

**Country Name (+three letter code)**

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| **Prepared by:**  Government Agency/ies:  Website:  Contact: | **Information last updated:** March 2025  **Geodesy Factbook template version:** 1.0 |

**GEODETIC DATUM (Number 1)**

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| **REFERENCE FRAME** | **Name:** The Geocentric Datum of Australia 2020 (GDA2020)  **Realised by:** The coordinates of the Australian Fiducial Network (AFN) geodetic stations, referred to in Schedule 1 of National Measurement (Recognized-Value Standard of Measurement of Position) Determination 2017[[1]](#footnote-2) in the International Terrestrial Reference Frame 2014 (ITRF2014) at the Reference Epoch. |
| **REFERENCE EPOCH** | 1 January 2020 |
| **STATIC OR TIME DEPENDENT REFERENCE FRAME** | Static |
| **REFERENCE ELLIPSOID** | The Geodetic Reference System 1980 (GRS80) ellipsoid[[2]](#footnote-3) with a semi-major axis (a) of 6 378 137 metres exactly and an inverse flattening (1/f) of 298.257 222 101. |
| **EXPLANATORY DOCUMENTS** | * National Measurement (Recognized-Value Standard of Measurement of Position) Determination 20171 * GDA2020 Technical Manual[[3]](#footnote-4) * Australian Geospatial Reference System Compendium[[4]](#footnote-5) |
| **STANDARDS**  **(EPSG and ISO Geodetic Registry)** | EPSG Datum Code: 1168[[5]](#footnote-6)  Geodetic Register Identifier: 186[[6]](#footnote-7) |

**GEODETIC DATUM (Number 2)\* (if applicable)**

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| **REFERENCE FRAME** | **Name:** The Australian Terrestrial Reference Frame 2014 (ATRF2014)  **Realised by:** The coordinates of the Australian Fiducial Network (AFN) geodetic stations, referred to in Schedule 1 of National Measurement (Recognized-Value Standard of Measurement of Position) Determination 20171 in the International Terrestrial Reference Frame 2014 (ITRF2014) at the Reference Epoch.  Global Cartesian coordinates of the AFN can be expressed at an epoch *t* (years)  through the application of the following linear model using the coordinates  (*X, Y, Z*) and velocities (*VX, VY, VZ*) listed in Schedule 1:  This model is valid for 15 years either side of the Reference Epoch:  This is practically implemented using the Australian Plate Motion Model4. |
| **REFERENCE EPOCH** | 1 January 2020 |
| **STATIC OR TIME DEPENDENT REFERENCE FRAME** | Time Dependent Reference Frame |
| **REFERENCE ELLIPSOID** | The Geodetic Reference System 1980 (GRS80) ellipsoid2 with a semi-major axis (a) of 6 378 137 metres exactly and an inverse flattening (1/f) of 298.257 222 101. |
| **EXPLANATORY DOCUMENTS** | * National Measurement (Recognized-Value Standard of Measurement of Position) Determination 20171 * GDA2020 Technical Manual3 * Australian Geospatial Reference System Compendium4 |
| **STANDARDS**  **(EPSG and ISO Geodetic Registry)** | EPSG Datum Code: 1291[[7]](#footnote-8)  Geodetic Register Identifier: 7836 |

**PHYSICAL HEIGHT DATUM (LAND)**

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| **REFERENCE FRAME** | **Name:** The Australian Height Datum  Australian Height Datum (AHD) is the official national vertical datum for Australia and refers to Australian Height Datum 1971 (AHD71; Australian mainland) and Australian Height Datum (Tasmania) 1983 (AHD–TAS83).  Levelling-based datum based on:   * Mainland: Mean Sea Level (MSL) observed between 1966-68 at 30 tide gauges around the Australian coastline. * Tasmania: MSL observed in 1972 at Hobart and Burnie tide gauges. * Christmas Island: MSL (details unspecified). * Cocos and Keeling Islands: MSL (details unspecified). |
| **HEIGHT SYSTEM** | Normal-orthometric[[8]](#footnote-9) |
| **EXPLANATORY DOCUMENTS** | * GDA2020 Technical Manual3 * Australian Geospatial Reference System Compendium4 |
| **STANDARDS**  **(EPSG and ISO Geodetic Registry)** | EPSG Datum Code: 5111[[9]](#footnote-10)  Geodetic Register Identifier: 1206 |
| **TRANSFORMATION BETWEEN GEODETIC DATUM AND PHYSICAL HEIGHT DATUM** | AUSGeoid2020 model  Gravimetric Quasigeoid + Geometric Correction Surface |

**PHYSICAL HEIGHT DATUM (MARINE)**

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| **REFERENCE FRAME** | To be completed |
| **HEIGHT SYSTEM** | To be completed |
| **EXPLANATORY DOCUMENTS** | To be completed |
| **STANDARDS**  **(EPSG and ISO Geodetic Registry)** | To be completed |
| **TRANSFORMATION BETWEEN GEODETIC DATUM AND SEA SURFACE** | To be completed |

**GEODETIC INFRASTRUCTURE**

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| **GLOBAL NAVIGATION SATELLITE SYSTEMS CONTINUOUSLY OPERATING REFERENCE STATIONS (GNSS CORS)** | 200 GNSS CORS (https://gnss.ga.gov.au/portal)  22 GNSS CORS in IGS (https://network.igs.org)  17 GNSS CORS in ITRF2020 realisation (https://network.igs.org) |
| **SATELLITE LASER RANGING (SLR)** | Mt Stromlo, ACT (owned and operated by Geoscience Australia)  Yarragadee, WA (owned by NASA and operated by Geoscience Australia) |
| **VERY LONG BASELINE INTERFEROMETRY (VLBI)** | Hobart, Tas  Katherine, NT  Yarragadee, WA |
| **DORIS** | Mt Stromlo, ACT (hosted by Geoscience Australia via an agreement with CNES/IGN)  Yarragadee, WA (hosted by Geoscience Australia via an agreement with CNES/IGN) |
| **TIDE GAUGES** | 17 Baseline Sea Level Monitoring stations (owned and operated by Australian Bureau of Meteorology)[[10]](#footnote-11) |
| **GRAVITY** | 14 geodetic gravity measurement sites |
| **SURVEY BENCHMARKS** |  |
| **COLLOCATION SITES** | Yarragadee, WA – SLR, VLBI, GNSS, DORIS  Mt Stromlo, ACT – SLR, GNSS, DORIS  Hobart, TAS – VLBI, GNSS  Katherine, WA – VLBI, GNSS (DORIS coming soon) |

**GEODETIC CAPABILITIES**

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| **DATA COLLECTION AND DATA CENTRES** | Hosts the regional GNSS data centre for the Asia-Pacific region, including RINEX archive, site manager and NTRIP Broadcaster. |  |
| **ANALYSIS** | Daily Precise Point Positioning GNSS CORS monitoring  Legally traceable (Regulation 13) coordinates certification and monitoring  Daily, weekly and long-term APREF network CORS position estimation  Near-real-time troposphere zenith total delay estimation  AUSPOS as a service to provide access to the national datum  Ginan capabilities partly in development and refinement[[11]](#footnote-12), including:   * Precise orbit and clock determination of GNSS satellites * Real-time and post-processed PPP positioning * Real-time corrections for PPP users   Production of IGS-type rapid, ultra-rapid and real-time products |  |
| **GEODETIC PRODUCT DEVELOPMENT** | Government real-time streaming (link)  IGS ACC  IVS AC  IVS Correlation Centre (in development) | Government real-time streaming (link)  IGS ACC  IVS AC  IVS Correlation Centre (in development) |
| **SOFTWARE RESOURCES** | AUSPOS (Online GPS processing)  GeodePy (Python GitHub repository of geodesy software)  Ginan (GNSS processing software)  AUSCORS (GNSS database and access point for real-time GNSS streams)  DynAdjust (national adjustment software) | AUSPOS  GeodePy  ... |

**GOVERNANCE**

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| **LEAD GOVERNMENT INSTITUTION/S** | Geoscience Australia (www.ga.gov.au) |
| **COUNTRY LEVEL STEERING / WORKING GROUP** | Intergovernmental PNT-WG  Intergovernmental Committee on Surveying and Mapping Geodesy Working Group |
| **OTHER GOVERNMENT INSTITUTIONS** | Agreement with Australian Geospatial-Intelligence Organisation |
| **ACADEMIC** | Agreement with University of Tasmania on VLBI operations |
| **INDUSTRY PARTNERS** |  |
| **INTERNATIONAL ENGAGEMENT** | IAG   * Central Bureau APREF[[12]](#footnote-13) * Co-operator of the IGS ACC (https://igs.org/acc/) * Member of the GGOS Executive Committee * Member of the IGS Executive Committee and Governing Board * Member of the IVS Governing Board   Member of UN-GGIM   * Subcommittee on Geodesy * UN-GGIM-AP   Partner of UN-GGCE  Participant in the RTCM  Participant in the International Committee on GNSS  Participant in the International Telecommunications Union |

**CONTACT US**

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| United Nations Global Geodetic Centre of Excellence | email: [un-ggce@un.org](mailto:un-ggce@un.org) | web: <https://ggim.un.org/UNGGCE/> |

1. National Measurement (Recognized-Value Standard of Measurement of Position) Determination 2017 <https://www.legislation.gov.au/F2017L01352/latest/downloads> [↑](#footnote-ref-2)
2. International Union of Geodesy and Geophysics (IUGG) website <http://www.iugg.org> [↑](#footnote-ref-3)
3. GDA2020 Technical Manual <https://www.icsm.gov.au/gda2020-and-gda94-technical-manuals> [↑](#footnote-ref-4)
4. Australian Geospatial Reference System Compendium <https://www.icsm.gov.au/publications/australian-geospatial-reference-system-compendium> [↑](#footnote-ref-5)
5. [https://epsg.org/datum\_1168/Geocentric-Datum-of-Australia-2020.html](https://epsg.org/datum_1168/Geocentric-Datum-of-Australia-2020.html?sessionkey=sq8wi7we0g) [↑](#footnote-ref-6)
6. <https://geodetic.isotc211.org/> [↑](#footnote-ref-7)
7. [https://epsg.org/datum\_1291/Australian-Terrestrial-Reference-Frame-2014.html](https://epsg.org/datum_1291/Australian-Terrestrial-Reference-Frame-2014.html?sessionkey=sq8wi7we0g) [↑](#footnote-ref-8)
8. The difference between normal heights and normal-orthometric heights is due to the gravity correction applied to levelling data. Normal heights require a location specific gravity value, whereas, normal-orthometric heights are derived using a gravity value based on the normal gravity field. [↑](#footnote-ref-9)
9. https://epsg.org/datum\_5111/Australian-Height-Datum.html [↑](#footnote-ref-10)
10. <http://www.bom.gov.au/oceanography/projects/abslmp/abslmp.shtml> [↑](#footnote-ref-11)
11. [<https://www.ga.gov.au/scientific-topics/positioning-navigation/positioning-australia/about-the-program/analysis-centre-software>](https://www.ga.gov.au/scientific-topics/positioning-navigation/positioning-australia/about-the-program/analysis-centre-software) [↑](#footnote-ref-12)
12. <https://www.ga.gov.au/scientific-topics/positioning-navigation/positioning-australia/geodesy/asia-pacific-reference-frame> [↑](#footnote-ref-13)