(Rev 1) entitled "Draft Antarctic Specially Managed Area (ASMA) Management Plan for the Larsemann Hills, East Antarctica (jointly by Australia, China and Russian Federation), referred to information Paper # 80, submitted under Agenda Item 4a, details on the proposed site for the new Indian research base, located in the Larsemann Hills

His Majesty King Carl Gustaf (King of Sweden) showed personal and keen interest in the 28th ATCM and visited the meeting venue and addressed the delegates

National Centre for Antarctic and Ocean Research Department of Ocean Development, Headland Sada, Vasco-da Gama - 403 804, Goa
Email nkhare@ncaor org
N KHARE

REDUCTION OF GRAVITY AND MAGNETIC DATA

We have contended that Bouguer and magnetic anomalies are proportional to vertical gradient of gravity and magnetic fields (Kesavami et al 2005, *Jour Geol Soc India, v 66, pp 510-511*) They only indicate the variations in density and magnetization respectively but not the mass distribution The primary requisite for comparison of any data is that it should be on a horizontal plane It is also mandatory that the signatures of the anomalies should not change at different levels

As the measured field in VG, SG, FA and BA are all station anomalies and the measured field is the vertical differences between un-even ground surface and even geoid level, these anomalies may be brought to a common datum in free air or mean sea level / geoid level The free air correction factor (FC) can be used to bring the station anomalies on to a common datum in free air If the FC is used as a correction factor for the increase in height and added to the station anomalies, all the anomalies show similar signatures as that obtained in VG, showing the inverse relationship with height That is, they are proportional to vertical gradient anomalies This is exactly what we observe in gentle undulating and plain areas However, if the FC is used as upward continuation and the correction is subtracted, because of the decrease of natural vertical gradient with height, all the anomalies show similar signatures as obtained in SG, revealing the mass distribution

As the measured field is the vertical differences, by logic, the data on even datum would be a mirror reflection of the uneven surface anomalies That is, the observed data on the uneven surface equals to inverse or negative of the measured field on the even surface The VG and SG at geoid level are equal to negative of VG and SG on the ground surface Thus, station level VG is equal to geoid level SG Similarly, station level SG is equal to geoid level VG which is the true gravity field on the geoid However, the FA and BA anomalies have to be brought on to one horizontal plane before transferring the data on to geoid because of the change in signatures due to elevation The even datum anomalies in free air are similar to that obtained on geoid level without any change in signatures We observe that the VG at station level is less compared to VG at Geoid level However, SG at geoid level is less than the SG at station level because the mass above the geoid is removed The vertical gradient anomaly due to the topography above mean sea level ie , the difference between the VG at station level and the geoid level is equal to twice of VG Similarly the difference of SG between the station level and geoid level is twice that of SG

For calculation of the geoid height, the transferred VG and SG anomalies on the geoid which are different from the free-air and Bouguer anomalies should be used By analogy, the magnetic data can also be reduced to geoid level or in free air These preliminary observations may have far reaching implications and further research may help minimize the ambiguities in the gravity and magnetic exploration from data collection to interpretation

Geological Survey of India
Bandlaguda,
Hyderabad - 500 068
Email:manikesava@rediffmail com
M KESAVAMANI
C RAMACHANDRAN
R M C PRASAD
M V R KRISHNA RAO