

AUSTRALIAN NATIONAL GRAVITY DATA

ACKNOWLEDGMENT

Geoscience Australia would like to acknowledge the enormously valuable contribution made by all state and territory Geological Surveys, private companies, educational institutions and other research organisations in helping to produce and maintain a National Gravity Database of over 1 400 000 stations. The data contributed by these organisations make up a large component of the Australian National Gravity Database. Their inclusion considerably enhances the value of the Australian National Gravity Database to the geoscientific community.

DATA FORMAT

The gravity data are supplied in either an ASCII file or INTREPID database format and consist of open file data from the Australian National Gravity Database of over 1,400,000 gravity station records.

All onshore gravity station records have the survey number, station number, latitude, longitude, ellipsoid ground elevation, geoid ground elevation, geoid-ellipsoid separation (N-Value), observed gravity, ellipsoid gravity meter height, geoid gravity meter height, Free Air Anomaly and Bouguer Anomaly fields filled. Some gravity stations have an "informal name", indicating bench mark number, isogal station, etc. Where terrain corrections have been calculated, they have been included in the gravity station record but **NOT APPLIED** to the Bouguer anomaly. If known the density used in the terrain correction is listed immediately following the terrain correction value and method. All onshore Bouguer anomalies are calculated using a density of 2.67 tonne/cubic metre.

All offshore gravity station records have the survey number, station number, latitude, longitude, water depth (located in the GNDELEV field), geoid-ellipsoid separation (N-Value), observed gravity, gravity meter height, Free Air Anomaly and Bouguer Anomaly fields filled. Some gravity stations have an "informal name" field filled in.

GRAVITY DATA FIELD DESCRIPTION

| Chosen Field | Delivered Field | Description | Units | Datum | Null Value |
|-----------------------------|-----------------|---|-----------------|-------|------------|
| Survey_Number | SURVEYID | Project number unique to each survey | | | N/A |
| Observation_Number | OBSNO | Oracle defined unique number | | | N/A |
| Station_Number | STATIONNO | Station number (includes surveyid) | | | N/A |
| Station_Name | STATIONNAME | Name of station | | | null |
| Station_Type | STATIONTYPE | Type of station eg absolute, base, control, ground, helicopter etc | | | N/A |
| Longitude | DLONG | Longitude | decimal degrees | GDA94 | N/A |
| Latitude | DLAT | Latitude (negative) for southern hemisphere | decimal degrees | GDA94 | N/A |
| Location_Units | LOCUNITS | Location units (degrees, decimal degrees) | | | N/A |
| Geodetic_Datum | GEODETIC_DATUM | Position datum | | GDA94 | N/A |
| Method_of_Location | LOCMETH | Method used to position the station eg digitised from map, GPS, etc | | | null |
| Accuracy_of_Location | LOCACC | Estimate of accuracy of the position | metres | | N/A |
| Units_of_Location_Accuracy | LOCCACCUOM | Units of the estimated accuracy of the position | metres | | N/A |
| Method_of_Location_Accuracy | LOCACCMETHOD | Method used to determine the accuracy of the position | 1 to 7 | | N/A |
| Geoid_Ground_Elevation | GNDELEV | Elevation of ground at the station referenced to the Geoid | metres | AHD | N/A |
| Units_of_Geoid_Gnd_Elev | GNDELEVUNITS | Units of the ground elevation | metres | AHD | N/A |
| Geoid_Gnd_Elev_Datum | GNDELEV DATUM | Ground elevation datum | | AHD | N/A |

| | | | | | |
|-------------------------------------|-------------------------|---|---------------------|--------|------|
| Method_of_Geoid_Gnd_Elev | GNDELEVMETHOD | Method used to define ground elevation eg barometer, map, GPS etc | | | null |
| Geoid_Gnd_Elev_Type | GNDELEVTYPE | Ground elevation description eg land, marine, underground etc | | | N/A |
| Accuracy_of_Geoid_Gnd_Elev | GNDELEVACC | Estimate of accuracy of the ground elevation. | metres | | N/A |
| Units_of_Geoid_Gnd_Elev_Acc | GNDELEVACCUOM | Units of the estimated accuracy of the ground elevation. | metres | | N/A |
| Method_of_Geoid_Gnd_Elev_Acc | GNDELEVACCMETHOD | Method used to determine the accuracy of the ground elevation | 1 to 7 | | N/A |
| Observed_Gravity | GRAV | Observed gravity value | μms^{-2} | AAGD07 | N/A |
| Units_of_Observed_Gravity | GRAVUNITS | Units of the observed gravity | μms^{-2} | AAGD07 | N/A |
| Observed_Gravity_Datum | GRAVDATUM | Observed gravity datum | | AAGD07 | N/A |
| Gravity_Meter_Make | GRAVMETHOD | Gravity meter used eg LaCoste Romberg, Scintrex etc | | | null |
| Accuracy_of_Observed_Gravity | GRAVACC | Estimate of accuracy of the observed gravity | μms^{-2} | | N/A |
| Units_of_Observed_Grav_Acc | GRAVACCUOM | Units of the estimated accuracy of the observed gravity | μms^{-2} | | N/A |
| Method_of_Observed_Grav_Acc | GRAVACCMETHOD | Method used to determine the accuracy of the observed gravity | 1 to 7 | | N/A |
| Gravity_Meter_Serial_Number | METERID | Gravity meter serial number | | | null |
| Geoid_Gravity_Meter_Height | METERHGT | Geoid height of the gravity meter at observation point | metres | AHD | N/A |
| Units_of_Geoid_Meter_Hgt | METERHGTUNITS | Units of the gravity meter height referenced to the Geoid | metres | | N/A |

| | | | | | |
|---------------------------------------|--------------------------|---|---------------------------|------|-----------------|
| Method_of_Geoid_Meter_Hgt | METERHGTMETHOD | Method used to obtain height of gravity meter | | | null |
| Error_of_Geoid_Meter_Hgt | METERHGTERR | Estimate of accuracy of meter height | metres | | N/A |
| Units_of_Geoid_Meter_Hgt_Error | METERHGTERRUOM | Units of the estimated accuracy of the gravity meter height | metres | | N/A |
| Method_of_Geoid_MeterHgt_Error | METERHGTERRMETHOD | Method used to obtain accuracy of the meter height error | 1 to 7 | | N/A |
| Terrain_Correction | TC | Terrain Correction | μms^{-2} | | 9999 |
| Units_of_Terrain_Correction | TCUNITS | Units of the Terrain Correction | μms^{-2} | | null |
| Method_of_Terrain_Correction | TCMETHOD | Method used to calculate Terrain Correction eg Hammer by hand, INTREPID software etc | | | null |
| Terr_Corr_Density_used | TCDENSITY | Density used in the Terrain Correction | tonne metre ⁻³ | | 9999 |
| Error_in_Terrain_Correction | TCERR | Terrain Correction accuracy estimate | μms^{-2} | | 9999 |
| Units_of_Terr_Corr_Error | TCERRUOM | Units of the estimated accuracy of the Terrain Correction | μms^{-2} | | null |
| Method_of_Terr_Corr_Error | TCERRMETHOD | Method used to calculate the accuracy of the TC error | 1 to 7 | | 9999 |
| Observation_Date | OBSDATE | Date observation was made | | DATE | 31-DEC-9999 |
| Processing_Date | CALCDATE | Date gravity data were processed | | DATE | 31-DEC-9999 |
| Estimate_of_Stn_Reliability | RELIAB | Estimate of the overall reliability of the reading (0 unreliable, 9 high reliability) | 0 to 9 | | 9999 |
| Comments | COMMENTS | Comments made when observing the station | | | comment is null |

| | | | | | |
|---------------------------------------|-----------------------------------|---|--------|------------|------|
| Ellipsoid_Ground_Height | ELLIPSOIDHGT | Elevation of ground at the station referenced to the Ellipsoid | metres | GRS80 | N/A |
| Units_of_Ellipsoid_Ground_Hgt | ELLIPSOIDHGTUNITS | Units of the ellipsoid height | metres | | N/A |
| Ellipsoid_Gnd_Hgt_Datum | ELLIPSOIDHGTDATUM | Ellipsoid height datum | | GRS80 | N/A |
| Method_of_Ellipsoid_Gnd_Hgt | ELLIPSOIDHGTMETHOD | Method used to define ellipsoid height eg GPS, post processing software, AHD + NVALUE etc | | | null |
| Accuracy_of_Ellipsoid_Gnd_Hgt | ELLIPSOIDHGTACC | Estimate of accuracy of the ellipsoid height | metres | | N/A |
| Units_of_Ellipsoid_Gnd_Hgt_Acc | ELLIPSOIDHGTACCUOM | Units of the estimated accuracy of the ellipsoid height. | metres | | N/A |
| Method_of_Ellipsoid_GndHgt_Acc | ELLIPSOIDHGTACCMETHOD | Method used to determine the accuracy of the ellipsoid height | 1 to 7 | | N/A |
| Ellipsoid_Hgt_of_Gravity_Meter | ELLIPSOIDMETERHGT | Ellipsoid height of the gravity meter at observation point | metres | GRS80 | N/A |
| Units_of_Ellipsoid_Meter_Hgt | ELLIPSOIDMETERHGTUNITS | Units of the gravity meter ellipsoid height | metres | | N/A |
| Method_of_Ellipsoid_Meter_Hgt | ELLIPSOIDMETERHGTMETHOD | Method used to obtain ellipsoid height of gravity meter | | GRS80 | N/A |
| Error_of_Ellipsoid_Meter_Hgt | ELLIPSOIDMETERHGTERR | Estimate of the accuracy of gravity meter ellipsoid height | metres | | null |
| Units_of_Ellips_Meter_Hgt_Err | ELLIPSOIDMETERHGTERRUOM | Units of the estimated accuracy of the gravity meter ellipsoid height | metres | | N/A |
| Method_of_Ellips_Meter_Hgt_Err | ELLIPSOIDMETERHGTERRMETHOD | Method used to obtain accuracy of the gravity meter ellipsoid height error | 1 to 7 | | N/A |
| Geoid_Ellipsoid_Separation | NVALUE | Geoid-ellipsoid | metres | AUSGEOID98 | N/A |

| | | | | | |
|--------------------------------------|------------------------|---|---------------------|------------|------|
| | | separation at the observation point. | | | |
| Units_of_G_E_Separation | NVALUEUNITS | Units of the geoid-ellipsoid separation. | metres | | N/A |
| Geoid_used_in_G_E_Separation | NVALUEGEOID | The geoid used to obtain N-Value. | | AUSGEOID98 | N/A |
| Ellips_used_in_G_E_Separation | NVALUEELLIPSOID | The ellipsoid used to obtain N-Value. | | GRS80 | null |
| Method_used_in_G_E_Separation | NVALUEMETH | Method used to define N-Value eg GPS, post survey software (WINTER) etc | | | null |
| Accuracy_of_G_E_Separation | NVALUEACC | Estimate of accuracy of the N-Value | metres | | N/A |
| Units_of_G_E_Separation_Acc | NVALUEACCUOM | Units of the estimated accuracy of the N-Value | metres | | N/A |
| Method_of_G_E_Separation_Acc | NVALUEACCMETHOD | Method used to obtain accuracy of the N-Value. | 1 to 7 | | N/A |
| Ellipsoid_Freeair_Anomaly | FREEAIR | Free Air Anomaly value (see below) using ellipsoidal height for calculations | μms^{-2} | AAGD07 | N/A |
| Spherical_Cap_Bouguer_Anomaly | BOUGUER | Bouguer Anomaly at 2.67 tonne metre ⁻³ (see below) using ellipsoidal height for calculations | μms^{-2} | AAGD07 | N/A |
| Geoidal_Freeair_Anomaly | GEOIDAL_FREEAIR | Free Air Anomaly value (see below) using geoidal elevation for calculations | μms^{-2} | AAGD07 | N/A |
| Infinite_Slab_Bouguer_Anomaly | GEOIDAL_BOUGUER | Bouguer Anomaly at 2.67 tonne metre ⁻³ (see below) using geoidal elevation for calculations | μms^{-2} | AAGD07 | N/A |

DATA QUALITY – LINEAGE

The Australian National Gravity Database contains over 1,400,000 point data values in the area extending from 8°S to 48°S and 108°E to 162°E. All data are provided in GDA94 coordinates. The database is regularly updated as Geoscience Australia acquires additional gravity data.

The parameters of the point located data are:

| | |
|------------------|------------------------------------|
| Station spacing: | various from 10 m to 11 km |
| Projection: | Geodetic in latitude and longitude |
| Null value: | “null”, “9999” or “31-DEC-9999” |

DATA QUALITY – POSITIONAL ACCURACY

Highly variable, depending on the age of the individual surveys that comprise this data set.

Prior to 1995 (approximately), data were collected using various techniques to determine position such as:

- manual scaling from base maps (100's m error);
- digitising from base maps derived from air photo station plots (100's m error); or
- optical surveying methods (metre accuracy).

Post 1995 most surveys were acquired using differential GPS with sub metre accuracy.

Vertical accuracy is highly variable too, depending on the age of the survey.

Prior to the use of differential GPS station heights were determined by:

- estimating heights from a topographic map (10's metre error);
- using barometric techniques (metre errors); or
- optical surveying techniques (sub metre accuracy).

Differential GPS gives centimetre accuracy.

DATA QUALITY – ATTRIBUTE ACCURACY

Highly variable depending on the age of the individual surveys that comprise this dataset.

Modern surveys use LaCoste Romberg or Scintrex gravity meters which have an accuracy of $0.01 \mu\text{ms}^{-2}$ (micrometres per second squared).

Earlier surveys used older style quartz spring meters with a lower accuracy (approximately $1.0 \mu\text{ms}^{-2}$).

DATA QUALITY – ERROR AND ACCURACY METHODS

The value given in the fields; LOCACCMETHOD, GNDELEVACCMETHOD, METERHGTERRMETHOD, GRAVACCMETHOD, TCERRMETHOD, ELLIPSOIDHGTACCMETHOD, ELLIPSOIDMETERHGTERRMETHOD and NVALUEACCMETHOD indicates the method used to determine the accuracy or error of the location value, ground elevation value, meter height value, observed gravity value, terrain correction value, ellipsoid height value, ellipsoid meter height value or N-Value.

METHOD NO DESCRIPTION

- 1.....Accuracy value taken as reported in Operations/Acquisition Report or reported metadata.
- 2.....Accuracy value taken as reported in Recomputation Report after reprocessing at a later date.
- 3.....Assigned accuracy value based on reported method/equipment used to measure the quantity.
- 4.....Assigned accuracy value based on assumed method/equipment used to measure the quantity.
- 5.....Assigned accuracy value based on survey era.
- 6.....Assigned accuracy value based on analysis of the external network adjustment errors.
- 7.....Accuracy value previously entered into Oracle pre Sept 2004.

DATA QUALITY – OVERALL DATA RELIABILITY

The value assigned to a gravity observation indicating the level of confidence in the station's overall fidelity. The higher the value the greater is its reliability.

RELIAB NO DESCRIPTION

| | |
|---|--|
| 0 | Unreliable data which should not be used pending remedial action. |
| 1 | Insufficient information to accurately classify but still regarded as reliable data. |
| 2 | Poorly controlled data which should be used cautiously. |
| 3 | Data with weak gravity, position and elevation control. |
| 4 | Data with moderate gravity, position and elevation control. |
| 5 | Documented gravity ties, levelled elevations and accurately scaled positions. |
| 6 | A point occupied once with well defined position and elevation. |
| 7 | Multiple occupations at a point with well defined position and elevation. |
| 8 | Multiple measurements at a point with accurate position and elevation. |
| 9 | Data measured numerous times with absolute, geodetic or first order precision. |

DATUMS

The gravity data as supplied are based on the Australian Absolute Gravity Datum 2007 (AAGD07). This new datum supercedes the previous ISOGAL84 datum. To convert observed gravity values from ISOGAL84 to AAGD07, the following formula can be used:

$$g_{(AAGD07)} = g_{(ISOGAL84)} - 0.78 \mu\text{ms}^{-2}$$

The gravity unit used is μms^{-2} (micrometres per second squared). The height data are given in metres above the ellipsoid. Station positions are given in the geodetic datum GDA94.

GRAVITY DATA PROCESSING

The processing of the gravity data used the following formulae:

- (i) normal (theoretical) gravity used the closed form of the 1980 international gravity formula (Moritz, 1980). This is

$$\gamma = \gamma_e((1 + k\sin^2\theta)/\sqrt{(1 - e^2\sin^2\theta)})$$

where:

γ = normal or theoretical gravity (G_n);

$\gamma_e = 9\,780\,326.7715$ micrometres/sec/sec = normal gravity at the equator;

$k = 0.001\,931\,851\,353$ = derived constant;

$e^2 = 0.006\,694\,380\,022\,90$ = first eccentricity;

θ = geodetic latitude in degrees.

This becomes:

$$G_n = \gamma = 9780326.7715((1 + 0.001931851353(\sin^2\theta))/(\text{SQRT}(1 - 0.0066943800229(\sin^2\theta)))) \text{ in } \mu\text{ms}^{-2}$$

- (ii) an atmospheric correction was applied to the normal (theoretical) gravity to correct for the gravity effect of the atmosphere. This correction is **SUBTRACTED** from the theoretical gravity value calculated from the equation above.

The atmospheric gravity effect is approximated using the following equation (Wenzel, 1985):

$$\text{atmos_corr} = \delta g_{\text{atm}} = 8.74 - 0.00099 * h + 0.0000000356 * h^2$$

Where h = ellipsoid height in metres and the units for atmospheric correction are in micrometres/sec/sec.

(iii) free air correction using the ellipsoid height and a second order approximation equation (Heiskanen and Mortiz, 1969):

$$\delta g_h = (-2\gamma_e/a)*[1 + f + m + (-3*f + ((5/2)*m))*\sin^2\phi]*h + (3\gamma_e/a^2)*h^2$$

where, for the GRS80 ellipsoid, these parameters have the following values or definitions:

γ = normal gravity for a point on the reference ellipsoid at latitude ϕ ;
 γ_h = normal gravity for a point at a height, h in metres above the ellipsoid;
 a = 6,378,137 metres = the semi major axis;
 b = 6,356,752.3141 metres = the semi minor axis;
 f = 0.003 3528 106 81 18 = the flattening;
 γ_e = 9.780 3267715 metres/sec/sec = normal gravity at the equator;
 GM = $3,986,005*10^8$ m³/sec/sec = is a geocentric gravitational constant;
 ω = $7,292,115*10^{-11}$ radians/sec = angular velocity;
 $m = \omega^2 a^2 b / GM$ = 0.003 449 786 003 08; and
 h = height of gravity meter above the ellipsoid in metres.

This equation can be expressed as:

$$\text{Free Air correction (FAC)} = -(3.08768 - 0.00440 \sin^2\phi)*h + 7.2125*10^{-7}*h^2 ;$$

The Free air Anomaly is given by;

$$\text{Free Air Anomaly (FAA)} = G_{\text{obs}} - (G_n - \delta g_{\text{atm}}) - \text{FAC} \quad \text{in } \mu\text{ms}^{-2}$$

Where

G_{obs} = observed gravity &
 δg_{atm} = atmospheric correction

(iv) Bouguer correction calculated using the closed form equation for the gravity effect of a spherical cap of radius 166.7 km (La Fehr 1991) based on a spherical Earth with a mean radius of 6,371.0087714 km, height relative to the ellipsoid, and a density of 2.67 t/m³ (for solid earth).

$$BC = 2\pi G\rho((1+\mu)*h - \lambda R)$$

where

π is pi;

G is the gravitational constant; = 6.67428×10^{-11} m³kg⁻¹s⁻² (Mohr and Taylor 2001);

ρ is density in t/m³ typically 2.67t/m³;

h is the ellipsoid height in metres of the station.;

$R = (R_o + h)$ the radius of the earth at the station and

R_o is the mean radius of the earth = 6,371.008 771 4 km GRS 80 value from Moritz;

μ & λ are dimensionless coefficients with following definitions:

$$\mu = ((1/3)*\eta^2 - \eta) \text{ where}$$

$$\eta = h/R$$

$$\lambda = (1/3)\{(d + f\delta + \delta^2)[(f - \delta)^2 + k]^{1/2} + p + m \ln(n/(f - \delta + [(f - \delta)^2 + k]^{1/2}))\}$$

where:

$$d = 3 \cos^2 \alpha - 2;$$

$f = \cos \alpha$; Please Note this “f” is NOT the same as the parameter “f” in Free Air Correction above.

$$k = \sin^2 \alpha;$$

$$p = -6 \cos^2 \alpha \sin(\alpha/2) + 4 \sin^3(\alpha/2);$$

$$\delta = R_o/R;$$

$m = -3 \sin^2 \alpha \cos \alpha = -3k*f$; Please Note this “m” is NOT the same as the parameter “m” in Free Air Correction above.

$$n = 2[\sin(\alpha/2) - \sin^2(\alpha/2)]; \text{ and}$$

$$\alpha = S/R_o, \text{ with } S = \text{Bullard B Surface radius} = 166.735 \text{ km.}$$

The Bouguer Anomaly is given by:

$$\text{Bouguer_Anomaly (BA)} = \text{FAA} - \text{BC} \quad \text{in } \mu\text{ms}^{-2}$$

(v) Free Air Correction and Free Air Anomaly formulae using ellipsoid heights for gravity measurement on the sea surface (offshore data) are the same as that for gravity measurements made onshore.

(vi) Bouguer Correction and Bouguer Anomaly for gravity measurements made on sea surface are as follows:

$$\text{BC} = 2\pi G(\rho_c - \rho_{sw})((1+\mu)*(-1)*D - \lambda R) + 2\pi G\rho_c((1+\mu)*N - \lambda R)$$

Where

ρ_c = crustal density, typically 2.67 t/m^3 ;

ρ_{sw} = sea water density, typically 1.027 t/m^3 ; and

D = Depth of sea water in metres, (negative downwards as used in Geoscience Australia’s National Gravity Database, (ANGDB));

N= N-Value, the geoid-spheroid separation value; and
the other terms and constants are as defined above.

The Bouguer Anomaly will be:

$$\text{Bouguer_Anomaly (BA)} = \text{FAA} + \text{BC} \quad \text{in } \mu\text{ms}^{-2}$$

Note: In the marine case the Bouguer correction is **ADDED** to account for the lack of mass between the sea floor and sea surface.

CONSTANTS USED IN THE NEW FORMULAE IN THE AUSTRALIAN NATIONAL GRAVITY DATABASE

| Name | Use | Value | Source |
|---|---|---|--|
| γ_e - normal gravity at equator | Theoretical Gravity Formula and Free Air Correction | 9,780,326.7715 micrometres sec ⁻² | Moritz, 1980; |
| | | | |
| k - derived constant | Theoretical Gravity Formula | 0.001 931 851 353 | Moritz, 1980; |
| | | | |
| e^2 – first eccentricity | Theoretical Gravity Formula | 0.006 694 380 022 90 | Moritz, 1980; |
| | | | |
| a – the semi major axis | Free Air Correction | 6,378,137 metres | Moritz, 1980; |
| | | | |
| b – the semi minor axis | Free Air Correction | 6,356,752.3141 metres | Moritz, 1980; |
| | | | |
| f – the flattening | Free Air Correction | 0.003 352 810 681 18 | Moritz, 1980; |
| | | | |
| GM – a geocentric gravitational constant | Free Air Correction | 3,986,005 x 10 ⁸ m ³ sec ⁻² | Moritz, 1980; |
| | | | |
| ω – angular velocity | Free Air Correction | 7,292,115 x 10 ⁻¹¹ radians/sec | Moritz, 1980; |
| | | | |
| m - constant | Free Air Correction | 0.003 449 786 003 08 | Moritz, 1980; |
| | | | |
| G – gravitational constant | Bouguer Correction | 6.67428 x 10 ⁻¹¹ m ³ kg ⁻¹ sec ⁻² | Mohr and Taylor, 2001 revised in March 2007; See web page reference for 2007 CODATA value. |
| | | | |
| R ₀ – the mean radius of the earth | Bouguer Correction | 6,371.0087714 km | Moritz, 1980; |
| | | | |
| S – Bullard B Surface Radius | Bouguer Correction | 166.735 km | LaFehr 1991 |

Free Air Anomalies and Bouguer Anomalies are also provided using geoid heights and an infinite slab Bouguer correction. They are designated as Geoidal Free Air Anomaly and Geoidal Bouguer Anomaly respectively.

These anomalies use the theoretical gravity calculated as above and geoid ground heights (AHD) rather than ellipsoid ground heights. Note that an Atmospheric Correction has been applied to the theoretical gravity.

The Free Air Correction formulae used in the calculation of the Geoidal Free Air Anomaly is as given above except h (ellipsoid height) is replaced by H (geoid height or elevation).

The Geoidal Bouguer correction is calculated using the infinite slab formula as follows:

$$\text{Geoidal Bouguer_Correction} = 0.4191 * H * \text{density}$$

where

H = ground elevation (geoid height) in metres
Density = crustal density, typically 2.67 t/m^3

The Geoidal Bouguer Anomaly is given by:

$$\text{Geoidal Bouguer_Anomaly} = \text{Geoidal FreeAir_Anomaly} - \text{Geoidal Bouguer_corr} \quad \text{in } \mu\text{ms}^{-2}$$

Users should be aware that Free Air and Bouguer Anomalies calculated using geoid heights and the infinite slab model will NOT be the same as those obtained prior to 5 February 2008. The data are now referenced to the new datum AAGD07, and the 1980 International Gravity Formula has been used with an Atmospheric Correction applied. Data downloaded prior to 5 February 2008 were in ISO GAL84 datum and used the 1967 International Gravity formula without an Atmospheric Correction.

REFERENCES

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- Moritz, H., 1980, Geodetic Reference System 1980: Journal of Geodesy, **54**, 395-405.
- Wenzel, H., 1985, Hochauflosende Kugelfunktionsmodelle fur des Gravitationspotential der Erde [1]: Wissenschaftliche arbeiten der Fachrichtung Vermessungswesen der Universitat Hannover, **137**.

GRAVITY DATA ERRORS

Most of the gross errors have been removed from the database. However, errors may still be present in the data. If any such errors are found, please FAX or e-mail the details to:

The Gravity Database Administrator:
Mr Phillip Wynne,
Continental Geophysics Project,
Geoscience Australia.

FAX: 02 6249 9917
E-mail: phill.wynne@ga.gov.au

These errors will be investigated and any corrections will be applied to the Australian National Gravity Database.

Phillip Wynne
Gravity Database Administrator
February 2008