

GRAVITY MAP SERIES OF INDIA – 2006

Systematic measurement of the Earth's gravity field in relation to geodynamic studies and natural resource exploration were initiated during early fifties.

- **In 1956, Survey of India (SOI)** published first Gravity Map of India on 1: 12 Million scale with 20 mGal contour interval based on 3,000 observations without terrain correction.
- **In 1978, National Geophysical Research Institute (NGRI)** published a set of five Gravity maps at scale 1: 5 Million with 10 mGal contour interval based on 30,050 observations without terrain correction (data from NGRI, SOI, ONGC and HIG).
- **In 1999, Geological Survey of India (GSI)** initiated the proposal for the Project: Revision of Gravity Map of India (RGMI) in collaboration with National Geophysical Research Institute (NGRI), Oil & Natural Gas Corporation Limited (ONGC), Survey of India (SOI) and Oil India Limited (OIL) to prepare Gravity Map of India at scale 1: 2 Million with 5 mGal contour interval with terrain correction as per the following International Standards.
 - Geodetic Reference System : GRS-80
 - International Gravity Standardization Net : IGSN-71
 - Bouguer Gravity values calculated for a crustal density of 2.67 gm/cc reduced to mean sea level
 - Lambert Conical Orthomorphic projection (as per SOI standards).
- **In 2006, Geological Survey of India** published a set of four Gravity maps at scale 1: 2 Million with 5 mGal contour interval based on 1,43,786 observations with terrain correction in collaboration with National Geophysical Research Institute, Oil and Natural Gas Corporation Limited, Survey of India and Oil India Limited.
- **On 19th February, 2007, Gravity Map Series of India–2006** was released by Shri. P.M. Tejale, Director General, Geological Survey of India at NGRI, Hyderabad.

The set of maps released under the Project: RGMI consists of the following:

1. **Free-air Gravity Anomaly Map of India with Station Distribution (1 : 2 Million)**
2. **Bouguer Gravity Anomaly (terrain corrected) Map of India with Station Distribution (1 : 2 Million)**
3. **Bouguer Gravity Anomalies (terrain corrected) superimposed on Geological Map of India (1 : 2 Million)**
4. **Gravity Image map of India (1 : 5 Million)**

Gravity Maps – 1, 2 and 3 are printed in four parts (NE, SE, SW and NW) with an overlap of one degree.

NE part:	Long: 82° to 96°	Lat: 21° to 36°
SE part:	Long: 82° to 96°	Lat: 08° to 22°
SW part:	Long: 68° to 83°	Lat: 08° to 22°
NW part:	Long: 68° to 83°	Lat: 21° to 36°

Gravity Map Series of India – 2006



The Gravity maps have brought several new features other than those associated with the well known tectonic trends and are expected to provide better understanding of the geodynamic evolution of various tectonic units of the Indian subcontinent.

1. Free-air Gravity Anomaly Map

The Free-air gravity anomalies show a total relief of 450mGal and correlate well with the known tectonic trends of the Indian Precambrian Shield. In general, most of the topographic highs of the Peninsular Shield are characterized by positive anomalies. Over the Shillong plateau, they attain a maximum of +170 mGal. The major tectonic units of southern Peninsular Shield such as Southern Granulite terrain, Cuddapah and Godavari basins are characterized by negative free-air anomalies. Gondwana grabens are usually associated with medium amplitude negative anomalies. In contrast, some of the low topographic areas are characterized by strong negative anomalies viz, west of Western Ghats, Indo-Gangetic plains and Brahmaputra valley of Assam and Arunachal Pradesh which indicate anomalous low density in the crust and / or crustal thickening. Negative free-air anomalies prevail over almost entire Himalayan region.



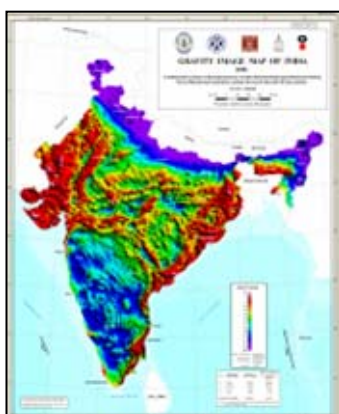
2 & 3. Bouguer Gravity Anomaly Maps

The Bouguer gravity anomalies (terrain corrected) show a large variation of about 470 mGal as documented by +75 mGal observed over the volcanic plugs in the Saurashtra and large negative anomalies of less than -395 mGal are observed to the east of Srinagar in the higher Himalayas. Bouguer anomalies which reflect density heterogeneity in the subsurface correlate well with the exposed geology and known tectonic frame work of the Indian landmass. For example, the Aravli-Delhi fold belt, Narmada-Son lineament, Godavari and Mahanadi grabens and the Eastern Ghat Mobile belt are associated with well defined linear Bouguer anomalies. Bouguer anomalies over the east coast of India attain values higher than -50 mGal and become positive at places. In contrast, the west coast, south of 18° N is characterized by negative anomalies varying between -50 and -100 mGal while the west coast lying north of 19° N shows positive anomalies. Invariably, pronounced 'lows' are observed over granitic batholiths and sedimentary basins and 'high's over the meta-volcanics, meta-sediments and uplifted blocks (horsts).



4. Gravity Image Map

The Image map has clearly brought out the major tectonic features of the Indian subcontinent viz, the Himalayan tectonic zone, Godavari, mahanadi, Damodar and Satpura grabens and Narmada-Son lineament (NSL), Aravalli-Delhi and Eastern Ghat Mobile belt, Saurashtra-Kuchch and Rajasthan Shelf as well as the Shillong Plateau. In addition to the above, the map has revealed several short wavelength and medium amplitude gravity signatures like (i) linear belts of parallel gravity highs trending E-W to ENE-WSW to the north of NSL and south of southern margin of the Bundelkhand massif, (ii) medium amplitude gravity low associated with the Bundelkhand massif surrounded by gravity 'high', (iii) N-S to NNW-SSE trending linear bands of gravity high and low over the gneiss-granite-greenstone terrain of Dharwar craton, (iv) NE-SW to N-S trending gravity low over western margin of Aravalli-Delhi fold belt, (v) linear gravity highs along the shoulders of Godavari graben and (vi) coaxially circular bands of highs and lows over Singhbhum craton.



- ❖ Maps were processed for Printing at Map Printing Division, Geological Survey of India, Hyderabad utilizing the in-house state-of-the-art facilities in digital techniques.
- ❖ The maps are published under “**Restricted Category**”
- ❖ The maps are available for sale at a price of Rs. 1000/- per set including brochure from the following GSI offices.

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