



AUSLIG's Online GPS PROCESSING SERVICE

AUSPOS

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This free Commonwealth service will benefit surveyors, differential GPS service providers and those who want accurate coordinates for a location.

Using the Global Positioning System (GPS), Australia's national mapping agency, AUSLIG, is able to automatically compute accurate coordinates to international standard from GPS data files submitted over the Internet.

For surveyors, expected to be the major users, the service will represent significant cost reductions, enabling them to get highly accurate "relative" positions using just one GPS receiver. It is capable of delivering centimetre accuracy, depending upon the observation span and quality of data supplied.

As well as giving accurate results, using the service will be simple and quick.

For example, a surveyor will set up a GPS receiver, record six to 12 hours of GPS signal, download the data to their computer and submit a RINEX file to AUSLIG's website. The 24 hour service will provide results within minutes.

WHERE DO I FIND IT?

The AUSLIG Online GPS Processing Service (AUSPOS) is easily accessed through the Geodesy page of the AUSLIG web site: www.auslig.gov.au. A description of the system, a step-by-step user guide and Frequently-Asked-Questions are provided, as well as a sample of a typical GPS processing report.

WHO WILL BENEFIT?

The service will be highly beneficial for survey work in remote areas, for example surveys for mining leases. It will also provide a 24-hour automated positioning service for Defence requirements in the Asia-Pacific region and will benefit private sector differential GPS service-providers by providing the coordinates of their GPS 'base-stations' at no cost.

WHAT RESULTS CAN I EXPECT?

It is expected that a good quality GPS receiver with 24 hours of data should typically achieve results with accuracy better than 10mm in the horizontal components and 10 to 20mm in the vertical component.

Shorter observation spans will provide less accurate results. Two hours of data generally results in coordinate accuracy of about 20mm horizontally and 50mm in the vertical component, a remarkable achievement considering that the closest GPS reference station might be 1000km away.

HOW FAST WILL I GET RESULTS?

This depends on how much data is submitted. A single site with one day of data should be completed within 15 minutes. A multiple site solution might take up to and over one hour. The processing times will also depend upon system load.





A GPS receiver set up at Blundell Peak in the Antarctic to collect data for a scientific study.



This GPS site at Karratha, on the north west coast of Western Australia, is one of the 15 receivers in Australia and its territories that make up the Australian Regional GPS Network (ARGN).

The ARGN provides the precise geodetic control for Australia's geographic framework and is part of the International GPS Service (IGS), a worldwide network of permanently tracking GPS receivers.

AUSPOS uses nearby IGS stations to calculate absolute GPS positions for any location in the world, and is capable of centimetre accuracy.

WHAT DO I SUBMIT?

The user is asked to provide:

1. Data Transfer Options—upload via the Internet browser or anonymous ftp site.
2. Location of the GPS data file in the standard Receiver Independent Exchange (RINEX) format.
3. Antenna type and height of the Antenna Reference Point (ARP) with respect to the ground mark.
4. User's email address for the results and processing report.

WHAT ABOUT COORDINATES OUTSIDE AUSTRALIA?

Anyone, anywhere in the world, can use AUSPOS. It will provide accurate coordinates for any location in the world, determined within the International Terrestrial Reference Frame (ITRF), or the Geocentric Datum of Australia (GDA) for Australian users.

The service uses the globally distributed International GPS Service (IGS) network and its product range. It will therefore compute station positions, relative to the IGS network, from data collected anywhere on Earth.

WHAT ABOUT SIMILAR INTERNATIONAL SERVICES?

At least two other overseas organisations provide a similar free service but their processing is not consistent with Australia's national geodetic framework, the Geocentric Datum of Australia, to which all spatial information in Australia is referred.

HOW DOES THE SYSTEM WORK?

To achieve positions accurate to a few centimetres, surveyors employ relative positioning — seeking the three-dimensional coordinates of a point relative to an already established, or fixed, set of coordinates in a defined reference frame.

The concept behind the GPS service is for two or more GPS receivers to simultaneously track an identical set of "visible" satellites. This observed data is then used to compute the positions of the antenna locations relative to each other and to the fixed point.

The reference frame for Australia is the Australian Regional GPS Network (ARGN), which has continuous GPS data. This facility overcomes the need for surveyors to have at least two GPS receivers; to request ARGN data; to obtain from the International GPS Service the GPS satellites' precise ephemerides; to use a global dataset to undertake a precise orbit determination computation; or to establish a high level computational capability.

Instead, the online service provides all these elements, transparent to the user.

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WHAT STANDARDS ARE USED?

All computations are undertaken using MicroCosm, a high precision state-of-the-art software system used to determine orbits and estimate geodetic parameters. MicroCosm is a US registered trademark of Van Martin Systems, Inc.

The computation standards are a full implementation of the International Earth Rotation Service (IERS) conventions.

The latest available products from the IGS for precise satellite orbit, Earth orientation parameters and station coordinates are used.

The effects of observation error sources such as receiver clocks, troposphere and ionosphere are taken into account either through the modelling or estimation of related parameters. Once a user has submitted a RINEX file to be processed, a set of the nearest IGS stations is determined and their data retrieved from an IGS data centre.

The coordinates of the IGS stations are held fixed at the value of the cumulative IGS Set of Station Coordinates (SSC). Since all estimated coordinates are computed using the IGS cumulative SSC, they are effectively in the ITRF reference frame. For Australian users, GDA coordinates are also provided through a transformation from ITRF to GDA.

AUSLIG'S ROLE IN PROVIDING THE GEODETIC FRAMEWORK FOR THE SERVICE

AUSLIG is the Commonwealth focal point for coordination of geodetic information and works closely with State and Territory agencies, the Inter-governmental Committee on Surveying and Mapping (ICSM) and industry groups towards the provision of the highest quality geodetic infrastructure.

As part of its geodetic activities, AUSLIG maintains a network of 15 permanent geodetic GPS receivers positioned across Australia and its Antarctic territories; this network is known as the Australian Regional GPS Network (ARGN). These receivers provide the precise geodetic framework for Australia's spatial data infrastructure.

AUSLIG and other international groups routinely process data from these GPS receivers. The AUSLIG GPS data and results contribute to the International GPS Service and provide a means of better understanding Earth processes such as crustal dynamics and sea level rise. In addition to these scientific objectives, AUSLIG's geodetic activities contribute to other products such as precise GPS satellite orbits that are widely used by the private sector primarily for precise positioning applications.

Increasingly, both the private and public sectors have embraced differential GPS technology for many applications. This technology in turn relies on GPS 'base-station' coordinates in an accurate and nationally consistent framework. AUSLIG has traditionally supported these applications by processing GPS data against the ARGN framework and has provided precise positioning by employing state-of-the-art processing technology and expertise.



A surveyor at work. Precise positioning using geodetic GPS equipment of this type is routine in regional Australia for many surveying purposes.



ARGN receivers are located in Darwin, Alice Springs and Jabiru NT, Townsville QLD, Tidbinbilla and Mt Stromlo ACT, Ceduna SA, Hobart TAS, Karraha and Yarragadee WA, Cocos Island off the WA coast, Macquarie Island, and Mawson, Casey and Davis Bases in the Antarctic.

WHAT USERS SAY ABOUT THE SERVICE

The following responses and comments have been received from users.

"I have been a user of this website over the last few days — I am very impressed with the performance and quality of the GPS reports and the design of the software."

"We recently submitted some data to your GPS processing service. I would just like to compliment you on the quality of the service and the results."

It certainly provides us with a useful service when working in areas remote from existing control."

"We have consistently proven that AUSLIG's GPS Processing Service produces quick, accurate and relevant base fixes that are essential to the success of our GPS network."

"Congratulations — it looks like your system gives excellent results."

"The results are truly amazing... Whoever did the modeling to get us back to GDA94 at these sites, from such long baselines, got it right."

WHY DOES THE GOVERNMENT PROVIDE THIS SERVICE?

As demand for the existing AUSLIG processing service increased, the next logical step was to web-enable the AUSLIG processing technology and provide a simple web page application that allows users to submit their GPS data and receive rapid turn-around, accurate positioning in a nationally and internationally consistent framework.

AUSPOS is an extension to its fundamental geodetic services, provided as a service to the Australian business, surveying and scientific community.

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