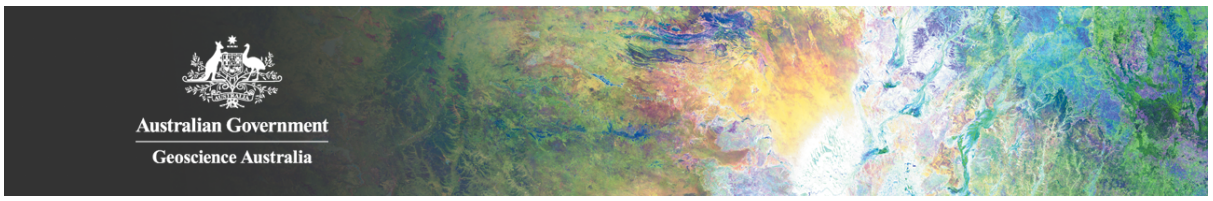

AUSPOS GPS Processing Report

October 19, 2025

This document is a report of the GPS data processing undertaken by the AUSPOS Online GPS Processing Service (version: AUSPOS 3.0). The AUSPOS Online GPS Processing Service uses International GNSS Service (IGS) products (final, rapid, ultra-rapid depending on availability) to compute precise coordinates in International Terrestrial Reference Frame (ITRF) anywhere on Earth and Geocentric Datum of Australia (GDA) within Australia. The Service is designed to process only dual frequency GPS phase data.

An overview of the GPS processing strategy is included in this report.

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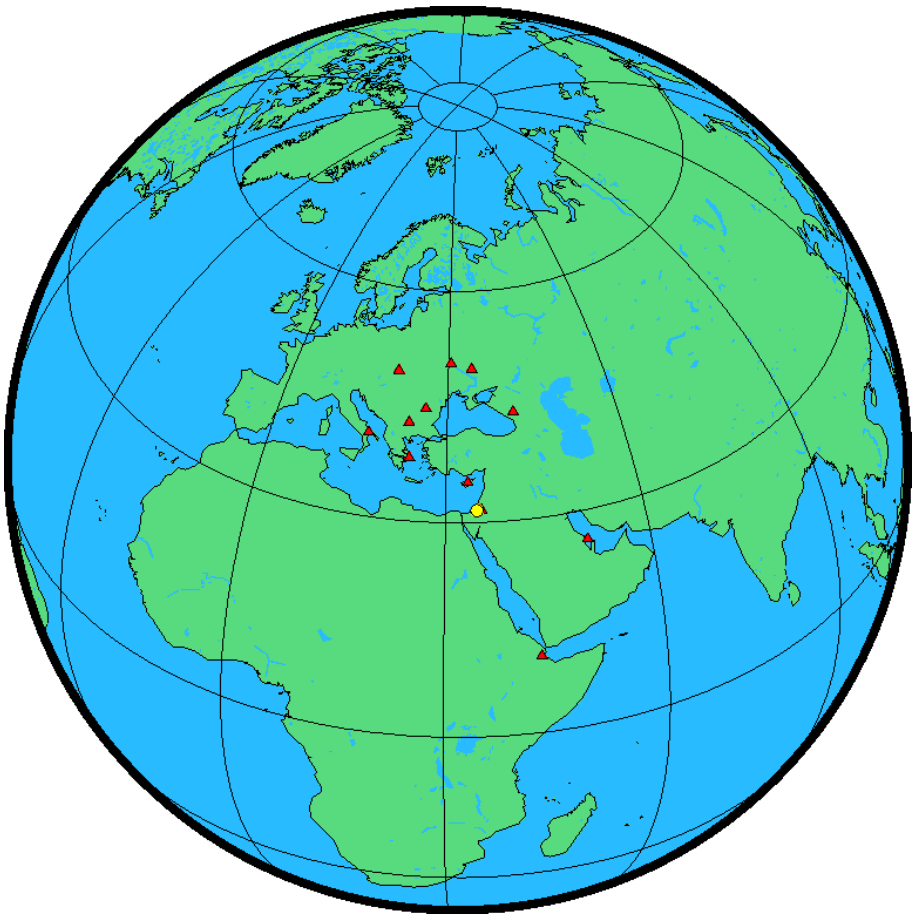
1 User Data

All antenna heights refer to the vertical distance from the Ground Mark to the Antenna Reference Point (ARP).

Station (s)	Submitted File	Antenna Type	Antenna Height (m)	Start Time	End Time
ISRA	____185C.23O	IGAIG8 NONE	2.000	2023/07/04 02:51:30	2023/07/04 09:25:30

2 Processing Summary



Date	User Stations	Reference Stations	Orbit Type
2023/07/04 02:51:30	ISRA	BHR3 BUCU DJIG DRAG DYNG GANP GLSV MATE NICO POLV SOFI ZECK	IGS final

3 Computed Coordinates, ITRF2020

All coordinates are based on the IGS realisation of the ITRF2020 reference frame. All the given ITRF2020 coordinates refer to a mean epoch of the site observation data. All coordinates refer to the Ground Mark.

3.1 Cartesian, ITRF2020

Station	X (m)	Y (m)	Z (m)	ITRF2020 @
ISRA	4472790.095	3095690.035	3319464.346	04/07/2023
BHR3	3633910.030	4425277.918	2799863.388	04/07/2023
BUCU	4093760.546	2007794.132	4445130.154	04/07/2023
DJIG	4583085.858	4250982.730	1266243.255	04/07/2023
DRAG	4432980.280	3149432.353	3322110.811	04/07/2023
DYNG	4595220.061	2039434.223	3912625.879	04/07/2023
GANP	3929181.227	1455237.023	4793654.079	04/07/2023
GLSV	3512888.591	2068980.148	4888903.358	04/07/2023
MATE	4641949.214	1393045.776	4133287.729	04/07/2023
NICO	4359415.382	2874117.270	3650778.059	04/07/2023
POLV	3411556.970	2348464.226	4834397.029	04/07/2023
SOFI	4319371.772	1868688.123	4292064.091	04/07/2023
ZECK	3451174.306	3060335.706	4391955.814	04/07/2023

3.2 Geodetic, GRS80 Ellipsoid, ITRF2020

Geoid-ellipsoidal separations, in this section, are computed using a spherical harmonic synthesis of the global EGM2008 geoid. More information on the EGM2008 geoid can be found at http://earth-info.nga.mil/GandG/wgs84/gravitymod/egm2008/.

Station	Latitude (DMS)	Longitude (DMS)	Ellipsoidal Height(m)	Derived Above Geoid Height(m)
ISRA	31 33 52.77746	34 41 15.83560	126.991	108.743
BHR3	26 12 32.92652	50 36 29.34481	-13.893	13.677
BUCU	44 27 50.20890	26 07 32.68585	143.231	107.683
DJIG	11 31 34.64168	42 50 49.44385	711.394	724.120
DRAG	31 35 35.53466	35 23 31.46953	31.867	13.613
DYNG	38 04 42.78692	23 55 56.76708	510.573	471.287
GANP	49 02 04.97677	20 19 22.58707	746.039	703.999
GLSV	50 21 51.06565	30 29 48.25738	226.320	200.778
MATE	40 38 56.88535	16 42 16.07233	535.650	490.146
NICO	35 08 27.56020	33 23 47.21927	190.016	161.949
POLV	49 36 09.41739	34 32 34.57021	178.359	159.778
SOFI	42 33 21.94767	23 23 41.05681	1119.524	1074.447
ZECK	43 47 18.22091	41 33 54.25933	1166.308	1143.408

3.3 UTM Grid, GRS80 Ellipsoid, ITRF2020

Station	East (m)	North (m)	Zone	Ellipsoidal Height (m)	Derived Above Geoid Height(m)
ISRA	660174.481	3493418.348	36	126.991	108.743
BHR3	460854.212	2898904.920	39	-13.893	13.677
BUCU	430455.909	4923776.164	35	143.231	107.683
DJIG	265181.298	1275054.366	38	711.394	724.120
DRAG	726966.089	3497829.869	36	31.867	13.613
DYNG	757212.239	4218592.059	34	510.573	471.287
GANP	450512.772	5431535.773	34	746.039	703.999
GLSV	321967.893	5582119.663	36	226.320	200.778
MATE	644108.799	4501205.448	33	535.650	490.146
NICO	536114.636	3888750.302	36	190.016	161.949
POLV	611484.344	5495592.565	36	178.359	159.778
SOFI	696595.356	4714301.440	34	1119.524	1074.447
ZECK	706384.885	4851568.740	37	1166.308	1143.408

3.4 Positional Uncertainty (95% C.L.) - Geodetic, ITRF2020

Station	Longitude(East) (m)	Latitude(North) (m)	Ellipsoidal Height(Up) (m)
ISRA	0.006	0.005	0.015
BHR3	0.009	0.005	0.018
BUCU	0.005	0.003	0.009
DJIG	0.007	0.005	0.012
DRAG	0.005	0.003	0.010
DYNG	0.005	0.003	0.009
GANP	0.006	0.005	0.014
GLSV	0.005	0.004	0.009
MATE	0.005	0.004	0.011
NICO	0.005	0.003	0.010
POLV	0.005	0.005	0.012
SOFI	0.005	0.004	0.010
ZECK	0.005	0.004	0.010

4 Ambiguity Resolution - Per Baseline

Baseline	Ambiguities Resolved	Baseline Length (km)
DRAG - ISRA	72.0 %	66.933
GLSV - POLV	91.7 %	302.242
BHR3 - DJIG	87.5 %	1811.989
DJIG - DRAG	0.0 %	2337.207
BUCU - GLSV	81.0 %	733.547
POLV - ZECK	80.9 %	839.098
DRAG - NICO	76.2 %	435.008
BUCU - DYNG	84.2 %	732.136
BUCU - SOFI	51.5 %	306.072
GANP - GLSV	100.0 %	747.698
BUCU - MATE	85.0 %	880.722
DYNG - NICO	79.0 %	906.015
AVERAGE	74.1%	841.556

Please note for a regional solution, such as used by AUSPOS, ambiguity resolution success rate of 50% or better for a baseline formed by a user site indicates a reliable solution.

5 Computation Standards

5.1 Computation System

Software	Bernese GNSS Software Version 5.2.
GNSS system(s)	GPS only.

5.2 Data Preprocessing and Measurement Modelling

Data preprocessing	Phase preprocessing is undertaken in a baseline by baseline mode using triple-difference. In most cases, cycle slips are fixed by the simultaneous analysis of different linear combinations of L1 and L2. If a cycle slip cannot be fixed reliably, bad data points are removed or new ambiguities are set up A data screening step on the basis of weighted postfit residuals is also performed, and outliers are removed.
Basic observable	Carrier phase with an elevation angle cutoff of 7° and a sampling rate of 3 minutes. However, data cleaning is performed a sampling rate of 30 seconds. Elevation dependent weighting is applied according to $1/\sin(e)^2$ where e is the satellite elevation.
Modelled observable	Double differences of the ionosphere-free linear combination.
Ground antenna phase centre calibrations	IGS20 absolute phase-centre variation model is applied.
Tropospheric Model	A priori model is the GMF mapped with the DRY-GMF.
Tropospheric Estimation	Zenith delay corrections are estimated relying on the WET-GMF mapping function in intervals of 2 hour. N-S and E-W horizontal delay parameters are solved for every 24 hours.
Tropospheric Mapping Function	GMF
Ionosphere	First-order effect eliminated by forming the ionosphere-free linear combination of L1 and L2. Second and third effect applied.
Tidal displacements	Solid earth tidal displacements are derived from the complete model from the IERS Conventions 2010, but ocean tide loading is not applied.
Atmospheric loading	Applied
Satellite centre of mass correction	IGS20 phase-centre variation model applied
Satellite phase centre calibration	IGS20 phase-centre variation model applied
Satellite trajectories	Best available IGS products.
Earth Orientation	Best available IGS products.

5.3 Estimation Process

Adjustment	Weighted least-squares algorithm.
Station coordinates	Coordinate constraints are applied at the Reference sites with standard deviation of 1mm and 2mm for horizontal and vertical components respectively.
Troposphere	Zenith delay parameters and pairs of horizontal delay gradient parameters are estimated for each station in intervals of 2 hours and 24 hours.
Ionospheric correction	An ionospheric map derived from the contributing reference stations is used to aid ambiguity resolution.
Ambiguity	Ambiguities are resolved in a baseline-by-baseline mode using the Code-Based strategy for 200-6000km baselines, the Phase-Based L5/L3 strategy for 20-200km baselines, the Quasi-Ionosphere-Free (QIF) strategy for 20-2000km baselines and the Direct L1/L2 strategy for 0-20km baselines.

5.4 Reference Frame and Coordinate Uncertainty

Terrestrial reference frame	IGS20 station coordinates and velocities mapped to the mean epoch of observation.
Australian datums	GDA2020 and GDA94.
Derived AHD	For stations within Australia, AUSGeoid2020 (V20180201) is used to compute AHD. AUSGeoid2020 is the Australia-wide gravimetric quasigeoid model that has been a posteriori fitted to the AHD. For reference, derived AHD is always determined from the GDA2020 coordinates. In the GDA94 section of the report, AHD values are assumed to be identical to those derived from GDA2020.
Above-geoid heights	Earth Gravitational Model EGM2008 released by the National Geospatial-Intelligence Agency (NGA) EGM Development Team is used to compute above-geoid heights. This gravitational model is complete to spherical harmonic degree and order 2159, and contains additional coefficients extending to degree 2190 and order 2159.
Coordinate uncertainty	Coordinate uncertainty is expressed in terms of the 95% confidence level for GDA94, GDA2020 and ITRF2020. Uncertainties are scaled using an empirically derived model which is a function of data span, quality and geographical location.