

AGD66, WGS84 and PNG94 transformations

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Quickclose

Coordinate Transformations in PNG

- Converting old AGD66 coordinates to WGS84(G1150) (for use in GIS packages such as MapInfo and ESRI ArcGIS and GNSS Post-processing software)
- Converting WGS84(G1150) to PNG94
- Converting WGS72 to WGS84(G1150)
- WGS84(G1150) is GPS week 1150 (January 2002) realisation of WGS84. WGS84 is a dynamic datum with coordinates changing as a result of plate tectonics

Current Strategy

- DMA Parameters are widely used
AGD66 to WGS84
DX -133 m, DY -48 m, DZ 148 m
- These values were computed using continental Australian Data not PNG data.
- They are known to be incorrect by up to 10 metres in Papua New Guinea!
- The parameters are mistakenly used to “define” AGD66 in an area which already has 1st order AGD66 control
- We know that the AGD66 primary network in PNG was one of the most precise geodetic networks in the world at the time!

Issues with the current practice

- Data from terrestrial surveys using 1st order AGD66 control is misaligned with GIS transformed data by up to 10 metres
- Geologists, GIS experts and armchair geodesists assume surveyors are in error because their handheld GPS agrees with their suspicion!

(This agreement would be expected because the GIS parameters are the same as the GPS ones, neither of which are localised!)

Analysis strategy

- GPS observations on AGD66 control that are tied to PNG94 stations with known site velocities
- Examination of Geodetic Section archive of PSM cards and sketches. Many coordinates in these are mixed WGS72, AGD66 and PNG94.
- Compute WGS84(G1150) Cartesian coordinates of stations using tectonic site velocity (time series analysis)
- Compute AGD66 Cartesian coordinates of stations using tabulated data. Since the AGD66 ellipsoid is poorly defined, the PNG08 elevations are used as ANS ellipsoid heights.
- Compute Cartesian coordinate differences for common stations.

Preliminary Results AMG66 to PNGMG94 Translation

Province	Locality	Diff E	Diff N
NCDC	Port Moresby	119.06	162.23
East Sepik	Wewak	125.0	160.5
Gulf	Interoil	121.3	162.6
Gulf	Kikori	121.6	161.9
Gulf	Gobe	123.0	160.7
Madang	Yandera	121.4	161.4
Madang	Madang	122.6	159.8
Milne Bay	Alotau	118.3	163.2
Milne Bay	Losuia	113.3	182.4
Milne Bay	Misima	105.9	199.1
Milne Bay	Woodlark	109.6	191.0
Morobe	Wau	120.0	161.1
Morobe	Watarais	121.7	162.0
Morobe	Lae	121.0	160.5
Morobe	Lababia	120.8	161.3
New Ireland	Lihir	129.4	179.8
North Solomons	Bougainville	106.1	165.6
Oro	Popondetta	119.3	161.7
Oro	Tufi	113.3	157.4
Sandaun	Frieda	125.0	160.5
Sandaun	Vanimo	127.6	163.5
Sandaun	Aitape	126.8	161.8
SHP	Hides	122.0	161.6
SHP	Tari	122.1	160.8
SHP	Moran	123.6	160.6
SHP	Moro	121.6	160.1
SHP	Iagifu	123.1	160.7
SHP	Mendi	121.9	161.0
WHP	Mt Hagen	122.4	162.2
WNB	Kimbe	124.4	160.4
WNB	Hoskins	124.4	160.9
WP	Ningerum	131.0	161.5
WP	Tabubil	-131.6	-160.5

The shift between AGD66 control and PNG94 and observed stations

Precision is 0.1 m at listed locations
(20 mm in Port Moresby)

Preliminary Results AGD66 to WGS84

The shift between
AGD66 control and
WGS84 (G1150) at
observed stations

Precision is 0.2 m at
listed locations
(40 mm in Port
Moresby)

These values can be
implemented directly
In GIS / GPS software

Province	Locality	DX	DY	DZ
NCDC	Port Moresby	-130.10	-58.10	148.20
East Sepik	Wewak	-127.6	-62.0	156.0
Gulf	Interoil	-129.0	-58.4	151.5
Gulf	Kikori	-130.9	-56.0	151.8
Gulf	Gobe	-132.6	-55.7	151.2
Madang	Yandera	-128.5	-58.4	152.6
Madang	Madang	-118.1	-68.0	153.1
Milne Bay	Alotau	-130.5	-62.5	146.0
Milne Bay	Losuia	-127.1	-59.6	168.6
Milne Bay	Misima	-126.0	-54.7	182.3
Milne Bay	Woodlark	-124.3	-59.8	176.9
Morobe	Wau	-130.9	-57.9	149.9
Morobe	Watarais	-124.4	-63.2	153.4
Morobe	Lae	-123.2	-64.6	151.3
Morobe	Lababia	-128.6	-61.1	150.7
New Ireland	Lihir	-110.5	-87.7	175.9
North Solomons	Bougainville	-101.9	-68.8	158.7
Oro	Popondetta	-132.9	-58.3	148.2
Oro	Tufi	-126.7	-56.7	144.0
Sandaun	Frieda	-133.3	-55.0	154.1
Sandaun	Vanimo	-129.2	-60.3	160.1
Sandaun	Aitape	-129.5	-60.9	157.8
SHP	Hides	-134.2	-51.8	153.1
SHP	Tari	-134.3	-52.2	152.4
SHP	Moran	-134.5	-54.2	151.8
SHP	Moro	-132.7	-53.2	151.2
SHP	Iagifu	-133.5	-54.5	151.7
SHP	Mendi	-134.3	-53.1	152.1
WHP	Mt Hagen	-133.5	-54.7	152.6
WNB	Kimbe	-127.2	-70.0	150.6
WNB	Hoskins	-126.2	-71.1	151.5
WP	Ningerum	-136.5	-58.8	153.7
WP	Tabubil	-139.5	-57.2	152.9

WGS72 to PNG94

Shift is between 23.4 m and 25.7 m in Eastings
and between -0.9 and +1.0 m in Northings

Mean is 24.5 m in E and 0.4 m in N

WGS84(G1674) update

WGS84 is being redefined at epoch G1674 (8th February 2012) and this will result in changes of up to 80 cm in the WGS84(G1150) parameters due to 10 years of plate motion.

Continued work required

- Parameters are poorly estimated in the PNG Islands
- Require connections to more AGD66 control to improve precision of parameterisation
- Supply final parameters to EPSG and GIS providers so that transformations are improved in PNG

Thank You!