

Mapping of Key Host Rock Formations in White Barytes Mineralization in parts of YSR District, Andhra Pradesh, India using Geospatial Techniques

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Abstract: Barytes is one of the rich resources produced by India in general and Andhra Pradesh in particular. It is one amongst many minerals derived from the crescent shaped Proterozoic concentrated on white variety of barytes. It is of igneous origin formed by hydrothermal solutions and occurs as vein deposits. The host rocks are shales, quartzites, and dolomites of sedimentary origin intruded by basic sills belonging to lower Cuddapah basin.

Keywords: Barytes, Crescent shaped, protozoic, sedimentary origin.

1. INTRODUCTION

Barytes is the sulphate of barium (BaSO₄). It is the principal ore for barium and the barium compounds (McDonald et al., 2011). Mineral is formed by various processes like hydrothermal, evaporation and biogenic (Banor, 2000). Most of the studies on barytes are focussed on their occurrence, genesis, mineralogical and structural aspects (Boye, 1972; White head and Mc Donald 1998; Adams, 2000, 2011; Eegh et al, 2004; Oden 2018). India is the second leading producer of barytes in the world. Baryte is also known as heavy spar. White barytes in the present study area has a regular tabular form and occurs as vein deposits trending NNW-ESE. In the study area 10 villages of 4 mandals (Table-1) host the barytes mineralization, of all being igneous origin, formed by the hydrothermal solutions.

Location: In the YSR District of Andhra Pradesh a cluster of 10 villages of 4 mandals within the coordinates of 14°34'21.2"N to 14°43'55.5"N latitudes and 78°12'1/98"E to 78°87'1.40"E longitudes (Table-1).

Table 1: Village names with Coordinates.

Sl.No	Village Name	Mandal Name	Coordinates
1.	Lopatnutala	Lingala	78°04'11"E 14°30'25"N
2.	Ippatla	Lingala	78°10'28"E 14°25'18"N
3.	Velidandla	Lingala	78°02'58"E 14°31'54"N
4.	K.Velamvaripalle	Pulivendla	78°13'7.86"E 14°22'59.97"N
5.	Tallapalle Velamavaripalle	Vempalle	78°22'40"E 14°20'11"N
6.	Vempalle	Vempalle	78°27'28"E 14°22'38"N

7.	Velpula	Vemula	78°15'45"E 14°22'00"N
8.	Kottapalle	Vemula	78°21'07"E 14°20'46"N
9.	Vemula	Vemula	78°19'39"E 14°20'59"N
10.	Midipentla	Vemula	78°18'24.46"E 14°19'59.91"N

2. GEOMORPHOLOGY OF THE STUDY AREA

The Geomorphological features in Vemula, Vempalle, Pulivendla and Lingala mandals are classified as flood plains, pediments, pediplains, residual hills, structural hills, structural valleys. Flood Plains occupy an area of 8.42 Sq.km, pediments extended in an area of 94.89 sq.km, pediplains occupy an area of 538.54 Sq.km, residual hills in 11.63 sq.km, Structural hills 202.94 Sq.km, and Structural valley 119.72 Sq.km (Fig-1).



Fig 1: Geomorphology Map of study area

3. GEOLOGY AND STRATIGRAPHY OF THE STUDY AREA

The study area composed of a stratigraphic sequence of rocks of Papaghni group and Chitravati group of lower Cuddapah Supergroup of rocks (Fig-2). The lithologically the study area has a series of alternate bands of argillaceous and arenaceous rocks. Igneous activity is seen between Vempalle and Pulivendla formations and below the Tadipatri shale formation (Nagaraja Rao, et al., 1987). Village wise host rock formations of barites is given Table-2. And the Image characteristics of the host rocks in the study area for the geospatial mapping is given in Table-3.

4. ORIGIN AND OCCURRENCE OF BARYTES IN STUDY AREA

Barytes in the study area occurs in the form of veins, stringers and fissure fillings between bedding planes, joint planes and shear planes. The mineral is commonly associated with the lead-zinc veins in limestones and with haematite, other common occurrence is in association with hot springs (Rubin, 1997). The barytes mineral is associated with veins of quartz, calcite and thin films of pyrite and chalcopyrite. Barytes occurs in both massive form and crystalline form in the study area. The veins of barytes are E-W trending and have a steep dip of around 60° to 80°. The Barytes might have been derived from magmatic exhalations and emanating from a shallow seated differentiating barium rich magma along fracture zone within country rock by mingling with sulphate bearing waters in the earlier formed fissures (Coulson, 1933; Venkatram, et al., 1953; Vyasa Rao, 1980).

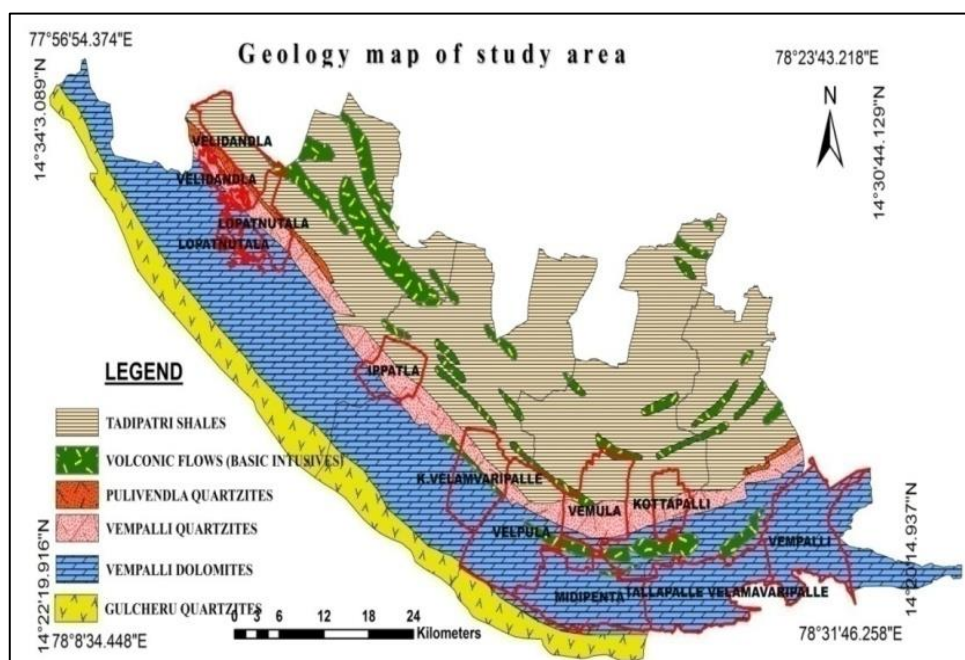


Figure 2: Geology map of study area

Table 2: Mineralized village and Host rock formation

S.No	Name of the mondal	Name of the village	Latitudes and Longitudes	Host rock
1	Lingala	Lopatnutala	78°04'11"E 14°30'25" N	Quartzite,dolomite (Vempalle Formation) Quartzite with Conglomerate(Pulivendla Quartzite)
2	Lingala	Ippatla	78°10'28"E 14°25'18" N	Shale,tuff(Tadipatri formation) Dolomite , Quartzite (Vempalle Formation)
3	Lingala	Velidandla	78°02'58"E 14°31'54"N	Shale,tuff (Tadipatri Formation) Dolomite (Vempalle Formation)
4	Pulivendula	K.Velamvaripalli	78°13'7.86"E 14°22'59.97"N	Shale , tuff (Tadipatri Formation) Quartzite , Dolomite , Basic flows , Intrusives (vempalle formation)
5	Vempalle	T.Velamvaripalle	78°22'40"E 14°20'11" N	Dolomite, Chert (Vempalle formation)
6	Vempalle	Vempalle	78°27'28"E 14°22'38" N	Dolomite (Vempalle formation)
7	Vemula	Velpula	78°15'45"E 14°22'00"N	Shale (Tadipatri formation) Dolomite,Quartzite, Basicflows , intrusives (Vempalle formation)
8	Vemula	Kottapalle	78°21'07E" 14°20'46"N	Shale (Tadipatri formation) Dolomite,Chert,Quartzite ,Basicflows,intrusives (Vempalle formation)
9	Vemula	Vemula	78°19'39E" 14°20'59"N	Shale (Tadipatri formation) Dolomite ,Quartzite,Basic flows, intrusives (Vempalle formation)
10	Vemula	Medipentla	78°18'24.46"E 14°19'59.91"N	Dolomite , Basic flows ,Intrusives (Vempalle formation)

5. IMAGE CHARACTERISTICS OF THE HOST ROCKS IN THE STUDY AREA

Sl.No.	Village Name	Lithounit	Image Characteristics		
			Tone	Texture	Drainage pattern
1.	Vempalle	Vempalle Dolomites	Lighter	Smooth	Dendritic
2.	T. Velamavaripalle	Vempalle Dolomites	Lighter	Smooth	Dendritic
3.	Kottapalle	Vempalle Dolomites	Lighter	Smooth	Dendritic
		Volcanic flows	Darker	Coarse	Parallal
		Vempalle Quartzites	Lighter	Coarse	Rectangular
		Tadipatri Shales	Lighte	Smooth	Dendritic
4.	Vemula	Vempalle Dolomites	Lighter	Smooth	Dendritic
		Vempalle Quartzites	Lighter	Coarse	Rectangular
		Volcanic flows	Darker	Coarse	Parallal
		Tadipatri Shales	Lighte	Smooth	Dendritic
5.	Meedipentla	Vempalle Dolmites	Lighter	Smooth	Dendritic
		Volcanic flows	Darker	Coarse	Parallal
6.	Velpula	Gulcheru Quartzites	Lighter	Smooth	Parallal
		Vempalle Dolomites	Lighter	Smooth	Dendritic
		Volcanic flows	Darker	Coarse	Parallal
		Vempalle Quartzites	Lighter	Coarse	Rectangular
		Tadipatri Shales	Lighter	Smooth	Dendritic
7.	K. Velamavari Palle	Vempalle Dolomites	Lighter	Smooth	Dendritic
		Volcanic flows	Darker	Coarse	Parallal
		Vempalle Quartzites	Lighter	Coarse	Rectangular
		Tadipatri Shales	Lighte	Smooth	Dendritic
		Basic Intrusives	Lighter	Smooth	Dendritic
8.	Ippatla	Vempalle Dolomites	Lighter	Smooth	Dendritic
		Vempalle Quartzites	Lighter	Coarse	Rectangular
		Tadipatri Shales	Lighter	Smooth	Dendritic
9.	Lepatnutala	Vempalle Dolomites	Lighter	Smooth	Dendritic
		Vempalle Quartzites	Lighter	Coarse	Rectangular
		Pulivendla Quartzites	Lighter	Smooth	Parallel
		Tadipatri Shales	Lighter	Smooth	Dendritic
10.	Velidandla	Vempalle Dolomites	Lighter	Smooth	Dendritic
		Vempalle Quartzites	Lighter	Coarse	Rectangular
		Pulivendla Quartzites	Lighter	Smooth	Parallel
		Tadipatri Shales	Lighter	Smooth	Dendritic

5. SUMMARY

A map has been prepared with the key host rocks lithology map (Fig-2). Further, the key host rocks integrated with mineralized villages and their corresponding grades barytes (Fig-3). Among these villages high grade barytes mineral of an order of 97.36% BaSO₄ occur in V.Kottapalle village of Vemula mandal and least grade of baryte mineral of 90.78% of BaSO₄ occur in K.Velamavaripalle village of Pulivendla mandal. The Samples of average content of barytes in all the villages is 95.34%. A grade wise thematic map of barytes mineralized villages has been prepared and false colours are given to the village for each grade. These maps will be helpful to the persons of companies who wish to extract barytes in this area.

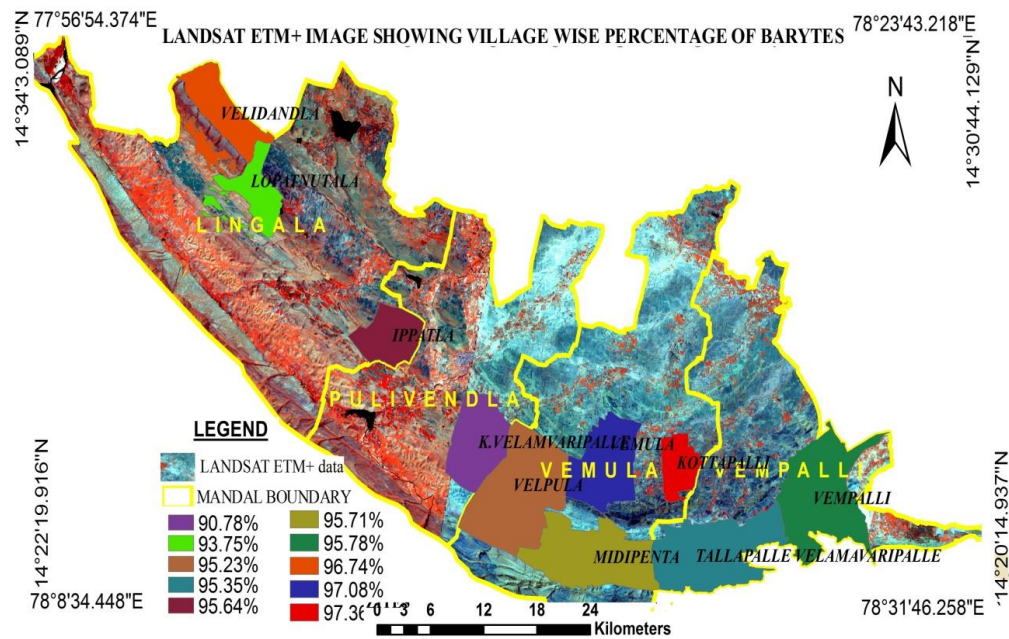


Figure 3: Percentage map of Barytes in the study area

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