



DIFFERENT GEO-TECTONIC OCCURRENCE OF QUARTZ FELDSPAR PORPHYRY IN THE KADIRI TALUK OF ANANTAPUR DISTRICT, ANDHRA PRADESH, INDIA

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ABSTRACT

Quartz Feldspar Porphyry is a rock type that has special status in the classification of rocks. It has the distinction of occurring as volcanic, hypabyssal and also as volcanoclast. The Kadiri taluk has hosted this special rock type in the form hypabyssal and also as volcanoclast within a distance of 40km. The volcanoclasts occur as a lithounit in the Kadiri Greenstone belt. The clast size gets decreased from east to west pointing to the younging direction. It has opalescent quartz reflecting the volcanic origin. It reflects some sedimentary features like cross bedding, cut and fill structures etc. The hypabyssal nature of the Quartz Feldspar Porphyry occurs as an intrusive into the granitoid country and it is located near Namala Gudi (temple), on way to Kadiri from Pulivendla. It runs for about 6-8km in the NNE-SSW direction. It has porphyroclasts of quartz and feldspar set in a fine grained matrix of the same material. The differences in the setup of this special type of rock are highlighted.

KEYWORDS : Quartz Feldspar Porphyry, Kadiri Greenstone Belt, Volcanoclast.

Introduction:

Geologically, Anantapur district in Andhra Pradesh has a special status, in that it had and has considerable mineral wealth. It has the Kimberlites at number of places around Wajrakarur, gold in Ramagiri Greenstone Belt and varieties of dimension stones in the form of granitoids. Further, Kadiri taluk has the special distinction of hosting a rock type i.e., the Quartz Feldspar Porphyry (QFP) that occurs in two different geological setup. QFP is seen as volcanoclast in the Kadiri Greenstone Belt (KGB) and also as a dyke body intruding the granitoids that are younger than the Kadiri Greenstone belt. The dual nature of occurrence of QFP and its field characters are vividly presented.

Material & Method:

1. Field Characters of QFP:

1.1. Volcanoclast (KGB):

This unit occupies major part of the KGB. One of the best section is observed along the road from Kadiri to Hindupur covering a length of about 1.5km. Various granitoids occurring as intrusives are observed on both the margins of the KGB. The QFP - volcanoclast (Schmid 1981) covers nearly 1.2km distance.

Kadiri town is located on the eastern side of the belt. The eastern end of the road section exposes QFP with coarse porphyries of opalescent quartz reflecting the volcanic parentage of the unit. Its blue color makes it very conspicuous and being most resistant stands out on the weathered surfaces (Fig. 1).



Fig.1. Porphyries of quartz & feldspar standing out on the weathered surface.

In addition, it has white quartz and feldspar occurring as porphyries measuring from 1 cm to slightly less than 2cm along the longer axis. The mineral feldspar and the quartz are subhedral and are

elongated (Fig. 1). The matrix is constituted by fine grained quartz and feldspar. This unit is considered as the basal unit.

This when traced further to the west continues for a distance of about 1200 meters and the size of the porphyries decreases gradually (Figs.2, 3 & 4), but, the elongated nature is conspicuously clear. This unit can be treated as the unit 'B' overlying the unit 'A'. Within this there are certain lensoid fine grained units that exhibit typical S0 planes (Fig. 5) clearly indicating the volcanoclastic nature. The thickness of each bed grades from a few cms to nearly 10 cms (Fisher and Schmincke 1984). The textural variation between the beds is also clear (Scheidegger and Potter 1968). This unit reflects finning upward sequence conspicuously (Figs. 1-6).



Fig.2, 3 & 4. Porphyries of quartz & feldspar get reduced in size towards the top.

Further up of the section, towards west, the grain size becomes very fine and the identification of the porphyries become very difficult on the fresh surface.

But, on the weathered surface the layering can be clearly seen (Walker 1971), (Fig. 5). This unit is considered as unit 'C' and forms big hills in the area. Finally the unit 'C' is over lain by rhyolites of honey and dark grey color (Fig. 6). The rhyolites form the topmost unit of the sequence.



Fig. 5. The S0 planes in volcanoclasts.

Fig. 6. Dark grey rhyolite forms the topmost unit of the sequence.

2. Sedimentary structures:

As the sequence is of volcanoclastic nature, in addition to S0 planes, it reflects sedimentary structures like, cut and fill, fining upward sequence and cross bedding etc.

2.1. Tectonic imprint:

The KGB has suffered tectonic effects that are clearly reflected even megascopically at outcrop level (Rao 1983). The imprint of the tectonism is reflected in the form of 1. Elongation of the porphyries and alignment of them (Fig.1). 2. The fracturing of the clasts is also seen megascopically when observed carefully with a magnifying glass (Figs. 1-3).

3. The clasts have been rotated, indicating the pre-kinematic nature of the porphyroclasts (Fig. 7). 4. The matrix veers around the clasts when observed carefully (Fig. 7).

Away from the area under report, near Nagireddipalle a conglomerate of the KGB shows clear effects of shear nature. In fact it can be stated that it is a shear conglomerate. Shear sensors are also seen very vividly (Fig. 8)

Further, the QFP reflects features resembling impressions in the form of angular (conical) holes all making an angle of 30° (Fig.9) with the surface caused due to the trajectory of the supposed to be volcanic bombs. This feature has not been reported so far in the published literature. This can be confused for current crescent structure (Johanson 1976).

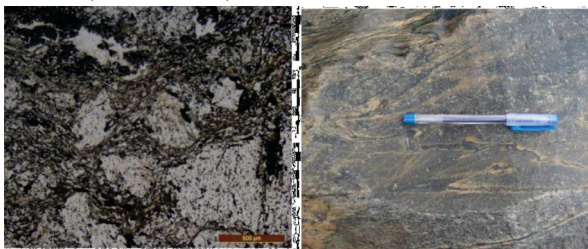


Fig.7. Rotation of pre-kinematic clasts & veering of matrix around the clasts.

Fig.8. Shear sensors in the conglomerate near Nagireddipalle.



Fig. 9. Suspected impressions of volcanic bombs in QFP.

2.2. QFP (Dyke Rock):

The Quartz Feldspar Porphyry (QFP) occurs as an intrusive into the granitoid country and it is located near Namala Gudi (temple), on way to Kadiri from Pulivendla (Fig. 10). It runs for about 6-8km in the NNE-SSW direction. It has porphyroclasts of quartz and feldspar set in a fine grained matrix of the same material.



Fig. 10. QFP intrusive into granitoids.

The QFP dyke body is located in the topographical map of 57J/3, of

Survey of India. It is covered between the 14° 18' 48" and 14° 20' 20" North latitude and 78° 10' 21" and 78° 12' 35" East longitude covering nearly an area of 12km2. The nearest township is Pulivendla of the Kadapa district.

Only a few outcrops of the QFP are seen intruding into the granitoid that acts as the basement to the sediments of the Cuddapah Basin. The dyke body occurs as strike ridges dipping steeply towards west. The outcrop occurring near the temple Namalagudi is the major one. It is on the right side of the Pulivendla – Kadiri new road (SH – 28). This outcrop runs nearly for about 1.75 km in the NNE - SSW direction and has a height of 20 m. After 1.75 km, it occurs as discontinuous outcrops and runs for about 1km in the SSW direction and has a height of less than 20m. The third location of the QFP is at south of Vepalapalle village, where the outcrops have an almost east – west trend and runs for less than 500mts with a height of 20 m.

Petrographically, this rock has quartz and feldspar occurring as phenocrysts (Leonard et al 2006). The matrix is also of the same material but is of fine grained nature. (Fig.11). Due to the higher incidence of K-feldspar, the rock has more pink color. At Namalagudi area, this shows extensive brittle deformation (Fig.12). All along the strike, the features remain same, but not the brittle deformation. The quartz appears to have two populations, viz., phenocrysts and phenoclasts – the average size is 5mm with the ground mass containing grains of less than 0.1 mm. They measure up to 7 mm. The larger grains measure 7mm and appear to have nucleation for the growth of the crystal. The quartz grains are sub-rounded.



Fig.11. Outcrop of the QFP.

Fig. 12. Brittle shearing of the QFP.

On way to the village Subbanaguntapalle the QFP has dark brown matrix with porphyroclasts of feldspar (Fig. 13). This is overlain by the pink variety of QFP (Fig.14).

In addition in the stream section, adjacent to the road on way to Subbanaguntapalle there are a few outcrops of QFP with enclaves of green chloritic material

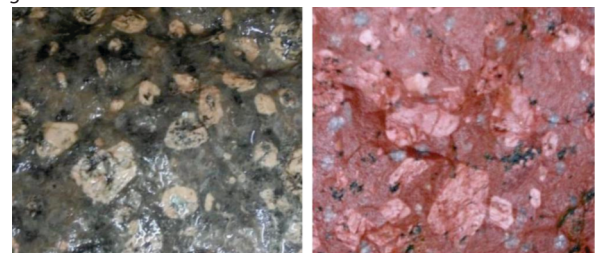


Fig. 13. Dark grey matrix with phenocrysts of feldspar and quartz.

Fig. 14. Pink matrix with phenocrysts of feldspar and quartz.

Conclusions:

Kadiri taluk has the distinction of hosting two geo-tectonically different set up of Quartz Feldspar Porphyries, viz. one is of volcanoclastic nature and the other intrusive (hypabyssal) nature. The former is located in the Kadiri Greenstone belt located very near to the Kadiri town and the latter is nearer to the Pulivendla town of Kadapa district.

The volcanoclast QFP was subjected to cataclastism, because of

which the pre-kinematic crystals have been rotated and the matrix is seen veering round the porphyroclasts.

The hypabyssal QFP located near Pulivendula has two populations of crystals. One represents the phenocrysts of quartz and feldspar and the other in the form of matrix, where the crystals are seen as smaller grains. Further, the QFP itself is seen with greenish black matrix studded with phenocrysts that is overlain by QFP with pink matrix having phenocryst of quartz and K-feldspar. This set up can be clearly observed near Subbanaguntapalle. Further work is under progress.

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