MAGNETIC RESPONSE IN PANYAM MANDAL,KURNOOL DIST., ANDHRA PRADESH,INDIA

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ABSTRACT

Magnetic studies were carried out in Panyam mandal to obtain the magnetic anomalies correspond to different geological formations. Along 11 profiles there are 340 magnetic readings were measured. The filtering technique like, high pass filter is applied to remove the noise, which is due to shallow features and low pass filter is used to enhance the signal which is obtained from the deep features. The Total magnetic intensity and both filtered magnetic contour maps are clearly show the anomaly difference in three different zones (shale, limestone and quartzites) of Panyam mandal. Limestones are showing very low magnetic anomalies, shales are showing medium to high and quartzites are showing very high magnetic anomalies.

Keywords:- *Panyam mandal, magnetic anomalies, geological boundaries, Nandyal shales, Limestone with shales, Panyam quartzites.*

1. INTRODUCTION

The magnetic method is the important technique among the other geophysical methods. It is inexpensive, speedy method of survey, the instrument also portable and man power also less. The advantage of this method is, equally applicable on the land, air and water and can be used at inaccessible areas (Telford, 1990). The Earth behaves as huge magnet and its magnetic field surrounds it far in space. The magnetic intensity varies inversely as the square of the distance from the pole. Unit is Gauss. But in the field generally measure even small part of gauss, gamma or nano Tesla (nT). 1 Gamma = 1/100,000 part of the gauss (Dobrin, 1976).

In the present study the magnetic measurements are carried out to obtain the magnetic values correspond to different geological formations prevailing in this Panyam mandal, Kurnool District, Andhra Pradesh.

2. GEOLOGY

The Panyam mandal is located in the Kurnool subbasin. The stratigraphy of the Kurnool group is shown in the table1: which are Nandyal Shale, Koilakuntla Limestone, Paniam Quartzites, Owk Shale, Narji Limestone, Banganapalli Quartzites (King, 1872; Nagaraja Rao et al., 1987).

Table-1 Stratigraphy of the Kurnool Subbasin (after Nagaraja Rao et al., 1987)

KURNOOL GROUP 500+ m	Nandyal Shale	
	Koilkuntala Limestone	
	Paniam Quartzite	
	Owk Shale	
	Narji Limestone	
	Banganapalli Quartzite	
-------- Unconformity --------		
	Srisailam Formation	Pebbly grit, quartzite, heterolithic shale-sandstone

Geologically this Panyam region is surrounded by three different formations from south to north, which can be seen clearly in the Fig.1. The line separating the two formations considered as boundary line and it has drawn in the geology map as BL-1 and BL-2.

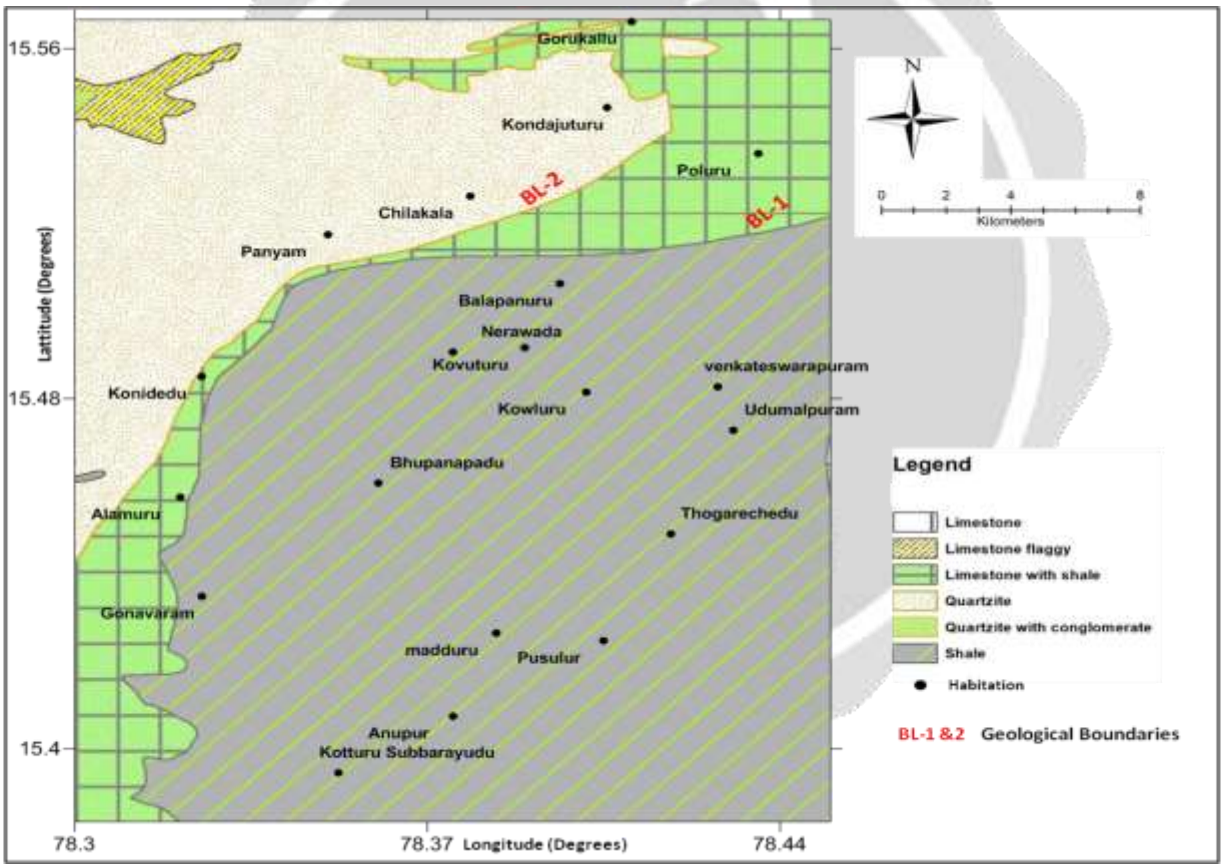

Fig-1. Geological map of the Panyam mandal along boundary lines BL-1 and BL-2. (after GSI, 2005)

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Magnetic readings were obtained using Proton Precession Magnetometer long 11 profiles in the study area. There are 340 measurements with station interval of 200 m were carried out and covered about 80 km^2. Diurnal correction has been done for the magnetic readings.

3.1 Total Magnetic Intensity Contour Map

The Total magnetic Intensity contour map (Fig.2) is generated with contour interval of 20 nT. The readings are range from 42248 nT to 42500 nT. Magnetic profiles are overlaid on this image. The geologocal boundary lines BL-1 and BL-2 (based on Fig.1) were drawn on the Fig.2. Except at few areas, the total area shows high magnetic values below the boundary line BL-1. Above the BL-2 the high values are identified. Between BL-1 and BL-2, low to high values are observed.

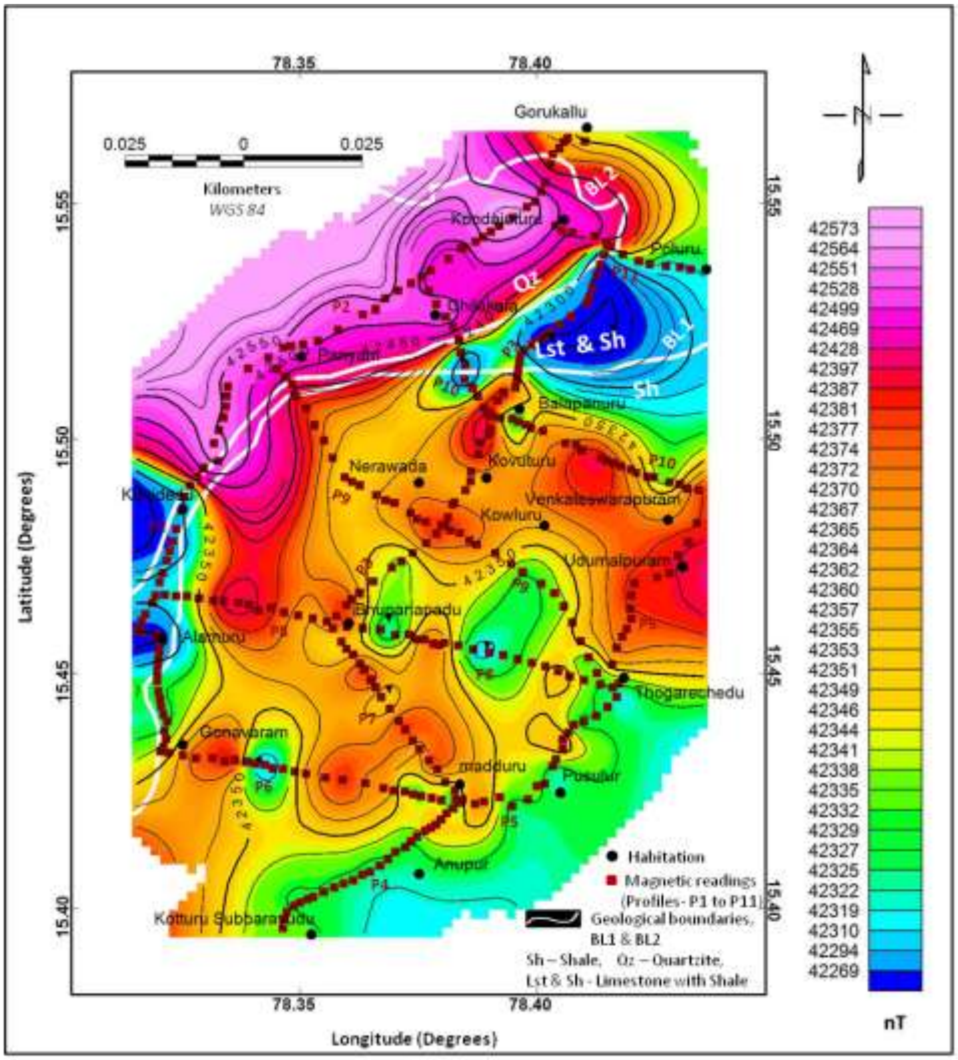

Fig-2. Total Magnetic Intensity contour map of the Panyam mandal along with magnetic profiles.

3.2 Filtering Technique

In the field, very often the shallow bodies create noise, which leads to difficult to identify the actual signals of target body from the deeper depths. To remove the noise and to pickup the signal the filtering technique is applied to the field data. The high pass filter is used to eliminate the noise, which is the anomalies of high frequencies or short wavelengths obtained from the shallow features at the time of data acquisition. The low pass filter is used to retain and emphasize the signal, which is the anomalies of low frequencies or long wavelengths obtained from the deeper structures (Cooper,2004; Oruc et al., 2008). In this present study using Oasis Montaj software (Geosoft, 2010), generated power spectrum (Dean, 1958; spector and Bhattacharyya,1966) and calculated the cut-off frequency for both the filter techniques.

3.2.1 High pass Filtered Magnetic Contour Map

Using this high pass filter, cut-off frequency 0.02701 cycles/m to magnetic data and generated contour image shown in Fi.3. The filtered magnetic filed is ranging from -20 nT to 30 nT. It is clearly seen in this map that the number of high and low magnetic anomalies with small closures, which it self indicate the noise. Geological boundary lines are shown in this map.

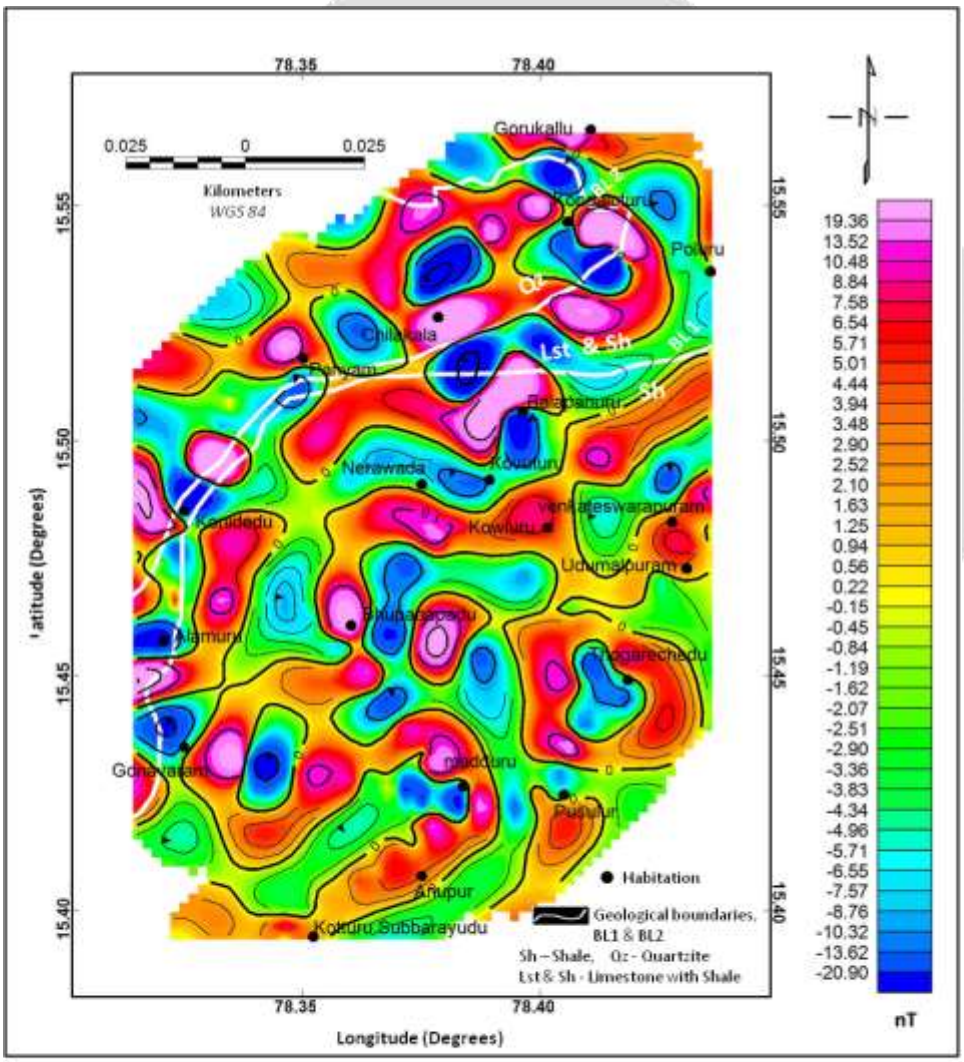

Fig- 3 High pass filter magnetic anomaly contour map of the Panuam mandal.

3.2.2 Low Pass Filtered Magnetic Contour Map

The low pass filter, cut-off frequency 0.02701 cycles/m, is applied to magnetic data and generated contour image, with contour interval of 20 nT, shown in Fig.4. The filtered magnetic filed is ranging from 42264 nT to 42410 nT. Geological boundary lines are shown in this map.

Same as in the Fig.2, in this Fig.4 also, low to high magnetic values are observed below the boundary line BL-1 and very high values can be seen above the BL-2. Between BL-1 and BL-2, low to high values are observed.

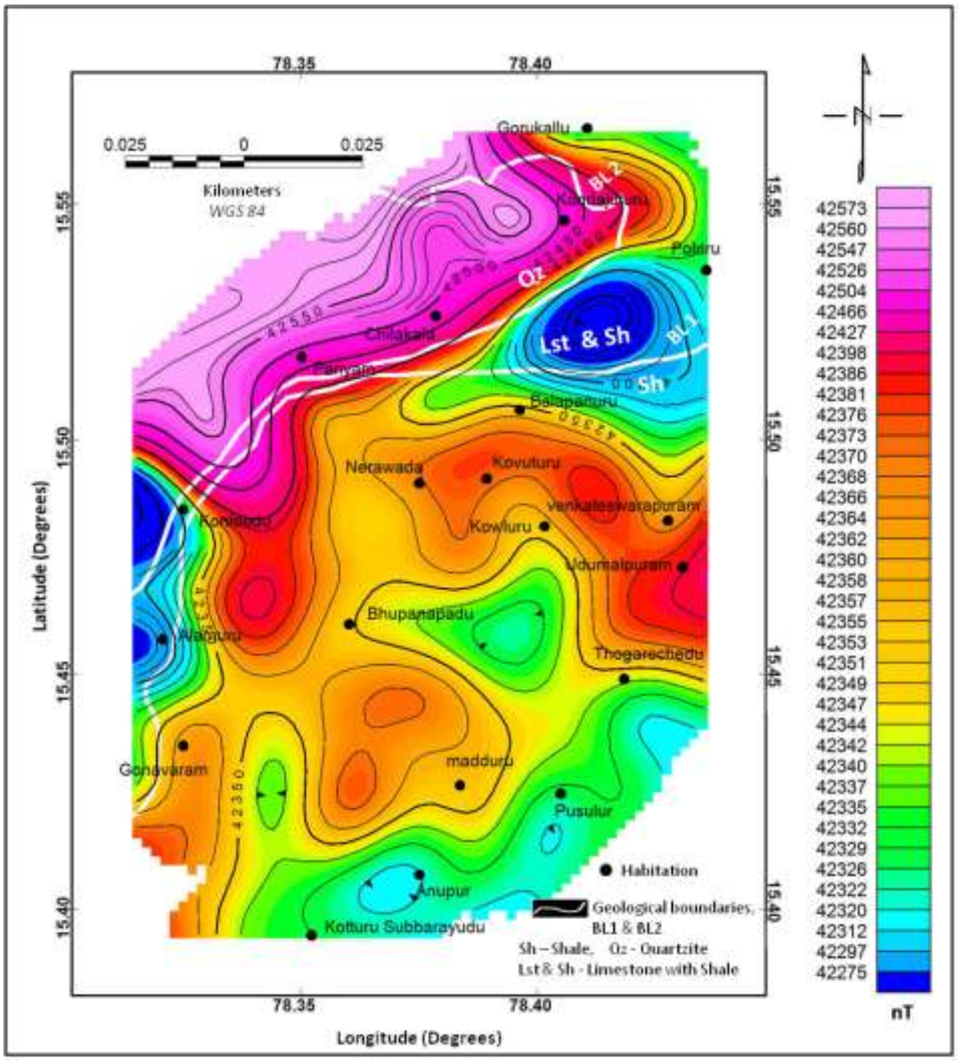

Fig-4 Low pass filter magnetic anomaly contour map of the Panyam mandal.

4. RESULTS

The results are observed among the total magnetic Intensity contour map (Fig.2) and low pass filtered magnetic contour map (Fig.4) and correlated with geology map (Fig.1).

1) High magnetic values ranges from 42310 nT to 42500 nT are observed below the boundary line BL-1. Based on geology map (Fig.1) in this area shales are present, and generally shales show medium to high magnetic values. It means these high values are due to shales. But at few regions low magnetic values are observed due to highly weathered shales.

2) High magnetic values from 42330 nT to 42500 nT are noticed above the boundary line BL-2. In the geology map Fig.1, Quartzites are present in this zones. Generally quartzites show very high magnetic values. It means these high values are due to quartzites.

3) Between BL-1 and BL-2, high and very low magnetic values are observed. Geology map Fig.1, shows limestones with shales are covered in this area. Generally limestones show low magnetic values. So this area shows very low to high magnetic values due to limestones and shales.

5. CONCLUSIONS

From the observation of magnetic anomalies in the contour maps Fig.2 and Fig.3, it is clearly derived that the high magnetic Nandyal shales are present below the BL-1, very high magnetic Panyam quartzites are exist above BL-2 and very low magnetic Koilakuntla limestones and high magnetic Nandyal shales are present between BL-1 and BL-2. High pass filtered magnetic contour map (Fig.2) shows the response of shallow surface features and low pass filtered magnetic contour map (Fig.3) reflects the response of deep subsurface features.

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