

PEGMATITES AND STRUCTURAL MAPPING USING MULTIPLE-SOURCE REMOTELY SENSED DATA IN THE KAMENA-MASOLA AREA, SERENJE DISTRICT, CENTRAL ZAMBIA

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The Kamena - Masola metasediments have been subjected to intense deformation resulting in strong foliation and recumbent and overturned folding. In places, the rocks seem to have undergone anatexis as indicated by heavily silicified layers and ductile flow structures. The general trend of foliation and schistosity in the Kamena - Masola area is northeast-southwest. Foliation planes are mainly vertical. The northeast-southwest structures are in places interfered by northwesterly trending structures probably of the Pan African Lufilian Orogeny. The rocks of the Kamena area have undergone at least three phases of deformation. A D_1 deformation phase resulted in S_1 schistosity which has been crenulated to S_2 by a second D_2 deformation phase. The rocks have then been subjected to a D_3 deformation phase resulting in overturned and isoclinal folds. The rocks of the Kamena-Masola area are characterised by vertical faults and joint patterns. The dominant fault pattern strikes between $30^\circ - 75^\circ$ NE. A less dominant second fault pattern cuts through the first and strikes NW-SE.

The pegmatites of the Masola-Masola area commonly occur as lensoids. They rarely form extensive and continuous tabular bodies. Most of the pegmatites in the belt are small, varying from 4 to 50 m in length and usually form small hills rising above the general surrounding up to about 10m high. The pegmatites tend to be associated with migmatites, muscovite-quartz-biotite-silimanite-schists, and micaceous quartzites. The pegmatites are intermediate to silicic in composition, white to pink colored. The pegmatites, despite being in a complex metamorphic environment, are "simple". They consist mostly of quartz, mica and feldspar. Pegmatites occurring in the migmatites commonly host abundant books of muscovite of economic significance. Other minerals include garnet, chlorite, hematite and biotite. The grain size, particularly that of quartz and feldspar, increases towards the cores of the pegmatites. The contacts between the pegmatites and the host rocks are gradational. In places, alteration halos occur along the borders of the pegmatites. Wallrock alteration around pegmatite outcrops is rarely visible and found only in trenches and quarries. Mica, feldspar and beryl are the principal commercial minerals recovered from most pegmatites and are associated with the alteration zone. The core in most of these pegmatites is commonly a solid mass of barren white, coarse grained, euhedral to recrystallized quartz and feldspar.

The database of structural variables in the Kamena Masola area (lineaments, faults and foliation traces) was assembled by interpreting enhanced Landsat TM images and aerial photographs. Most lineaments were interpreted directly and digitized from screen. The known faults were digitized from the published geological maps. One direct way of representing, classifying and analysing the variations in the orientations of geological lineaments was to construct rose diagrams. These diagrams define differently oriented sets of lineaments. A class interval of 15° azimuth was arbitrarily applied as the main division to construct the rose diagrams.

From the structural analysis, at least two major lineament orientations are pervasive. These are grouped as NNE-ENE and NNW-WNW. Some of these lineaments are easily related to the known faults and lineaments. Other lineaments identified were previously unknown, while others were not recognised as related structures. Lineaments that are indicated as faults are those proven in the field or digitized from existing geological maps. The NNW-WNW lineaments often crosscut and displace the NNE-ENE structures as

observe in the southern and south-eastern parts of the study area. The NNE-ENE lineaments are the most easily visible structures and are well documented in various publications on the Irumide Fold Belt. There is a close correlation between the major structural trends and the emplacement of the pegmatites. About 70% of pegmatites lie concordantly within a buffer of 200m from the lineaments. This suggests that the occurrence of pegmatites is structurally controlled. The buffering technique provides a guideline to narrowing down target areas for pegmatite mapping in unmapped areas.

The Kamena-Masola area has been subjected to extensive prospecting and mining activities, the majority of which are illegal. Although the pegmatites in the Kamena – Masola area host abundant muscovite and feldspar, little has been exploited. Most of the pegmatites have been exploited for beryl but very few mines have been producing. All the previously active mines are dormant and very little exploitation of these pegmatites is taking place.