of which are available except it were acquired in early 1960s.

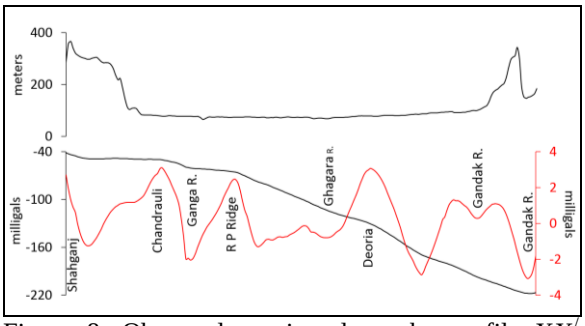

Figure 8: Observed gravity along the profile XX/ along with residual gravity and SRTM elevation.

The gravity high and low, at beginning of the profile, to the south and north of Shahganj may be due to the structural changes at Son-Narmada Geofracture. The other gravity lows are attributable to river basins of the Ganga, the Ghagara and the Gandak as shown in figure. The gravity highs along this profile are of isolated type (fig.5) except the gravity high due to Ratlam-Patna ridge and at Deoria.

Gravity modeling is carried out by constraining the seismic horizons and well data (shown in figure 9,10 & 11). Densities used for the modeling are shown in table-1.

Table-1

Formation	Densities	Symbol
Recent	2.00-2.10	-
Upper Siwalik	2.10-2.15	US
Middle Siwalik	2.20-2.25	MS
Lower Siwalik	2.30-2.35	LS
Karnapur	2.50-2.55	KR
Tilhar	2.55-2.57	TR
Ujhani	2.57-2.60	UN
Bahraich	2.60-2.62	BH

To simplify the model, Vindhyan sediments are taken as single entity at start of profile where variation in observed gravity may be mainly due to changes in different formations in this layer.

Along the profile XX/, the gravity modeling demands the mantle to be dipping gently towards north from about 42 km at start of profile to more than 50 km at end of profile.
Intrusive are introduced in upper basement to explain observed gravity highs of RP ridge and Deoria area, the actual size and depth may be different as it is introduced to produce the gravity effects only.

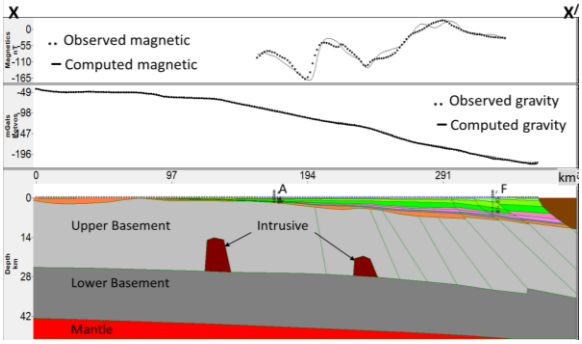

Fig.9. Gravity model along profile XX/.

Magnetic modeling along this profile suggest breakup of the upper basement with slight variations in inclination and declination values. But it suggests same polarity of magnetization for this part of crust.

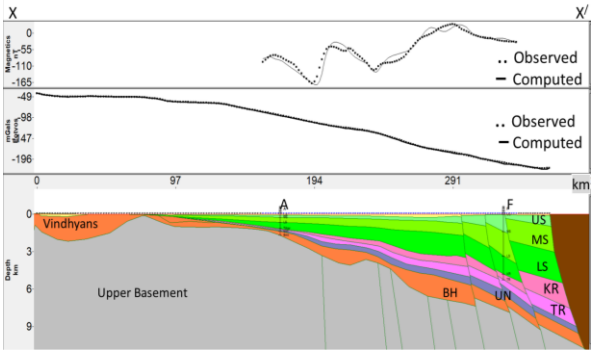

Fig.10. Close-up view of the gravity model shown in figure 9.

The sediment thickness at Gandak depression may be expected up to 11 km at the areas near main boundary thrust. Whereas sediment thickness at areas of gravity low to the north of Deoria (fig. 8) may be more than 7 km.

Similarly, gravity modeling along profile YY/ (fig.11) is carried out by converting the seismic time horizons into depth with densities in table-1. The sediment thickness in this profile may be a little above 5 km at the end of profile. But as seen in seismic section in fig.6b the reflection below the unconformity surface is comes out to be sediments as demanded by gravity modeling. Similar to XX/ the variations in observed gravity at beginning of the profile may be due to

changes in different Vindhyan layers but to simplify the modelling, it is taken as single layer.

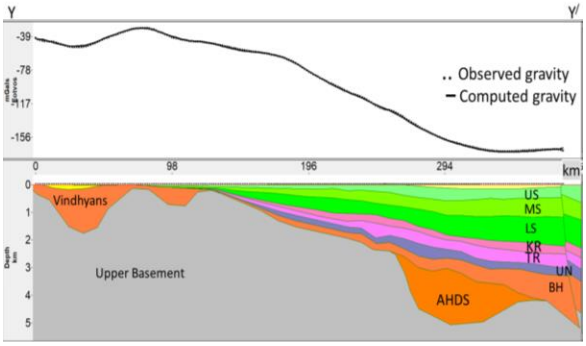

Fig.11. Gravity modelling along profile YY/. (AHDS: Additional Higher Density Sediments)

From integrated study along these profiles, it can be inferred that sediment thickness in Gandak depression is more than Bahraich low of Sarda depression. As gravity lows are having thicker sediments this areas may be a good target for hydrocarbon exploration.

Conclusions

- Observed gravity anomaly in Ganga basin is varying between from about -42 milligals to -215 milligals i.e. gravity anomaly in the basin is lower by 173 milligals than its margin.

- Thick accumulation of sediments alone may not be the cause of low gravity in the basin, but it may also has the isostatic effect of the Himalayas.

- Euler depth analysis reveals sources of gravity high and lows in the basin are deeper.

- Gravity modeling suggests maximum sediments may be more than 7 km in Gandak depression and a little above 5 km in Bahraich low of Sarda depression.

- Modeling suggests gravity highs are due to basement high and deep seated high density intrusive.

- As gravity lows are having thicker sediments these areas may be a good target for hydrocarbon exploration.

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Views express in this paper are of Authors only and not of ONGC.