Policy on the International Use of OPUS-GNSS

National Geodetic Survey

Approved by the NGS Executive Steering Committee
Revised: 19 June 2013
Original: 21 July 2008

NGS POLICY ON THE INTERNATIONAL USE OF OPUS-GNSS

1. This policy addresses the international use of all current and future Web services, operated by the National Geodetic Survey (NGS) to post-process GNSS (Global Navigation Satellite Systems) data to obtain precise or differential coordinates. Hereinafter these Web services will be collectively called "OPUS-GNSS" (for Online Positioning User Service for GNSS).
2. This policy only addresses the operation of OPUS-GNSS which uses both:
    a. GNSS data collected by a user; and

    b. GNSS data collected at stations contained in the NGS Continuously Operating Reference Stations (CORS) network and/or the International GNSS Service (IGS) network.

3. NGS hereby approves the open availability of OPUS-GNSS for use anywhere by anyone, unless a specific country has been blocked based on:
    a. A written request by an authorized official of the government of the country to be blocked via their foreign office or mission representative to the United States Government; or
    b. Explicit instructions from the President of the United States, or the Secretary of the Department of Commerce or the Administrator of the National Oceanic and Atmospheric Administration.
4. Coordinates calculated by OPUS-GNSS for data sets located outside the boundaries of the United States and its territories will be provided only in a current realization of the International Terrestrial Reference Frame (ITRF) and/or the International GNSS Service (IGS) reference frame.
5. NGS shall not be held liable for the consequences of any actions which rely on coordinates determined with OPUS-GNSS.

Background Information

The previous NGS policy regarding international access to OPUS-GNSS Web services was that no coordinates were calculated for data collected in any foreign country unless explicit permission had been granted by that country's government. This permission was usually requested in the form of a letter from a government representative to NGS stating that NGS may provide ITRF/IGS coordinates for GNSS data collected within its borders by any user. This policy can be viewed as an "opt-in" only policy, otherwise the country was excluded. In addition, the previous policy excluded all data collected in Antarctica and International waters. NGS' new policy would reverse this restricted geographic access and make OPUS-GNSS open to the entire world with only an "opt-out" policy.

Questions regarding the OPUS-GNSS Web services and associated changes the NGS policy on providing these services.

1) What is OPUS-GNSS and why is it important?

   a) OPUS-GNSS is a set of free web services, operated by NGS, which determine the coordinates of a GNSS data set collected and submitted by a user. The resulting coordinates are typically accurate to a few centimeters. These automated services involve the following basic steps:

      1) A user collects, with their own receiver and antenna, some GNSS data.

      2) The user submits their data to NGS along with her/his email address via a web interface.

      3) NGS software first assesses whether the submitted data are valid. If so, the software identifies a series of proximal reference stations contained in NGS' CORS network and/or the IGS network that have data for the same time period as the submitted data. If the data are invalid, the software sends an email to the user indicating that their data is invalid.

      4) The software next analyzes the submitted data in conjunction with the GNSS data from the selected proximal reference stations and high-precision orbits. For submitted data sets collected within the United States and its territories coordinates are calculated in ITRF/IGS, NAD83, and state plane coordinate

systems. For all other data sets only ITRF/IGS coordinates are calculated (see question 2).

   5) NGS returns coordinates for the submitted data to the user via her/his email address.

b) The relationship between the coordinates computed by NGS and any particular point of interest to the user is unknown to NGS and is not important for the analysis of the data.

c) Users are interested in obtaining results via OPUS-GNSS as it provides a uniform analysis with minimal user input and an accuracy of a few centimeters. For data collected within the United States and its territories, the coordinates provided are consistent with the National Spatial Reference System.

d) OPUS-GNSS started in 2001 and is one of NGS' most used applications - approximately 235,000 data sets were successfully processed in FY 2007.

2) Why provide coordinates in the International Terrestrial Reference Frame (ITRF) and not in country/region specific reference frames?

a) ITRF is an internationally defined reference frame that is maintained by the International Earth Rotation and Reference Systems Service (IERS) (www.iers.org). The ITRF, as well as the reference frames defined by the IGS, are supported by, and extensively used by, NGS and other national geodetic agencies and is GNSS constellation independent. Providing coordinates in local/country specific reference frames would add a significant burden on NGS as it would have to identify, maintain and provide the requisite tools for all countries/regions. If a user wants coordinates in a different reference frame, many national geodetic agencies provide tools/parameters to convert ITRF/IGS coordinates to local coordinates.

3) What is the impact of continuing with restricted international access under the current policy?

a) Only data collected on 16% of the Earth's surface will receive coordinates due to the current NGS policy which restricts international access.

b) NGS must maintain a database of select foreign borders, and obtain and verify records of permission from representatives of foreign governments.

c) Since the current policy restricts access based on geographic areas, U.S. citizens collecting data in many foreign countries, Antarctica, and in international waters are not able to obtain coordinates for data submitted to OPUS-GNSS. This may impact commercial contracts and research activities.

d) OPUS-GNSS under the current policy does not compare favorably with similar services provided by four other groups, both US and foreign, that provide unrestricted access (See Table 1).

Table 1. List of all known groups providing services similar to OPUS-GNSS

Agency Name	NASA, Jet Propulsion Laboratory	University of San Diego, Scripps Orbit and Permanents Array Center	Government of Canada, Natural Resources Canada	Government of Australia, Geosciences Australia
Service Name	Auto-Gipsy	Scripps Coordinate Update Tool (SCOUT).	CSRS-PPP – Canadian Spatial Reference System- Precise Point Positioning Service	AUSPOS – Online GPS Processing Service
URL	http://millhouse.jpl.nasa.gov/ag	http://sopac.ucsd.edu/cgi-bin/SCOUT.cgi	http://ess.nrcan.gc.ca/2002_2006/gnd/csrs_e.php	http://www.ga.gov.au/bin/gps.pl

Table 1. Cont.

Agency Name	NASA, Jet Propulsion Laboratory	University of San Diego, Scripps Orbit and Permanents Array Center	Government of Canada, Natural Resources Canada	Government of Australia, Geosciences Australia
Technique	Precise point positioning	Double differencing	Double differencing	Precise point positioning
Data Sources:	IGS orbits	IGS orbits Dual-frequency GPS observation files	IGS orbits Dual-frequency GPS observation files	IGS orbits
Data Type Accepted	Dual-frequency GPS RINEX files	Dual-frequency GPS RINEX files	Dual-frequency GPS RINEX files	Dual-frequency GPS RINEX files
Reference Frame of Coordinates	ITRF/IGS	ITRF/IGS	ITRF/IGS	ITRF/IGS
Geographic Restrictions	None	None	None	None
Login Restrictions	None	None	None	Login

4) What is the impact of broadening international access as proposed?

a) It removes the NGS burden of complying and updating information (listed in 3b) and the associated personnel time.

b) Since all current OPUS-GNSS products use GPS only and it is a very popular service (see 1d), expanding its coverage will provide greater visibility to the benefits of using GPS. The new expanded policy is consistent with the U.S. Space-Based Positioning, Navigation and Timing Policy (http://pnt.gov/policy).

c) Four other Governments/Agencies provide services similar to OPUS-GNSS and they all have no geographic restrictions (see 3d).

5) What is the practice of other governments/agencies with similar products?

a) No geographic or user restrictions are applied to submitted data sets.

b) Of the services listed in Table 1, only the Canadian CSRS-PPP service requires a login and password, which are issued individually and are valid for one year. They impose no restrictions on issuing the login and password.

c) Government/agencies providing coordinates do not undertake any liability or responsibility for the decisions made by the user of coordinates that are provided by the governments/agencies.

6) What are the major political/security concerns associated with this change?

a) No known security concerns exist. All services that are provided by OPUS-GNSS are already available via commercial, shareware or freeware software.

b) No transfer of equipment/software from NGS to the user occurs. The entire processing software resides solely on NGS servers.