NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

SUBJECT: WGS 84 G1674 Geodetic Control Network Upgrade for Areas of White Sands Missile Range and Holloman AFB, NM

1. WGS 84 G1674 Refinement

On 8 February 2012, GPS week 1674, NGA implemented the latest realization of the World Geodetic System 1984 (WGS 84), bringing WGS 84 into alignment with the International Terrestrial Reference Frame of 2008 (ITRF08). Also, on 26 February 2012, GPS week 1677, NGA replaced its Orbit Mensuration and Navigation Improvement System (OMNIS) with a new Kalman filter process in determining GPS precise ephemerides, referred to as Estimation of Precise Orbits and Clock to High Accuracy (EPOCHA). During 2nd Quarter, FY12, NGA's NM Range Support offices upgraded the WGS 84 geodetic survey control network. This upgrade takes advantage of the latest improvements to the WGS 84.

2. Data Acquisition

The NGA/SNSH office maintains a permanent GPS tracking station mounted on the rooftop of Building 1160 on Holloman AFB, referred to as GPS station 100246. Subject station is held fixed in each component (latitude ϕ, longitude λ, ellipsoid height h) in the New Mexico Range Support offices geodetic survey control network. Thirteen 24-hr recording sessions, spanning 26 February through 9 March 2012, were downloaded for absolute Precise Point Positioning (PPP).

3. Data Reduction and Analysis

a. Data was processed using NGA's PPP software GPS/RINEX ARL:UT PPP Estimator (GRAPE) v.4.3, developed by the Applied Research Laboratory University of Texas, Austin (ARL/UT). The previous station 100246 realization (G1150 reference epoch 2001.0) has 'moved' 0.165 meter west-southwest and 'raised' 0.006 meter relative to the center of the WGS 84 reference frame.

b. The following table lists transformation values from G1150 (previous) to G1674 (current) in Earth-centered Earth-fixed Cartesian coordinates (X,Y,Z) and geodetic coordinates (ϕ,λ,h). Estimated accuracies: 0.05 meter, each component, relative to WGS 84 G1674 Epoch 2012.2.

ΔX	ΔY	ΔZ	$\Delta\phi$	$\Delta\lambda$	Δh
Meter	**meter**	**meter**	**arc sec**	**arc sec**	**meter**
-0.1564	0.0022	-0.0528	-0.0022	0.0058	0.006

G1150 to G1674 Transformations

3. Effective Date of NGA/SNSH & NGA/SNSW Implementation

Both offices will effectively implement the new WGS 84 G1674 realization for all published geodetic survey results from 1 July 2012 forward. Users of NGA data requiring accuracy results less than the WGS 84 G1150 to G1674 difference (0.165 meter ≈ 0.5 feet) should avoid combining prior NGA G1150 published data with newly realized G1674 data. Note that relative accuracy results for already existing surveys still meet/exceed original program requirements when not combined with newer G1674 data. Customers desiring to use a combination of coordinates from both the WGS 84 G1150 and G1674 realizations should either contact the NGA New Mexico Range Support office handling their particular geodetic survey test program requirement for further assistance/technical support (recommended) OR utilize the provided transformation values (less recommended) from the above table.

4. Contact NGA

If you have any questions, please contact either of the following at the National Geospatial-Intelligence Agency, New Mexico Range Support Offices (NGA/SNSH & NGA/SNSW).

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