During the last decade, three dedicated satellite gravity missions (CHAMP, GRACE and GOCE) have greatly improved the knowledge of the static and dynamic gravity field of the Earth. Bouguer Gravity anomalies (BGA) derived from global gravity models (e.g. EGM2008), which consist of GRACE satellite observations and terrestrial gravity data, are analysed to demonstrate through selected applications, their potential use in studying large scale geological features of the Himalaya, where little or no terrestrial data are available. Gravity gradient (GG) tensors over a part of the eastern Himalayan region are computed from a constrained 3D lithospheric density model and computed directly from BGA by Fourier transformation to highlight certain aspects of the structural features of the Himalayan Collision Zone (HCZ). This exercise demonstrates the extra advantages of modeling gravity gradient measurements, which is of high contemporary relevance in view of the fact that satellite gravity gradient data from the ongoing GOCE mission will be available shortly. It is remarkable to note that GG clearly demarcate the region between Main Central Thrust (MCT) and Main Boundary Thrust (MBT), which indicates that surface expressions of tectonic features extend to the subsurface. It also appears that combined interpretation of BGA and GG can better resolve the locations and possibly the depth extent of the density anomalies. Modelling of BGA provided crustal thickness variation (~ 35-37 km south of the Indo-Gangetic plane to ~ 70 km under southern Tibet) and also constrained the estimate of Effective Elastic Thickness changes, which lower value marks the extent of Indian plate under Tibet.