km wide) interthrusted between mafic granulites and the overlying amphibolite and meta-anorthosite unit near Barro Alto. As a whole, textures and field relations provide evidence that this association is of plutonic origin, probably a disrupted layered igneous complex intruding a roof of supracrustal rocks partially preserved in scattered patches within the granulite belt.

The medium-grade rocks of the western/northern portion (Barro Alto Complex) comprise both layered mafic rocks and a volcanic-sedimentary sequence, deformed and metamorphosed under amphibolite facies conditions. The layered rock form dome-shaped structures with troctolite, olivine gabbro, and anorthosite surrounded by gabbro (Figueiredo, 1978; Fuck et al., 1981; Danni et al., 1984), usually converted into coarse-grained banded amphibolites. The latter grade upwards into fine-grained amphibolites, in some places through metadolerite with preserved diabase texture (Danni et al., 1984). The fine-grained amphibolites form the basal part of the Juscelândia metavolcanic-sedimentary sequence. They are interbedded with garnetiferous metacherts and display chemical affinities of ocean ridge tholeiite basalt (Danni & Kuyumjian, 1984). The metabasalts are interlayered with gneissic rocks, which gradually become the dominant rock types towards the top of the unit. Some of the gneisses display relict textures recalling features of felsic volcanics. Their trend is distinctly calc-alkaline, with over 65% SiO_2 and high contents of Ba, Zr, Rb and Sr (Fuck et al., 1985). The upper part of the sequence is made of a thick pile of mica schist, with minor interbedded amphibolite, gneiss, iron formation, calc-silicate rock, gondite, and quartzite.

A geochronologic investigation by the Rb-Sr method has been carried out mainly on felsic rocks from the granulite belt and gneisses of the Juscelândia sequence. Rb and Sr isotopes have been measured in the geochronology laboratories of the Universidade de São Paulo and Universidade do Pará, according to usual techniques described elsewhere (e.g. Cordani & Iyer, 1979). Sample localities are indicated in Figure 1.

Computed data points of samples collected at site 1 (Serra da Gameleira),

some 20 km WNW of Goianésia (Fig. 1), define a well fitted isochron (MSWD = 0.525) with T=1266 ± 17 Ma (Fig. 2). Initial $^{87}Sr/^{86}Sr$ has a high value of 0.73473 ± 0.00051. Samples 7A and 8A plot well below the isochronic line, indicating separate isotopic systems, and have not been included in the calculations. The isochronic age of about 1270 Ma is interpreted as a Sr isotope homogenization event under high-grade metamorphic conditions. As inferred from the high initial ration, the protoliths were probably incorporated into the crust long before the granulite facies metamorphism took place.

Analysed samples from different outcrops of the northern slope of the Gameleira hills (Fig. 1, sites 2, 3), Monte Alegre farm (site 4), and Guará creek (site 5) exhibited a scattered pattern within the Rb-Sr isotope diagram,

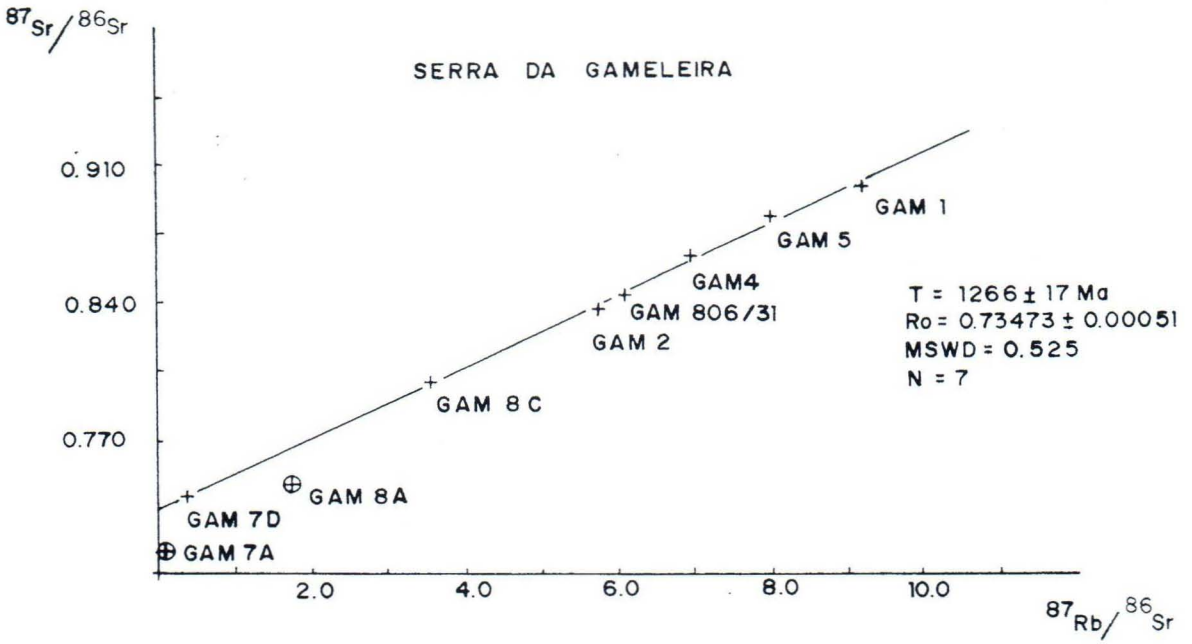


Figure 2 -- Rb-Sr isochron for Barro Alto granulites.

indicating either different protoliths of different geologic evolution.

The analytical results for the Juscelândia sequence are presented in Figures 3 and 4. Isotope measurements on samplex from a single outcrop, about 2 km north of Jardim Paulista (Fig 1, site 6), yielded an isochronic age of 1330 ± 65 Ma, R_o = 0.70819 ± 0.00274 (Fig. 3). Samples JP-10A and 10C, possibly representing separate isotope systems, plot below the isochron and were excluded

from the calculations. The calculated age value of about 1300 Ma is interpreted as the age of amphibolite facies metamorphism of the Juscelândia sequence.

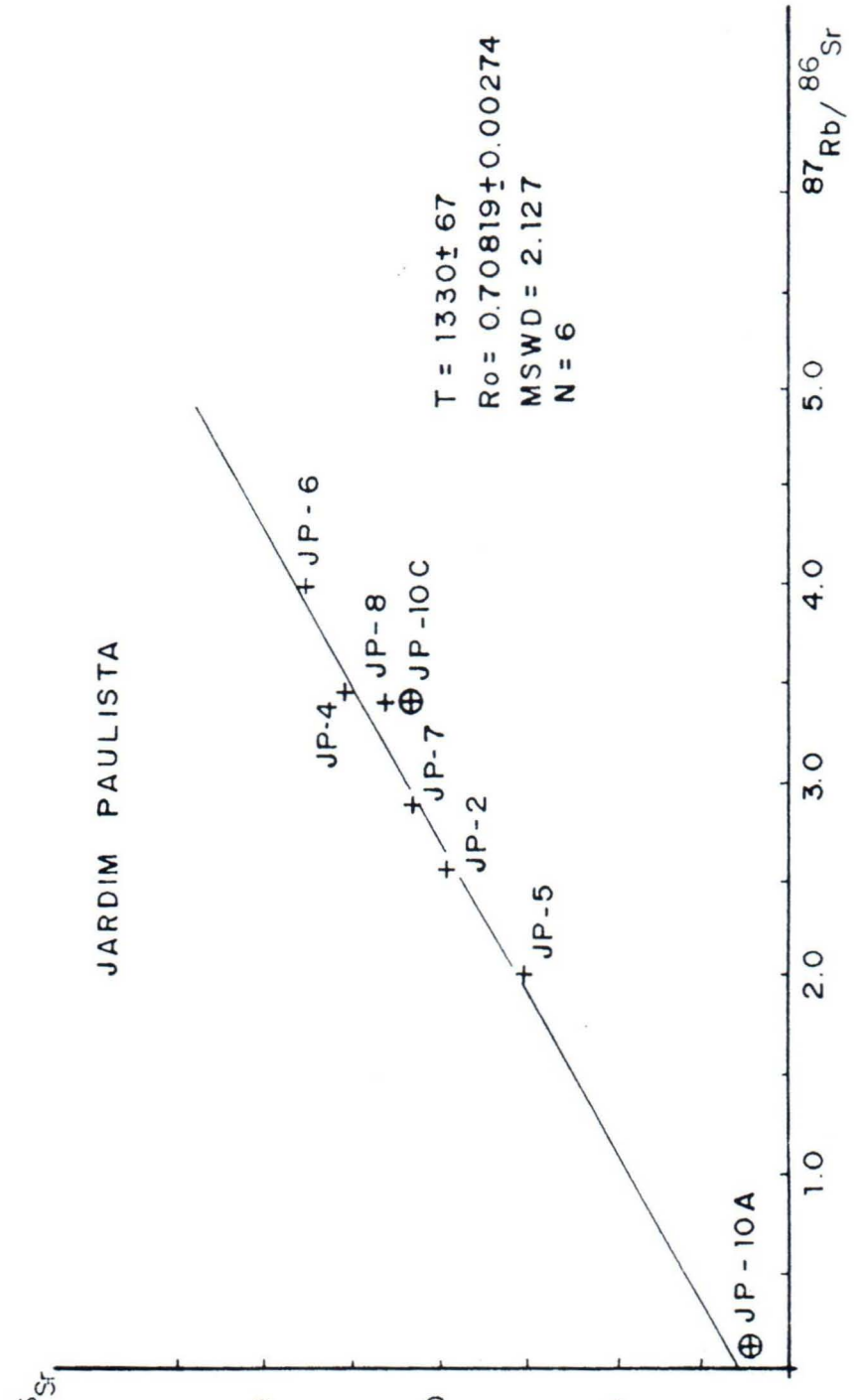


Figure 3 -- Rb-Sr isochron plot for Juscelândia gneisses at Jardim Paulista.

Isotope results for rocks from different outcrops along the gneiss layer near Juscelândia (Fig. 1, sites 8, 9, 10, 11) are presented in Figure 4. Despite the fact that rather diverse materials have been analysed, the points are reasonably aligned, and plot close to the Jardim Paulista reference isochron, providing additional evidence for a metamorphism affecting the Juscelândia sequence about 1300 Ma ago.

In conclusion, Rb-Sr isotope measurements suggest that the Barro Alto rocks have undergone at least one important metamorphic event during Middle Proterozoic times, around 1300 Ma ago. During that event volcanic and sedimentaru rocks of the Juscelândia sequence, as well as the underlying gabbro-anorthosite layered complex, underwent deformation and recrystallization under amphibolite facies conditions. At about the same time apparently older rocks have been isotopically homogenized under high-grade conditions within the lower crust. These rocks are presently exposed in the granulite belt of the Barro Alto Complex due to low-angle thrust faults along which slices of the lower crust were pushed over upper continental crust material (Fuck et al., 1985; Assumpção et al., 1985).

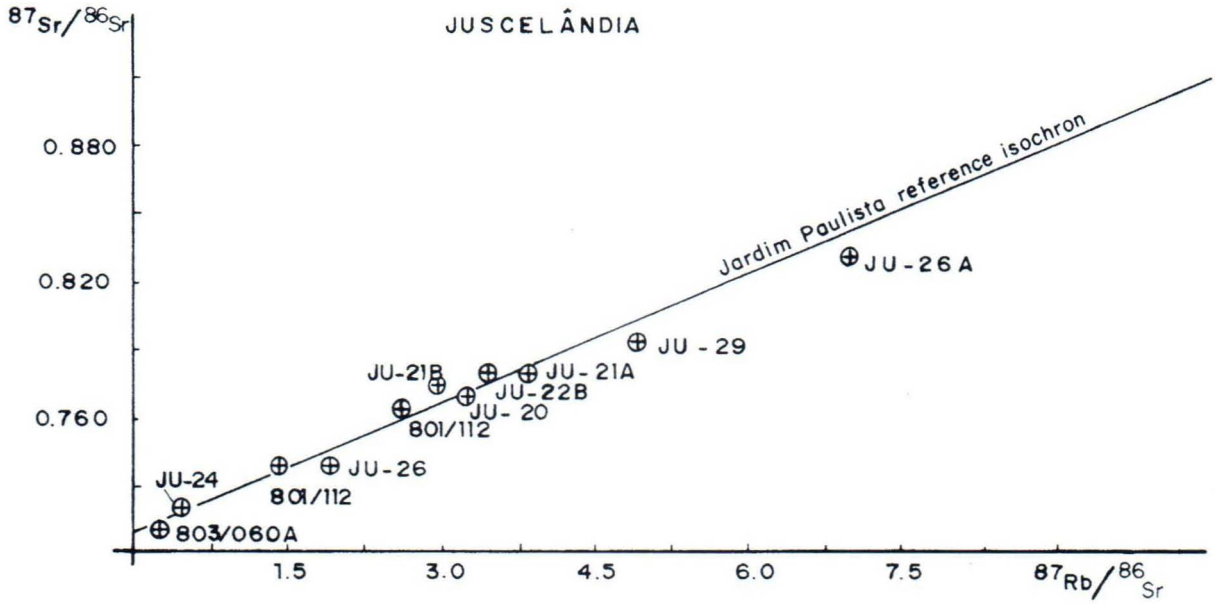


Figure 4 -- Rb-Sr isochron plot for Juscelândia gneisses.

The resulting geologic structure is one of interstacked tectonic slices as might be expected in a continent-continent collision environment. The process

may be related with the Uruaçuano Cycle proposed years ago by Almeida (1968). Unfortunately regional geologic relations are still poorly understood. Additional detailed stratigraphic, structural, geochemical, and geochronologic studies are needed in order to better constrain the geodynamic events of the Precambrian evolution of Central Goiaś.

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THE AGE AND ORIGIN OF THE SANTA CATARINA GRANULITIC COMPLEX, SOUTH BRAZIL

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The Santa Catarina Granulitic Complex covers an area of about 6000 km^2 in north-west part of Santa Catarina State (Fig. 1). This domain comprises medium to high grade terranes composed by quartz feldspatic gneisses, migmatites and