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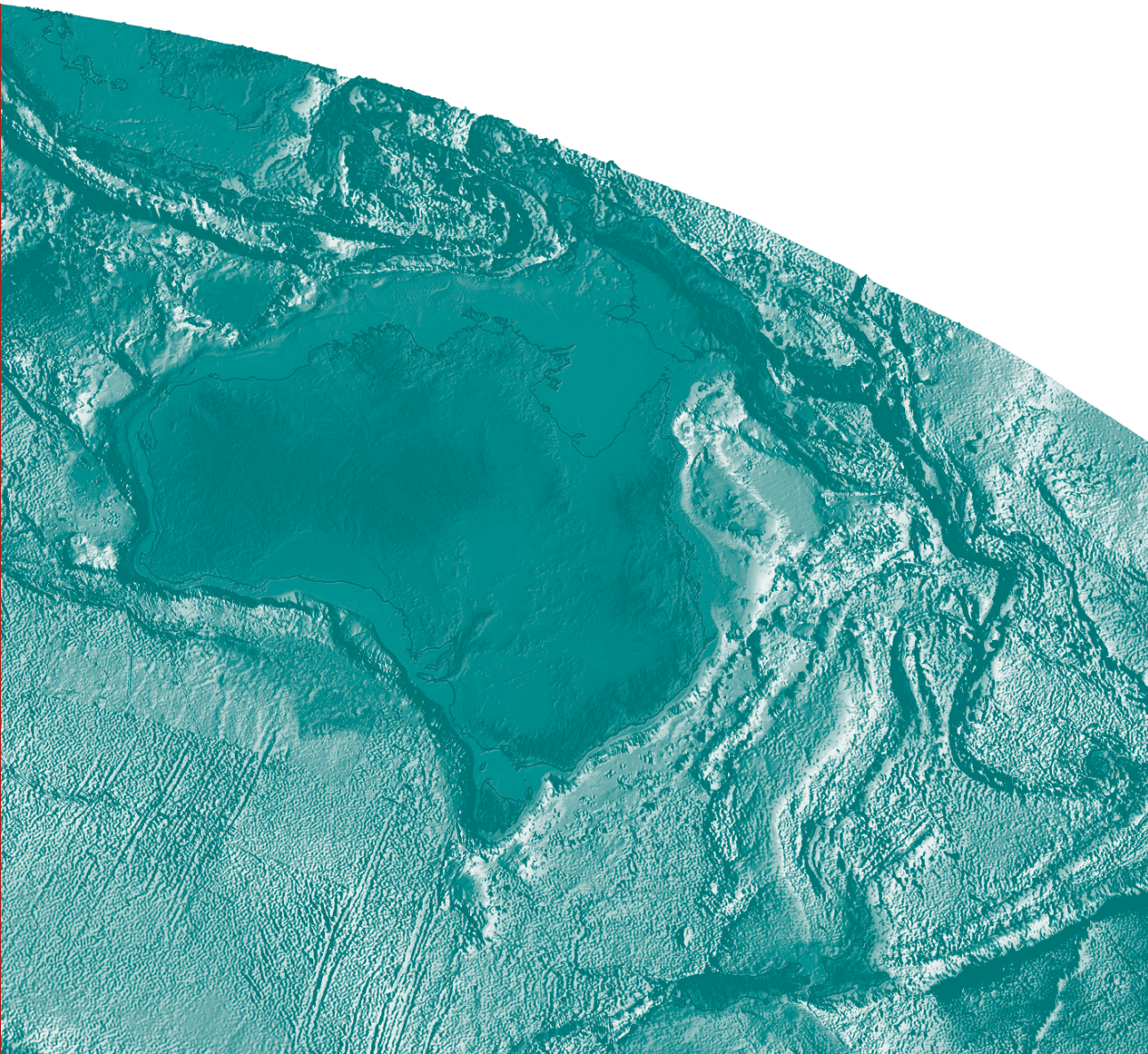
A Report on the Analysis of the Asia Pacific Regional Geodetic Project (APRGP) GPS Campaign in 2009

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Record

2010/30

**GeoCat #
70731**



A Report on the Analysis of the Asia Pacific Regional Geodetic Project (APRGP) GPS Campaign in 2009

GEOSCIENCE AUSTRALIA
RECORD 2010/30

by

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ISSN 1448-2177

ISBN 978-1-921781-29-2

GeoCat # 70731

Bibliographic reference: Hu, G., 2010. A Report on the Analysis of the Asia Pacific Regional Geodetic Project (APRGP) GPS Campaign in 2009, Record 2010/30. 12pp.

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Executive Summary

A REPORT ON THE ANALYSIS OF THE ASIA PACIFIC REGIONAL GEODETIC PROJECT (APRGP) GPS CAMPAIGN IN 2009

The annual APRGP GPS campaign is an important activity of the Geodesy Technologies and Applications Working Group (WG) of the Permanent Committee on GIS Infrastructure for Asia and the Pacific Region (PCGIAP). This document overviews the data analysis of Asia Pacific Regional Geodetic Project (APRGP) GPS campaign undertaken in 2009. The GPS data was processed using version 5.0 of the Bernese GPS Software in a regional network together with selected IGS sites. The GPS solution was constrained to the ITRF2005 reference frame through adopting IGS05 coordinates on selected IGS reference sites and using the final IGS earth orientation parameters and satellite ephemerides products.

Introduction

The annual APRGP GPS campaign is an important activity of the Geodesy Technologies and Applications Working Group (WG) of the Permanent Committee on GIS Infrastructure for Asia and the Pacific Region (PCGIAP). The role of the WG is to coordinate regional cooperation in geodesy amongst national agencies, and to build and improve the regional geodetic infrastructure. The APRGP is where PCGIAP member agencies contribute campaign or continuous Global Navigation Satellite System (GNSS) data to the WG. GNSS data from the APRGP are available for all participant member countries for local and global scientific research and local applications. The composite GNSS data-set is subsequently analysed by the WG so as to provide estimates of station coordinates in the International Terrestrial Reference Frame (ITRF). The results of the APRGP are also supplied by the WG to the official ITRF product center to densify the ITRF in the Asia-Pacific region. This document overviews the data analysis of APRGP GPS campaign undertaken in 2009.

The document is organized as follows. The data set of the campaign is described first. The data processing scheme is detailed after, followed by the results of processing including the repeatability RMS (root mean square) of the station coordinates, and the final computed station coordinates.

GPS Data Set

The 2009 GNSS campaign was undertaken from 04th to 10th October 2009 inclusive (days of year 277 to 283). The data were contributed from eleven countries and regions, i.e., Cambodia, Fiji, Hongkong, Japan, Macau, Malaysia, New Zealand, Philippine, Singapore, Vietnam and Australia. Figure 1 shows the distribution of the APRGP 2009 campaign stations.

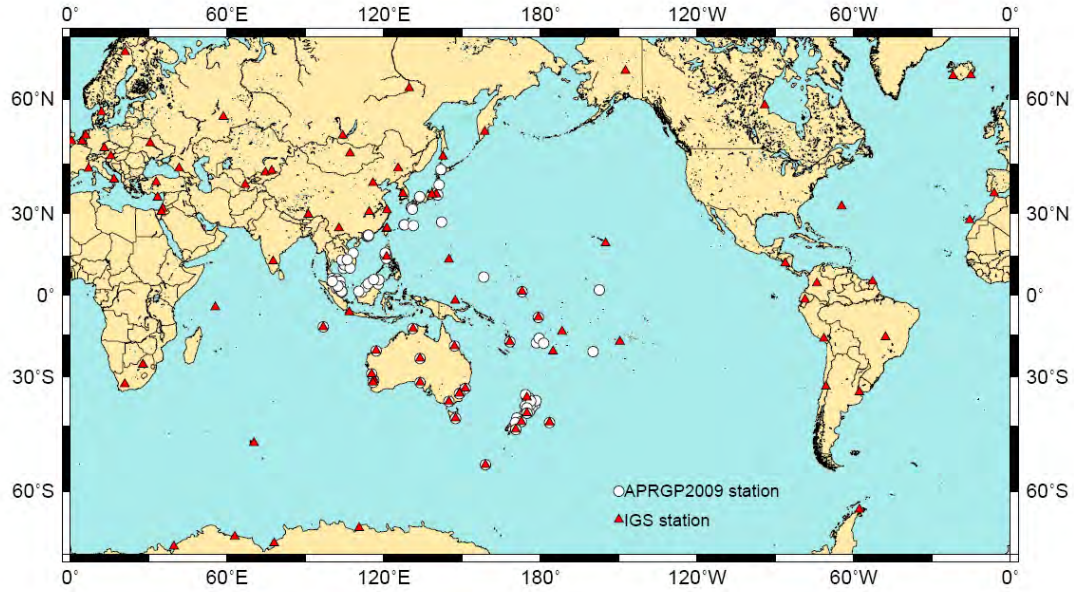


Figure 1: APRGP and IGS stations used in the 2009 campaign analysis.

Data Processing Scheme

Analysis of the GPS observations was undertaken with the processing engine of Bernese GPS software V5.0 (Dach et al., 2007). The Bernese GPS software conforms to the IERS2003 conventions (McCarthy and Petit, 2004). In order to tie the APRGP network to the ITRF2005 reference frame (Altamimi et al., 2007), we processed the available data from IGS sites located around the Asia Pacific region in addition to campaign sites as shown in Figure 1.

The overview of the processing strategy is as follows:

- 1) IGS final precise GPS satellite ephemeris and the Earth rotation parameters were used for the daily data processing to generate daily normal equations.
- 2) Site displacement due to ocean tidal loading for all stations were corrected by using the GOT00.2 model (Scherneck, 1991).
- 3) Antenna phase centre variations were taken into consideration using consistent, absolute IGS models of both receiver and satellite antenna phase centres (Schmid et al., 2007).
- 4) Dual frequency carrier phase and code data were used with an elevation cut off angle of 10° and elevation-dependent weighting ($w = \cos^2 z$, where z is the zenith angle). Code measurements were only used for receiver clock synchronisation. Pre-processing used the full sampling rate of 30 seconds, a sampling rate of three minutes was used for other processing.

- 5) Carrier phase pre-processing was conducted on a baseline by baseline mode using triple differences. The observations with small pieces and the observations suspected to be corrupted by a cycle slip were marked. Subsequent processing did not use the marked observations. Using different linear combination of L1 and L2 cycle slips were fixed if possible. New ambiguity parameters were introduced if cycle slips could not be fixed reliably, or if significant gaps in the observations were present. In addition, a data screening step in a baseline by baseline mode was performed on the basis of weighted post-fit residuals and outliers were marked and removed for the further processing.
- 6) An a priori dry tropospheric delay computed from a standard atmosphere was mapped with the Dry Niell mapping function (Niell, 1996). For the wet component, continuous piecewise linear troposphere parameters were estimated in 1-hour intervals without any a priori model using the wet Niell mapping function and the ionosphere-free combination observations.
- 7) After the pre-processing, ionosphere maps were estimated using the geometry-free linear combination. The vertical electron content was modelled with a single-layer model in a solar geomagnetic reference frame. The height of the single layer was 450 km above the Earth's surface. The previously estimated ionosphere maps were introduced as a priori ionosphere information and, in addition, stochastic ionosphere parameters were set up to support the Quasi Ionospheric Free (QIF) ambiguity resolution strategy (Dach et al., 2007).
- 8) Ambiguity resolution was attempted on all baselines within the network using the QIF strategy with ionospheric and tropospheric delay supporting. The QIF strategy is based on the ionospheric free linear combination, but also incorporates the estimation of an ionospheric parameter for each epoch to account for the residual ionospheric biases, details can be found in Dach et al. (2007).
- 9) The daily normal equations were generated and combined into a campaign solution. As part of this process the daily solutions were compared with the combined solution and the resulting differences were analysed for the presence of outliers and the daily repeatability.

Results

THE REPEATABILITY RMS (ROOT MEAN SQUARE) OF THE STATION COORDINATES

The repeatability RMS (root mean square) of the station coordinates, an estimate of the day-to-day scatters of coordinates components about a weighted epoch mean, was used to assess the quality of the final epoch solution and as a measure of internal precision. Table 1 lists the repeatabilities RMS of the station coordinates. The average of the repeatabilities RMS of the station coordinates for the campaign are 1.6, 1.8 and 5.5 mm in north, east and up components, respectively.

Table 1. The repeatability RMS for the campaign stations.

Station	North (mm)	East (mm)	Up (mm)	Station	North (mm)	East (mm)	Up (mm)
0029 21702S011	1.4	2.1	6.1	HKFN	0.8	0.8	4.1
0100 21742S001	2.5	1.7	6.4	HKKT	1.0	1.1	3.0
0745	1.5	1.7	5.9	HKLT	0.9	1.4	3.6
0746	1.1	0.7	7.3	HKSC	1.3	1.2	4.7
0837 21742S001	1.7	1.3	5.7	HKSL	1.9	1.0	5.4
1135	0.9	1.4	4.1	HKST	1.1	1.6	5.2
2003 21732S003	1.5	2.2	6.9	HOB2 50116M004	0.7	1.1	4.0
2004	1.2	1.6	11.7	HOFN 10204M002	1.4	2.6	2.5
2005	1.4	2.3	4.4	HOKI 50211M001	0.9	0.9	3.6
3009	1.8	1.4	3.6	HRAO 30302M004	3.6	1.4	7.1
ALIC 50137M001	1.4	1.6	4.3	IISC 22306M002	1.1	1.5	7.5
AMAN	1.4	2.5	6.2	IRKT 12313M001	0.9	1.0	3.7
ANKR 20805M002	0.6	1.3	3.5	JHJY	0.4	0.9	4.9
ARAU	1.8	2.0	6.8	KARR 50139M001	1.7	0.8	2.7
AREQ 42202M005	2.4	2.0	2.9	KERG 91201M002	4.9	2.6	5.9
ARTU 12362M001	1.5	1.4	3.8	KIRI 50305M001	1.3	0.4	5.2
AUCK 50209M001	2.0	0.5	5.0	KIRU 10403M002	1.4	1.8	3.4
BAKO 23101M002	2.6	1.3	13.1	KIT3 12334M001	1.3	1.2	4.7
BASE	1.4	2.1	6.5	KOSG 13504M003	1.7	2.5	2.5
BEHR	1.3	1.2	4.9	KOUR 97301M210	1.5	2.6	7.6
BIN1	2.8	3.0	8.9	KRTM	2.1	3.7	8.8
BJFS 21601M001	0.8	1.0	3.2	KUAL	0.7	1.5	6.7
BOGT 41901M001	2.4	2.3	7.1	KUNM 21609M001	1.3	1.7	4.4
BRAZ 41606M001	1.8	2.6	6.0	LAB1	1.0	2.1	2.4
BRMU 42501S004	1.3	2.6	4.8	LHAZ 21613M002	0.7	1.3	4.3
BRUS 13101M004	0.9	2.1	2.3	LPGS 41510M001	2.4	1.9	8.1
CAS1 66011M001	1.4	1.8	5.5	MAC1 50135M001	0.6	1.8	3.2
CEDU 50138M001	0.9	1.4	2.2	MANA 41201S001	1.9	1.9	6.3
CHAN 21611M002	0.6	1.1	3.6	MAS1 31303M002	1.6	1.9	3.7
CHAT 50207M001	1.3	0.8	4.0	MAST 50220M001	1.7	1.0	4.9
CHUR 40128M002	1.4	2.1	3.0	MATE 12734M008	0.8	1.8	4.1
COAL	1.7	1.2	4.7	MAW1 66004M001	1.5	0.7	2.2
COCO 50127M001	1.3	1.4	4.3	MCM4 66001M003	1.8	2.3	7.5
COOK	0.9	2.0	7.4	MIRI	1.2	0.9	3.3
CORM 50226M001	1.8	1.1	4.4	MOBS 50182M001	0.8	1.0	2.9
DAEJ 23902M002	0.4	1.3	4.2	MQZG 50214M001	1.5	0.5	4.4
DARW 50134M001	1.1	1.3	3.9	MTAW	1.5	2.3	6.6
DAV1 66010M001	0.9	1.9	4.7	MTJO 50204M001	1.9	0.9	5.6
DNVK 50224M001	1.7	0.8	3.8	NICO 14302M001	1.4	2.1	5.1
DRAG 20710S001	1.2	2.5	8.4	NNOR 50181M001	1.0	1.2	3.2
DSMG	1.5	1.0	6.2	NPLY	1.4	1.4	3.1
FAIR 40408M001	2.1	1.8	5.0	NT04	0.8	1.9	6.5
FOMO	0.7	1.7	5.4	OHI2 66008M005	3.7	2.4	11.7
GETI	1.7	1.6	11.5	ONSA 10402M004	1.0	2.1	2.3
GISB 50223M001	1.5	1.1	6.1	OUS2 50212M002	2.6	2.6	2.3
GLSV 12356M001	0.8	1.2	3.2	OUSD 50212M001	1.7	0.8	1.3
GMUS	0.9	1.3	6.5	PCAB	1.1	1.0	6.0
GRAS 10002M006	0.9	1.8	2.6	PDIC	0.9	0.9	5.1
GRAZ 11001M002	0.9	1.8	2.6	PEKN	1.1	1.1	7.3
GRIK	1.4	1.3	5.8	PENH	1.3	1.3	5.0
GUAM 50501M002	2.2	1.9	7.4	PERT 50133M001	1.2	1.7	5.1
HAMT 50222M001	1.8	0.4	4.6	PETP 12355M002	1.5	1.9	11.4
HARB 30302M009	3.7	1.4	6.8	PFLO	1.9	2.3	4.3
HAST 50221M001	1.4	0.6	4.8	PIMO 22003M001	2.5	1.3	6.4
HERS 13212M007	1.4	3.6	4.9	PNGM 51006M001	0.7	1.0	1.1
HIKB 50225M001	1.8	1.0	3.5	POHN	0.5	1.1	13.3
HILO 49979S001	2.3	2.8	7.5	POL2 12348M001	1.2	1.1	1.4

Table 1. continued.

Station	North (mm)	East (mm)	Up (mm)	Station	North (mm)	East (mm)	Up (mm)
PTAG	1.2	2.0	8.4	THU2 43001M002	1.1	1.6	4.1
PTGY	1.3	2.1	6.7	TIDB 50103M108	0.6	1.1	3.5
PURD	2.2	2.3	10.1	TIXI 12360M001	1.0	1.2	2.5
QT03	1.2	1.4	5.2	TLOH	1.2	0.9	3.5
QT04	2.3	4.0	6.3	TNML 23604S001	1.3	1.7	4.0
RAMO 20703S001	1.4	1.6	5.5	TONG 50902M001	3.0	2.4	7.8
REYK 10202M001	1.5	1.5	2.9	TOW2 50140M001	1.4	2.2	4.0
RIOP 42006M001	2.0	2.4	3.1	TRNG 50219M001	1.5	0.6	3.0
SAMO 50603M001	1.1	2.4	5.4	TSKB 21730S005	1.0	1.0	3.5
SAND	1.1	1.7	8.5	TUVA 51101M001	2.5	0.8	9.3
SANT 41705M003	2.1	2.8	4.4	TWTF 23603S002	1.1	1.4	6.2
SEG1	1.3	1.1	6.7	ULAB 24201M001	1.1	0.7	2.8
SELE 12352M001	0.9	1.3	4.5	ULUI	1.3	3.2	4.2
SEY1 39801M001	3.6	3.7	12.0	UMAS	1.0	1.5	6.5
SFER 13402M004	1.5	2.0	4.0	UMSS	1.4	1.7	7.0
SHAO 21605M002	0.9	0.8	1.9	UNAV	1.2	1.6	6.1
SIEM	2.1	1.5	4.4	USMP	1.9	2.2	3.2
SKEP	1.5	2.1	4.5	USUD 21729S007	1.8	1.8	4.1
SLOY	2.0	2.0	4.3	VANU 51402M001	1.9	2.8	5.4
SNTU	2.0	2.3	4.0	WANG 50228M001	1.4	0.6	4.0
SNYP	1.6	2.4	3.1	WGTM 50208M003	1.5	1.6	3.0
SSEK	2.5	1.9	4.4	WGTT 50208S004	2.3	0.7	4.3
STR1 50119M002	0.7	1.7	4.0	WHNG 50218M001	1.3	0.8	3.1
STUE	1.0	1.6	8.9	WTZR 14201M010	1.4	1.6	2.9
SUTH 30314M002	3.9	3.0	7.2	WUHN 21602M001	1.2	0.8	5.1
SYDN 50124M003	1.1	1.1	4.5	YAKT 12353M002	1.3	1.5	2.5
SYOG 66006S002	2.5	2.8	7.7	YAR2 50107M004	1.2	0.8	5.2
T430	0.7	1.8	7.9	YSSK 12329M003	2.0	1.6	9.7
TAUP 50217M001	1.5	0.6	4.1	ZECK 12351M001	1.0	1.3	2.0
THTI 92201M009	1.5	4.3	7.1				

FINAL COMPUTED STATION COORDINATES

The final computed Cartesian and geodetic coordinates (ITRF2005, GRS80 ellipsoid) are listed in Tables 2 and 3, respectively, along with their formal error estimates, which can be the first indication of the quality of the measurements and characterizes the internal precision of positioning performance. Note that the listed coordinates are at the mean epoch of the measurements in the ITRF2005 reference frame.

Table 2. The final computed Cartesian coordinates in ITRF2005 at the mean epoch of the measurements, i.e. @2009.7671.

SITE 4-char. ID	X (m)	1 σ (m)	Y (m)	1 σ (m)	Z (m)	1 σ (m)
0029	-3862395.4575	0.0004	3105010.6879	0.0004	4001962.4124	0.0004
0100	-3509124.7426	0.0004	4529006.9366	0.0005	2793529.2728	0.0003
0745	-3512919.8566	0.0004	4524558.1454	0.0004	2795882.1162	0.0003
0746	-3786805.1759	0.0004	4311846.0411	0.0004	2774485.3996	0.0003
0837	-3530185.6139	0.0005	4118797.2990	0.0005	3344036.8848	0.0005
1135	-3591930.8811	0.0005	3758797.1105	0.0004	3682342.8526	0.0004
2003	-4488925.6194	0.0004	3483903.2157	0.0003	2887743.3425	0.0003
2004	-3565271.6549	0.0004	4118973.1409	0.0005	3306293.1963	0.0004
2005	-3642161.2985	0.0004	2861487.8535	0.0003	4370351.3112	0.0004
3009	-3997615.5023	0.0004	3276762.7415	0.0003	3724230.5263	0.0003
ALIC	-4052052.3487	0.0006	4212836.0540	0.0006	-2545105.1525	0.0004
AMAN	-2332691.7776	0.0003	5934768.4062	0.0006	135097.4618	0.0002
ANKR	4121948.4991	0.0004	2652187.8915	0.0003	4069023.8030	0.0004
ARAU	-1131051.7951	0.0003	6236311.7718	0.0008	711748.0071	0.0002
AREQ	1942826.2146	0.0003	-5804070.3505	0.0006	-1796894.2363	0.0003
ARTU	1843956.6084	0.0002	3016203.1631	0.0003	5291261.7599	0.0005
AUCK	-5105681.2994	0.0005	461564.0211	0.0002	-3782181.3396	0.0004
BAKO	-1836969.2428	0.0003	6065617.0360	0.0009	-716257.8603	0.0002
BASE	-6061844.7515	0.0009	163678.5301	0.0003	-1970543.2336	0.0004
BEHR	-1270756.5871	0.0002	6236377.9567	0.0006	416063.9014	0.0002
BIN1	-2497850.0464	0.0003	5857731.7323	0.0006	358111.9565	0.0002
BJFS	-2148744.2352	0.0003	4426641.2538	0.0004	4044655.8966	0.0004
BOGT	1744398.9678	0.0004	-6116037.3064	0.0009	512731.7791	0.0003
BRAZ	4115014.0833	0.0005	-4550641.5975	0.0006	-1741443.9022	0.0003
BRMU	2304703.4116	0.0003	-4874817.2009	0.0005	3395186.9852	0.0004
BRUS	4027893.6933	0.0004	307045.9047	0.0002	4919475.1793	0.0005
CAS1	-901776.1446	0.0002	2409383.3024	0.0003	-5816748.4779	0.0006
CEDU	-3753472.7786	0.0004	3912741.0199	0.0004	-3347960.2254	0.0003
CHAN	-2674427.3537	0.0003	3757143.1802	0.0003	4391521.6266	0.0004
CHAT	-4590671.2325	0.0006	-275482.4912	0.0002	-4404596.4708	0.0005
CHUR	-236438.9506	0.0002	-3307616.8766	0.0003	5430049.2691	0.0005
COAL	-2363061.0517	0.0003	5418784.9788	0.0006	2386862.0341	0.0003
COCO	-741950.6245	0.0002	6190961.6758	0.0005	-1337767.9360	0.0002
COOK	-5583616.9151	0.0009	-2053000.2073	0.0004	-2292142.4339	0.0004
CORM	-5095050.8678	0.0005	378667.2072	0.0002	-3805557.8564	0.0004
DAEJ	-3120042.0997	0.0004	4084614.8278	0.0005	3764026.8664	0.0004
DARW	-4091359.2606	0.0005	4684606.5809	0.0005	-1408579.7316	0.0002
DAV1	486854.5666	0.0002	2285099.2369	0.0003	-5914955.7025	0.0006
DNVK	-4860760.8779	0.0004	325692.7361	0.0002	-4103646.3205	0.0004
DRAG	4432980.5694	0.0005	3149432.1636	0.0004	3322110.5565	0.0004
DSMG	-2363102.1291	0.0003	5416972.3809	0.0006	2390768.0558	0.0003
FAIR	-2281621.7500	0.0003	-1453595.9208	0.0002	5756961.7841	0.0006
FOMO	-2359952.2578	0.0004	5416530.1947	0.0006	2394688.5043	0.0003
GETI	-1329733.2102	0.0014	6199766.6033	0.0058	687129.4820	0.0012
GISB	-4985376.2433	0.0006	184022.2371	0.0002	-3960830.0208	0.0005
GLSV	3512888.8727	0.0005	2068979.9571	0.0003	4888903.2496	0.0005
GMUS	-1317445.0934	0.0002	6217407.6990	0.0007	537098.0305	0.0002
GRAS	4581690.8471	0.0004	556114.9251	0.0002	4389360.8572	0.0004
GRAZ	4194423.7484	0.0004	1162702.7822	0.0002	4647245.4725	0.0005
GRIK	-1225760.6232	0.0002	6230325.9901	0.0006	600544.1001	0.0002
GUAM	-5071312.7232	0.0007	3568363.5908	0.0005	1488904.3562	0.0003
HAMT	-5027290.0037	0.0005	430177.7617	0.0002	-3888561.8308	0.0004
HARB	5084657.6296	0.0005	2670325.2059	0.0003	-2768481.0764	0.0003

Table 2. Continued.

SITE 4-char. ID	X (m)	1 σ (m)	Y (m)	1 σ (m)	Z (m)	1 σ (m)
HAST	-4912020.6123	0.0005	280940.5282	0.0002	-4045418.3039	0.0004
HERS	4033470.0583	0.0005	23672.9657	0.0002	4924301.3683	0.0006
HIKB	-5060143.4413	0.0006	149885.1494	0.0002	-3867001.9865	0.0005
HILO	-5446001.8826	0.0005	-2533416.9366	0.0003	2138468.4931	0.0003
HKFN	-2411013.2258	0.0003	5380268.1521	0.0006	2425128.9713	0.0003
HKKT	-2405144.2296	0.0003	5385195.1299	0.0005	2420032.4160	0.0003
HKLT	-2399063.0702	0.0003	5389237.7315	0.0006	2417326.9324	0.0003
HKSC	-2414267.2467	0.0003	5386768.8682	0.0006	2407459.9057	0.0003
HKSL	-2393382.7494	0.0003	5393861.0608	0.0006	2412592.2798	0.0003
HKST	-2417143.2088	0.0003	5382345.3703	0.0006	2415036.8196	0.0003
HOB2	-3950071.8624	0.0005	2522415.2900	0.0003	-4311637.8387	0.0004
HOFN	2679689.9652	0.0003	-727951.1528	0.0002	5722789.3967	0.0005
HOKI	-4635697.3011	0.0004	735523.2837	0.0002	-4304158.3218	0.0004
HRAO	5085352.4566	0.0006	2668395.9302	0.0004	-2768731.4690	0.0004
IISC	1337936.2601	0.0002	6070317.1170	0.0007	1427876.9531	0.0002
IRKT	-968332.5181	0.0002	3794425.4109	0.0006	5018167.7218	0.0007
JHJY	-1520490.0887	0.0002	6191944.4753	0.0006	169912.7184	0.0002
KARR	-2713832.8282	0.0003	5303935.1137	0.0005	-2269514.3225	0.0003
KERG	1406337.2551	0.0002	3918161.1215	0.0004	-4816167.3895	0.0005
KIRI	-6327822.4566	0.0025	785604.4923	0.0006	149769.2290	0.0005
KIRU	2251420.7195	0.0003	862817.2727	0.0002	5885476.7721	0.0006
KIT3	1944945.0033	0.0003	4556652.2775	0.0006	4004326.0236	0.0006
KOSG	3899225.0674	0.0004	396732.0165	0.0002	5015078.4807	0.0005
KOUR	3839591.3783	0.0004	-5059567.5850	0.0005	579957.1065	0.0002
KRTM	-5886688.6581	0.0009	-2444651.4590	0.0004	226251.0829	0.0003
KUAL	-1443668.3426	0.0003	6184650.1364	0.0007	587309.8797	0.0002
KUNM	-1281255.8700	0.0003	5640746.0929	0.0008	2682879.8941	0.0004
LAB1	-2708735.3862	0.0004	5744698.5364	0.0006	583318.8054	0.0002
LHAZ	-106941.6641	0.0002	5549269.8517	0.0005	3139215.0719	0.0003
LPGS	2780103.0204	0.0005	-4437418.9656	0.0007	-3629404.4815	0.0006
MAC1	-3464038.7068	0.0003	1334173.0157	0.0002	-5169224.0963	0.0005
MANA	407981.8681	0.0005	-6222925.7086	0.0017	1333528.9991	0.0005
MAS1	5439192.2063	0.0006	-1522055.3972	0.0003	2953454.9313	0.0004
MAST	-4801933.8683	0.0005	370789.1623	0.0002	-4167752.3301	0.0004
MATE	4641949.4758	0.0005	1393045.5132	0.0003	4133287.5383	0.0005
MAW1	1111287.1882	0.0003	2168911.2278	0.0005	-5874493.5974	0.0012
MCM4	-1311703.1272	0.0003	310814.9507	0.0002	-6213255.1307	0.0011
MIRI	-2586925.3080	0.0003	5809853.3928	0.0006	482986.9389	0.0002
MOBS	-4130636.3633	0.0004	2894953.1053	0.0003	-3890530.7153	0.0004
MQZG	-4580569.7064	0.0006	590465.8062	0.0002	-4384379.9089	0.0005
MTAW	-2974552.6836	0.0005	5622306.0517	0.0009	470932.4962	0.0003
MTJO	-4533815.8517	0.0006	761552.8857	0.0002	-4407673.5410	0.0005
NICO	4359415.6385	0.0004	2874117.1267	0.0003	3650777.8938	0.0003
NNOR	-2414151.9026	0.0004	4907778.5574	0.0007	-3270644.7321	0.0004
NPLY	-4924806.7713	0.0005	507350.5125	0.0002	-4008310.2191	0.0004
NT04	-1575936.4371	0.0004	6075089.1590	0.0011	1132070.0661	0.0003
OHI2	1525811.9605	0.0002	-2432478.2349	0.0003	-5676165.5864	0.0006
ONSA	3370658.4833	0.0003	711877.2080	0.0002	5349787.0117	0.0005
OUS2	-4387890.9118	0.0005	733420.5948	0.0002	-4555176.2499	0.0004
OUSD	-4387888.7503	0.0005	733421.3546	0.0002	-4555178.2800	0.0005
PCAB	-3161422.9712	0.0003	5274253.0390	0.0005	1688186.5307	0.0002
PDIC	-1304197.7968	0.0002	6237114.3648	0.0005	279242.7490	0.0002
PEKN	-1474284.6378	0.0002	6193341.6060	0.0006	385958.6351	0.0002

Table 2. Continued.

SITE 4-char. ID	X (m)	1 σ (m)	Y (m)	1 σ (m)	Z (m)	1 σ (m)
PENH	-1608754.8562	0.0003	6038688.0454	0.0007	1271254.4249	0.0003
PERT	-2368687.5767	0.0004	4881316.6158	0.0006	-3341795.5106	0.0004
PETP	-3576239.7888	0.0016	1401003.5321	0.0006	5075177.4559	0.0017
PFLO	-3127779.0405	0.0004	5310051.1899	0.0006	1638298.7988	0.0003
PIMO	-3186293.7886	0.0005	5286624.2932	0.0008	1601158.3145	0.0003
PNGM	-5367942.9924	0.0014	3437431.5606	0.0010	-225885.8446	0.0004
POHN	-5879158.5687	0.0011	2350292.1318	0.0006	767748.3439	0.0003
POL2	1239971.2390	0.0002	4530790.1182	0.0004	4302578.8348	0.0004
PTAG	-3184317.9197	0.0004	5291063.9264	0.0006	1590417.7548	0.0003
PTGY	-3181285.1397	0.0003	5307488.1968	0.0004	1543919.0955	0.0002
PURD	-3119484.2017	0.0003	5279887.0631	0.0005	1747196.4879	0.0002
QT03	-1916791.3042	0.0004	5822974.8735	0.0008	1754668.6761	0.0004
QT04	-1843712.1114	0.0003	5998027.5379	0.0008	1138672.6454	0.0002
RAMO	4514721.7638	0.0005	3133507.9120	0.0004	3228024.7950	0.0004
REYK	2587384.2048	0.0003	-1043033.5386	0.0002	5716564.0808	0.0006
RIOP	1255144.9666	0.0003	-6253609.4506	0.0006	-182569.8053	0.0002
SAMO	-6129702.3521	0.0014	-890029.1076	0.0005	-1516807.1671	0.0005
SAND	-2990750.6773	0.0004	5596337.9618	0.0006	644936.5252	0.0002
SANT	1769693.6356	0.0003	-5044574.1913	0.0005	-3468320.8862	0.0004
SEG1	-1404378.1096	0.0002	6215518.7233	0.0007	274837.3758	0.0002
SELE	1046790.4768	0.0002	4540257.1018	0.0006	4342920.7993	0.0005
SEY1	3602870.4884	0.0006	5238174.5302	0.0008	-516275.3621	0.0002
SFER	5105518.9776	0.0005	-555145.7935	0.0002	3769803.4484	0.0004
SHAO	-2831733.6524	0.0003	4675665.8980	0.0004	3275369.3650	0.0003
SIEM	-1481813.6800	0.0002	6025851.5614	0.0006	1469486.5192	0.0002
SKEP	-1521817.4448	0.0003	6192367.1348	0.0007	140106.7292	0.0002
SLOY	-1539523.1211	0.0003	6187726.0699	0.0007	151765.3459	0.0002
SNTU	-1508021.3699	0.0003	6195577.0879	0.0007	148800.7533	0.0002
SNYP	-1526242.9233	0.0003	6191001.9841	0.0007	152484.1223	0.0002
SSEK	-1522480.0444	0.0003	6191654.8897	0.0007	162569.3742	0.0002
STR1	-4467102.8356	0.0004	2683039.4818	0.0003	-3666949.2309	0.0004
STUE	-1706562.5062	0.0002	5962886.4182	0.0006	1482541.0767	0.0002
SUTH	5041274.8658	0.0005	1916054.2412	0.0003	-3397075.8731	0.0004
SYDN	-4648240.5104	0.0005	2560636.4722	0.0004	-3526318.2683	0.0005
SYOG	1766207.8932	0.0003	1460290.3322	0.0003	-5932297.6772	0.0008
T430	-2411015.5649	0.0003	5380265.5934	0.0006	2425132.5737	0.0003
TAUP	-4969936.6227	0.0006	340472.5161	0.0002	-3970347.0335	0.0004
THTI	-5246415.7394	0.0006	-3077259.7767	0.0004	-1913842.0628	0.0003
THU2	538093.4387	0.0002	-1389088.0712	0.0002	6180979.2772	0.0008
TIDB	-4460996.6000	0.0005	2682557.0891	0.0003	-3674443.1153	0.0004
TIXI	-1264873.2904	0.0002	1569455.7774	0.0002	6031003.4245	0.0007
TLOH	-1369260.4382	0.0002	6217732.1635	0.0006	381198.0822	0.0002
TNML	-2982779.2574	0.0005	4966662.5782	0.0009	2658805.6728	0.0005
TONG	-5930303.6530	0.0010	-500147.8297	0.0003	-2286366.2270	0.0005
TOW2	-5054583.1054	0.0005	3275504.2785	0.0004	-2091539.0337	0.0003
TRNG	-5040272.3990	0.0006	329395.9144	0.0002	-3881773.0906	0.0005
TSKB	-3957199.2643	0.0004	3310199.7348	0.0004	3737711.6314	0.0004
TUVA	-6307543.7889	0.0010	88454.6934	0.0003	-939277.9302	0.0003
TWTF	-2994428.3023	0.0005	4951309.2076	0.0008	2674496.8065	0.0005
ULAB	-1257408.6809	0.0002	4099404.3442	0.0004	4707992.6017	0.0005
ULUI	-6119101.3539	0.0007	62728.1959	0.0002	-1792699.5726	0.0003
UMAS	-2225109.0957	0.0003	5975252.6523	0.0006	162341.1468	0.0002
UMSS	-2791752.1318	0.0004	5695647.5916	0.0007	666580.6488	0.0002
UNAV	-6060202.5742	0.0009	-129071.5146	0.0003	-1978127.2363	0.0004

Table 2. Continued.

SITE 4-char. ID	X (m)	1 σ (m)	Y (m)	1 σ (m)	Z (m)	1 σ (m)
USMP	-1135919.5140	0.0003	6248058.5125	0.0007	591589.4799	0.0002
USUD	-3855263.0416	0.0005	3427432.5544	0.0004	3741020.2656	0.0004
VANU	-5950766.5979	0.0011	1230703.9644	0.0004	-1931445.0146	0.0005
WANG	-4888073.4461	0.0005	443004.7740	0.0002	-4060015.3860	0.0004
WGTT	-4777269.5847	0.0006	434270.3294	0.0002	-4189484.3086	0.0005
WGTT	-4779508.1528	0.0006	436517.5649	0.0002	-4186740.9326	0.0005
WHNG	-5153430.6591	0.0006	513057.5154	0.0002	-3710655.8549	0.0005
WTZR	4075580.4866	0.0004	931853.8795	0.0002	4801568.1920	0.0004
WUHN	-2267749.5810	0.0004	5009154.2621	0.0006	3221290.6559	0.0004
YAKT	-1914999.0488	0.0002	2308241.4891	0.0003	5610225.5476	0.0005
YAR2	-2389026.1419	0.0003	5043316.9866	0.0005	-3078530.0884	0.0003
YSSK	-3465321.0364	0.0003	2638269.3345	0.0003	4644085.3746	0.0004
ZECK	3451174.6080	0.0003	3060335.5082	0.0003	4391955.6982	0.0004

Table 3. The final computed geodetic coordinates in ITRF2005 at the mean epoch of the measurements, i.e. @2009.7671.

SITE	LONGITUDE (DMS)			1 σ (m)	LATITUDE (DMS)			1 σ (m)	ELLIPSOID HEIGHT (m)	1 σ (m)
0029	141	12	14.10987	0.0002	39	6	38.24799	0.0002	172.1835	0.0007
0100	127	46	8.11569	0.0002	26	8	41.32821	0.0002	127.5566	0.0007
0745	127	49	34.25744	0.0002	26	10	6.98765	0.0002	97.1353	0.0006
0746	131	17	26.40498	0.0002	25	57	13.42596	0.0002	72.5804	0.0006
0837	130	35	58.53829	0.0002	31	49	26.61886	0.0002	314.6605	0.0008
1135	133	41	58.46095	0.0002	35	29	25.43890	0.0002	72.4840	0.0007
2003	142	11	4.48260	0.0002	27	5	44.09896	0.0002	208.8414	0.0005
2004	130	52	42.87783	0.0002	31	25	31.11305	0.0002	134.5650	0.0007
2005	141	50	41.34863	0.0002	43	31	43.11778	0.0002	118.5629	0.0006
3009	140	39	33.24817	0.0002	35	57	19.63756	0.0002	65.8745	0.0006
ALIC	133	53	7.86632	0.0002	-23	-40	-12.41617	0.0002	603.2700	0.0008
AMAN	111	27	27.24446	0.0002	1	13	18.69901	0.0002	52.4996	0.0006
ANKR	32	45	30.49169	0.0002	39	53	14.53800	0.0002	976.0353	0.0006
ARAU	100	16	47.05544	0.0002	6	27	0.56572	0.0002	18.0642	0.0008
AREQ	-71	-29	-34.06750	0.0002	-16	-27	-55.86002	0.0002	2488.9386	0.0007
ARTU	58	33	37.65137	0.0002	56	25	47.35843	0.0002	247.5817	0.0006
AUCK	174	50	3.78951	0.0002	-36	-36	-10.22757	0.0002	132.6982	0.0007
BAKO	106	50	56.08194	0.0003	-6	-29	-27.79767	0.0002	158.1324	0.0009
BASE	178	27	11.90638	0.0003	-18	-6	-54.85300	0.0002	104.3248	0.0010
BEHR	101	31	1.96445	0.0002	3	45	55.33046	0.0002	68.7155	0.0007
BIN1	113	5	39.61317	0.0002	3	14	25.14280	0.0002	59.0121	0.0006
BJFS	115	53	32.95305	0.0002	39	36	30.96304	0.0002	87.4734	0.0005
BOGT	-74	-4	-51.38239	0.0003	4	38	24.26468	0.0003	2576.5197	0.0009
BRAZ	-47	-52	-40.32947	0.0002	-15	-56	-50.90727	0.0003	1106.0218	0.0008
BRMU	-64	-41	-46.58582	0.0002	32	22	13.43651	0.0002	-11.6070	0.0007
BRUS	4	21	33.19334	0.0002	50	47	52.14731	0.0002	149.6927	0.0007
CAS1	110	31	10.94231	0.0002	-66	-17	-0.09567	0.0002	22.4593	0.0006
CEDU	133	48	35.39372	0.0002	-31	-51	-59.98694	0.0002	144.7483	0.0006
CHAN	125	26	39.12280	0.0002	43	47	26.47013	0.0002	273.2606	0.0005
CHAT	-176	-33	-57.04063	0.0002	-43	-57	-20.82182	0.0002	57.9836	0.0008
CHUR	-94	-5	-19.42565	0.0002	58	45	32.67956	0.0002	-19.2962	0.0006
COAL	113	33	40.98398	0.0002	22	7	14.47004	0.0002	169.4508	0.0007
COCO	96	50	2.29645	0.0002	-12	-11	-18.04255	0.0002	-35.2858	0.0006

Table 3. Continued.

SITE	LONGITUDE (DMS)			1 σ (m)	LATITUDE (DMS)			1 σ (m)	ELLIPSOID HEIGHT (m)	1 σ (m)
COOK	-159	-48	-44.60495	0.0003	-21	-12	-2.80492	0.0003	22.0820	0.0010
CORM	175	44	58.40873	0.0002	-36	-51	-55.54781	0.0002	170.2513	0.0006
DAEJ	127	22	28.13039	0.0002	36	23	57.94159	0.0002	116.8356	0.0007
DARW	131	7	57.86702	0.0002	-12	-50	-37.32849	0.0002	125.1322	0.0007
DAV1	77	58	21.40656	0.0002	-68	-34	-38.36358	0.0002	44.3993	0.0006
DNVK	176	9	59.96226	0.0002	-40	-17	-55.87798	0.0002	457.6369	0.0005
DRAG	35	23	31.45731	0.0002	31	35	35.52546	0.0002	31.8410	0.0008
DSMG	113	34	7.58579	0.0002	22	9	32.24716	0.0002	117.7813	0.0007
FAIR	-147	-29	-57.26340	0.0002	64	58	40.79278	0.0003	319.0177	0.0007
FOMO	113	32	32.96654	0.0002	22	11	50.69510	0.0002	56.6755	0.0008
GETI	102	6	19.67010	0.0009	6	13	34.29011	0.0008	-0.4928	0.0060
GISB	177	53	9.72466	0.0002	-38	-38	-7.20558	0.0002	87.1942	0.0007
GLSV	30	29	48.24183	0.0002	50	21	51.05977	0.0002	226.3300	0.0007
GMUS	101	57	49.66199	0.0002	4	51	46.70546	0.0002	125.9687	0.0007
GRAS	6	55	14.06788	0.0002	43	45	17.05852	0.0002	1319.3240	0.0005
GRAZ	15	29	36.53384	0.0002	47	4	1.67023	0.0002	538.3046	0.0006
GRIK	101	7	48.99301	0.0002	5	26	20.44152	0.0002	149.1983	0.0006
GUAM	144	52	6.09844	0.0002	13	35	21.58613	0.0002	201.9310	0.0009
HAMT	175	6	33.11473	0.0002	-37	-48	-24.30650	0.0002	69.4116	0.0006
HARB	27	42	26.08339	0.0002	-25	-53	-13.06381	0.0002	1558.0929	0.0006
HAST	176	43	35.62752	0.0002	-39	-37	-1.31018	0.0002	152.3712	0.0006
HERS	0	20	10.58135	0.0002	50	52	2.33199	0.0002	76.4996	0.0007
HIKB	178	18	12.07151	0.0002	-37	-33	-39.74233	0.0002	107.2964	0.0007
HILO	-155	-3	-9.71011	0.0002	19	43	9.06332	0.0002	29.2939	0.0006
HKFN	114	8	17.41822	0.0002	22	29	40.86625	0.0002	41.1962	0.0007
HKKT	114	3	59.64669	0.0002	22	26	41.65779	0.0002	34.5466	0.0006
HKLT	113	59	47.85673	0.0002	22	25	5.27871	0.0002	125.9062	0.0007
HKSC	114	8	28.28879	0.0002	22	19	19.81540	0.0002	20.2144	0.0007
HKSL	113	55	40.74528	0.0002	22	22	19.21301	0.0002	95.2764	0.0007
HKST	114	11	3.28252	0.0002	22	23	42.97015	0.0002	258.6974	0.0007
HOB2	147	26	19.44674	0.0002	-42	-48	-16.95730	0.0002	41.0617	0.0007
HOFN	-15	-11	-52.50937	0.0002	64	16	2.25331	0.0002	82.7716	0.0005
HOKI	170	59	3.53291	0.0002	-42	-42	-46.45300	0.0002	53.6680	0.0005
HRAO	27	41	13.13305	0.0002	-25	-53	-24.37521	0.0002	1414.1599	0.0008
IISC	77	34	13.35962	0.0002	13	1	16.20276	0.0002	843.7028	0.0007
IRKT	104	18	58.47170	0.0002	52	13	8.48618	0.0003	502.3505	0.0009
JHJY	103	47	47.51659	0.0002	1	32	12.51538	0.0002	39.1811	0.0006
KARR	117	5	49.89445	0.0002	-20	-58	-53.14069	0.0002	109.1591	0.0006
KERG	70	15	19.88140	0.0002	-49	-21	-5.28088	0.0002	73.0433	0.0006
KIRI	172	55	22.41570	0.0006	1	21	16.49918	0.0006	36.2067	0.0025
KIRU	20	58	6.41657	0.0002	67	51	26.46802	0.0002	391.0183	0.0006
KIT3	66	53	7.60889	0.0002	39	8	5.16172	0.0002	622.4917	0.0008
KOSG	5	48	34.72252	0.0002	52	10	42.33871	0.0002	96.8592	0.0006
KOUR	-52	-48	-21.45546	0.0002	5	15	7.85463	0.0002	-25.7447	0.0006
KRTM	-157	-26	-51.49727	0.0003	2	2	47.62998	0.0003	25.6395	0.0009
KUAL	103	8	20.92949	0.0002	5	19	7.99910	0.0002	54.9963	0.0007
KUNM	102	47	49.90904	0.0002	25	1	46.33661	0.0002	1986.2172	0.0009
LAB1	115	14	41.19122	0.0002	5	16	57.50777	0.0002	57.3104	0.0007
LHAZ	91	6	14.49973	0.0002	29	39	26.39747	0.0002	3624.6094	0.0006
LPGS	-57	-55	-56.27842	0.0002	-34	-54	-24.28123	0.0003	29.8911	0.0010
MAC1	158	56	8.99291	0.0002	-54	-29	-58.30597	0.0002	-6.7866	0.0005
MANA	-86	-14	-56.37719	0.0004	12	8	56.17930	0.0004	71.0462	0.0017
MAS1	-15	-37	-59.78955	0.0002	27	45	49.47158	0.0002	197.1572	0.0007
MAST	175	35	4.46809	0.0002	-41	-3	-43.15617	0.0002	207.2421	0.0007
MATE	16	42	16.05843	0.0002	40	38	56.87696	0.0002	535.6591	0.0007

Table 3. Continued.

SITE	LONGITUDE (DMS)			1 σ (m)	LATITUDE (DMS)			1 σ (m)	ELLIPSOID HEIGHT (m)	1 σ (m)
MAW1	62	52	14.57362	0.0003	-67	-36	-17.16011	0.0004	59.1267	0.0013
MCM4	166	40	9.58859	0.0002	-77	-50	-18.05950	0.0002	97.9829	0.0011
MIRI	114	0	6.27894	0.0002	4	22	19.56087	0.0002	62.3954	0.0007
MOBS	144	58	31.21994	0.0002	-37	-49	-45.87033	0.0002	40.5931	0.0006
MQZG	172	39	16.92291	0.0002	-43	-42	-9.83968	0.0002	154.6710	0.0008
MTAW	117	52	53.93750	0.0003	4	15	45.98469	0.0002	72.8643	0.0010
MTJO	170	27	53.78262	0.0002	-43	-59	-8.53092	0.0002	1043.6390	0.0007
NICO	33	23	47.20897	0.0002	35	8	27.55329	0.0002	190.0319	0.0005
NNOR	116	11	33.79146	0.0002	-31	-2	-55.43827	0.0002	234.8342	0.0009
NPLY	174	7	5.42640	0.0002	-39	-10	-57.19366	0.0002	416.9455	0.0007
NT04	104	32	33.09379	0.0003	10	17	32.21420	0.0003	-10.0168	0.0012
OHI2	-57	-54	-4.79268	0.0002	-63	-19	-15.89047	0.0003	32.4889	0.0006
ONSA	11	55	31.86730	0.0002	57	23	43.07822	0.0002	45.6050	0.0006
OUS2	170	30	39.35038	0.0002	-45	-52	-10.10336	0.0002	26.1042	0.0006
OUSD	170	30	39.29911	0.0002	-45	-52	-10.19579	0.0002	26.1640	0.0006
PCAB	120	56	19.52736	0.0002	15	27	0.76492	0.0002	69.7435	0.0006
PDIC	101	48	37.91968	0.0002	2	31	34.23254	0.0002	31.1951	0.0005
PEKN	103	23	22.89021	0.0002	3	29	33.34905	0.0002	26.0152	0.0006
PENH	104	55	3.28861	0.0003	11	34	25.71763	0.0003	15.1542	0.0007
PERT	115	53	6.91035	0.0002	-31	-48	-7.06802	0.0002	12.7167	0.0008
PETP	158	36	25.47584	0.0004	53	4	0.23402	0.0005	210.3148	0.0023
PFLO	120	29	57.68861	0.0002	14	58	58.55931	0.0002	88.2259	0.0007
PIMO	121	4	39.82935	0.0002	14	38	8.59178	0.0002	95.5384	0.0009
PNGM	147	21	57.63052	0.0004	-2	-2	-35.62605	0.0004	116.3652	0.0017
POHN	158	12	36.40387	0.0003	6	57	35.80253	0.0003	90.6971	0.0012
POL2	74	41	39.35992	0.0002	42	40	47.17281	0.0002	1714.2118	0.0005
PTAG	121	2	26.75871	0.0002	14	32	7.58937	0.0002	84.8188	0.0007
PTGY	120	56	17.83449	0.0002	14	6	1.00796	0.0002	715.1934	0.0005
PURD	120	34	32.21337	0.0002	16	0	15.10449	0.0002	80.4643	0.0006
QT03	108	13	13.34220	0.0002	16	4	28.71179	0.0002	8.2946	0.0009
QT04	107	5	12.17907	0.0002	10	21	10.44774	0.0002	22.7913	0.0008
RAMO	34	45	47.30595	0.0002	30	35	51.38276	0.0002	886.8453	0.0007
REYK	-21	-57	-19.75277	0.0002	64	8	19.62625	0.0002	93.0342	0.0006
RIOP	-78	-39	-3.98551	0.0002	-1	-39	-2.14359	0.0002	2817.1858	0.0006
SAMO	-171	-44	-18.32472	0.0004	-13	-50	-57.15145	0.0004	76.8659	0.0015
SAND	118	7	14.10974	0.0002	5	50	32.65167	0.0002	133.4950	0.0007
SANT	-70	-40	-6.79083	0.0002	-33	-9	-1.03514	0.0003	723.0822	0.0006
SEG1	102	43	55.27286	0.0002	2	29	10.67539	0.0002	28.5300	0.0007
SELE	77	1	0.83944	0.0002	43	10	43.43614	0.0002	1342.0077	0.0008
SEY1	55	28	45.85946	0.0002	-4	-40	-25.38687	0.0002	537.2047	0.0009
SFER	-6	-12	-20.32142	0.0002	36	27	51.64648	0.0002	84.1828	0.0006
SHAO	121	12	1.60514	0.0002	31	5	58.71083	0.0002	22.0537	0.0006
SIEM	103	48	55.60516	0.0003	13	24	33.39258	0.0002	-2.2677	0.0005
SKEP	103	48	25.95347	0.0002	1	16	1.83489	0.0002	36.8184	0.0008
SLOY	103	58	17.98261	0.0002	1	22	21.49402	0.0002	50.3055	0.0008
SNTU	103	40	47.79458	0.0002	1	20	44.92976	0.0002	75.5074	0.0008
SNYP	103	50	55.51305	0.0002	1	22	44.89832	0.0002	54.8392	0.0007
SSEK	103	48	52.26787	0.0002	1	28	13.35594	0.0002	40.0652	0.0008
STR1	149	0	36.19226	0.0002	-35	-18	-55.91160	0.0002	799.9481	0.0006
STUE	105	58	15.53958	0.0003	13	31	49.88597	0.0003	37.5750	0.0006
SUTH	20	48	37.66834	0.0002	-32	-22	-48.75517	0.0002	1799.7685	0.0007
SYDN	151	9	1.36915	0.0002	-33	-46	-51.15666	0.0002	85.5964	0.0007
SYOG	39	35	1.47508	0.0002	-69	0	-25.04572	0.0002	50.0041	0.0008
T430	114	8	17.52951	0.0002	22	29	40.99159	0.0002	41.3009	0.0007

Table 3. Continued.

SITE	LONGITUDE (DMS)			1 σ (m)	LATITUDE (DMS)			1 σ (m)	ELLIPSOID HEIGHT (m)	1 σ (m)
TAUP	176	4	51.58192	0.0002	-38	-44	-33.76902	0.0002	427.0300	0.0007
THTI	-149	-36	-23.22597	0.0002	-17	-34	-37.41814	0.0002	98.0438	0.0007
THU2	-68	-49	-30.14763	0.0002	76	32	13.37200	0.0002	36.1487	0.0008
TIDB	148	58	47.99696	0.0002	-35	-23	-57.12818	0.0002	665.3478	0.0006
TIXI	128	51	59.12171	0.0002	71	38	4.10304	0.0002	47.0752	0.0007
TLOH	102	25	9.71788	0.0002	3	26	58.01899	0.0002	57.0002	0.0006
TNML	120	59	14.44668	0.0003	24	47	52.63510	0.0003	75.8744	0.0011
TONG	-175	-10	-45.18208	0.0003	-21	-8	-40.96773	0.0003	56.3179	0.0011
TOW2	147	3	20.48181	0.0002	-19	-16	-9.39962	0.0002	88.1399	0.0006
TRNG	176	15	39.15928	0.0002	-37	-43	-43.71147	0.0002	151.1138	0.0007
TSKB	140	5	14.98722	0.0002	36	6	20.44582	0.0002	67.2616	0.0006
TUVA	179	11	47.60719	0.0003	-8	-31	-31.04287	0.0003	38.4248	0.0011
TWTF	121	9	52.20838	0.0003	24	57	12.83377	0.0002	201.5401	0.0010
ULAB	107	3	8.37758	0.0002	47	51	54.24293	0.0002	1575.5371	0.0006
ULUI	179	24	45.61012	0.0002	-16	-25	-55.90274	0.0002	167.3668	0.0008
UMAS	110	25	28.91719	0.0002	1	28	5.91369	0.0002	51.3800	0.0006
UMSS	116	6	43.31188	0.0002	6	2	21.23685	0.0002	76.3656	0.0007
UNAV	-178	-46	-47.59130	0.0003	-18	-11	-14.34807	0.0003	113.0072	0.0010
USMP	100	18	14.53528	0.0002	5	21	28.03216	0.0002	19.8732	0.0007
USUD	138	21	43.35720	0.0002	36	7	59.19610	0.0002	1508.6050	0.0007
VANU	168	18	54.52928	0.0003	-17	-44	-38.30861	0.0003	97.5806	0.0012
WANG	174	49	17.20749	0.0002	-39	-47	-12.75901	0.0002	289.6958	0.0006
WGTN	174	48	21.20809	0.0002	-41	-19	-24.43512	0.0002	26.0463	0.0007
WGTT	174	46	53.73445	0.0002	-41	-17	-25.57170	0.0002	42.9827	0.0007
WHNG	174	18	52.44155	0.0002	-35	-48	-13.56418	0.0002	172.7936	0.0007
WTZR	12	52	44.07983	0.0002	49	8	39.11678	0.0002	666.0400	0.0005
WUHN	114	21	26.14936	0.0002	30	31	53.94801	0.0002	25.8715	0.0008
YAKT	129	40	49.09734	0.0002	62	1	51.45424	0.0002	103.3952	0.0006
YAR2	115	20	49.12334	0.0002	-29	-2	-47.58798	0.0002	241.3018	0.0006
YSSK	142	43	0.19633	0.0002	47	1	47.04367	0.0002	91.2910	0.0006
ZECK	41	33	54.24378	0.0002	43	47	18.21609	0.0002	1166.2966	0.0005

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