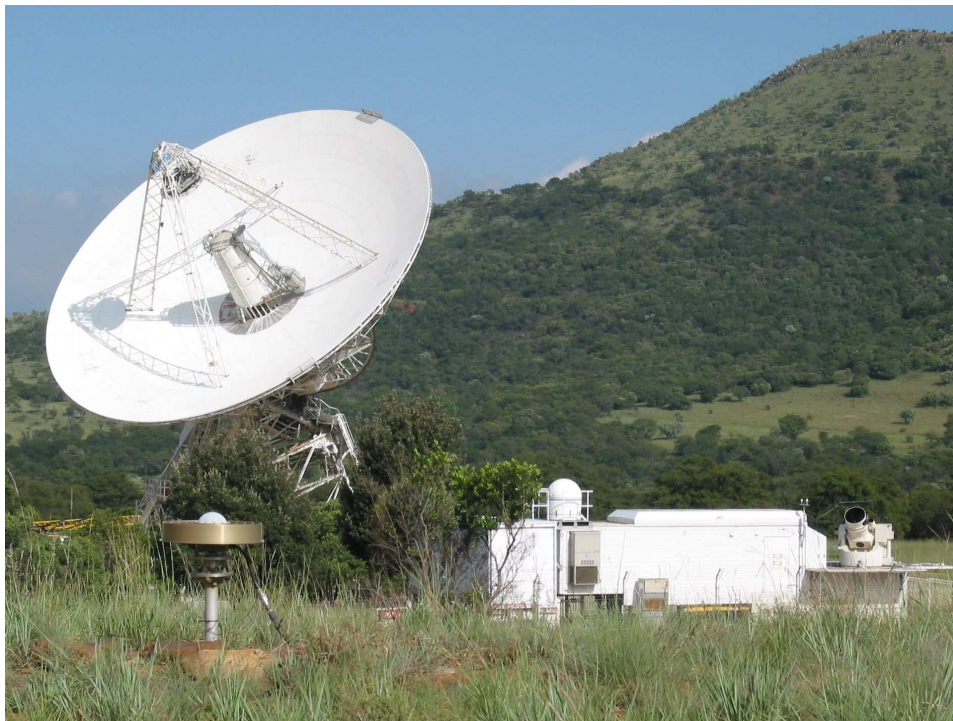


HARTEBEESTHOEK CO-LOCATION SURVEY



Reports and results

Surveyed on July-August 2003

Reported on June 2005



Institut Géographique National
Direction de la Production
Service de Géodésie et de Nivellement

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Introduction

The ITRF is the result of a combination of different terrestrial reference frames provided by four space geodetic techniques GPS, VLBI, SLR and DORIS. To perform this combination between independent reference frames, it is necessary to have some co-location sites where the various techniques are observing and whose tie vectors between their reference points have been surveyed in three dimensions. Many co-location sites have been identified and some of them have missing or inconsistent ties. Furthermore, new instruments may be installed or replaced on these sites. Then, the ties with the existant techniques on the site have to be determined.

In this frame, it has been decided as one of the top priorities to survey Hartebeesthoek co-location site (South Africa). Indeed, this site is one of only two sites where the four techniques are currently observing. Some of the ties at Hartebeesthoek were missing, and others were inconsistent.

This document presents the results of the Hartebeesthoek local ties survey with as many details of the observations and the computations as necessary to fully understand what the resulting SINEX file means. A paper titled “Hartebeesthoek Co-location Survey” was also published by some people from the survey team in the IERS Technical note n°33 “Hartebeesthoek Co-location Survey”.

1. Co-location site description

The Hartebeesthoek co-location site is located in the Gauteng province, in a valley in the Magaliesberg hills, 50 km west of Johannesburg, South Africa.



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Hartebeesthoek co-location site can be divided into two subsites distant by about 3 km and eachone covering an area of about 300 meters.

For each subsite, a local control network was set up, from which the instruments were observed and tied together with GPS observations.


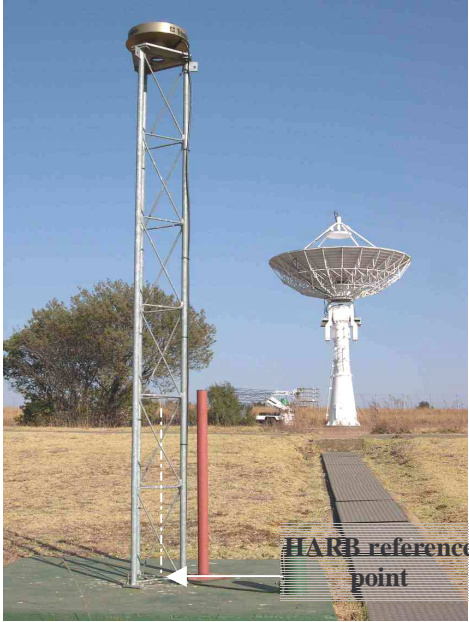
The first subsite is on HartRAO site. On this site, one can find a 26-meter VLBI radiotelescope, a 30-inch diameter SLR telescope (MOBLAS-6) and the IGS GPS station (HRAO). The site is organized so that 7 reinforced concrete piers surround the space geodetic instruments. These piers are 1.2 m to 3 m high and their diameter is 0.5 m. They are all equipped with self-centering devices and are mostly used for SLR calibration targets what gives an explanation about the tall height of the piers.

The second subsite is on the Satellite Application Centre (SAC) site. A DORIS antenna is installed, very close to another IGS GPS permanent station (HARB). Three pillars equipped with self-centering devices have been set up around this site.

The 2 subsites were tied together using the 2 IGS GPS permanent stations observations.

1.1. ITRF space geodetic techniques

1.1.1. HRAO and HARB IGS GPS stations

DOMES number : 30302M004	DOMES number : 30302M009
 <p data-bbox="309 1783 628 1809"><i>HRAO groundmark and antenna</i></p>	 <p data-bbox="963 1854 1283 1881"><i>HARB ground mark and antenna</i></p>
<p>The stations reference points are a mark distinct from the antenna ones. (cf annexes 5.1 and 5.2).</p>	

1.1.2. SLR station



Building hosting SLR telescope



Global view of the telescope

The SLR measurements refer to a point in the telescope where the two rotation axes intersect. This reference point can not be materialized. The offset from the top of the SLR telescope to the horizontal axis is **0.489 m**

The SLR System Reference Point (SRP) is a groundmark as described in the site log (cf annexe 5.3.).

DOMES NUMBER : 30302M003



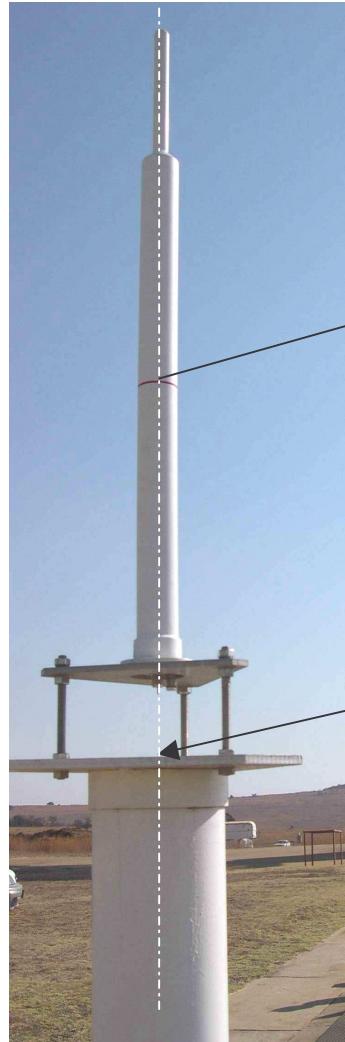
SLR System Reference Point (SRP)

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1.1.3. DORIS antenna



DORIS mark (30302M008)



**30302S006
(HBKB)**

**DORIS ground mark
(30302M008)**

DORIS antenna on its support

This antenna and its support have been installed in year 2000. The antenna support is an aluminium plate that has been levelled.

The DORIS antenna reference point (HBKB) which is the reference point for ITRF solutions, is in this case, a red ring mark, 0.390 m above the base.

A ground mark is set up on the top of the metallic mast.

HBKB reference point DOMES number is **30302S006** and DORIS groundmark DOMES number is **30302M008**. The site log is presented in Annexe 5.5.

1.1.4. VLBI antenna

DOMES number : 30302S001

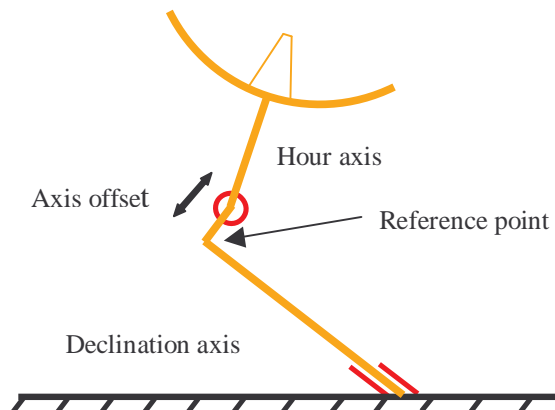


Global view of the VLBI antenna



Reference
benchmark
V100

For the VLBI antenna, the measurement data is received at the phase center of the receiver feed horn. The VLBI reference point is generally described as the point where the two rotation axes intersect. But for this antenna type, the rotation axes do not intersect, and in this case the VLBI reference point is described as the point represented by the intersection of the fixed axis (Hour Axis) with the perpendicular plane containing the moving one (Declination Axis).



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One of the 4 concrete blocks of the VLBI antenna platform is equipped with a levelling benchmark V100 for stability check.

1.2. Other points of interest

For each subsite, a local control network was set up, from which the instruments were observed and tied together with GPS observations. The control network includes some existing and new piers.

- HartRAO subsite : 7 reinforced concrete piers (6 existings and one new) surrounding the space geodetic instruments were used. These piers are 1.2 m to 3 m high and their diameter is 0.5 m. They are all equipped with self-centering devices and are mostly used for SLR calibration targets what gives an explanation about the tall height of the piers. A levelling benchmark was embedded at the base.
(cf Annexe 5.7.)
- SAC subsite : 3 pillars equipped with self-centering devices have been set up around this site. All the piers are concrete piers with forced-centering devices embedded in the top. 2 piers are equipped with levelling benchmarks.

2. Survey description

2.1. Organization

The local ties survey of Hartebeesthoek co-location site is a cooperative project in which the four following agencies participated :

- Hartebeesthoek Radio Astronomy Observatory (HartRAO)
- NASA Goddard Space Flight Center (GSFC)
- Institut Géographique National (IGN)
- South African Department of Land Affairs.

The survey team gathered 5 members : Jim Long, coming from NASA GSFC who has experience in numerous local ties surveys ; Valérie Michel, Céline Corbière and Georgia Roesch from the Special Works unit of IGN, which mainly deals with micro-geodesy and metrology ; and Sean Dane from Surveys and Mapping service of the South African Department of Land Affairs. Also, this project took many benefits of support from the HartRAO personnel and facilities, such as the workshop.

The survey took place from July, the 22nd to August, the 12th 2003. The meteorological conditions have been very appropriate for such a fieldwork since it was sunny almost everyday and all the outside work was easy to plan, even if in a topometric sense the bright sun is not always an advantage during the measurements. Furthermore, in planning the survey work, it was necessary to coordinate with the astronomic observations planning for the VLBI and SLR.

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2.2. Equipments

All the topometric survey instruments and equipments belong to IGN or NASA and had been temporarily imported for the needs of the survey.

2.2.1. Instruments

Leica total stations (TC2002 and TDA5005) were used. Those total stations, which are regularly calibrated at IGN's calibration unit, have a standard deviation of 0.15 mgon about angles and 1 mm + 1 ppm about distances. Two Leica accurate corner cube reflectors (GPHP1P), which are calibrated with the total stations were used to determine distances.

For the altimetric observations, an electronic level (Leica NA3003) and invar bar code levelling rods were used. This equipment, regularly calibrated at IGN's calibration unit, has a resolution of 0.01 mm.

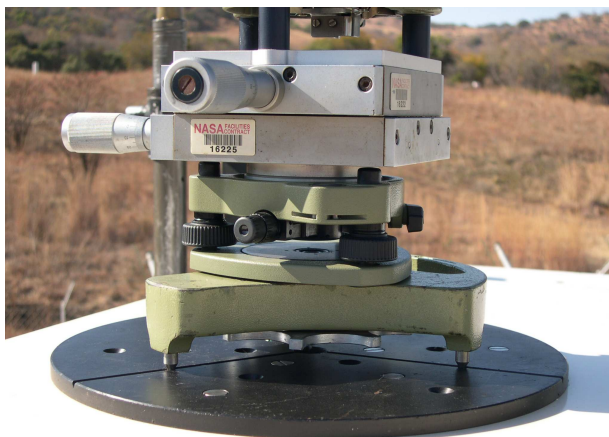
For the GPS observations, four Leica SR530 receivers with Leica AT504 choke ring antennas were used.

All these instruments allowed the observations to be recorded electronically on PCMCIA cards or REC modules and then downloaded to laptop PC for processing.

2.2.2. Equipment and accessories

Several very useful accessories have also been brought for this type of fieldworks. These accessories included such items as :

- § heavy tripods in order to ensure the stability of temporary stations ;
- § translation stage in order to center a target on a vertical rotation axis ;



- § 0.5 m, 1.8 m and 3.0 m long Invar levelling rods that are all calibrated and associated to each other ;
- § calibrated trefoils targets, prisms ;
- § trivet plates and tribachs regularly calibrated.

Equipments for construction were also used.

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2.3. General overview

The 2 subsites were considered as 2 individual survey control networks including space geodetic techniques instruments. For each of them, all the survey was conducted in order to provide the highest accuracy in the determination of the 3D vectors between the observing instruments. It mixed GPS (mainly for orientation) and topometric observations.

In order to tie the two local control networks and include them into a common ITRF reference frame, the 2 IGS GPS permanent stations observations during all the campaign were used.

2.4. Survey control network observations

All the visible lines of sights have been observed with the tacheometers described in 2.2.1. Horizontal directions and zenith distances were observed in sets, with each set consisting of one reading in both direct and reverse telescope positions. Any observed angle was rejected if the difference between the two circles was greater than 1mgon. Distance measurements were observed over each line one time in both direct and reverse positions. Meteorological data (atmospheric pressure and temperature) were recorded at the beginning of each station.

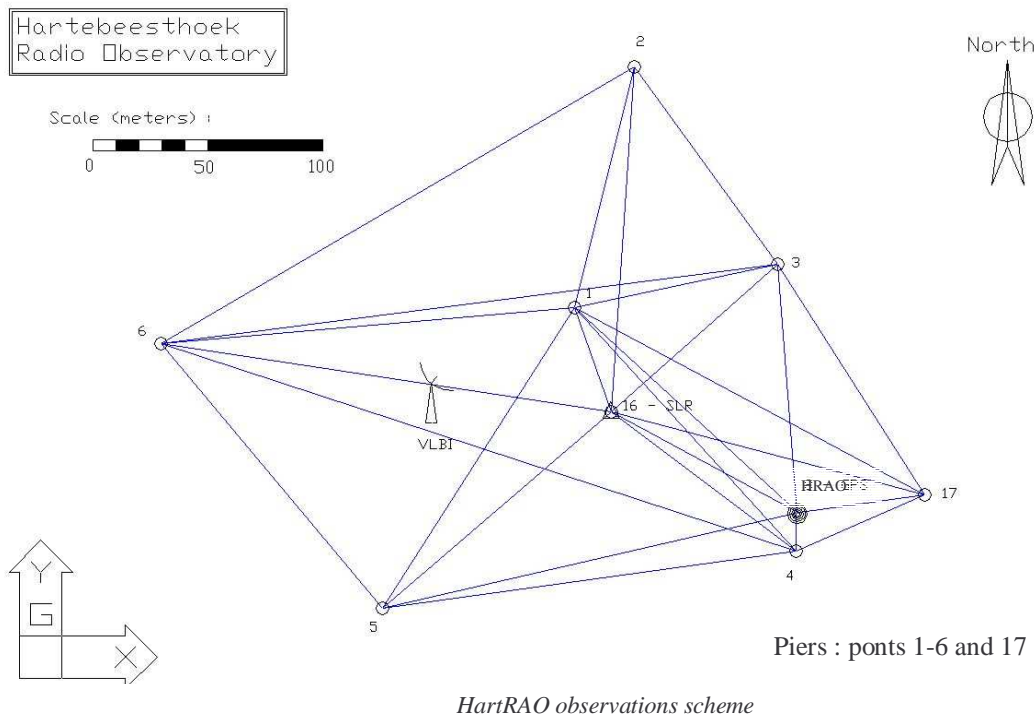
All the piers are concrete piers with forced-centering devices embedded in the top. During the observations, Wild or IGN trivet plates were used, which ensured that the targets and total stations were always on the same planimetric position. On each pier, two different total stations have been set up and two different operators observed, in order to avoid any systematic effect. The heights above the reference point of each monument were measured after each setup on three different points with a calliper rule.

As far as direct levelling is concerned, a forward run and a backward run were observed between each benchmark. Before each workday, the instrument collimation was checked. The electronic level instrument was set to perform two readings on bar code rod, and that measurement was rejected if the difference between the two readings was greater than 0.04 mm. In the same way, if the difference between the two runs was greater than $0.1 \text{ mm } \sqrt{n}$, with n number of traverse legs, a third run was completed.

Some of the piers of the ground control networks were too high to be levelled by direct levelling. Therefore, indirect levelling was done between the benchmark installed on the pier and a target on the top of the pier.

2.4.1. HartRAO observations polygon

This control network polygon includes 6 concrete piers, the SLR telescope (a total station has been set up on the top of the telescope right on the vertical axis), the IGS GPS antenna (which has been intersected). The VLBI can also be included in this polygon, since a particular moving point has been observed using the 6 piers.



2.4.1.1. SLR System Reference Point (SRP)

The reference point has been determined in two successive steps : the first one to materialize its planimetric position, the second one to determine the vertical eccentricity between the reference point and the planimetric materialization.

The SLR vertical axis rotation had to be in a first time determined and after that be marked. To determine its position, from one total station set up on a heavy tripod, a target on the translation stage was sighted and the direction recorded. The SLR has been rotated 180° around the vertical axis, and the same target sighted again. Then the translation stage was adjusted of half the difference between the two directions. The same procedure was followed with the SLR telescope oriented at 90° from the original position. This operation was repeated until the target doesn't move, when sighted with the total station, regardless the direction the SLR is pointing.

In a second time, this rotation axis, determined as described above, was marked on the brass disk of the ground mark. Two different methods were used and they agreed to less than 1mm :

- NASA-GSFC method : using 3 total stations in 3 different directions, the operator sighted the target on the top of the SLR, and went vertically down to the ground mark. The point was then determined using graphical method.
- IGN method : using 3 total stations in 3 different directions, the operator sighted the target on the top of the SLR, and went vertically down to a target on a translation stage above the brass part. By iteration, the target was brought to the SLR axis. A needle took the place of the target on the translation stage thus sticking the brass disk.

The horizontal axis was not determined during this survey. The previously determined value of 0.489 m was used for the offset from the top of the SLR telescope to the horizontal rotation axis.

2.4.1.2. VLBI reference point

A special target was installed on the apex of the antenna quadripod, to be visible from as many survey control monuments as possible. The hour / declination mount of this antenna made the observation of the antenna difficult since the dish of the antenna hides much of the structure from view when rotating around one of the axes. The apex was the only point that could be observed from three piers during the whole required rotations of the antenna. Indeed, this target was determined by intersections from three piers with three different total stations.



Target



Target at the apex

The antenna was rotated around the axis to be determined, in increments of about 10 degrees, causing the target to describe an arc of a circle around the axis of rotation. Several arcs for each axis (3 around declination axis and 2 around hour angle axis) were observed. At each increment, horizontal directions and zenithal distances were measured.

The declination axis has been observed in three different hour angle positions by rotating the antenna around the declination axis. The hour angle wheel (big wheel) was in position 0°, and the declination wheel (small wheel) went from southern limit to northern limit by step of 10°, 14 points were observed (-85° to +48°). The same operation was done with the hour angle wheel at +19° west and -25° east.

In the same idea, the hour angle axis has been observed by rotating the antenna around the hour angle axis in two different declination positions. The declination angle was held fixed on the position where zenith is achievable, and the big wheel went from western limit to eastern limit by step of 10°, 17 points were observed (+85° to -85°). This operation was repeated with declination angle set at 50°.

		HOUR ANGLE	DECLINATION ANGLE	NUMBER OF POINTS
DECLINATION AXIS	Position 1	-25°	45° - 275°	14
	Position 2	0°	45° - 275°	14
	Position 3	19°	45° - 275°	14
HOUR AXIS	Position 1	85° - 275°	309°	17
	Position 2	85° - 275°	334.112°	19

2.4.1.3.HRAO GPS antenna intersections

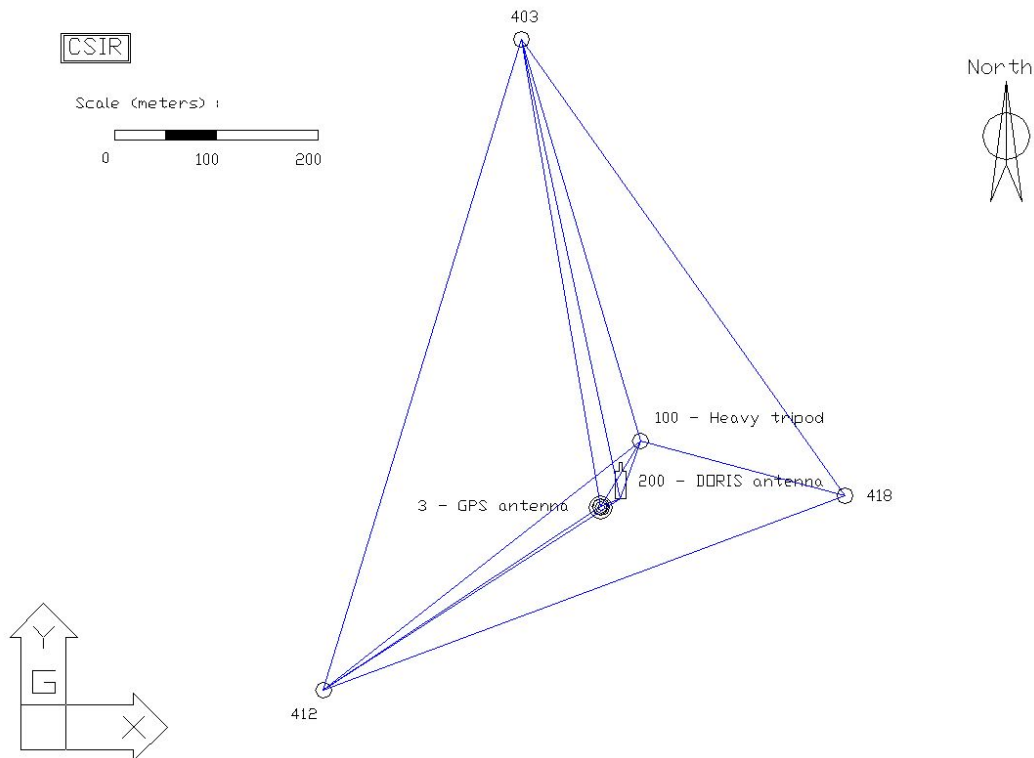
In order to find the planimetric position of the antenna, the directions tangent to the left and the right hand sides of the choke ring antenna were observed from all the stations of the polygonation from which the antenna was visible, i.e. 6 stations. In the adjustment, the mean direction of two observations from a same station, was used to process the planimetric position.

The antenna height was measured by direct levelling on three different points on the top of the choke ring antenna. The mean of the three observations was corrected to account for the difference in height from the top of the choke ring to the Antenna Reference Point (ARP).

Annexe 5.8. shows some elements on HRAO GPS antenna observations.

2.4.2. SAC polygon observations

This control network polygon includes 3 concrete piers, one temporary station on a heavy tripod, the DORIS pillar and the IGS GPS antenna on a steel tower.



2.4.2.1.DORIS reference point

After having verified the antenna verticality and centering above the DORIS mark, this point has been included in the polygonation : a target was installed on the metallic mast, instead of the DORIS antenna during the polygonation using a special forced-centering interface. A GPS antenna was also installed on the metallic mast after the polygonation. The different heights were measured to 0.001 m.

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To determine the altimetric position of the red ring mark (HBKB DORIS reference point), located at about 0.390 m above the base, direct levelling was done using direct inverse rod on 3 three different points on the antenna base.

2.4.2.2. HARB GPS antenna intersections

The directions tangent to the left and the right hand sides of the choke ring antenna were observed from all the polygonation stations from which the antenna was visible, ie. 4 stations. In the adjustment, the mean of each pair of observations was used to process the planimetric intersection.

The antenna height was measured by direct levelling on three different places under the choke ring antenna using reverse rod. Then, the mean of the three observations was corrected to account for the difference in height between the bottom of the choke ring and the ARP.

2.5. GPS observations

In order to tie the two local control networks and to provide ITRF orientation, three sessions of 5 hours on three different days with a recording rate of 30 s have been observed. During each session, four different stations were set up, 2 on each subsite and at least 6 satellites were visible.

For each session, 6 points are observed at a given time : the 2 permanent stations HARB and HRAO, 3 pier stations on HartRAO site, 3 temporary stations on SAC site.

The GPS observations of HRAO and HARB IGS permanent stations have been used during the whole survey, from DOY 212 (July, 31st) to DOY 216 (August, 4th).

The GPS observations for the DORIS plate, the piers and the temporary stations, were carried out during the survey with LEIAT504 GPS antennas and the following specifications :

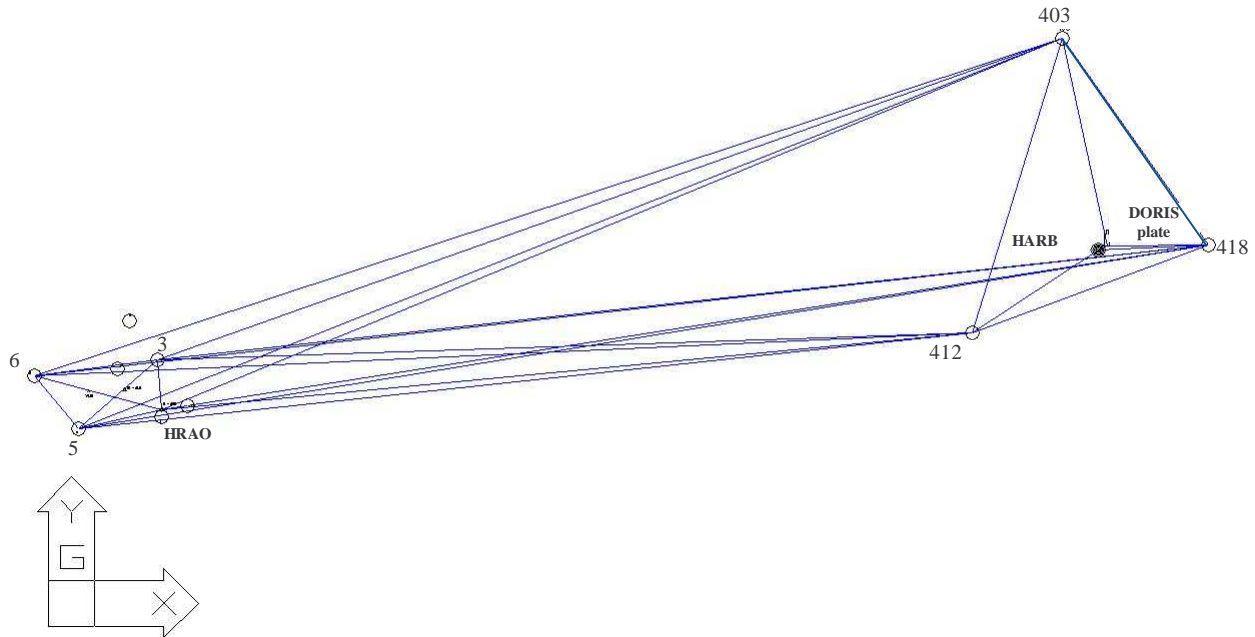
- § Cutoff angle 10°
- § Data recording rate 30 s

The following table presents the different sessions :

Point	Start (UT)	End (TU)	Ant. Height (m)	Ant. Type
DORIS plate	DOY 216 06:55	DOY 216 12:34	N,E 0.000 UP 0.3127	LEIAT504 (IGS standards)
Pier 3 (top and center of platform)	DOY 212 05:59 DOY 213 05:57	DOY 212 11:42 DOY 213 14:23	N,E 0.0000 UP 0.2410 N,E 0.0000 UP 0.2370	
Pier 5 (top and center of platform)	DOY 213 05:51 DOY 216 06:41	DOY 213 14:40 DOY 216 13:19	N,E 0.0000 UP 0.2360 N,E 0.0000 UP 0.2380	
Pier 6 (top and center of platform)	DOY 212 06:10 DOY 216 06:51	DOY 212 11:53 DOY 216 13:32	N,E 0.0000 UP 0.2330 N,E 0.0000 UP 0.2340	

Point	Start (UT)		End (TU)		Ant. Height (m)		Ant. Type
403 (top and center of heavy tripod)	DOY 213	10:59	DOY 213	14:27	N,E 0.0000 Up 0.1890		
412 (top and center of heavy tripod)	DOY 212	06:01	DOY 212	11:58	N,E 0.0000 Up 0.2320		
	DOY 213	05:46	DOY 213	14:45	N,E 0.0000 Up 0.2300		
418 (top and center of heavy tripod)	DOY 212	06:26	DOY 212	12:15	N,E 0.0000 Up 0.2380		
	DOY 213	06:02	DOY 213	10:02	N,E 0.0000 Up 0.2410		
	DOY 216	07:06	DOY 216	12:56	N,E 0.0000 Up 0.2310		

All the antenna heights are related to the GPS antenna reference point. They were measured to 0.001 m.



3. Computations

3.1. On-site validation

3.1.1. Ground control networks

Each local control network has been pre-processed on site in order to point out any problems consequently to observations. The observations have been checked in a local coordinate system by a 3D least squares adjustment with the software COMP3D developed at IGN by Y. EGELS.

The blunders have been detected and the precision has been estimated in order to check if the requirements of such a survey were achieved.

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The a priori standard deviations for the different observations from tacheometers are :

- § 0.5 mgon for horizontal angles,
- § 0.8 mgon for vertical angles,
- § 1 mm + 1 ppm for distances,

The levelling observations have also been validated on site by adjustments between 2 successive benchmarks, then by independent adjustments of the 2 subsites. The precision was about 0.5 mm for HartRAO levelling network and 0.6 mm for SAC levelling network.

3.1.2. GPS

The GPS baselines have been processed on site to check the ambiguities resolution.

3.2. **GPS network**

The GPS baselines have been processed with BERNESE software version 4.2.

The antenna heights from the HRAO and HARB logsheets were used to get the stations reference point positions.

The main features of the adopted processing strategy are presented in the following table :

Measurement models	<ul style="list-style-type: none"> • DE200 planetary ephemeris model • Earth potential model : JGM3 • Ground antenna : IGS/NGS elevation-dependent phase center models (cf annexe 5.) • Solid Earth tides applied (IERS Conventions96) • Orbits and ERPs : IGS final products
Processing parameters	<ul style="list-style-type: none"> • Elevation dependant weighting • Elevation angle cutoff : 10 degrees • Troposphere model : Saastamoinen
Estimated parameters :	<ul style="list-style-type: none"> • Adjustment : Weighted least-squares algorithms • Ambiguity resolution : different strategies according to the length of the baselines <ul style="list-style-type: none"> - QIF strategy - SIGMA strategy • Solved ambiguities introduced into daily solutions • Daily final solutions : different strategies according to the length of the baselines <ul style="list-style-type: none"> - L1 solution for short baselines at the 2 subsites - Ionosphere free solutions for the connexion between them • Constrained solutions (no stations fixed) • No troposphere zenith delays estimation

Daily solutions were produced and correlations correctly modelled. The corresponding NEQs were combined using ADDNEQ program providing a full covariance matrix given in annexe 5.9.

For this solution, the reference point (HRAO GPS stations) has been heavily constrained (0.1 mm) to its ITRF2000 coordinates at epoch 2003:214.

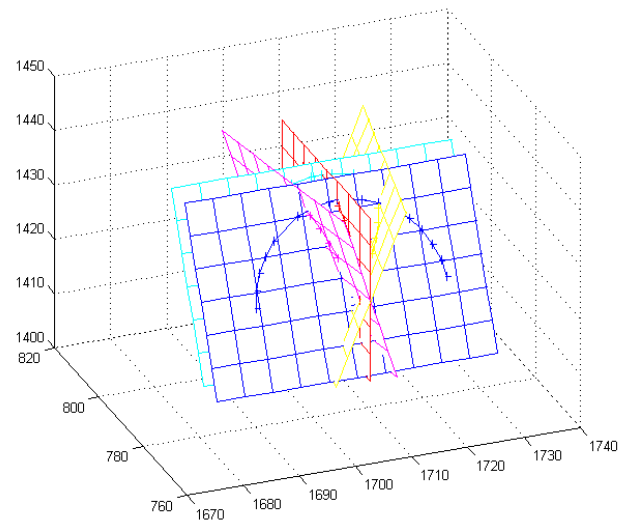
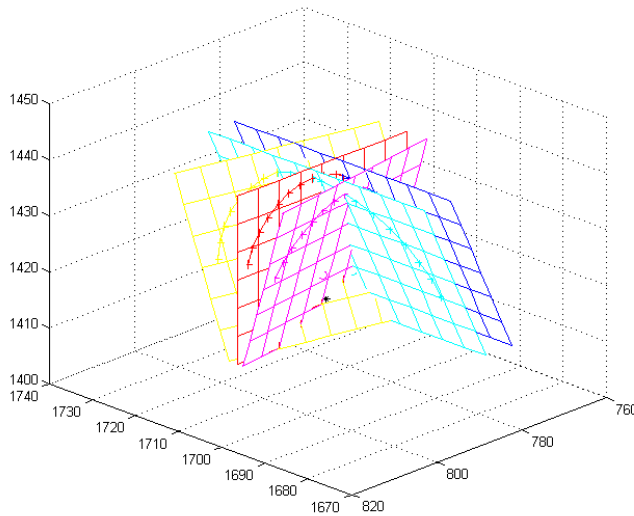
COMPARISON OF COORDINATES (IN NORTH, EAST, AND HEIGHT COMPONENT)
RMS: UNWEIGHTED RMS OF THE ESTIMATION OF ONE COORDINATE COMPONENT IN MM

NUM	STATION	#FIL	C	RMS	1	2	3
1	HRAO 30302M004	3	N	.0	.0	.0	.0
			E	.0	.0	.0	.0
			U	.0	.0	.0	.0
2	HARB 30302M009	3	N	.7	-.8	.4	.4
			E	.1	.0	-.1	.1
			U	1.7	.9	1.1	-1.9
3	3_P	2	N	.9	-.6	.6	
			E	.0	.0	.0	
			U	1.5	1.1	-1.1	
5	6_P	2	N	1.3	1.0		-1.0
			E	.6	.4		-.4
			U	.0	.0		.0
8	412_P	2	N	.9	-.7	.7	
			E	.2	.1	-.1	
			U	.6	-.4	.4	
9	418_P	3	N	1.6	-1.9	1.1	.8
			E	.7	.3	-.7	.4
			U	1.9	1.6	.5	-2.1
4	5_P	2	N	.0		.0	.0
			E	.6		.4	-.4
			U	2.8		-2.0	2.0
7	403_P	1	N	.0		.0	
			E	.0		.0	
			U	.0		.0	
6	200_P	1	N	.0			.0
			E	.0			.0
			U	.0			.0

3.3. VLBI Reference point

The first computations were done in the local topocentric network that was defined by the polygon of HartRAO site. By rotating the antenna around one of the axis holding the other one blocked, the target describes an arc of a circle. The plane in which the circle is drawn is normal to the rotation axis around which the antenna is moving. This rotation axis crosses the plane in the centre of the circle.

The 5 plane and circle fittings have been computed by programs developed on the Matlab 6.1 software. A first on-site program has been developed in order to check the quality of the target positions determinations and the precision to fitting a circle. Then a more elaborate program takes into account the variances-covariances matrix of the polygon and the target positions to compute the circle fittings.



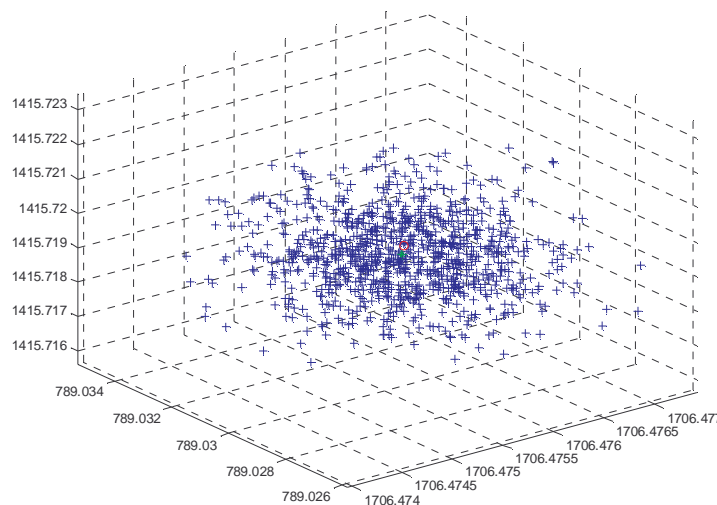
2 views of the circle and plane fittings for the 5 rotations in the local topocentric network

As far as the primary axis is concerned, one arc lets the axis be determined. The problem is then over-determined since 2 arcs have been observed, which leads to a check and an evaluation of the precision.

For the secondary axis, each of the 3 arcs defines a position of the secondary axis. However, the angles between each secondary planes and the primary plane have to be constant (and even right angles). Furthermore, the distances between each secondary axis and the primary axis have to be equal. Therefore, a control of the data does exist for the secondary axis too.

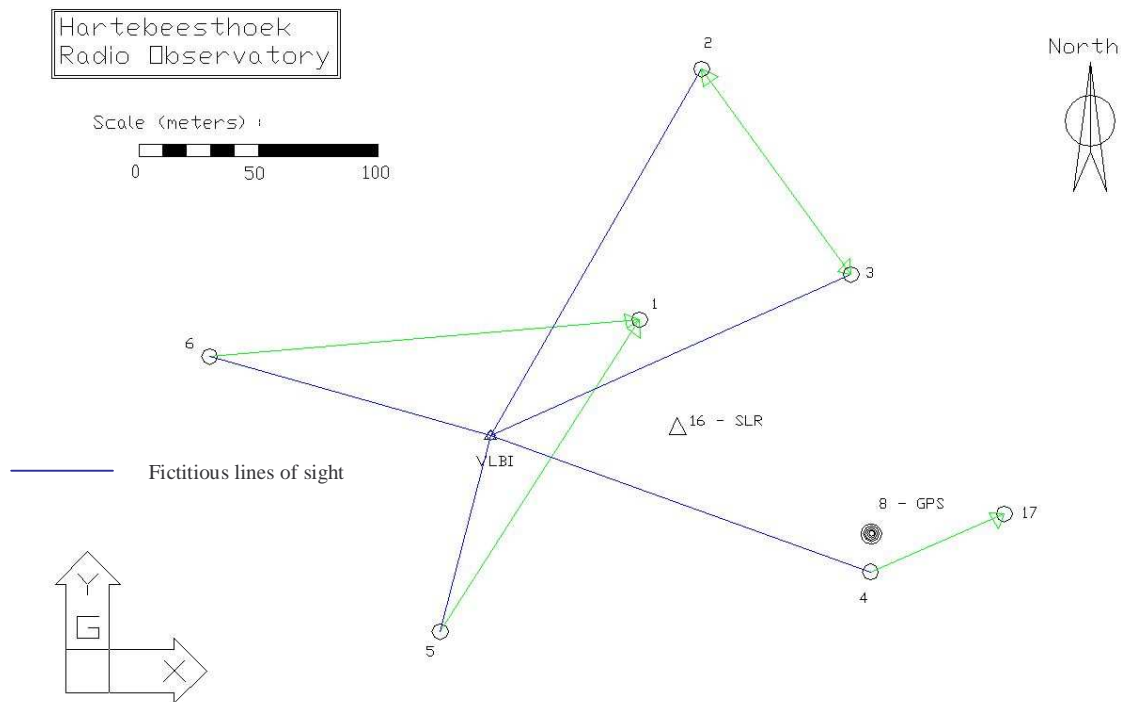
The VLBI reference point is the closest point of the primary axis to the secondary axis. The axis offset is the distance between primary and secondary axis.

In order to get an idea of the precision, a Monte-Carlo algorithm has been implemented. The precision of the reference point estimated by the Monte-Carlo method is 0.5 mm in x-direction, 1.6 mm in y-direction and 1.1 mm in z-direction. The axis offset is 6.695 m \pm 2.5 mm.



Monte-Carlo distribution of the estimated point position expressed in a local reference frame (m)

Given the position of the reference point and its precision, a set of fictitious observations have been computed with their associated precision. These fictitious observations correspond to fictitious horizontal and vertical angles that would be measured from the piers of the polygon to the VLBI reference point. They were introduced in HartRAO polygon.



All this study has been led in HartRAO local topocentric network and Matlab 6.1. was the main developing environment.

3.4. HartRAO and SAC survey networks

The final analysis of each network observations has been carried out with Microsearch GeoLab 2001 software, 2001.9.20.0 version. In order to have the best relative accuracy between the points, the input files were developed from all the topometric observations only (distances, horizontal and zenithal angles, direct levelling planimetric and altimetric centerings) and GPS results have been used to define local frames as follows :

- HartRAO
 - Origin : HRAO coordinates heavily constrained
 - Orientation : azimuth between piers 3 and 5

- SAC
 - Origin : HARB coordinates heavily constrained
 - Orientation : azimuth between piers 412 and 403 temporary stations

These two “topometric” adjustments give us coordinates and a covariance matrix for all the points of surveys. The results for the points of interest are :

- HartRAO network

Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV	
XYZ		SLR meas.	5085403.6808 0.0012	2668331.5518 0.0007	-2768690.1814 m 0.0008	0
XYZ		Pier 17	5085330.9356 0.0009	2668447.6608 0.0006	-2768725.1044 m 0.0006	0
XYZ		Pier 1	5085428.4379 0.0009	2668326.4552 0.0006	-2768649.4294 m 0.0006	0
XYZ		Pier 2	5085457.9475 0.0009	2668371.1494 0.0007	-2768555.8319 m 0.0007	0
XYZ		Pier 3	5085397.7425 0.0009	2668410.2415 0.0006	-2768634.0422 m 0.0006	0
XYZ		Pier 4	5085345.5063 0.0008	2668392.0148 0.0005	-2768745.6979 m 0.0006	0
XYZ		Pier 5	5085415.4983 0.0009	2668225.1889 0.0006	-2768765.9413 m 0.0006	0
XYZ		Pier 6	5085499.8113 0.0009	2668160.3993 0.0006	-2768659.8145 m 0.0008	0
XYZ		30302S001 (VLBI)	5085442.7809 0.0011	2668263.6120 0.0010	-2768696.9181 m 0.0012	0
XYZ		30302M003 (SLR SRP)	5085401.1066 0.0009	2668330.2083 0.0006	-2768688.7731 m 0.0007	0
XYZ		30302M004 (HRAO)	5085352.4810 0.0001	2668395.8000 0.0001	-2768731.5720 m 0.0001	0

2-D and 1-D Station Confidence Regions (95.000 and 95.000 percent):

STATION	MAJOR SEMI-AXIS	AZ	MINOR SEMI-AXIS	VERTICAL
SLR meas.	0.0013	3	0.0011	0.0029
Pier 17	0.0011	15	0.0009	0.0020
Pier 1	0.0012	8	0.0009	0.0021
Pier 2	0.0014	59	0.0013	0.0021
Pier 3	0.0012	7	0.0009	0.0021
Pier 4	0.0010	1	0.0005	0.0020
Pier 5	0.0012	5	0.0009	0.0021
Pier 6	0.0018	10	0.0010	0.0021
30302S001 (VLBI)	0.0029	20	0.0018	0.0025
30302M003 (SLR RP)	0.0013	3	0.0011	0.0021
30302M004 (HRAO)	0.0002	0	0.0002	0.0002

- SAC network

Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV	
XYZ		30302M008	5084652.9073 0.0003	2670347.0909 0.0009	-2768470.6348 m 0.0006	0
XYZ		HARB ARP	5084660.0692 0.0001	2670326.3633 0.0001	-2768482.5204 m 0.0001	0
XYZ		30302M009 (HARB)	5084657.6353 0.0001	2670325.0851 0.0001	-2768481.1863 m 0.0001	0
XYZ		30302S006	5084653.3092 0.0009	2670347.3006 0.0011	-2768470.8569 m 0.0009	0

2-D and 1-D Station Confidence Regions (95.000 and 95.000 percent):

STATION	MAJOR SEMI-AXIS	AZ	MINOR SEMI-AXIS	VERTICAL
30302M008	0.0027	56	0.0008	0.0004
HARB ARP	0.0003	0	0.0003	0.0003
30302M009 (HARB)	0.0002	0	0.0002	0.0002
30302S006	0.0030	55	0.0015	0.0020

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The full results are presented in annexe 5.10. and annexe 5.12., and the covariance matrices in annexe 5.11. and 5.13.

It could be helpful to know the station name translation table used for the computation :

Point description	Used name or code	Computation name
HRAO IGS reference point	30302M004	8GPS
HARB IGS reference point	30302M009	3GPS
HARB IGS antenna reference point	HARB ARP	3
VLBI reference point	30302S001	7232
SLR System Reference Point (SRP)	30302M003	7501
SLR measurements reference point	SLR optic centre	16_C
DORIS reference point	30302S006	DORIS
DORIS mark	30302M008	200_P
Piers 1 to 17		1_P / 2_P / 3_P / 4_P / 5_P / 6_P / 17_P

3.4.1. The SLR measurements point eccentricity

During the survey, the eccentricity of the System Reference Point (SRP) to the measurements point (intersection of the vertical and horizontal axis of the telescope) has been observed and computed with an accuracy of about **0.2 mm**. The resulted following values have been obtained and used in the final SINEX :

	IGN Survey	Site log (cf Annexe 5.3)
North (m)	-0.0006	-0.003
East (m)	-0.0060	-0.006
Up (m)	3.2271	3.228

This eccentricity had been observed in year 2000 with an accuracy of about 1 mm, when the new telescope was installed. These values are still used by the analysis centers to reduce the SLR observations to the reference point (cf annexe 5.3)

3.4.2. HARB GPS antenna height

During the survey, the antenna height between the antenna reference point (ARP) and the marker has been observed and computed with an accuracy better than 0.2 mm. This value has not been used for the GPS computation, but for the survey results.

	Survey	Site log (cf Annexe 5.2)
Antenna height (m)	3.0557	3.052

3.4.3. DORIS reference point

The resulting height of the DORIS reference point above the DORIS mark is **0.5047 m**.
The top of the plate is **0.1097 m** over the DORIS mark

4. Results

The final results have been processed with the “Microsearch GeoLab 2001” software, 2001.9.20.0 version. The input files were developed from all the terrestrial observations of the 2 networks (distances, horizontal and vertical angles, planimetric and altimetric centerings, levelling) and the GPS baselines. Therefore, all the input data can be sorted as following :

- HartRAO polygon
- HartRAO levelling
- SAC polygon
- SAC levelling
- GPS network : GPS baselines expressed as set of points coordinates and the associated covariance matrix.

The ITRF2000 coordinates of HRAO IGS GPS station at epoch 2003:214 have been constrained at 0.1 mm. The GPS covariance matrix has been weighted by the RMS given by Bernese computations. The adjustment has to deal with 684 observations in order to estimate 273 parameters.

The results are the coordinates of all the points referring to piers, space geodetic instruments as well as their confidence ellipsoids in the ITRF 2000 at the epoch of the observations.

Here is a table with the 3D confidence region at 95% of the 5 points of interest :

Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV		
XYZ		30302M009 (HARB)	5084657.6352 0.0013	2670325.0847 0.0009	-2768481.1863 0.0009	m	0
XYZ		30302S001 (VLBI)	5085442.7806 0.0011	2668263.6119 0.0010	-2768696.9178 0.0012	m	0
XYZ		30302M003 (SLR)	5085401.1063 0.0009	2668330.2082 0.0006	-2768688.7728 0.0007	m	0
XYZ		30302M004 (HRAO)	5085352.4810 0.0001	2668395.8000 0.0001	-2768731.5720 0.0001	m	0
XYZ		30302S006 (DORIS)	5084653.3091 0.0016	2670347.3000 0.0012	-2768470.8569 0.0012	m	0

3D Station Confidence Regions (95.000 percent):

STATION	MAJ-SEMI (AZ, VANG)	MED-SEMI (AZ, VANG)	MIN-SEMI (AZ, VANG)
30302M009	0.0043 (32, 87)	0.0020 (213, 3)	0.0017 (123, 0)
30302S001	0.0036 (20, 6)	0.0034 (200, 84)	0.0021 (290, 0)
30302M003	0.0028 (32, 89)	0.0017 (200, 1)	0.0013 (290, 0)
30302M004	0.0003 (162, 89)	0.0003 (340, 1)	0.0003 (70, 0)
30302S006	0.0052 (38, 87)	0.0029 (223, 3)	0.0024 (133, 0)

2-D and 1-D Relative Station Confidence Regions (95.000 and 95.000 percent):

FROM	TO	MAJ-SEMI	AZ	MIN-SEMI	VERTICAL	DISTANCE	PPM
30302M009	30302S001	0.0033	25	0.0022	0.0034	2216.4529	1.51
30302M009	30302M003	0.0020	41	0.0017	0.0031	2139.0122	0.93
30302M009	30302M004	0.0018	33	0.0015	0.0030	2065.8274	0.85
30302M009	30302S006	0.0024	54	0.0015	0.0021	24.8784	95.41
30302S001	30302M003	0.0029	21	0.0019	0.0016	78.9820	36.60
30302S001	30302M004	0.0032	20	0.0018	0.0024	163.7945	19.33
30302S001	30302S006	0.0037	28	0.0027	0.0040	2239.6707	1.67
30302M003	30302M004	0.0014	20	0.0011	0.0020	92.1872	15.46
30302M003	30302S006	0.0027	46	0.0023	0.0037	2162.2551	1.24
30302M004	30302S006	0.0026	42	0.0021	0.0036	2089.2980	1.22

The achieved relative accuracy (at a 95% confidence level) between the space geodetic technique reference points is less than 4 mm in the 3 dimensions.

Furthermore, the whole covariance matrix is computed and it is possible to extract covariance submatrix of reference points from

- HARO IGS GPS station 30302M004
- HARB IGS GPS station 30302M009
- HBKB DORIS station 30302S006
- SLR station 30302M003
- VLBI station 30302S001

The results and the full covariance matrix are presented in annexes 5.14. and 5.15. The covariance matrix has finally been converted into SINEX format using a special program from CATREF package. The resulting file is given in annexe 5.17.

The SINEX file has been introduced into the first ITRF 2004 computations by Zuheir Altamimi. The local ties, which were dubious, agree now at a mm level with the individual space geodetic technique solutions.

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5.1. HRAO site log

HRAO Site Information Form
International GPS Service
See Instructions at:
ftp://igs.cb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0. Form

Prepared by (full name) : Dave Stowers
Date Prepared : 2002-04-03
Report Type : UPDATE
If Update:
Previous Site Log : hrao0204.log
Modified/Added Sections : (n.n,n.n,...)

1. Site Identification of the GNSS Monument

Site Name : Hartebeesthoek RAO
Four Character ID : HRAO
Monument Inscription : (none)
IERS DOMES Number : 30302M004
CDP Number : (A4)
Monument Description : (PILLAR/BRASS PLATE/STEEL MAST/etc)
Height of the Monument : (m)
Monument Foundation : (STEEL RODS, CONCRETE BLOCK, ROOF, etc)
Foundation Depth : (m)
Marker Description : (CHISELLED CROSS/DIVOT/BRASS NAIL/etc)
Date Installed : 1996-09-05
Geologic Characteristic : BEDROCK
Bedrock Type : IGNEOUS
Bedrock Condition : JOINTED
Fracture Spacing : 1-10 cm
Fault zones nearby : (YES/NO/Name of the zone)
Distance/activity : (multiple lines)
Additional Information : (multiple lines)
: HartRAO is located on the Pretoria Series of the
: Transvaal System. The territory occupied or else
: underlain by the System embraces the greater
: part of the Central Transvaal. The Transvaal
: System is of Precambrian age. The antenna and
: buildings are situated on Ongeluk Lava
: (Andesite).
: Geological information from "NASA Space Geodesy
: Program
: Technical Memorandum 4482, March 1993, p196.
: Interlocking steel rod 25 meters deep grouted on
: the bottom 10 meters and isolated in PVC for the
: next 15 meters.

2. Site Location Information

City or Town : Krugersdorp
State or Province :
Country : South Africa
Tectonic Plate : Africa plate, Kaapvaal Craton
Approximate Position (ITRF)
X coordinate (m) : 5085352.500
Y coordinate (m) : 2668395.681
Z coordinate (m) : -2768731.692
Latitude (N is +) : -255324.38
Longitude (E is +) : +0274113.12
Elevation (m,ellips.) : 1414.1877
Additional Information : Latitude, Longitude and Elevation derived from
: ITRF96 coordinates at epoch 1997.0, from Z.
: Altamimi/IGN.
: HartRAO is situated 60 km NW of Johannesburg.
: HartRao is a National Research Facility which
: operates within the foundation for Research
: Development.
: Site information from "NASA Space Geodesy
: Program
: Technical Memorandum 4482, March 1993, p196.

<p style="text-align: center;">Institut Géographique National Direction de la Production Service de Géodésie et de Nivellement</p>	<p style="text-align: center;">Hartebeesthoek Co-location Survey</p>	<p>RT/G 61</p> <p>Page 26 / 146 Version : 1 Révision : 0 Date 27/06/2005</p>
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3. GNSS Receiver Information

- 3.1 Receiver Type : ROGUE SNR-8000
Satellite System : (GPS/GLONASS/GPS+GLONASS)
Serial Number : T365
Firmware Version : 3.2 link 03/09/95
Elevation Cutoff Setting : (deg)
Date Installed : 1996-09-05
Date Removed : (CCYY-MM-DDThh:mmZ)
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : (multiple lines)

- 3.2 Receiver Type : ROGUE SNR-12 RM
Satellite System : (GPS/GLONASS/GPS+GLONASS)
Serial Number : 254
Firmware Version : 3.2.32.4
Elevation Cutoff Setting : (deg)
Date Installed : 1998-01-14
Date Removed : (CCYY-MM-DDThh:mmZ)
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : replaced SNR 8 with SNR 12

- 3.3 Receiver Type : ROGUE SNR-12 RM
Satellite System : (GPS/GLONASS/GPS+GLONASS)
Serial Number : 254
Firmware Version : 3.2.32.8
Elevation Cutoff Setting : (deg)
Date Installed : 1999-05-25T12:30Z
Date Removed : 2000-04-16T00:00Z
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : (firmware upgrade)

- 3.4 Receiver Type : ASHTECH Z-XII3
Satellite System : (GPS/GLONASS/GPS+GLONASS)
Serial Number : LP019990511
Firmware Version : CC00 1s soc2rnx
Elevation Cutoff Setting : (deg)
Date Installed : 2000-04-26T12:30Z
Date Removed : (CCYY-MM-DDThh:mmZ)
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : replaced SNR 12 with Z12
: samplerate - 1s
: offload format - soc
: conversion to 30s - soc2rnx

- 3.x Receiver Type : (A20, from rcvr_ant.tab; see instructions)
Satellite System : (GPS/GLONASS/GPS+GLONASS)
Serial Number : (A5)
Firmware Version : (A11)
Elevation Cutoff Setting : (deg)
Date Installed : (CCYY-MM-DDThh:mmZ)
Date Removed : (CCYY-MM-DDThh:mmZ)
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : (multiple lines)

4. GNSS Antenna Information

- 4.1 Antenna Type : AOAD/M_T
Serial Number : 200
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 0.0814
Marker->ARP North Ecc(m) : (F8.4)
Marker->ARP East Ecc(m) : (F8.4)
Alignment from True N :
Antenna Radome Type :
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 1996-09-05
Date Removed : (CCYY-MM-DDThh:mmZ)
Additional Information : SS6TRI monument

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- 4.2 Antenna Type : AOAD/M_T
Serial Number : 201
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 0.0814
Marker->ARP North Ecc(m) : (F8.4)
Marker->ARP East Ecc(m) : (F8.4)
Alignment from True N :
Antenna Radome Type :
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 1998-01-14
Date Removed : (CCYY-MM-DDThh:mmZ)
Additional Information : SS6TRI monument
- 4.3 Antenna Type : AOAD/M_T
Serial Number : 127
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 0.0814
Marker->ARP North Ecc(m) : (F8.4)
Marker->ARP East Ecc(m) : (F8.4)
Alignment from True N :
Antenna Radome Type :
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 1999-02-20
Date Removed : 1999-07-13T07:00Z
Additional Information : SS6TRI monument
- 4.4 Antenna Type : AOAD/M_T
Serial Number : 201
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 0.0814
Marker->ARP North Ecc(m) : (F8.4)
Marker->ARP East Ecc(m) : (F8.4)
Alignment from True N :
Antenna Radome Type :
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 1999-07-13T07:00Z
Date Removed : (CCYY-MM-DDThh:mmZ)
Additional Information : SS6TRI monument
- 4.x Antenna Type : (A20, from rcvr_ant.tab; see instructions)
Serial Number : (A*, but note the first A5 is used in SINEX)
Antenna Reference Point : (BPA/BCR/XXX from "antenna.gra"; see instr.)
Marker->ARP Up Ecc. (m) : (F8.4)
Marker->ARP North Ecc(m) : (F8.4)
Marker->ARP East Ecc(m) : (F8.4)
Alignment from True N : (deg; + is clockwise/east)
Antenna Radome Type : (A4 from rcvr_ant.tab; see instructions)
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : (CCYY-MM-DDThh:mmZ)
Date Removed : (CCYY-MM-DDThh:mmZ)
Additional Information : (multiple lines)
5. Surveyed Local Ties
- 5.1 Tied Marker Name : 26 m VLBI antenna
Tied Marker Usage : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
Tied Marker CDP Number :
Tied Marker DOMES Number : 30302S001
Differential Components from GNSS Marker to the tied monument (ITRS)
dx (m) : 90.280
dy (m) : -132.198
dz (m) : 34.658
Accuracy (mm) : 10
Survey method : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)

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Date Measured : (CCYY-MM-DDThh:mmZ)
Additional Information : ITRF96 coordinates epoch 1997
: for HRAO and VLBI points differential
: components
: The SLR/VLBI/HRAO/HART/DORIS differential
: components will be determined in a high
: precision GPS survey later this year

5.x Tied Marker Name :
Tied Marker Usage : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
Tied Marker CDP Number : (A4)
Tied Marker DOMES Number : (A9)
Differential Components from GNSS Marker to the tied monument (ITRS)
dx (m) :
dy (m) :
dz (m) :
Accuracy (mm) : (mm)
Survey method : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
Date Measured : (CCYY-MM-DDThh:mmZ)
Additional Information : (multiple lines)

6. Frequency Standard

6.1 Standard Type : INTERNAL
Input Frequency : 5 MHz
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

6.2 Standard Type : H-MASER
Input Frequency : 5 MHz
Effective Dates : 1998-05-05/CCYY-MM-DD
Notes : (multiple lines)

6.3 Standard Type : INTERNAL
Input Frequency : 5 MHz
Effective Dates : 2000-04-26/CCYY-MM-DD
Notes : (multiple lines)

6.x Standard Type : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
Input Frequency : (if external)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

7. Collocation Information

7.1 Instrumentation Type : VLBI
Status : PERMANENT
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : The VLBI telescope routinely participates in
: IRIS, CORE-A and Syowa experiments)

7.x Instrumentation Type : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
Status : (PERMANENT/MOBILE)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8. Meteorological Instrumentation

8.1.1 Humidity Sensor Model :
Manufacturer :
Serial Number :
Data Sampling Interval :
Accuracy (% rel h) : (% rel h)
Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
Height Diff to Ant : (m)
Calibration date : (CCYY-MM-DD)
Effective Dates : CCYY-MM-DD/CCYY-MM-DD
Notes : (multiple lines)

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- 8.1.x Humidity Sensor Model :
- Manufacturer :
 - Serial Number :
 - Data Sampling Interval : (sec)
 - Accuracy (% rel h) : (% rel h)
 - Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
 - Height Diff to Ant : (m)
 - Calibration date : (CCYY-MM-DD)
 - Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
 - Notes : (multiple lines)
- 8.2.1 Pressure Sensor Model :
- Manufacturer :
 - Serial Number :
 - Data Sampling Interval :
 - Accuracy : (mbar)
 - Height Diff to Ant : (m)
 - Calibration date : (CCYY-MM-DD)
 - Effective Dates : CCYY-MM-DD/CCYY-MM-DD
 - Notes : (multiple lines)
- 8.2.x Pressure Sensor Model :
- Manufacturer :
 - Serial Number :
 - Data Sampling Interval : (sec)
 - Accuracy : (hPa)
 - Height Diff to Ant : (m)
 - Calibration date : (CCYY-MM-DD)
 - Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
 - Notes : (multiple lines)
- 8.3.1 Temp. Sensor Model :
- Manufacturer :
 - Serial Number :
 - Data Sampling Interval :
 - Accuracy : (deg C)
 - Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
 - Height Diff to Ant : (m)
 - Calibration date : (CCYY-MM-DD)
 - Effective Dates : CCYY-MM-DD/CCYY-MM-DD
 - Notes : (multiple lines)
- 8.3.x Temp. Sensor Model :
- Manufacturer :
 - Serial Number :
 - Data Sampling Interval : (sec)
 - Accuracy : (hPa)
 - Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
 - Height Diff to Ant : (m)
 - Calibration date : (CCYY-MM-DD)
 - Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
 - Notes : (multiple lines)
- 8.4.1 Water Vapor Radiometer :
- Manufacturer :
 - Serial Number :
 - Distance to Antenna : (m)
 - Height Diff to Ant : (m)
 - Calibration date : (CCYY-MM-DD)
 - Effective Dates : CCYY-MM-DD/CCYY-MM-DD
 - Notes : (multiple lines)
- 8.4.x Water Vapor Radiometer :
- Manufacturer :
 - Serial Number :
 - Distance to Antenna : (m)
 - Height Diff to Ant : (m)
 - Calibration date : (CCYY-MM-DD)
 - Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
 - Notes : (multiple lines)
- 8.5.1 Other Instrumentation : (multiple lines)
- 8.5.x Other Instrumentation :

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9. Local Ongoing Conditions Possibly Affecting Computed Position

- 9.1.x Radio Interferences : (TV/CELL PHONE ANTENNA/RADAR/etc)
Observed Degradations : (SN RATIO/DATA GAPS/etc)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)
- 9.2.x Multipath Sources : (METAL ROOF/DOME/VLBI ANTENNA/etc)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)
- 9.3.x Signal Obstructions : (TREES/BUILDINGS/etc)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)

10. Local Episodic Effects Possibly Affecting Data Quality

- 10.x Date : (CCYY-MM-DD/CCYY-MM-DD)
Event : (TREE CLEARING/CONSTRUCTION/etc)

11. On-Site, Point of Contact Agency Information

Agency : JPL
Preferred Abbreviation : (A10)
Mailing Address : 4800 Oak Grove Drive
: Pasadena, CA 91109 USA

Primary Contact
Contact Name : David A. Stowers
Telephone (primary) : 818-354-7055
Telephone (secondary) :
Fax : 818-393-4965
E-mail : dstowers@jpl.nasa.gov

Secondary Contact
Contact Name : Oivind Ruud/UNAVCO
Telephone (primary) : 303-497-8030
Telephone (secondary) : 303-497-8002
Fax : 303-497-8028
E-mail : ruud@unavco.ucar.edu
Additional Information : (multiple lines)

12. Responsible Agency (if different from 11.)

Agency : HartRAO
Preferred Abbreviation : (A10)
Mailing Address : PO BOX 443
: Krugersdorp
: 1740
: South Africa

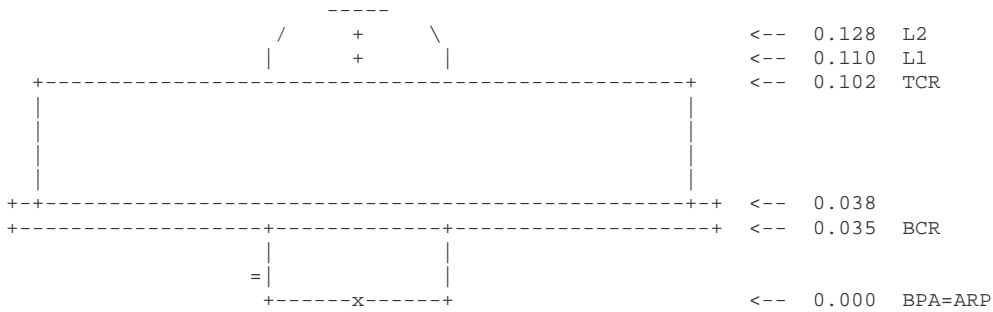
Primary Contact
Contact Name : Ludwig Combrinck
Telephone (primary) : 27-12-3260742
Telephone (secondary) :
Fax : 27-12-3260756
E-mail : ludwig@hartrao.ac.za

Secondary Contact
Contact Name : Marisa Nickola
Telephone (primary) : 27-12-3260742
Telephone (secondary) :
Fax :
E-mail : marisa@hartrao.ac.za
Additional Information : (multiple lines)

13. More Information

URL for More Information :
Hardcopy on File
Site Map : (Y or URL)
Site Diagram : (Y)
Horizon Mask : (Y)
Monument Description : (Y)
Site Pictures : (Y)
Additional Information : (multiple lines)
Antenna Graphics with Dimensions

TURBOROGUE: DORNE MARGOLIN T



ARP: Antenna Reference Point
 L1 : L1 Phase Center
 TCR: Top of Chokering

BPA: Bottom of Preamplifier
 L2 : L2 Phase Center
 BCR: Bottom of Chokering

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5.2. HARB site log

International GPS Service
HARB Site Information Form
See Instructions at:
ftp://igsch.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0. Form

Prepared by (full name) : Louis Duquesne
Date Prepared : 2002-05-29
Report Type : UPDATE
If Update:
Previous Site Log : harb_20000926.log
Modified/Added Sections : 1.0,3.*,4.*,5.*,6.1,11.0,12.0,13.0

1. Site Identification of the GNSS Monument

Site Name : Hartebeesthoek
Four Character ID : HARB
Monument Inscription : NONE
IERS DOMES Number : 30302M009
CDP Number : Not assigned
Monument Description : STEEL MAST
Height of the Monument : 3
Monument Foundation : CONCRETE BLOCK
Foundation Depth : (m)
Marker Description : BRASS NAIL
Date Installed : 2000-08-09
Geologic Characteristic : (BEDROCK/CLAY/CONGLOMERATE/GRAVEL/SAND/etc)
Bedrock Type : (IGNEOUS/METAMORPHIC/SEDIMENTARY)
Bedrock Condition : (FRESH/JOINTED/WEATHERED)
Fracture Spacing : (1-10 cm/10-50 cm/50-200 cm/over 200 cm)
Fault zones nearby : (YES/NO/Name of the zone)
Distance/activity : (multiple lines)
Additional Information : (multiple lines)
: Station located at the site
: of the 2-GHz CNES Tracking Station.
: Monument is a 12mm domed brass mark in a 2m
: sided,
: 0.35 m thick concrete slab.

2. Site Location Information

City or Town : Pretoria
State or Province :
Country : Republic of South Africa
Tectonic Plate : African
Approximate Position (ITRF)
X coordinate (m) : 5084658
Y coordinate (m) : 2670325
Z coordinate (m) : -2768481
Latitude (N is +) : -255312.84
Longitude (E is +) : +0274227.00
Elevation (m,ellips.) : 1555
Additional Information : (multiple lines)

3. GNSS Receiver Information

3.1 Receiver Type : ROGUE SNR-8000
Satellite System : GPS
Serial Number : T 367
Firmware Version : 3.2.32.1
Elevation Cutoff Setting : (deg)
Date Installed : 1997-05-26
Date Removed : 1999-05-27
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : (multiple lines)

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- 3.2 Receiver Type : TRIMBLE 4000SSI
Satellite System : GPS
Serial Number : 3844A24813
Firmware Version : 7.29
Elevation Cutoff Setting : (deg)
Date Installed : 1999-06-01
Date Removed : (CCYY-MM-DDThh:mmZ)
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : (multiple lines)
- 3.x Receiver Type : (A20, from rcvr_ant.tab; see instructions)
Satellite System : (GPS/GLONASS/GPS+GLONASS)
Serial Number : (A5)
Firmware Version : (A11)
Elevation Cutoff Setting : (deg)
Date Installed : (CCYY-MM-DDThh:mmZ)
Date Removed : (CCYY-MM-DDThh:mmZ)
Temperature Stabiliz. : (none or tolerance in degrees C)
Additional Information : (multiple lines)
4. GNSS Antenna Information
- 4.1 Antenna Type : AOAD/M_T
Serial Number : 153
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 9.803
Marker->ARP North Ecc(m) : 000.0000
Marker->ARP East Ecc(m) : 000.0000
Alignment from True N :
Antenna Radome Type :
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 1997-05-26
Date Removed : 1999-05-27
Additional Information : (multiple lines)
- 4.2 Antenna Type : TRM29659.00
Serial Number : 0220136820
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 9.803
Marker->ARP North Ecc(m) : 000.0000
Marker->ARP East Ecc(m) : 000.0000
Alignment from True N :
Antenna Radome Type :
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 1999-06-01
Date Removed : 2000-08-10
Additional Information :
- 4.3 Antenna Type : TRM29659.00
Serial Number : 0220136820
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 3.052
Marker->ARP North Ecc(m) : 000.0000
Marker->ARP East Ecc(m) : 000.0000
Alignment from True N :
Antenna Radome Type : NONE
Radome Serial Number :
Antenna Cable Type : (vendor & type number)
Antenna Cable Length : (m)
Date Installed : 2000-08-11T10:00Z
Date Removed : (CCYY-MM-DDThh:mmZ)
Additional Information : Antenna support is a 3m triangular metal
: support
- 4.x Antenna Type : (A20, from rcvr_ant.tab; see instructions)
Serial Number : (A*, but note the first A5 is used in SINEX)
Antenna Reference Point : (BPA/BCR/XXX from "antenna.gra"; see instr.)
Marker->ARP Up Ecc. (m) : (F8.4)
Marker->ARP North Ecc(m) : (F8.4)
Marker->ARP East Ecc(m) : (F8.4)

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Alignment from True N : (deg; + is clockwise/east)
 Antenna Radome Type : (A4 from rcvr_ant.tab; see instructions)
 Radome Serial Number :
 Antenna Cable Type : (vendor & type number)
 Antenna Cable Length : (m)
 Date Installed : (CCYY-MM-DDThh:mmZ)
 Date Removed : (CCYY-MM-DDThh:mmZ)
 Additional Information : (multiple lines)

5. Surveyed Local Ties

- 5.1 Tied Marker Name : IGS monument HRAO
 Tied Marker Usage : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
 Tied Marker CDP Number :
 Tied Marker DOMES Number : 30302M004
 Differential Components from GNSS Marker to the tied monument (ITRS)
 dx (m) : 694.842
 dy (m) : -1929.285
 dz (m) : -250.384
 Accuracy (mm) : 2
 Survey method : GPS CAMPAIGN
 Date Measured : 2000-08-09
 Additional Information : Survey by IGN-France
- 5.2 Tied Marker Name : DORIS antenna HBKB
 Tied Marker Usage : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
 Tied Marker CDP Number :
 Tied Marker DOMES Number : 30302S006
 Differential Components from GNSS Marker to the tied monument (ITRS)
 dx (m) : -4.327
 dy (m) : 22.214
 dz (m) : 10.332
 Accuracy (mm) : 1
 Survey method : GPS CAMPAIGN
 Date Measured : 2000-08-09
 Additional Information : Survey by IGN-France
- 5.3 Tied Marker Name : IGS monument HARK (former location of the GPS)
 Tied Marker Usage : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
 Tied Marker CDP Number :
 Tied Marker DOMES Number : 30302M007
 Differential Components from GNSS Marker to the tied monument (ITRS)
 dx (m) : -32.350
 dy (m) : 41.266
 dz (m) : -13.245
 Accuracy (mm) : 1
 Survey method : GPS CAMPAIGN
 Date Measured : 2000-08-09
 Additional Information : Survey by IGN-France
- 5.x Tied Marker Name :
 Tied Marker Usage : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
 Tied Marker CDP Number : (A4)
 Tied Marker DOMES Number : (A9)
 Differential Components from GNSS Marker to the tied monument (ITRS)
 dx (m) :
 dy (m) :
 dz (m) :
 Accuracy (mm) : (mm)
 Survey method : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
 Date Measured : (CCYY-MM-DDThh:mmZ)
 Additional Information : (multiple lines)

6. Frequency Standard

- 6.1 Standard Type : EXTERNAL CESIUM
 Input Frequency : 5MHz
- Effective Dates : 1999-11-23/CCYY-MM-DD
 Notes : (multiple lines)

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6.x Standard Type : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
Input Frequency : (if external)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

7. Collocation Information

7.1 Instrumentation Type : DORIS
Status : PERMANENT
Effective Dates : 2000-08-10/CCYY-MM-DD
Notes : DORIS antenna HBKB

7.2 Instrumentation Type : VLBI
Status : PERMANENT
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

7.x Instrumentation Type : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
Status : (PERMANENT/MOBILE)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8. Meteorological Instrumentation

8.1.1 Humidity Sensor Model :
Manufacturer :
Serial Number :
Data Sampling Interval :
Accuracy (% rel h) : (% rel h)
Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
Height Diff to Ant : (m)
Calibration date : (CCYY-MM-DD)
Effective Dates : CCYY-MM-DD/CCYY-MM-DD
Notes : (multiple lines)

8.1.x Humidity Sensor Model :
Manufacturer :
Serial Number :
Data Sampling Interval : (sec)
Accuracy (% rel h) : (% rel h)
Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
Height Diff to Ant : (m)
Calibration date : (CCYY-MM-DD)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8.2.1 Pressure Sensor Model :
Manufacturer :
Serial Number :
Data Sampling Interval :
Accuracy : (mbar)
Height Diff to Ant : (m)
Calibration date : (CCYY-MM-DD)
Effective Dates : CCYY-MM-DD/CCYY-MM-DD
Notes : (multiple lines)

8.2.x Pressure Sensor Model :
Manufacturer :
Serial Number :
Data Sampling Interval : (sec)
Accuracy : (hPa)
Height Diff to Ant : (m)
Calibration date : (CCYY-MM-DD)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8.3.1 Temp. Sensor Model :
Manufacturer :
Serial Number :
Data Sampling Interval :
Accuracy : (deg C)
Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
Height Diff to Ant : (m)

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Calibration date : (CCYY-MM-DD)
Effective Dates : CCYY-MM-DD/CCYY-MM-DD
Notes : (multiple lines)

8.3.x Temp. Sensor Model :
Manufacturer :
Serial Number :
Data Sampling Interval : (sec)
Accuracy : (hPa)
Aspiration : (UNASPIRATED/NATURAL/FAN/etc)
Height Diff to Ant : (m)
Calibration date : (CCYY-MM-DD)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8.4.1 Water Vapor Radiometer :
Manufacturer :
Serial Number :
Distance to Antenna : (m)
Height Diff to Ant : (m)
Calibration date : (CCYY-MM-DD)
Effective Dates : CCYY-MM-DD/CCYY-MM-DD
Notes : (multiple lines)

8.4.x Water Vapor Radiometer :
Manufacturer :
Serial Number :
Distance to Antenna : (m)
Height Diff to Ant : (m)
Calibration date : (CCYY-MM-DD)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : (multiple lines)

8.5.1 Other Instrumentation : (multiple lines)

8.5.x Other Instrumentation :

9. Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences : (TV/CELL PHONE ANTENNA/RADAR/etc)
Observed Degradations : (SN RATIO/DATA GAPS/etc)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)

9.2.x Multipath Sources : (METAL ROOF/DOME/VLBI ANTENNA/etc)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)

9.3.x Signal Obstructions : (TREES/BUILDINGS/etc)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Additional Information : (multiple lines)

10. Local Episodic Effects Possibly Affecting Data Quality

10.x Date : (CCYY-MM-DD/CCYY-MM-DD)
Event : (TREE CLEARING/CONSTRUCTION/etc)

11. On-Site, Point of Contact Agency Information

Agency : CSIR
Preferred Abbreviation : (A10)
Mailing Address : (multiple lines)
Primary Contact
Contact Name : Tiaan Strydom - Satellite Applications Center
Telephone (primary) : 27.12.326.5271
Telephone (secondary) : -
Fax : 27.11.642.2446
E-mail : tstrydom@csir.co.za
Secondary Contact
Contact Name :
Telephone (primary) :
Telephone (secondary) :
Fax :

E-mail :
Additional Information : (multiple lines)

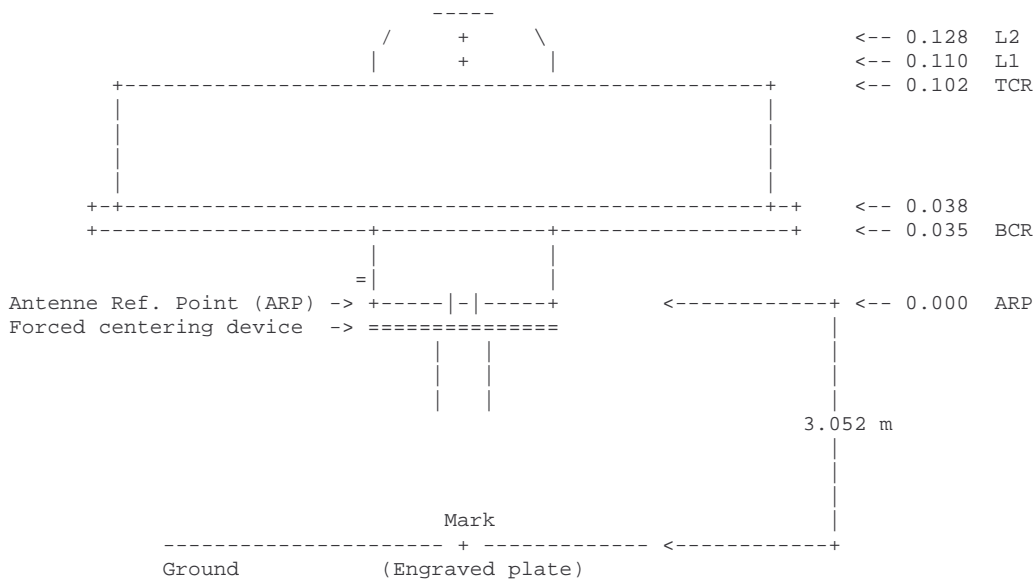
12. Responsible Agency (if different from 11.)

Agency : Centre National d'Etudes Spatiales
Preferred Abbreviation : CNES
Mailing Address : CNES DEE/EO/ST/SC - 18, avenue Edouard Belin
: 31401 - Toulouse cedex 04 - France
Primary Contact
Contact Name : Louis Duquesne
Telephone (primary) : (33) 5 61 28 19 62
Telephone (secondary) :
Fax : (33) 5 61 28 15 36
E-mail : Louis.Duquesne@cnes.fr
Secondary Contact
Contact Name :
Telephone (primary) :
Telephone (secondary) :
Fax :
E-mail :
Additional Information : (multiple lines)

13. More Information

Primary Data Center : IGN
Secondary Data Center : CDDIS
URL for More Information :
Hardcopy on File
Site Map : (Y or URL)
Site Diagram : X
Horizon Mask : (Y)
Monument Description : X
Site Pictures : 03-DEC-1993
Additional Information : (multiple lines)
Antenna Graphics with Dimensions

TURBOROGUE: DORNE MARGOLIN T



ARP: Antenna Reference Point
L1 : L1 Phase Center
TCR: Top of Chokingring

L2 : L2 Phase Center
BCR: Bottom of Chokingring

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5.3. SLR site log

ILRS Site and System Information Form
International Laser Ranging Service

0. Form

Prepared by (Full Name) : BERNHARDT Johan
Preparer E-mail : johan@hartrao.ac.za
Date Prepared : 2004-08-26
Report Type : UPDATED (2004-08-26)
Format Version : 1.0

1. Identification of the Ranging System Reference Point (SRP)

Site Name : Hartebeeshoek Radio Astronomy Observatory
IERS DOMES Number : 30302M003
CDP Pad ID : 7501
Subnetwork : NASA
Description : MONUMENT
Monument Description : PILLAR
Monument Inscription : None
Mark Description : Bullseye
Date Installed : 1993-07-12
Date Removed : (yyyy-mm-dd)
Geologic Characteristic : Andersite
Additional Information : monument is a brass marker with a stainless
: steel plate around the marker

2. Site Location Information

City or Town : Johannesburg
State or Province : Gauteng
Country : South Africa
Tectonic Plate : African
Approximate Position
X coordinate [m]: 5085401.135
Y coordinate [m]: 2668330.108
Z coordinate [m]: -2768688.865
Latitude [deg]: 25.8897 S
Longitude [deg]: 27.6861 E
Elevation [m]: 1406.822
Additional Information : (multiple lines)

3. General System Information

3.01 System Name : Moblas-6
4-Character Code : HARL
CDP System Number : 06
CDP Occupation Number : 02
Eccentricity to SRP (if Not Identical With SRP)
North [m]: -0.003 + 0.001
East [m]: -0.006 + 0.001
Up [m]: 3.228 + 0.001
Date Measured : 2000-08-07
Date Installed : 2000-06-09
Date Removed : (yyyy-mm-dd)
Additional Information : Previously occupied by MTLRS

4. Telescope Information

4.01 Receiving Telescope Type : Cassegrain
Aperture [m]: 0.762
Mount : AZ-EL
Xmitting Telescope Type : Refractor
Aperture [m]: 0.163
Tracking Camera Type : NONE
Model :
Manufacturer :
Field of View [deg]:
Minimum Magnitude [mag]:

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Transmit/Receive Path      : SEPARATE
Transmit/Receive Switch   : NONE
Max Slew Rate Az         [deg/s]: 20
Max Slew Rate El         [deg/s]: 5
Max Used Tracking Rate Az : 5
Max Used Tracking Rate El : 3
Telescope Shelter        : ROLL-BACK ROOF
Daylight Filter Type     : Omega optical 532NB1 9114
Dayl. Filt. Bandwidth [nm]: 100
Adjustable Attenuation   : RECEIVE
Transmit Efficiency       : 0.94
Receive Efficiency        : 0.76
Date Installed           : 2000-06-09
Date Removed             : (yyyy-mm-dd)
Additional Information    : (multiple lines)

```

5. Laser System Information

```

5.01 Laser Type           : ND:YAG
Number of Amplifiers      : 1
Primary Wavelength       [nm]: 1064nm
Primary Maximum Energy [mJ]: 200
Secondary Wavelength     [nm]: 532.1
Secondary Max. Energy [mJ]: 100
Xmit Energy Adjustable   : YES
Pulse Width (FWHM)      [ps]: 200
Max. Repetition Rate     [Hz]: 5
Fullw. Beam Divergence  [ "]: 30
Final Beam Diameter     [m]: 0.093
Eyesafe                  : NO
Eyesafe Standard         : ANSI 136.1
Date Installed           : 2000-06-09
Date Removed             : (yyyy-mm-dd)
Additional Information    : laser repetition rate is 10 Hz,
                          but the time interval counter
                          restricts the maximum rate to 5 Hz

```

6. Receiver System

6.01.01 Primary Chain

```

Wavelength               [nm]: 532
Detector Type            : PMT
Manufacturer              : Photek
Model                    : PMT-318
Quantum Efficiency [%]   : 13%
Nominal Gain             : 1E
Rise Time                [ps]: 350
Jitter (Single PE)[ps]  : 100
Field of View           [ "]: 360
Date Installed           : 2003-07-24
Date Removed             : (yyy-mm-dd)
Signal Processing        : CFD
Manufacturer              : Tennelec
Model                    : TC454
Date Installed           : 2000-06-09
Date Removed             : (yyyy-mm-dd)
Amplitude Measurement   : Yes
Return-rate Controlled  : Yes
Mode of Operation       : Few to Multi Photons
Time of Flight Observ.  : INTERNAL
Manufacturer              : Hewlett-Packard
Model                    : 5370B
Resolution               [ps]: 20
Precision                [ps]: 35
Date Installed           : 2000-06-09
Date Removed             : (yyyy-mm-dd)
Additional Information    : (multiple lines)

```

6.02.01 Secondary Chain

```

Wavelength               [nm]: 532
Detector Type            : MCP
Manufacturer              : ITT
Model                    : F4129F
Quantum Efficiency [%]   : 17.7
Nominal Gain             : 1E
Rise Time                [ps]: 350

```


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```

Jitter (Single PE)[ps]: 100

Field of View      ["]: 360
Date Installed     : 2000-06-09
Date Removed      : 2003-07-24
Signal Processing  : CFD
Manufacturer       : Tennelec
Model              : TC454
Date Installed     : 2000-06-09
Date Removed      : (yyyy-mm-dd)
Amplitude Measurement : yes
Return-rate Controlled: yes
Mode of Operation  : Few to Multi Photons
Time of Flight Observ. : INTERVAL
Manufacturer       : Hewlett-Packard
Model              : 5370B
Resolution         [ps]: 20
Precision          [ps]: 35
Date Installed     : 2000-06-09
Date Removed      : (yyyy-mm-dd)
Additional Information : (multiple lines)

```

6.03.01 Secondary Chain

```

Wavelength        [nm]: 532
Detector Type     : MCP
Manufacturer       : ITT
Model              : F4129F
Quantum Efficiency [%]: 17.7
Nominal Gain      : 1E6
Rise Time         [ps]: 350
Jitter (Single PE)[ps]: 100
Field of View     ["]: 360
Date Installed    : 1986-03-31
Date Removed     : (yyyy-mm-dd)
Signal Processing : CFD
Manufacturer       : Tennelec
Model              : TC454
Date Installed    : 2000-06-09
Date Removed     : (yyyy-mm-dd)
Amplitude Measurement : YES
Return-rate Controlled: YES
Mode of Operation  : Single to Multi Photons
Time of Flight Observ. : INTERVAL
Manufacturer       : Hewlett-Packard
Model              : 5370B
Resolution        [ps]: 20
Precision         [ps]: 35
Date Installed    : 2000-06-09
Date Removed     : (yyyy-mm-dd)
Additional Information : High sensitivity laser receiver configuration.
                        Everything is the same as the primary chain
                        except the discriminator threshold has been
                        lowered to accept single photons and the
                        signal is amplified with 24 dB of gain

```

7. Tracking Capabilities

7.01 Satellites

```

Very Low Alt (<400 km) : YES
Low Altitude (400-2000) : YES
Lageos                 : YES
GLONASS                : YES
Etalon                 : NIGHT
GPS                    : NIGHT
Moon                   : NO
Avg Pass Switch Time [s]: 60
Average values for Lageos
Single Shot RMS       [mm]: 10
# of Obs per NP      : 200
Use of Semi-trains    : NO
# of Semi-train Tracks : N.A.
Range Gate Width     [ns]: 2000
Beam Pointing Accuracy ["]: 0.6
Angle Encoder Resolution["]: 0.6
Min. Tracking Elev. [deg]: 20
Operation

```

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Months per Year : 12
Days per Week : 7
Hours per Day : 16
Staff per Shift : one
System Shared With : none
Time Allocated to SLR [%]: 100
Remotely Controllable : NO
Date First Applicable : 2000-06-09
Date Last Applicable : (yyyy-mm-dd)
Additional Information : On 2002-06-09 went from
5 days a week to 7 days
a week operation. Staff
per shift was reduced from 2
to 1 at this time.

8. Calibration

8.01 Calibration Type : PRE
Target Location : EXTERNAL
Target Type : CORNER CUBE
Target Structure : CONCRETE PIER
Target Distance [m]: 198
Date Measured : 2000-08-07
Accuracy (mm) [mm]: 2
Verification : multi-target ranging
Return-rate Controlled : NO
Mode of Operation : MULTI
Average Cal Interval [min]: 5
Single Shot RMS [mm]: 5
Edit Criterion 1st Chain : ITERATIVE 3 SIGMA
Edit Criterion 2nd Chain : N.A.
Application of Cal Data : AVERAGE
Date Installed : (yyyy-mm-dd)
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

9. Time and Frequency Standards

9.01.01 Frequency Standard Type : Rubidium disciplined by GPS
Model : XL-DC 151-358-108-2
Manufacturer : TrueTime
Short Term Stab. [e-12]: 10
Long Term Stab. [e-12]: 3
Time Reference : GPS
Synchronization : GPS
Epoch Accuracy [ns]: <100
Date Installed : 2000-06-09
Date Removed : (yyyy-mm-dd)
Additional Information : This Truetime model contains the
Stanford PRS10 Rubidium Frequency
Standard

9.02.01 GPS Timing Rcvr Model : XL-DC 151-358-108-2
Manufacturer : TrueTime
Date Installed : 2000-06-09
Date Removed : (yyyy-mm-dd)
Additional Information : CNS clock used for comparisons

10. Preprocessing Information

10.01 On-site NP Generation : NO
Data Screening : IRV
Edit Criterion 1st Chain : ITERATIVE 3.0 SIGMA
Edit Criterion 2nd Chain : N.A.
Upload interval : HOURLY
Date First Applicable : 2000-06-09
Date Last Applicable : 2002-06-19
Additional Information : (multiple lines)

10.02 On-site NP Generation : YES
Data Screening : IRV
Edit Criterion 1st Chain : ITERATIVE 3.0 SIGMA
Edit Criterion 2nd Chain : N.A.
Upload interval : HOURLY
Date First Applicable : 2002-06-19

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Date Last Applicable : (yyyy-mm-dd)
Additional Information : Generic Normal Point Processing
System 2.0 installed 2002-06-19
at 06:30 UT

11. Aircraft Detection

11.01 Detection Type : RADAR
Date Installed : 2002-06-09
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

12. Meteorological Instrumentation

12.01.01 Pressure Sensor Model : MET3
Manufacturer : Paroscientific
Recording Interval : PER PULSE
Accuracy [mbar]: 0.1
Height Diff to SRP [m]: 4
Date Installed : 2000-06-09
Calibration Interval : YEARLY
Date Removed : (yyyy-mm-dd hh:mm UT)
Additional Information : MET3 package replaced on
2002-06-13. Barometric data
taken between 2002-05-13 and
2002-06-12 is suspect.

12.02.01 Temp Sensor Model : MET3
Manufacturer : Paroscientific
Recording Interval : PER PULSE
Accuracy [deg C]: 0.5
Date Installed : 2000-06-09
Calibration Interval : YEARLY
Date Removed : (yyyy-mm-dd hh:mm UT)
Additional Information : (multiple lines)

12.03.01 Humidity Sensor Model : MET3
Manufacturer : Paroscientific
Recording Interval : PER PASS
Accuracy [% rel h]: 2
Date Installed : 2000-06-09
Calibration Interval : YEARLY
Date Removed : (yyyy-mm-dd hh:mm UT)
Additional Information : (multiple lines)

13. Local Ties, Eccentricities, and Collocation Information

13.01 Collocated Permanent Geodetic Systems

GPS : IGS
Date Installed : 1996-09-05
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)
GLONASS : NO
Date Installed : (yyyy-mm-dd)
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)
DORIS : IDS
Date Installed : 2000-08-09
Date Removed : (yyyy-mm-dd)
Additional Information : HBKB
PRARE : NO
Date Installed : (yyyy-mm-dd)
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)
VLBI : YES
Date Installed : 1961-01-01
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)
Gravimeter : NO
Date Installed : (yyyy-mm-dd)
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

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13.02 Collocated Permanent Geodetic Systems

```

GPS                : IGS
  Date Installed   : 1996-09-05
  Date Removed    : (yyyy-mm-dd)
  Additional Information : (multiple lines)
GLONASS            : NO
  Date Installed   : (yyyy-mm-dd)
  Date Removed    : (yyyy-mm-dd)
  Additional Information : (multiple lines)
DORIS              : IDS
  Date Installed   : 1997-05-30
  Date Removed    : 2000-08-08
  Additional Information : HBLA
PRARE              : NO
  Date Installed   : (yyyy-mm-dd)
  Date Removed    : (yyyy-mm-dd)
  Additional Information : (multiple lines)
VLBI               : YES
  Date Installed   : 1961-01-01
  Date Removed    : (yyyy-mm-dd)
  Additional Information : (multiple lines)
Gravimeter         : NO
  Date Installed   : (yyyy-mm-dd)
  Date Removed    : (yyyy-mm-dd)
  Additional Information : (multiple lines)

```

13.03 Collocated Permanent Geodetic Systems

```

GPS                : IGS
  Date Installed   : 1996-09-05
  Date Removed    : (yyyy-mm-dd)
  Additional Information : (multiple lines)
GLONASS            : NO
  Date Installed   : (yyyy-mm-dd)
  Date Removed    : (yyyy-mm-dd)
  Additional Information : (multiple lines)
DORIS              : IDS
  Date Installed   : 1988-03-10
  Date Removed    : 1997-05-23
  Additional Information : HBKA
PRARE              : NO
  Date Installed   : (yyyy-mm-dd)
  Date Removed    : (yyyy-mm-dd)
  Additional Information : (multiple lines)
VLBI               : YES
  Date Installed   : 1961-01-01
  Date Removed    : (yyyy-mm-dd)
  Additional Information : (multiple lines)
Gravimeter         : NO
  Date Installed   : (yyyy-mm-dd)
  Date Removed    : (yyyy-mm-dd)
  Additional Information : (multiple lines)

```

13.02.01 Local Ties from the SRP to Other Monuments or Systems on Site

```

Monument Name      : HRAO
Instrumentation Type : GPS
Instrumentation Status : PERMANENT
DOMES Number       : 30302M004
CDP Number         : (XXXX)
Differential Components (ITRS)
  dx                [m]: -48.556 + 0.0018
  dy                [m]: 65.627 + 0.0013
  dz                [m]: -42.851 + 0.0012
  Date Measured     : (yyyy-mm-dd)
  Determined by     : Ludwig Combrinck
  Date Installed    : 1999-09-05
  Date Removed      : (yyyy-mm-dd)
  Additional Information : (multiple lines)

```

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13.03.01 Eccentricities Between Other Monuments on Site

From: Monument Name : HRAO
DOMES Number : 30302M004
CDP Number : (XXXX)
To: Monument Name : 7232
DOMES Number : 30302S001
CDP Number : 7232
Differential Components (ITRS)
dx [m]: 90.236 + 0.0158
dy [m]: -132.190 + 0.075
dz [m]: 34.704 + 0.039
Date Measured : 1999-06-01
Determined by : Ludwig Combrinck
Additional Information : Previous site log had the wrong
sign for dz and also the wrong
To: monument

13.03.02 Eccentricities Between Other Monuments on Site

From: Monument Name : HARL
DOMES Number : 30302M003
CDP Number : 7501
To: Monument Name : VLBI
DOMES Number : 30302S001
CDP Number : 7232
Differential Components (ITRS)
dx [m]: 41.680 + 0.0158
dy [m]: -66.564 + 0.075
dz [m]: -8.131 + 0.039
Date Measured : 1996-06-01
Determined by : Ludwig Combrinck
Additional Information : (multiple lines)

14. Local Events Possibly Affecting Computed Position

14.01 Date : (yyyy-mm-dd hh:mm UT)
Event : (EARTHQUAKE/CONSTRUCTION/etc)
Additional Information : (multiple lines)

15. On-Site, Point of Contact Agency Information

Agency : Hartebeeshoek Radio Astronomy Observatory
Mailing Address : P.O. Box 443
Krugersdorp 1740
South Africa
Primary Contact
Contact Name : Wilhelm Haupt
Telephone (primary) : 326 0753
Telephone (secondary) : 326 0750
Fax : 326 0756
E-mail : wilhelm@hartrao.ac.za
Secondary Contact
Contact Name : Ludwig Combrinck
Telephone (primary) : 326 0742
Telephone (secondary) : 326 0743
Fax : 326 0756
E-mail : ludwig@hartrao.ac.za
Additional Information : (multiple lines)

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16. Responsible Agency (if different from 15.)

Agency : NASA, Code 920.1
Mailing Address : Code 920.1
: NASA GSFC
: Greenbelt, MD 20771 USA

Primary Contact
Contact Name : David Carter
Telephone (primary) : 1-301-614-5966
Telephone (secondary) :
Fax : 1-301-614-5970
E-mail : dlcarter@pop900.gsfc.nasa.gov

Secondary Contact
Contact Name :
Telephone (primary) :
Telephone (secondary) :
Fax :
E-mail :
Additional Information : (multiple lines)

17. More Information

URL for More Information : www.Hartrao.ac.za
Hardcopy on File
Site Map : NO
Site Diagram : NO
Horizon Mask : NO
Monument Description : NO
Site Pictures : Yes
Additional Information :

5.4. SLR observations description

The translation stage has been put on top of the SLR and is centered on the vertical rotation axis of the SLR and could be used with target or tacheometre.



Target and translation stage centered on the telescope vertical axis to find the eccentricity of the SLR (IGN method). This point has been included into the levelling observations.



Translation stage ...



...and invar rod for levelling

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5.5. DORIS site log

HARTEBEESTHOEK DORIS site description form

0. Form

Prepared by : SIMB (DORIS installation and maintenance department)
Date prepared : 6/05/2004
Report type : UPDATE

1. Site location information

Site name : HARTEBEESTHOEK
Site DOMES number : 30302
Host agency : Satellite Application Centre
City : Hartebeesthoek
State or province : Pretoria
Country : SOUTH AFRICA
Tectonic plate : AFRC
Geological information :

Geographical coordinates (ITRF) :

North Latitude : -25 deg 53' 13''
East Longitude : 27 deg 42' 27''
Ellipsoid height : 1559 m
Approximate altitude : 1556 m

2. DORIS antenna and reference point information

2.1

Four character ID : HBKA
Antenna model : Alcatel
Antenna serial number : 24
IERS DOMES number : 30302S202
CNES/IGN number : 303021
CTDP number : 19
Date installed (dd/mm/yy) : 10/03/1988
Date removed (dd/mm/yy) : 23/05/1997
Antenna support type : 3 meters pylon not guyed
Installed on : Embedded on the side face of a pillar support of a
: one storied building.
Height above ground mark : 6.970 m
Ground mark type : Target glued on concrete floor.
Ground mark DOMES number : 30302M005
Notes :

2.2

Four character ID : HBLA
Antenna model : Alcatel
Antenna serial number : 24
IERS DOMES number : 30302S005
CNES/IGN number : 303022
CTDP number : 76
Date installed (dd/mm/yy) : 30/05/1997
Date removed (dd/mm/yy) : 08/08/2000
Antenna support type : 3.5 m tower not guyed
Installed on : Embedded on the side face of a pillar support of a
: one storied building.
Height above ground mark : ? m
Ground mark type : Domed brass mark
Ground mark DOMES number : 30302M006
Notes :

2.3

Four character ID : HBKB
Antenna model : Starec 52291 type
Antenna serial number : 60
IERS DOMES number : 30302S006
CNES/IGN number : 303023
CTDP number : 95
Date installed (dd/mm/yy) : 09/08/2000
Date removed (dd/mm/yy) :
Antenna support type : 2 meter tubular mast 0.15 m diameter
Installed on : Metallic mast fixed 4 meters deep in ground. 3 m
: soil ground and 1 m rock ground. Mast filled with concrete.

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Height above ground mark : m
Ground mark type : Mark on top of the mast.
Ground mark DOMES number : 30302
Notes :

3. DORIS beacons information

3.1

Beacon serial number : 86 27 019
Beacon model : 1.0
USO serial number : 1.539
4 Char. ID of the REF point : HBKA
Date installed (dd/mm/yy) : 01/04/1988
Date removed (dd/mm/yy) : 04/09/1996

3.2

Beacon serial number : 86 27 005
Beacon model : 1.0
USO serial number : 3.116
4 Char. ID of the REF point : HBKA
Date installed (dd/mm/yy) : 04/09/1996
Date removed (dd/mm/yy) : 26/05/1997

3.3

Beacon serial number : 86 27 005
Beacon model : 1.0
USO serial number : 3.116
4 Char. ID of the REF point : HBLA
Date installed (dd/mm/yy) : 30/05/1997
Date removed (dd/mm/yy) : 09/08/2000

3.4

Beacon serial number : 86 27 005
Beacon model : 1.0
USO serial number : 3.116
4 Char. ID of the REF point : HBKB
Date installed (dd/mm/yy) : 11/08/2000
Date removed (dd/mm/yy) :

4. ITRF coordinates and velocities of the current DORIS ref. point (HBKB)

Solution : ITRF2000 (connection with the IGS station HARK)
Epoch : 1997.0
X = 5084653.326 m Y = 2670347.176 m Z = -2768470.965 m
Sig X = 0.003 m Sig Y = 0.002 m Sig Z = 0.002 m
VX = -0.0012 m/y VY = 0.0198 m/y VZ = 0.0159 m/y
Sig VX = 0.0005 m/y Sig VY = 0.0003 m/y Sig VZ = 0.0004 m/y

5. IERS colocation information

5.1

Instrument type : GPS
Status : Permanent
DOMES number of the
instrument ref. point : 30302M009
Notes :

5.2

Instrument type : VLBI
Status : Permanent
DOMES number of the
instrument ref. point : 30302S001
Notes :

6. Tide Gauge colocation information

7. Local site ties

7.1

Point description : DORIS Alcatel antenna reference point (HBLA)
DOMES number : 30302S005
Differential components from the current DORIS ref. point (HBKB)
to the above point (in the ITRS) :
dX (m) : -11.833
dY (m) : 2.762
dZ (m) : -26.889
Accuracy (m) : 0.002
Date measured : August 2000
Additional information : Survey by IGN-F

7.2

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Point description : HARK IGS station
DOMES number : 30302M007
Differential components from the current DORIS ref. point (HBKB)
to the above point (in the ITRS) :
dX (m) : -28.023
dY (m) : 19.052
dZ (m) : -23.577
Accuracy (m) : 0.001
Date measured : August 2000
Additional information : Survey by IGN-F

7.3

Point description : HARB IGS station
DOMES number : 30302M009
Differential components from the current DORIS ref. point (HBKB)
to the above point (in the ITRS) :
dX (m) : 4.327
dY (m) : -22.214
dZ (m) : -10.332
Accuracy (m) : 0.001
Date measured : August 2000
Additional information : Survey by IGN-F

7.4

Point description : DORIS Alcatel antenna reference point (HBKA)
DOMES number : 30302S202
Differential components from the current DORIS ref. point (HBKB)
to the above point (in the ITRS) :
dX (m) : -11.790
dY (m) : 2.543
dZ (m) : -26.195
Accuracy (m) : 0.02
Date measured :
Additional information :

8. Meteorological Instrumentation

8.1 Humidity sensor

Model : MUC.1 + transmitter M-UTN3
Manufacturer : SPSI
Accuracy :
Notes :

8.2 Pressure sensor

Model : M-PaTN.8
Manufacturer : SPSI
Accuracy :
Height : m above the current DORIS ref. point (HBKB)
Notes :

8.3 Temperature sensor

Model : Constructed for DORIS beacons
Manufacturer : CEIS-TM
Accuracy :
Notes :

9. DORIS network contacts

Primary contact:

Name : Herve FAGARD
Agency : Institut Geographique National
Mailing address : Service de Geodesie et de Nivellement
: 2 Avenue PASTEUR
: 94165 SAINT-MANDE CEDEX FRANCE
Telephone : + 33 1 43 98 81 48
Fax : + 33 1 43 98 84 50
E-mail : herve.fagard@ign.fr

Secondary contact:

Name : Francois BOLDO
Agency : Institut Geographique National
Mailing address : CNES (ED/AL/MA)
: 18 Avenue Edouard BELIN
: 31401 TOULOUSE Cedex FRANCE
Telephone : + 33 5 61 27 40 72
Fax : + 33 5 61 28 25 95
E-mail : Simb.Doris@cnes.fr

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5.6. VLBI station logsheet

Network Station Configuration File
International VLBI Service

Refer to the instructions in the file
ftp://ivscc.gsfc.nasa.gov/config/instructions.txt
for how to fill out and submit this form.
990624 nrv Form version 0.5
990702 nrv Form version 0.6

990713 nrv Form version 0.7
991020 nrv Form version 0.8

0. Form

Prepared by (full name) : Ludwig Combrinck
Date prepared : 2000-MAY-15
Report type : new

1. Site identification

Site name : Hartebeesthoek Radio Astronomy Observatory
Site 8-letter code : HARTRAO
Site 2-letter code(s) : Hh
IERS DOMES number : 30302S001
CDP occupation code :
CDP monument number : 7232
Surveyed into national network? : yes
IGS station code : HRAO
ILRS station name :
Additional information : MOBLAS6 will be collocated during 2000

2. Site information

2.1 Site location information

City or Town : Krugersdorp
State or Province : Gauteng
Country : South Africa
Tectonic plate : African
Approximate position
X coordinate (m) : 5085442.780
Y coordinate (m) : 2668263.483
Z coordinate (m) : -2768697.034
Latitude (deg) : -25.88975199 S
Longitude (deg) : 27.68539261 E
Elevation (m) : 1415
Source of position : ITRF
Additional information : Elevation is above WGS84 ellipsoid

2.2 Site local survey network information

Number of reference markers : 12
Type of marker : pillar
Frequency of surveying : annual
Surveying method : GPS
Survey instruments used : GPS
Accuracy : 3 mm
Survey performed by : Ludwig Combrinck
Survey documentation : report
Most recent survey date : 2000-mar-10
Results provided to IERS: yes
Results provided to CDDIS: no
Person responsible : Ludwig Combrinck
Additional information :

2.3 Site descriptive information

Electronic file available at IVSCC:
(Please upload these files to ftp://ivscc.gsfc.nasa.gov/incoming
and send e-mail to ivscc@ivscc.gsfc.nasa.gov telling the names.)

<p style="text-align: center;">Institut Géographique National Direction de la Production Service de Géodésie et de Nivellement</p>	<p style="text-align: center;">Hartebeesthoek Co-location Survey</p>	<p>RT/G 61</p> <p style="text-align: right;">Page 51 / 146 Version : 1 Révision : 0 Date 27/06/2005</p>
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ns is for Network Stations (don't change)
 Xy is station 2-letter code
 sm, sd, hm, md, sp indicate the type of file (don't change)
 NN are numbers, 01 is the first such file, 02 the second, etc.
 .type is the file type, .ps for PostScript, .jpg for JPEG, etc.

Site map : nsXysmNN.type
 Site diagram : nsXysmNN.type
 Horizon mask diagram : nsXysmNN.type
 Monument description : nsXysmNN.type
 Site photographs : nsXysmNN.type

URLs for reference

Site map :
 Site diagram :
 Horizon mask :
 Monument description :
 Site photographs :
 Additional information :

3. Antenna information

Diameter (m) : 26
 Axis type : HADC
 Axis offset (m) : 6.6956 + 2.3 mm
 Slew rate first axis : 0.5 deg/sec
 Slew rate second axis : 0.5 deg/sec
 Limit stops first axis : -88,
 Limit stops second axis : -88,
 Horizon mask data : (Pairs of values separated with /.
 Either line segment end points:
 Az1 El1/Az2 El2/.../Azlast Ellast
 or step function:
 Az1 El1/Az2 El2/.../Azlast)
 Occupation dates : (yyyy-mm-dd to yyyy-mm-dd)
 Additional information : (multiple lines allowed)

4. Receiver information

Feed location : cassegrain focus
 Feed type : dichroic
 X 1st-stage amplifier : cooled HEMT
 X bandwidth (MHz) : 800
 X Tsys at zenith (K) : 40
 X SEFD (Jy) :
 X aperture efficiency : (optional)
 X LO frequencies (MHz) : 8080
 S 1st-stage amplifier : cooled HEMT
 S bandwidth (MHz) : 240
 S Tsys at zenith (K) : 50
 S SEFD (Jy) :
 S aperture efficiency : (optional)
 S LO frequencies (MHz) : 2020
 Phase calibrator type : NASA/CDP with 5 MHz input
 Additional information : (multiple lines allowed)

5. Cables between receiver and back end

Length of cable run : (between front end and back end, meters)
 X band cable type : (e.g. RG214, optical fiber, etc.)
 X band freq. bandpass : (MHz)
 S band cable type : (e.g. RG214, optical fiber, etc.)
 S band freq. bandpass : (MHz)
 LO ref signal cable type: (e.g. RG214, optical fiber, etc.)
 LO ref signal freq. : (MHz)
 Phase cal ref signal cable type: (e.g. RG214, optical fiber, etc.)
 Phase cal ref signal freq. : (MHz)
 Cable meas. system type : MarkIII cable cal
 Additional information : (multiple lines allowed, e.g. multiple
 signals multiplexed on a single cable)

6. Data acquisition system information

6.1 Video/baseband converter set (group each set of up to 16 mixers with similar characteristics)

Type of converters : MarkIV, K4-1
 Number of mixers : MarkIV type has 1 mixer per converter,
 Sidebands available : U&L

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Number of mixers with
the following filters in
all sideband outputs:

2 MHz : 15
4 MHz : 15
8 MHz : 15
16 MHz : 15
32 MHz : 15

Additional information : (multiple lines allowed)

6.1.x (add sections for each additional video/baseband converter set)

6.2 Formatter

Formatter type : MarkIV, S2
Serial number or rack ID: SN 007
Additional information : (multiple lines allowed)

6.2.x (add sections for each additional formatter)

6.3 Decoder

Decode type : MarkIII, S2
Additional information : (multiple lines allowed)

6.3.x (add sections for each additional decoder)

6.4 IF distribution

IF distributor type : MarkIII/IV
Additional information : (multiple lines allowed)

6.4.x (add sections for each additional IF distribution)

6.5 Up/down converters

X up/down converter freq.: (MHz) (up/down)
S up/down converter freq.: (MHz) (up/down)
Additional information : (multiple lines allowed)

6.5.x (add sections for each additional converter)

6.6 Other rack equipment : CresTech VIA interface box,
S2 16 channel sampler
Additional information : (multiple lines allowed)

6.6.x (add lines or sections for other types of rack equipment)

6.7 Recorders

Recorder type : MarkIV, S2
Number of recorders : 1 MarkIV, 1 S2
Tape type : thin, S2 type
Additional information : (multiple lines allowed)

6.7.x (add sections for each recorder type)

6.8 Data Acquisition System Configuration Types Supported
(list only those that are actually usable)

6.8.1 Configuration 1 : (list elements from section 6 that
: make a usable configuration)
: Example:
: 6.8.1.1 MKIV IF distribution
: 6.8.1.2 MKIV BBCs
: 6.8.1.3 MKIV formatter
: 6.8.1.4 MKIV decoder
: 6.8.1.5 MKIV recorder

6.8.2 Configuration 2 : 6.8.2.1 IF distributor MKIV
: 6.8.2.2 MKIV BBCs
: 6.8.2.3 S2 16 Chan 1 bit sampler
: 6.8.2.4 Crestech
: 6.8.2.5 S2 Recorder

7 Meteorological instrumentation

7.1 Humidity sensor

Manufacturer : Delta OHM
Model : HD 8508TC

<p style="text-align: center;">Institut Géographique National Direction de la Production Service de Géodésie et de Nivellement</p>	<p style="text-align: center;">Hartebeesthoek Co-location Survey</p>	<p>RT/G 61</p> <p style="text-align: right;">Page 53 / 146 Version : 1 Révision : 0 Date 27/06/2005</p>
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Accuracy : (% rel h)
Effective dates : (yyyy-mmm-dd to yyyy-mmm-dd)
Additional information : (multiple lines allowed)

7.2 Pressure sensor

Manufacturer : Setra
Model : Sirius III SP-208
Accuracy : 0.1
Effective dates : (yyyy-mmm-dd to yyyy-mmm-dd)
Height relative to VLBI : (m)
Additional information : (multiple lines allowed)

7.3 Temperature sensor

Manufacturer : Delta OHM
Model : HD 8508TC
Accuracy : (degrees)
Effective dates : (yyyy-mmm-dd to yyyy-mmm-dd)
Additional information : (multiple lines allowed)

8. Time and frequency standards

8.1

Standard type : H-maser
Installed dates : 1985-MAY-13
Manufacturer : Oscilloquartz
Model number or ID : EFOS 6
Additional information : (multiple lines allowed)

8.x (add more sections for each standard)

9. Auxilliary equipment information

Type of equipment : (WVR, etc.)
Installed dates : (yyyy-mmm-dd to yyyy-mmm-dd)
Manufacturer :
Model number or ID :
Additional information : (multiple lines allowed)

9.x (add sections for additional auxilliary equipment)

10. Co-location information

10.1

Instrument type : GPS
Instrument name : Ashtec Z12
Status : Permanent
Effective dates : 1996-SEP-05
Included in local survey: yes
Additional information : (multiple lines allowed)

10.x (add sections for each type)

11. Field System computer information

System vendor : PCI
CPU : P
CPU speed : 100 MHz
Memory : 48 Mbytes
Disk : 2x1 Gbytes
Linux release : Debian 2.0
Internet connection : direct
Antenna interface type : ethernet
Spare FS computer? : yes

12. Known RFI sources

12.1

Center frequency : (MHz)
Approximate bandwidth :
Approximate az/el range : (give range affected by RFI)
Additional informaiton : (multiple lines allowed, give estimate
of strength of interference)

12.x (add sections for multiple RFI sources and frequencies)

13. On-site contact information

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Agency : Hartebeesthoek Radio Astronomy Observatory
Shipping address : CSIR Clearing Officer
Johannesburg International Airport
To: HartRAO
Attention: Frans Nortje/Annette Joubert
Tel: 012-841 3545
Postal address : (if different, multiple lines)
URL of site web page : <http://www.hartrao.ac.za>
On-site Friend of VLBI
Name : Jonathan Quick
Telephone (primary) : 12 326 0742
Telephone (alternate) :
Fax : 12 326 0756
E-mail : jon@hartrao.ac.za
On-site VLBI operations room
Telephone (primary) : 12 326 0742
Telephone (alternate) :
Fax : 12 326 0756
E-mail :
Other on-site contact
Name : Ludwig Combrinck
Telephone (primary) : 12 326 0742
Telephone (alternate) :
Fax : 12 326 0756
E-mail : ludwig@hartrao.ac.za
Additional information : (multiple lines allowed)

14. Responsible agency (if different from on-site information)

Agency : (multiple lines)
Shipping address : (multiple lines)
Postal address : (if different, multiple lines)
URL of agency web page :
Primary administrative agency contact
Contact person :
Telephone (primary) :
Telephone (alternate) :
Fax :
E-mail :
Alternate agency contact
Contact person :
Telephone (primary) :
Telephone (alternate) :
Fax :
E-mail :
Additional information : (multiple lines allowed)

15. More information

Additional information : (multiple lines allowed)

5.7. HartRAO survey control piers

Pier 1

1_P (old name : 7) :
self-centering plate

1111 :
benchmark



Pier 2

2_P (old name : Cal Pier A) :
self-centering plate

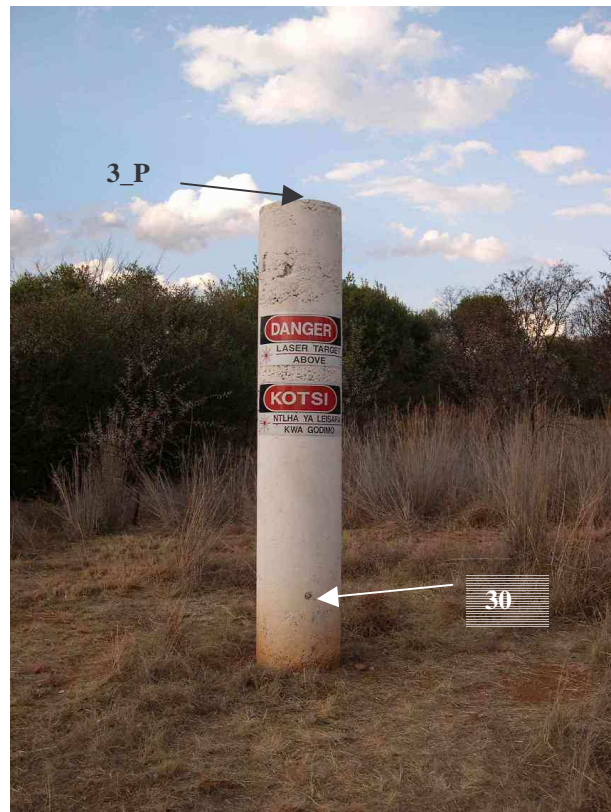
20 :
benchmark



Pier 3

3_P (old name : Cal Pier B) :
self-centering plate

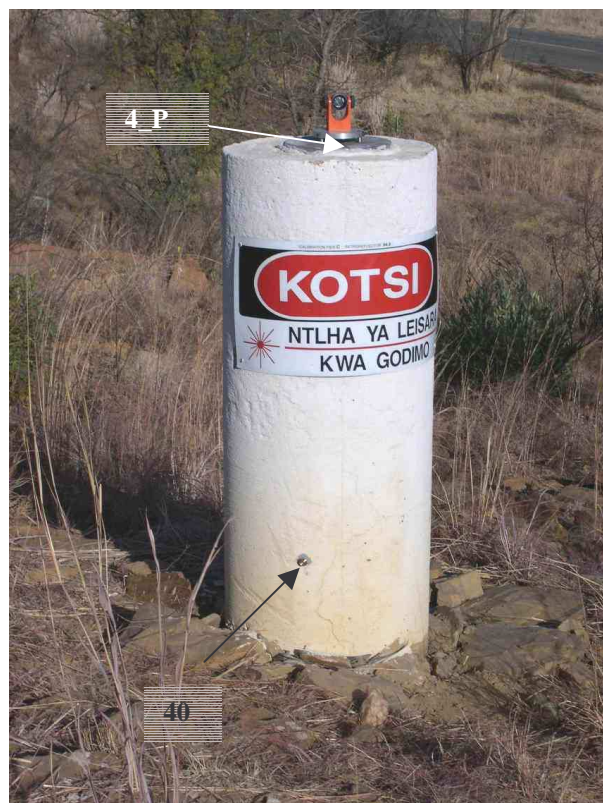
30 :
benchmark



Pier 4

4_P (old name : Cal Pier C) :
self-centering plate

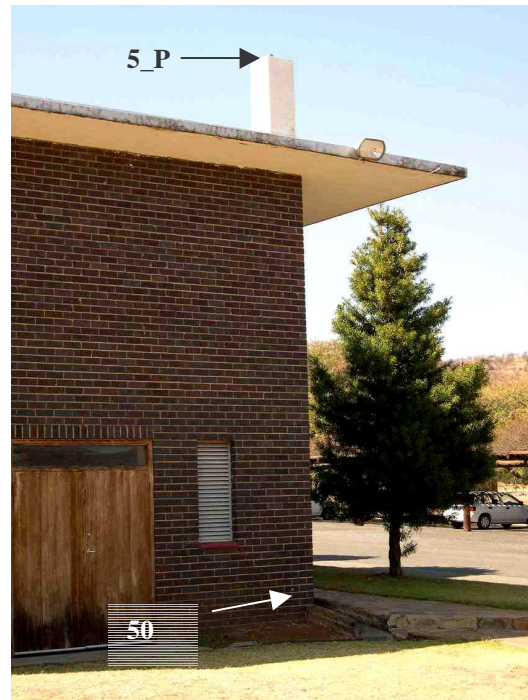
40 :
benchmark



Pier 5

5_P (old name : Cal Pier D) :
self-centering plate

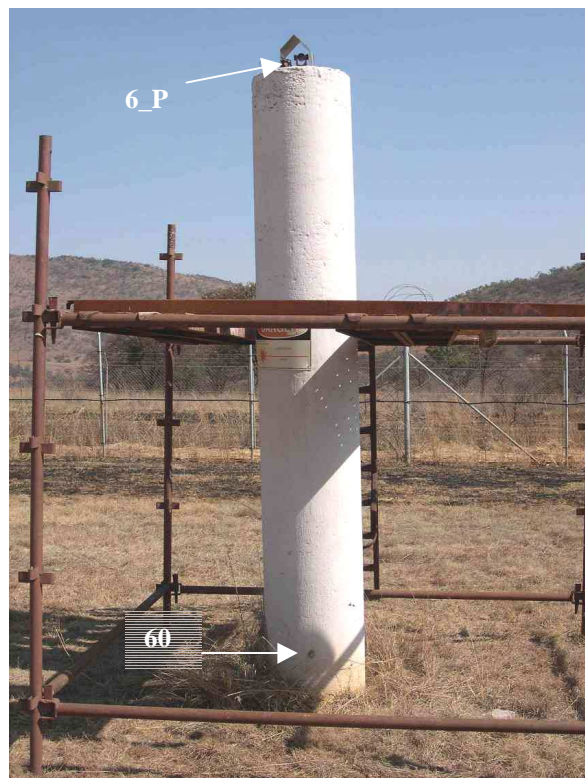
50 :
benchmark



Pier 6

6_P (old name : Cal Pier E) :
self-centering plate

60 :
benchmark



Pier 17

17_P (new pier) :
self-centering plate

170 :
benchmark



Benchmark type used on piers

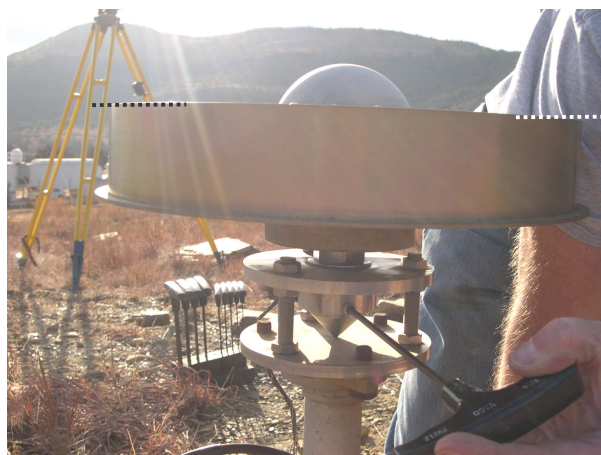


5.8. IGS GPS stations antenna intersections

HRAO antenna intersections



References for horizontal determination



References for vertical determination

HARB antenna intersections



References for horizontal determination



References for vertical determination

5.9. GPS network covariance matrix

*CMT Input File Name: D:\temp\HRAOFIN.CRD

```

3DD
XYZ      8GPS      5085352.4810      2668395.8000      -2768731.5720 m  0
XYZ      3GPS      5084657.6353      2670325.0851      -2768481.1863 m  0
XYZ      412_P     5084728.1864      2670054.0571      -2768650.7604 m  0
XYZ      418_P     5084555.5645      2670542.6816      -2768474.3601 m  0
XYZ      3_P       5085397.7373      2668410.2400      -2768634.0370 m  0
XYZ      6_P       5085499.8100      2668160.3987      -2768659.8136 m  0
XYZ      403_P    5084867.8560      2670347.1565      -2768064.9845 m  0
XYZ      5_P       5085415.4984      2668225.1897      -2768765.9402 m  0
XYZ      200_P    5084652.9018      2670347.0877      -2768470.6309 m  0
COV  CT  UPPR    0.00000    0.00100    0.00000    0.00000    0.00000    0.00000    0.00000 m
ELEM  2.382703362000000e-03  1.032287697000000e-03  -9.212155985000000e-04 m
ELEM  1.261244126000000e-03  5.710807258000000e-04  -4.855901848000000e-04 m
ELEM  1.255366803000000e-03  5.686115748000000e-04  -4.813540334000000e-04 m
ELEM  1.217552371000000e-03  5.381187152000000e-04  -4.692514777000000e-04 m
ELEM  1.216419797000000e-03  5.382907279000000e-04  -4.685249682000000e-04 m
ELEM  1.238935846000000e-03  5.459654685000000e-04  -4.809096773000000e-04 m
ELEM  1.216891679000000e-03  5.377552631000000e-04  -4.690336895000000e-04 m
ELEM  1.260597077000000e-03  5.727579849000000e-04  -4.821208233000000e-04 m
ELEM  1.084818780000000e-03  -4.700268315000000e-04  5.663432682000000e-04 m
ELEM  5.872296206000000e-04  -2.514828569000000e-04  5.633661485000000e-04 m
ELEM  5.856278856000000e-04  -2.492251266000000e-04  5.360421528000000e-04 m
ELEM  5.598278969000000e-04  -2.412642208000000e-04  5.358988565000000e-04 m
ELEM  5.599177819000000e-04  -2.409954160000000e-04  5.444484548000000e-04 m
ELEM  5.663521685000000e-04  -2.459411601000000e-04  5.355819860000000e-04 m
ELEM  5.595724699000000e-04  -2.410924520000000e-04  5.679233638000000e-04 m
ELEM  5.897356667000000e-04  -2.497267550000000e-04
ELEM  9.984483184000000e-04  -4.860096580000000e-04  -2.537014722000000e-04 m
ELEM  5.112485110000000e-04  -4.828273321000000e-04  -2.524432730000000e-04 m
ELEM  5.081424298000000e-04  -4.697310073000000e-04  -2.424004104000000e-04 m
ELEM  5.027108168000000e-04  -4.691434833000000e-04  -2.422977804000000e-04 m
ELEM  5.021616182999999e-04  -4.820465010000000e-04  -2.474844768000000e-04 m
ELEM  5.100273644000000e-04  -4.695635304000000e-04  -2.423196514000000e-04 m
ELEM  5.026060947000000e-04  -4.850480377000000e-04  -2.541166059000000e-04 m
ELEM  5.086480074000000e-04
ELEM  6.024214036000000e-03  2.897723301000000e-03  -2.477972242000000e-03 m
ELEM  1.945364054000000e-03  9.304193110000000e-04  -7.655776763000000e-04 m
ELEM  2.216242259000000e-03  1.053203033000000e-03  -8.959511540000000e-04 m
ELEM  1.746306573000000e-03  8.179027705000000e-04  -6.948678654000000e-04 m
ELEM  2.322377239000000e-03  1.102439492000000e-03  -9.476230660000000e-04 m
ELEM  1.840570267000000e-03  8.720998804000000e-04  -7.398680811000000e-04 m
ELEM  1.370730762000000e-03  6.503284731000000e-04  -5.403850726000000e-04 m
ELEM  3.207956926000000e-03  -1.239831233000000e-03  9.292883624000000e-04 m
ELEM  9.934029025000001e-04  -3.801128421000000e-04  1.054560824000000e-03 m
ELEM  1.149232375000000e-03  -4.496587804000000e-04  8.181702742000000e-04 m
ELEM  8.818789517000000e-04  -3.402419634000000e-04  1.105001868000000e-03 m
ELEM  1.199358982000000e-03  -4.745731622000000e-04  8.736231376000000e-04 m
ELEM  9.487885544999999e-04  -3.664775055000000e-04  6.495871502000000e-04 m
ELEM  6.925190964000000e-04  -2.708203731000000e-04
ELEM  2.823494360000000e-03  -7.670458550000000e-04  -3.815827333000000e-04 m
ELEM  8.400261886000000e-04  -8.959514411000000e-04  -4.491019991000000e-04 m
ELEM  1.006002098000000e-03  -6.939245249000000e-04  -3.391711624000000e-04 m
ELEM  7.748503090000000e-04  -9.514163170000000e-04  -4.754056905000000e-04 m
ELEM  1.051926251000000e-03  -7.394167990000000e-04  -3.655032919000000e-04 m
ELEM  8.308295800000000e-04  -5.413709249000000e-04  -2.718519899000000e-04 m
ELEM  5.918403746000001e-04
ELEM  5.543838499000000e-03  2.680249523000000e-03  -2.263166879000000e-03 m
ELEM  1.910002492000000e-03  8.971671281000000e-04  -7.592013855000000e-04 m
ELEM  2.068033895000000e-03  9.843719336000000e-04  -8.408183615000000e-04 m
ELEM  1.404202585000000e-03  6.585466268000000e-04  -5.554739360000000e-04 m
ELEM  1.888132892000000e-03  8.930407536000000e-04  -7.574788670000000e-04 m
ELEM  2.211889558000000e-03  1.091481158000000e-03  -8.846576680000000e-04 m
ELEM  3.007051278000000e-03  -1.084485837000000e-03  8.973669033000000e-04 m
ELEM  9.649034843000000e-04  -3.716105792000000e-04  9.856978363000000e-04 m
ELEM  1.080092894000000e-03  -4.132414051000000e-04  6.603024244000000e-04 m
ELEM  7.036162367000000e-04  -2.770159155000000e-04  8.936827357000000e-04 m
ELEM  9.675721294000000e-04  -3.730412997000000e-04  1.093905723000000e-03 m
ELEM  1.191049451000000e-03  -4.406587989000000e-04
ELEM  2.637258166000000e-03  -7.581940869000000e-04  -3.709543811000000e-04 m
ELEM  8.424213492000000e-04  -8.411261619000000e-04  -4.129712809000000e-04 m

```

ELEM	9.518127980000000e-04	-5.542367110000000e-04	-2.756974166000000e-04	m
ELEM	6.083048688000000e-04	-7.572771360000000e-04	-3.725450182000000e-04	m
ELEM	8.494410280000000e-04	-8.874587108000000e-04	-4.425651045000000e-04	m
ELEM	9.907997456999999e-04			
ELEM	6.525768210000000e-03	3.252419000000000e-03	-2.703858503000000e-03	m
ELEM	1.779770327000000e-03	8.405642596000000e-04	-7.089891814000000e-04	m
ELEM	2.316838442000000e-03	1.124061474000000e-03	-9.387997849000000e-04	m
ELEM	1.866909693000000e-03	8.953006559000000e-04	-7.496339731000000e-04	m
ELEM	1.363230916000000e-03	6.435488675000000e-04	-5.394225612000000e-04	m
ELEM	3.577607250000000e-03	-1.367621512000000e-03	8.403879830000000e-04	m
ELEM	9.045200812000000e-04	-3.462613184000000e-04	1.123238825000000e-03	m
ELEM	1.229544736000000e-03	-4.754661824000000e-04	8.953991312000000e-04	m
ELEM	9.729056993000000e-04	-3.733168405000000e-04	6.421520668000000e-04	m
ELEM	6.877260240000000e-04	-2.684475590000000e-04		
ELEM	3.025015597000000e-03	-7.089401255000000e-04	-3.462270151000000e-04	m
ELEM	7.861700245000000e-04	-9.348457166000001e-04	-4.744672549000000e-04	m
ELEM	1.053784714000000e-03	-7.495664350000000e-04	-3.733339037000000e-04	m
ELEM	8.391012945000000e-04	-5.403652080000000e-04	-2.697500158000000e-04	m
ELEM	5.941684816000000e-04			
ELEM	7.198628962000000e-03	3.589791547000000e-03	-2.949268962000000e-03	m
ELEM	1.317823761000000e-03	6.151092327000000e-04	-5.238901328000000e-04	m
ELEM	1.829554526000000e-03	8.748807643000000e-04	-7.390709284000000e-04	m
ELEM	2.392077745000000e-03	1.139802443000000e-03	-9.777912677000000e-04	m
ELEM	3.954359633000000e-03	-1.426870186000000e-03	6.155911279000000e-04	m
ELEM	6.596152678000000e-04	-2.605468042000000e-04	8.746024719000000e-04	m
ELEM	9.485000012000000e-04	-3.709952318000000e-04	1.137377447000000e-03	m
ELEM	1.253151684000000e-03	-4.746902538000000e-04		
ELEM	3.347384887000000e-03	-5.237350998000000e-04	-2.605833046000000e-04	m
ELEM	5.774048495999999e-04	-7.389517300000000e-04	-3.709152865000000e-04	m
ELEM	8.226812868000000e-04	-9.756681324000000e-04	-4.736345591000000e-04	m
ELEM	1.115064141000000e-03			
ELEM	2.794888463000000e-02	1.281989237000000e-02	-1.014725071000000e-02	m
ELEM	2.186917582000000e-03	1.049195134000000e-03	-8.676574711000000e-04	m
ELEM	1.233510222000000e-03	5.776876947000000e-04	-4.866580675000000e-04	m
ELEM	1.270667460000000e-02	-4.604561571000000e-03	1.049255768000000e-03	m
ELEM	1.142210854000000e-03	-4.268400249000000e-04	5.757732061000000e-04	m
ELEM	6.160527478000001e-04	-2.426576504000000e-04		
ELEM	1.036855001000000e-02	-8.702096439000000e-04	-4.275537689000000e-04	m
ELEM	9.835553671000000e-04	-4.880499664000000e-04	-2.441209750000000e-04	m
ELEM	5.361725097000000e-04			
ELEM	6.144819464000000e-03	3.004412705000000e-03	-2.463322858000000e-03	m
ELEM	2.164050100000000e-03	1.016624627000000e-03	-8.705938427999999e-04	m
ELEM	3.281676687000000e-03	-1.188335771000000e-03	1.015348222000000e-03	m
ELEM	1.107893034000000e-03	-4.225878662000000e-04		
ELEM	2.791243362000000e-03	-8.695040728000000e-04	-4.220320864000000e-04	m
ELEM	9.870644449999999e-04			
ELEM	1.362617458000000e-02	6.473768224000000e-03	-5.323266858000000e-03	m
ELEM	7.148591209000000e-03	-2.361477492000000e-03		
ELEM	6.243168393000000e-03			

5.10. HartRAO ground network adjustment results

```

=====
                                HRAO.iob
Microsearch GeoLab, V2001.9.20.0      GRS80      UNITS: m,GRAD Page 0001
=====
Tue Jun 14 19:05:47 2005

```

```

Input file: D:\Valerie\chantier devis\HRAO\calculs juin\HRAO\HRAO.iob
Output file: D:\Valerie\chantier devis\HRAO\calculs juin\HRAO\HRAO.lst
Options file: C:\PROGRA~1\MICROS~3\GeoLab\default.gpj

```

PARAMETERS		OBSERVATIONS	
Description	Number	Description	Number
No. of Stations	61	Directions	116
Coord Parameters	147	Distances	76
Free Latitudes	43	Azimuths	1
Free Longitudes	43	Vertical Angles	0
Free Heights	61	Zenithal Angles	109
Fixed Coordinates	36	Angles	0
Astro. Latitudes	0	Heights	0
Astro. Longitudes	0	Height Differences	93
Geoid Records	0	Auxiliary Params.	0
All Aux. Pars.	38	2-D Coords.	0
Direction Pars.	38	2-D Coord. Diffs.	82
Scale Parameters	0	3-D Coords.	3
Constant Pars.	0	3-D Coord. Diffs.	0
Rotation Pars.	0		
Translation Pars.	0		
-----		-----	
Total Parameters	185	Total Observations	480
Degrees of Freedom =		295	

SUMMARY OF SELECTED OPTIONS

OPTION	SELECTION
Computation Mode	Adjustment
Maximum Iterations	30
Convergence Criterion	0.00010
Residual Rejection Criterion	Tau Max
Confidence Region Types	1D 2D 3D Station
Variance Factor (VF) Known	Yes
Scale Covariance Matrix With VF	Yes
Scale Residual Variances With VF	No
Force Convergence in Max Iters	No
Distances Contribute To Heights	Yes
Compute Full Inverse	Yes
Optimize Band Width	Yes
Generate Initial Coordinates	Yes
Re-Transform Obs After 1st Pass	Yes
Geoid Interpolation Method	Bi-Quadratic

=====
 HRAO.iob
 Microsearch GeoLab, V2001.9.20.0 GRS80 UNITS: m,GRAD Page 0003
 =====

Adjusted PLH Coordinates:

CODE	FFF	STATION		LATITUDE STD DEV		LONGITUDE STD DEV		ELIP-HEIGHT STD DEV	
PLH	110	10	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1406.8422 0.0011	m 0
PLH	000	1001	S 25 53	21.48092 0.0005	E 27 41	9.65551 0.0004		1410.1170 0.0011	m 0
PLH	000	1002	S 25 53	18.08007 0.0005	E 27 41	10.58451 0.0006		1411.4363 0.0012	m 0
PLH	000	1003	S 25 53	20.86453 0.0005	E 27 41	12.83247 0.0004		1413.9627 0.0012	m 0
PLH	000	1004	S 25 53	24.90419 0.0004	E 27 41	13.12451 0.0002		1413.4848 0.0012	m 0
PLH	000	1005	S 25 53	25.71620 0.0005	E 27 41	6.65073 0.0004		1408.3501 0.0012	m 0
PLH	000	1006	S 25 53	21.98232 0.0007	E 27 41	3.18320 0.0004		1402.1379 0.0012	m 0
PLH	000	1016	S 25 53	22.94937 0.0005	E 27 41	10.23073 0.0004		1410.9179 0.0012	m 0
PLH	000	1017	S 25 53	24.11856 0.0004	E 27 41	15.13743 0.0004		1416.1484 0.0012	m 0
PLH	110	1111	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1407.1746 0.0011	m 0
PLH	110	13	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1406.8152 0.0011	m 0
PLH	110	16	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1410.5374 0.0011	m 0
PLH	000	16_26	S 25 53	22.94937 0.0005	E 27 41	10.23073 0.0003		1410.9197 0.0011	m 0
PLH	000	16_C	S 25 53	22.94937 0.0005	E 27 41	10.23073 0.0005		1410.0284 0.0015	m 0
PLH	000	16_P	S 25 53	22.94937 0.0005	E 27 41	10.23073 0.0004		1410.5174 0.0011	m 0
PLH	110	17	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1415.9311 0.0010	m 0
PLH	110	170	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1414.3746 0.0010	m 0
PLH	000	17_25	S 25 53	24.11855 0.0005	E 27 41	15.13743 0.0004		1416.1456 0.0013	m 0
PLH	000	17_26	S 25 53	24.11856 0.0004	E 27 41	15.13743 0.0004		1416.1464 0.0011	m 0
PLH	000	17_P	S 25 53	24.11856 0.0004	E 27 41	15.13743 0.0004		1415.8607 0.0010	m 0
PLH	000	1_25	S 25 53	21.48092 0.0005	E 27 41	9.65551 0.0004		1410.1143 0.0012	m 0
PLH	000	1_26	S 25 53	21.48092 0.0005	E 27 41	9.65550 0.0004		1410.1164 0.0011	m 0
PLH	000	1_P	S 25 53	21.48092 0.0005	E 27 41	9.65550 0.0004		1409.8266 0.0011	m 0
PLH	110	2	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1411.2214 0.0011	m 0
PLH	110	20	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1409.5888 0.0011	m 0
PLH	000	2_26	S 25 53	18.08007 0.0005	E 27 41	10.58451 0.0005		1411.4358 0.0012	m 0
PLH	000	2_P	S 25 53	18.08007 0.0005	E 27 41	10.58451 0.0006		1411.1501 0.0011	m 0
PLH	110	30	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1411.4813 0.0011	m 0
PLH	000	3001	S 25 53	21.48092 0.0005	E 27 41	9.65550 0.0004		1410.1176 0.0011	m 0
PLH	000	3002	S 25 53	18.08007 0.0005	E 27 41	10.58451 0.0006		1411.4363 0.0012	m 0
PLH	000	3003	S 25 53	20.86453 0.0005	E 27 41	12.83247 0.0004		1413.9622 0.0012	m 0
PLH	000	3004	S 25 53	24.90419 0.0004	E 27 41	13.12451 0.0002		1413.4851 0.0011	m 0
PLH	000	3005	S 25 53	25.71620 0.0005	E 27 41	6.65073 0.0004		1408.3502 0.0012	m 0
PLH	000	3006	S 25 53	21.98232 0.0007	E 27 41	3.18320 0.0004		1402.1375 0.0012	m 0

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Adjusted PLH Coordinates:

CODE	FFF	STATION	LATITUDE STD DEV	LONGITUDE STD DEV	ELIP-HEIGHT STD DEV		
PLH	000	3016	S 25 53 22.94937 0.0005	E 27 41 10.23073 0.0004	1410.9191 m 0.0012		0
PLH	000	3017	S 25 53 24.11856 0.0004	E 27 41 15.13743 0.0004	1416.1481 m 0.0012		0
PLH	000	3_25	S 25 53 20.86453 0.0005	E 27 41 12.83247 0.0004	1413.9630 m 0.0013		0
PLH	000	3_26	S 25 53 20.86453 0.0005	E 27 41 12.83246 0.0004	1413.9614 m 0.0012		0
PLH	000	3_P	S 25 53 20.86453 0.0005	E 27 41 12.83247 0.0004	1413.6779 m 0.0011		0
PLH	110	4	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1413.2716 m 0.0010		0
PLH	110	40	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1412.2920 m 0.0010		0
PLH	000	4_25	S 25 53 24.90419 0.0004	E 27 41 13.12451 0.0003	1413.4830 m 0.0012		0
PLH	000	4_26	S 25 53 24.90419 0.0004	E 27 41 13.12451 0.0003	1413.4845 m 0.0012		0
PLH	000	4_P	S 25 53 24.90419 0.0004	E 27 41 13.12451 0.0002	1413.1996 m 0.0010		0
PLH	110	5	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1408.1353 m 0.0011		0
PLH	110	50	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1401.2009 m 0.0010		0
PLH	000	5_25	S 25 53 25.71620 0.0005	E 27 41 6.65073 0.0004	1408.3490 m 0.0014		0
PLH	000	5_26	S 25 53 25.71620 0.0005	E 27 41 6.65074 0.0004	1408.3488 m 0.0013		0
PLH	000	5_P	S 25 53 25.71620 0.0005	E 27 41 6.65073 0.0004	1408.0645 m 0.0011		0
PLH	110	60	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1399.0075 m 0.0011		0
PLH	000	6_25	S 25 53 21.98232 0.0008	E 27 41 3.18320 0.0005	1402.1042 m 0.0013		0
PLH	000	6_26	S 25 53 21.98232 0.0007	E 27 41 3.18320 0.0004	1402.1364 m 0.0012		0
PLH	000	6_P	S 25 53 21.98232 0.0007	E 27 41 3.18320 0.0004	1401.8117 m 0.0011		0
PLH	000	7232	S 25 53 23.10290 0.0011	E 27 41 7.41748 0.0008	1415.7203 m 0.0013		0
PLH	000	7501	S 25 53 22.94940 0.0005	E 27 41 10.23096 0.0005	1406.8013 m 0.0011		0
PLH	110	7501_Temp	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1406.8213 m 0.0011		0
PLH	110	777	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1404.3561 m 0.0010		0
PLH	000	8	S 25 53 24.37877 0.0001	E 27 41 13.12850 0.0001	1414.2514 m 0.0010		0
PLH	110	88	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1412.4596 m 0.0010		0
PLH	000	8GPS	S 25 53 24.37877 0.0001	E 27 41 13.12850 0.0001	1414.1700 m 0.0001		0
PLH	110	V100	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1402.5763 m 0.0011		0

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Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV	m	0
XYZ	10		5085403.6956 0.0008	2668331.8327 0.0004	-2768682.5883 0.0005		
XYZ	1001		5085428.6692 0.0009	2668326.5766 0.0006	-2768649.5562 0.0007		
XYZ	1002		5085458.1754 0.0010	2668371.2690 0.0007	-2768555.9569 0.0007		
XYZ	1003		5085397.9693 0.0010	2668410.3605 0.0006	-2768634.1665 0.0007		
XYZ	1004		5085345.7336 0.0009	2668392.1339 0.0005	-2768745.8224 0.0006		
XYZ	1005		5085415.7258 0.0010	2668225.3083 0.0006	-2768766.0660 0.0007		
XYZ	1006		5085500.0711 0.0010	2668160.5357 0.0007	-2768659.9569 0.0009		
XYZ	1016		5085404.3894 0.0010	2668331.9235 0.0006	-2768690.5698 0.0007		
XYZ	1017		5085331.1647 0.0010	2668447.7811 0.0006	-2768725.2301 0.0006		
XYZ	1111		5085403.9604 0.0008	2668331.9716 0.0004	-2768682.7334 0.0005		
XYZ	13		5085403.6741 0.0008	2668331.8214 0.0004	-2768682.5765 0.0005		
XYZ	16		5085406.6393 0.0009	2668333.3773 0.0004	-2768684.2017 0.0005		
XYZ	16_26		5085404.3908 0.0009	2668331.9244 0.0006	-2768690.5706 0.0006		
XYZ	16_C		5085403.6808 0.0012	2668331.5518 0.0007	-2768690.1814 0.0008		
XYZ	16_P		5085404.0703 0.0009	2668331.7562 0.0006	-2768690.3949 0.0007		
XYZ	17		5085410.9361 0.0008	2668335.6318 0.0004	-2768686.5568 0.0005		
XYZ	170		5085409.6962 0.0008	2668334.9812 0.0004	-2768685.8772 0.0004		
XYZ	17_25		5085331.1625 0.0011	2668447.7800 0.0007	-2768725.2288 0.0007		
XYZ	17_26		5085331.1633 0.0009	2668447.7801 0.0006	-2768725.2292 0.0006		
XYZ	17_P		5085330.9356 0.0009	2668447.6608 0.0006	-2768725.1044 0.0006		
XYZ	1_25		5085428.6671 0.0010	2668326.5755 0.0006	-2768649.5550 0.0007		
XYZ	1_26		5085428.6688 0.0009	2668326.5762 0.0006	-2768649.5559 0.0007		
XYZ	1_P		5085428.4379 0.0009	2668326.4552 0.0006	-2768649.4294 0.0006		
XYZ	2		5085407.1842 0.0008	2668333.6632 0.0004	-2768684.5004 0.0005		
XYZ	20		5085405.8837 0.0008	2668332.9808 0.0004	-2768683.7875 0.0005		
XYZ	2_26		5085458.1751 0.0010	2668371.2688 0.0007	-2768555.9566 0.0007		
XYZ	2_P		5085457.9475 0.0009	2668371.1494 0.0007	-2768555.8319 0.0007		
XYZ	30		5085407.3913 0.0008	2668333.7718 0.0004	-2768684.6139 0.0005		
XYZ	3001		5085428.6697 0.0009	2668326.5768 0.0006	-2768649.5565 0.0007		
XYZ	3002		5085458.1755 0.0010	2668371.2690 0.0007	-2768555.9569 0.0007		
XYZ	3003		5085397.9690 0.0010	2668410.3604 0.0006	-2768634.1663 0.0007		
XYZ	3004		5085345.7337 0.0009	2668392.1342 0.0005	-2768745.8226 0.0006		
XYZ	3005		5085415.7259 0.0010	2668225.3083 0.0006	-2768766.0661 0.0007		
XYZ	3006		5085500.0709 0.0010	2668160.5355 0.0007	-2768659.9567 0.0009		

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Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV	m	0
XYZ		3016	5085404.3904 0.0010	2668331.9241 0.0006	-2768690.5703 0.0007		
XYZ		3017	5085331.1645 0.0009	2668447.7810 0.0006	-2768725.2299 0.0006		
XYZ		3_25	5085397.9696 0.0011	2668410.3607 0.0007	-2768634.1667 0.0008		
XYZ		3_26	5085397.9683 0.0010	2668410.3598 0.0006	-2768634.1660 0.0007		
XYZ		3_P	5085397.7425 0.0009	2668410.2415 0.0006	-2768634.0422 0.0006		
XYZ		4	5085408.8175 0.0008	2668334.5202 0.0004	-2768685.3956 0.0005		
XYZ		40	5085408.0371 0.0008	2668334.1107 0.0004	-2768684.9679 0.0004		
XYZ		4_25	5085345.7321 0.0010	2668392.1333 0.0006	-2768745.8216 0.0007		
XYZ		4_26	5085345.7334 0.0009	2668392.1338 0.0005	-2768745.8223 0.0006		
XYZ		4_P	5085345.5063 0.0008	2668392.0148 0.0005	-2768745.6979 0.0006		
XYZ		5	5085404.7258 0.0008	2668332.3732 0.0004	-2768683.1529 0.0005		
XYZ		50	5085399.2016 0.0008	2668329.4747 0.0004	-2768680.1251 0.0005		
XYZ		5_25	5085415.7250 0.0011	2668225.3078 0.0007	-2768766.0656 0.0008		
XYZ		5_26	5085415.7247 0.0011	2668225.3078 0.0006	-2768766.0654 0.0007		
XYZ		5_P	5085415.4983 0.0009	2668225.1889 0.0006	-2768765.9413 0.0006		
XYZ		60	5085397.4543 0.0008	2668328.5578 0.0004	-2768679.1673 0.0005		
XYZ		6_25	5085500.0443 0.0011	2668160.5216 0.0007	-2768659.9422 0.0009		
XYZ		6_26	5085500.0699 0.0010	2668160.5350 0.0007	-2768659.9562 0.0008		
XYZ		6_P	5085499.8113 0.0009	2668160.3993 0.0006	-2768659.8145 0.0008		
XYZ		7232	5085442.7809 0.0011	2668263.6120 0.0010	-2768696.9181 0.0012		
XYZ		7501	5085401.1066 0.0009	2668330.2083 0.0006	-2768688.7731 0.0007		
XYZ		7501_Temp	5085403.6790 0.0008	2668331.8240 0.0004	-2768682.5791 0.0005		
XYZ		777	5085401.7151 0.0008	2668330.7935 0.0004	-2768681.5027 0.0005		
XYZ		8	5085352.5458 0.0008	2668395.8340 0.0004	-2768731.6075 0.0005		
XYZ		88	5085408.1706 0.0008	2668334.1807 0.0004	-2768685.0410 0.0004		
XYZ		8GPS	5085352.4810 0.0001	2668395.8000 0.0001	-2768731.5720 0.0001		
XYZ		V100	5085400.2973 0.0008	2668330.0496 0.0004	-2768680.7256 0.0005		

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Residuals (critical value = 4.000):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
XCT	8GPS			5085352.48100 0.0001	-0.0000 0.0000	-0.0000 *
YCT	8GPS			2668395.80000 0.0001	-0.0000 0.0000	-0.0000 *
ZCT	8GPS			-2768731.57200 0.0001	-0.0000 0.0000	-0.0000 *
GAZI		5_P	3_P	54 50 36.8 0.1	-0.0 0.0	-0.0 *
DIR		1004	5_26	0 0 0.0 5.0	-5.6 4.3	-1.3
DIR		1004	1_26	61 53 83.0 5.0	8.7 4.4	2.0
DIR		1004	16_26	49 60 78.0 5.0	4.9 4.2	1.2
DIR		1004	8	109 20 98.0 5.0	-3.1 2.4	-1.3
DIR		1004	17_26	182 83 91.0 5.0	-0.3 3.9	-0.1
DIR		1004	6_26	28 77 22.0 5.0	-4.7 4.4	-1.1
DIR		1017	3_26	0 0 0.0 5.0	6.3 4.2	1.5
DIR		1017	8	327 22 25.0 5.0	-2.1 3.3	-0.6
DIR		1017	5_26	323 21 41.0 5.0	-2.8 4.4	-0.6
DIR		1017	4_26	310 34 46.0 5.0	-2.8 4.1	-0.7
DIR		1017	16_26	352 67 50.0 5.0	-1.3 4.4	-0.3
DIR		1017	1_26	367 39 86.0 5.0	2.6 4.4	0.6
DIR		1003	17_26	0 0 0.0 5.0	-2.7 4.0	-0.7
DIR		1003	1_26	122 82 43.0 5.0	2.1 4.1	0.5
DIR		1003	8	31 43 36.0 5.0	8.1 4.1	2.0
DIR		1003	16_26	90 12 38.0 5.0	-8.4 4.2	-2.0
DIR		1003	2_26	196 12 8.0 5.0	0.9 3.9	0.2
DIR		1005	1_26	0 0 0.0 5.0	-3.4 4.5	-0.8
DIR		1005	17_26	50 61 56.0 5.0	-4.5 4.5	-1.0
DIR		1005	8	49 39 7.0 5.0	8.7 4.4	2.0
DIR		1005	4_26	54 90 58.0 5.0	1.7 4.5	0.4
DIR		1005	6_26	319 19 83.0 5.0	2.8 4.1	0.7
DIR		1005	16_26	18 66 58.0 5.0	-5.5 4.4	-1.2
DIR		1002	1_26	0 0 0.0 5.0	-2.0 4.1	-0.5
DIR		1002	3_26	344 42 35.0 5.0	1.5 4.1	0.4
DIR		1002	6_26	50 98 12.0 5.0	0.9 4.1	0.2
DIR		1002	16_26	388 75 60.0 5.0	-0.4 4.2	-0.1
DIR		1006	2_26	0 0 0.0 5.0	4.2 4.5	0.9
DIR		1006	3_26	25 48 85.0 5.0	-2.8 4.5	-0.6

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Residuals (critical value = 4.000):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIR	1006	1_26	28 15 80.0	-1.8	-0.4
			5.0	4.5	
DIR	1006	16_26	43 18 11.0	1.8	0.4
			5.0	4.5	
DIR	1006	5_26	89 11 81.0	-1.8	-0.4
			5.0	4.4	
DIR	1006	4_26	53 59 76.0	0.3	0.1
			5.0	4.5	
DIR	1001	2_26	0 0 0.0	7.4	1.8
			5.0	4.1	
DIR	1001	3_26	71 12 82.0	0.4	0.1
			5.0	4.2	
DIR	1001	17_26	115 70 27.0	-11.7	-2.6
			5.0	4.5	
DIR	1001	8	132 1 28.0	-0.1	-0.0
			5.0	4.5	
DIR	1001	4_26	137 34 76.0	-5.7	-1.3
			5.0	4.5	
DIR	1001	16_26	162 90 3.0	2.3	0.6
			5.0	3.8	
DIR	1001	5_26	220 90 7.0	2.3	0.5
			5.0	4.4	
DIR	1001	6_26	279 13 92.0	5.0	1.2
			5.0	4.3	
ZANG	1004	5_26	101 79 82.0	9.3	1.3
			8.0	7.4	
ZANG	1004	1_26	101 50 25.0	18.3	2.5
			8.0	7.5	
ZANG	1004	16_26	101 62 38.0	-2.9	-0.4
			8.0	7.1	
ZANG	1004	17_26	97 22 50.0	-11.0	-1.8
			8.0	6.0	
ZANG	1004	6_26	102 48 35.0	9.1	1.2
			8.0	7.8	
ZANG	1017	3_26	101 17 11.0	2.0	0.3
			8.0	7.2	
ZANG	1017	5_26	102 5 94.0	16.0	2.1
			8.0	7.6	
ZANG	1017	4_26	102 77 73.0	3.9	0.7
			8.0	5.8	
ZANG	1017	16_26	102 35 62.0	3.9	0.5
			8.0	7.5	
ZANG	1017	1_26	102 22 12.0	-0.1	-0.0
			8.0	7.6	
ZANG	1003	17_26	98 83 30.0	9.6	1.3
			8.0	7.2	
ZANG	1003	1_26	102 70 46.0	-8.7	-1.3
			8.0	6.5	
ZANG	1003	16_26	102 0 19.0	3.4	0.5
			8.0	7.0	
ZANG	1003	2_26	101 51 50.0	-10.1	-1.5
			8.0	6.7	
ZANG	1005	1_26	99 27 42.0	-7.0	-0.9
			8.0	7.4	
ZANG	1005	17_26	97 94 52.0	-2.7	-0.3
			8.0	7.8	
ZANG	1005	4_26	98 20 49.0	-2.2	-0.3
			8.0	7.6	
ZANG	1005	6_26	102 63 42.0	-4.7	-0.7
			8.0	7.3	
ZANG	1005	16_26	98 75 29.0	-1.6	-0.2
			8.0	7.3	
ZANG	1002	1_26	100 77 95.0	-2.7	-0.4
			8.0	6.9	
ZANG	1002	3_26	98 48 65.0	3.7	0.5
			8.0	7.0	

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Residuals (critical value = 4.000):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ZANG	1002	6_26	102 48 25.0 8.0	4.1 7.7	0.5
ZANG	1002	16_26	100 22 1.0 8.0	4.1 7.5	0.5
ZANG	1006	2_26	97 52 2.0 8.0	-6.3 7.7	-0.8
ZANG	1006	3_26	97 22 43.0 8.0	1.9 7.8	0.2
ZANG	1006	1_26	97 19 39.0 8.0	-5.0 7.6	-0.7
ZANG	1006	16_26	97 18 65.0 8.0	6.3 7.7	0.8
ZANG	1006	5_26	97 36 88.0 8.0	7.9 7.0	1.1
ZANG	1006	4_26	97 52 4.0 8.0	-3.1 7.8	-0.4
ZANG	1001	2_26	99 22 20.0 8.0	0.3 6.9	0.0
ZANG	1001	3_26	97 29 69.0 8.0	1.3 6.9	0.2
ZANG	1001	17_26	97 78 18.0 8.0	3.4 7.7	0.4
ZANG	1001	4_26	98 50 8.0 8.0	-3.8 7.5	-0.5
ZANG	1001	16_26	98 93 50.0 8.0	3.3 5.6	0.6
ZANG	1001	5_26	100 72 69.0 8.0	-5.4 7.2	-0.7
ZANG	1001	6_26	102 80 74.0 8.0	-7.4 7.6	-1.0
DIST	1004	5_26	182.04090 0.0010	0.0016 0.0010	1.7104 8.94
DIST	1004	1_26	142.97950 0.0010	0.0005 0.0010	0.5394 3.61
DIST	1004	16_26	100.59100 0.0010	0.0004 0.0010	0.3719 3.54
DIST	1004	17_26	61.09680 0.0010	0.0005 0.0009	0.5100 7.77
DIST	1004	6_26	291.25660 0.0010	0.0006 0.0010	0.6182 2.08
DIST	1017	5_26	241.47750 0.0010	0.0018 0.0010	1.9294 7.63
DIST	1017	4_26	61.09690 0.0010	0.0006 0.0009	0.6550 9.94
DIST	1017	16_26	141.37260 0.0010	-0.0003 0.0010	-0.3564 2.41
DIST	1017	1_26	172.98640 0.0010	-0.0002 0.0010	-0.2016 1.12
DIST	1003	17_26	118.97660 0.0010	0.0010 0.0009	1.1386 8.81
DIST	1003	1_26	90.54870 0.0010	0.0002 0.0009	0.1892 1.98
DIST	1003	16_26	96.82380 0.0010	0.0002 0.0009	0.1844 1.81
DIST	1003	2_26	106.15730 0.0010	0.0015 0.0009	1.6331 14.20
DIST	1005	1_26	154.91070 0.0010	-0.0000 0.0009	-0.0037 0.02
DIST	1005	17_26	241.47990 0.0010	-0.0007 0.0010	-0.7201 2.83
DIST	1005	4_26	182.04250 0.0010	0.0001 0.0009	0.1350 0.70
DIST	1005	6_26	150.22910 0.0010	0.0000 0.0009	0.0472 0.29
DIST	1005	16_26	131.13020 0.0010	-0.0003 0.0009	-0.3479 2.51

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Residuals (critical value = 4.000):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIST	1002	1_26	107.83720 0.0010	0.0000 0.0009	0.0117 0.10
DIST	1002	3_26	106.15730 0.0010	0.0013 0.0009	1.4174 12.30
DIST	1002	6_26	238.70370 0.0010	0.0007 0.0009	0.7924 3.11
DIST	1002	16_26	150.20510 0.0010	0.0002 0.0009	0.1872 1.17
DIST	1006	3_26	271.11130 0.0010	0.0016 0.0010	1.7022 6.03
DIST	1006	1_26	181.04040 0.0010	0.0009 0.0010	0.8920 4.71
DIST	1006	16_26	198.65990 0.0010	0.0006 0.0010	0.6470 3.13
DIST	1006	5_26	150.22910 0.0010	-0.0000 0.0009	-0.0395 0.24
DIST	1006	4_26	291.25560 0.0010	0.0015 0.0010	1.5444 5.18
DIST	1001	2_26	107.83620 0.0010	0.0010 0.0009	1.0282 8.93
DIST	1001	3_26	90.54780 0.0010	0.0006 0.0009	0.6522 6.81
DIST	1001	17_26	172.98040 0.0022	0.0055 0.0022	2.4600 31.52
DIST	1001	4_26	142.97900 0.0010	0.0010 0.0010	1.0034 6.69
DIST	1001	16_26	47.96020 0.0010	0.0004 0.0009	0.4563 9.01
DIST	1001	5_26	154.91100 0.0010	-0.0002 0.0009	-0.2551 1.56
DIST	1001	6_26	181.04070 0.0010	0.0009 0.0010	0.8928 4.73
ELAT	1_P	1001	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 81.04
ELON	1_P	1001	0 00 0.00000 0.0002	0.0001 0.0001	0.4913 216.70
EHDF	1_P	1001	0.28970 0.0010	0.0007 0.0009	0.7561 2292.10
ELAT	3_P	1003	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 32.72
ELON	3_P	1003	0 00 0.00000 0.0002	0.0000 0.0001	0.3772 163.32
EHDF	3_P	1003	0.28950 0.0020	-0.0048 0.0019	-2.5223 16804.88
ELAT	6_P	1006	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 15.10
ELON	6_P	1006	0 00 0.00000 0.0002	0.0001 0.0001	0.4865 182.51
EHDF	6_P	1006	0.32600 0.0010	0.0001 0.0008	0.1684 393.78
ELAT	5_P	1005	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 10.97
ELON	5_P	1005	0 00 0.00000 0.0002	-0.0000 0.0001	-0.2417 102.98
EHDF	5_P	1005	0.28660 0.0010	-0.0010 0.0008	-1.3088 3609.69
ELAT	17_P	1017	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 127.00
ELON	17_P	1017	0 00 0.00000 0.0002	0.0000 0.0001	0.2758 117.99
EHDF	17_P	1017	0.28640 0.0010	0.0013 0.0008	1.5858 4594.63
ELAT	4_P	1004	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 78.74
ELON	4_P	1004	0 00 0.00000 0.0002	-0.0001 0.0001	-0.5230 240.12

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Residuals (critical value = 4.000):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
EHDF	4_P	1004	0.28510 0.0010	0.0002 0.0008	0.2049 602.72
ELAT	2_P	1002	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 124.33
ELON	2_P	1002	0 00 0.00000 0.0002	0.0000 0.0001	0.1183 49.16
EHDF	2_P	1002	0.28560 0.0010	0.0006 0.0008	0.7196 2004.86
DIR	1016	5_25	0 0 0.0 8.0	-2.4 5.5	-0.4
DIR	1016	6_25	54 59 62.0 8.0	2.4 5.5	0.4
DIR	1016	17_25	0 0 0.0 8.0	14.3 4.2	3.4
DIR	1016	8	15 39 5.0 12.8	-36.6 10.7	-3.4
DIR	1016	6_25	0 0 0.0 8.0	7.5 5.2	1.5
DIR	1016	1_25	68 73 90.0 8.0	-7.5 5.2	-1.5
ZANG	1016	4_25	98 37 73.0 10.0	3.3 8.8	0.4
ZANG	1016	5_25	101 24 97.0 10.0	17.8 9.0	2.0
ZANG	1016	6_25	102 82 62.0 10.0	-1.1 9.5	-0.1
ZANG	1016	17_25	97 64 36.0 10.0	-24.6 9.1	-2.7
ZANG	1016	6_25	102 82 42.0 10.0	-21.1 9.5	-2.2
ZANG	1016	1_25	101 6 60.0 10.0	-9.8 6.9	-1.4
DIST	1016	4_25	100.59360 0.0020	-0.0020 0.0020	-1.0316 20.08
DIST	1016	5_25	131.13120 0.0020	-0.0014 0.0020	-0.7065 10.54
DIST	1016	17_25	141.37390 0.0020	-0.0016 0.0020	-0.8026 11.12
DIST	1016	1_25	47.95930 0.0020	0.0013 0.0020	0.6595 26.89
ELAT	16_P	1016	0 00 0.00000 0.0003	0.0000 0.0001	0.1880 59.80
ELON	16_P	1016	0 00 0.00000 0.0003	-0.0001 0.0002	-0.2580 133.86
EHDF	16_P	1016	0.40140 0.0010	-0.0009 0.0008	-1.0564 2134.33
ELAT	8	8GPS	0 00 0.00000 0.0001	0.0000 -0.0000	0.0000 0.00
ELON	8	8GPS	0 00 0.00000 0.0001	0.0000 0.0000	0.0929 0.00
DIR	3016	1_25	68 73 55.0 5.0	0.3 2.8	0.1
DIR	3016	3_25	144 26 16.0 5.0	-0.3 2.8	-0.1
DIR	3016	5_25	345 40 42.0 5.0	-0.0 0.0	-0.0
DIR	3016	5_25	0 0 0.0 5.0	-4.0 3.6	-1.1
DIR	3016	17_25	261 41 5.0 5.0	0.3 4.1	0.1
DIR	3016	4_25	285 84 89.0 5.0	2.1 4.0	0.5
DIR	3016	8	276 79 58.0 5.0	1.5 3.9	0.4
ZANG	3016	6_25	102 82 70.0 8.0	3.0 7.5	0.4


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Residuals (critical value = 4.000):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ELON	4_P	4_25	0 00 0.00000	0.0000	1.1198
				0.0002	158.58
EHDF	4_P	4_25	0.28440	-0.0010	-1.3784
				0.0010	3511.85
DIR	3002	3_26	0 0 0.0	-0.6	-0.2
				5.0	3.3
DIR	3002	6_26	106 55 75.0	0.6	0.2
				5.0	3.3
DIR	3002	3_26	0 0 0.0	-2.8	-0.7
				5.0	3.9
DIR	3002	16_26	44 33 17.0	3.2	0.8
				5.0	4.0
DIR	3002	1_26	55 57 59.0	-0.4	-0.1
				5.0	3.9
DIR	3006	1_26	0 0 0.0	-5.3	-1.5
				5.0	3.4
DIR	3006	5_26	60 95 90.0	5.3	1.5
				5.0	3.4
DIR	3006	1_26	0 0 0.0	4.8	1.2
				5.0	4.0
DIR	3006	16_26	15 2 44.0	-4.7	-1.2
				5.0	4.0
DIR	3006	2_26	371 84 31.0	-0.1	-0.0
				5.0	4.0
DIR	3006	1_26	0 0 0.0	1.0	0.3
				5.0	3.5
DIR	3006	4_26	25 44 0.0	-1.0	-0.3
				5.0	3.5
DIR	3001	6_26	0 0 0.0	-5.4	-1.4
				5.0	3.9
DIR	3001	8	252 87 21.0	3.9	1.0
				5.0	3.8
DIR	3001	5_26	341 76 5.0	1.5	0.4
				5.0	3.9
DIR	3001	6_26	0 0 0.0	-1.8	-0.6
				5.0	3.2
DIR	3001	2_26	120 86 7.0	1.8	0.6
				5.0	3.2
DIR	3001	6_26	0 0 0.0	-2.5	-0.8
				5.0	3.0
DIR	3001	16_26	283 76 2.0	2.5	0.8
				5.0	3.0
DIR	3001	2_26	0 0 0.0	0.8	0.2
				5.0	3.7
DIR	3001	17_26	115 70 5.0	3.0	0.8
				5.0	3.8
DIR	3001	3_26	71 12 79.0	-3.9	-1.0
				5.0	3.8
DIR	3004	17_26	0 0 0.0	-1.9	-0.5
				5.0	3.7
DIR	3004	5_26	217 16 5.0	-1.9	-0.5
				5.0	3.9
DIR	3004	6_26	245 93 22.0	3.8	1.0
				5.0	3.9
DIR	3004	17_26	0 0 0.0	-3.7	-1.6
				5.0	2.3
DIR	3004	8	326 36 92.0	3.7	1.6
				5.0	2.3
DIR	3004	17_26	0 0 0.0	2.6	0.8
				5.0	3.2
DIR	3004	16_26	266 76 98.0	-2.6	-0.8
				5.0	3.2
DIR	3004	17_26	0 0 0.0	2.1	0.7
				5.0	3.3
DIR	3004	1_26	278 70 6.0	-2.1	-0.7
				5.0	3.3

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Residuals (critical value = 4.000):
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TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIR	3017	4_26	0 0 0.0	0.9 5.0	0.3 3.2
DIR	3017	3_26	89 65 65.0	-0.9 5.0	-0.3 3.2
DIR	3017	4_26	0 0 0.0	-3.3 5.0	-1.1 2.9
DIR	3017	8	16 87 73.0	3.3 5.0	1.1 2.9
DIR	3017	4_26	0 0 0.0	4.2 5.0	1.1 3.9
DIR	3017	5_26	12 87 1.0	-1.6 5.0	-0.4 4.2
DIR	3017	16_26	42 33 10.0	-0.3 5.0	-0.1 4.2
DIR	3017	1_26	57 5 52.0	-2.3 5.0	-0.6 4.2
DIR	3003	16_26	0 0 0.0	1.2 5.0	0.3 3.8
DIR	3003	6_26	38 4 27.0	8.6 5.0	2.1 4.0
DIR	3003	2_26	105 99 82.0	-2.0 5.0	-0.5 3.8
DIR	3003	17_26	309 87 97.0	-27.8 9.4	-3.2 8.7
DIR	3003	16_26	0 0 0.0	3.1 5.0	0.9 3.3
DIR	3003	8	341 31 21.0	-3.1 5.0	-0.9 3.3
DIR	3005	1_26	0 0 0.0	0.8 5.0	0.2 4.3
DIR	3005	16_26	18 66 56.0	0.7 5.0	0.2 4.3
DIR	3005	8	49 39 22.0	-2.1 5.0	-0.5 4.4
DIR	3005	17_26	50 61 50.0	5.7 5.0	1.3 4.4
DIR	3005	4_26	54 90 69.0	-5.1 5.0	-1.2 4.4
DIR	3005	1_26	0 0 0.0	3.9 5.0	1.2 3.4
DIR	3005	6_26	319 19 97.0	-3.9 5.0	-1.2 3.4
ZANG	3002	3_26	98 48 60.0	-1.4 8.0	-0.2 7.3
ZANG	3002	6_26	102 48 25.0	4.1 8.0	0.5 7.7
ZANG	3002	3_26	98 48 64.0	2.6 8.0	0.4 7.3
ZANG	3002	3_26	98 48 66.0	4.6 8.0	0.6 7.3
ZANG	3002	16_26	100 21 97.0	-0.0 8.0	-0.0 7.6
ZANG	3002	1_26	100 77 97.0	-0.9 8.0	-0.1 7.0
ZANG	3006	1_26	97 19 42.0	-0.9 8.0	-0.1 7.6
ZANG	3006	5_26	97 36 68.0	-10.8 8.0	-1.5 7.0
ZANG	3006	1_26	97 19 39.0	-3.9 8.0	-0.5 7.6
ZANG	3006	16_26	97 18 61.0	3.2 8.0	0.4 7.7
ZANG	3006	2_26	97 52 8.0	0.6 8.0	0.1 7.7
ZANG	3006	1_26	97 19 42.0	-0.9 8.0	-0.1 7.6

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Residuals (critical value = 4.000):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ZANG	3006	4_26	97 52 19.0 8.0	12.6 7.8	1.6
ZANG	3006	1_26	97 19 45.0 8.0	2.1 7.6	0.3
ZANG	3001	6_26	102 80 87.0 8.0	3.6 7.7	0.5
ZANG	3001	5_26	100 72 72.0 8.0	-4.8 7.2	-0.7
ZANG	3001	6_26	102 80 93.0 8.0	9.6 7.7	1.2
ZANG	3001	2_26	99 22 27.0 8.0	3.9 7.1	0.6
ZANG	3001	6_26	102 80 84.0 8.0	0.6 7.7	0.1
ZANG	3001	16_26	98 93 50.0 8.0	-4.3 5.7	-0.8
ZANG	3001	6_26	102 80 90.0 8.0	6.6 7.7	0.9
ZANG	3001	2_26	99 22 27.0 8.0	3.9 7.1	0.6
ZANG	3001	17_26	97 78 28.0 8.0	11.3 7.7	1.5
ZANG	3001	3_26	97 29 77.0 8.0	5.2 6.9	0.8
ZANG	3004	17_26	97 22 63.0 8.0	-0.3 7.3	-0.0
ZANG	3004	5_26	101 79 70.0 8.0	-3.4 7.4	-0.5
ZANG	3004	6_26	102 48 38.0 8.0	11.6 7.8	1.5
ZANG	3004	17_26	97 22 64.0 8.0	0.7 7.3	0.1
ZANG	3004	17_26	97 22 62.0 8.0	-1.3 7.3	-0.2
ZANG	3004	16_26	101 62 45.0 8.0	2.7 7.3	0.4
ZANG	3004	17_26	97 22 61.0 8.0	-2.3 7.3	-0.3
ZANG	3004	17_26	97 22 61.0 8.0	-2.3 7.3	-0.3
ZANG	3004	1_26	101 50 23.0 8.0	15.3 7.5	2.0
ZANG	3017	4_26	102 77 65.0 8.0	-0.4 6.9	-0.1
ZANG	3017	3_26	101 17 10.0 8.0	2.8 7.2	0.4
ZANG	3017	4_26	102 77 64.0 8.0	-1.4 6.9	-0.2
ZANG	3017	4_26	102 77 66.0 8.0	0.6 6.9	0.1
ZANG	3017	5_26	102 5 82.0 8.0	4.9 7.6	0.6
ZANG	3017	16_26	102 35 56.0 8.0	-0.5 7.6	-0.1
ZANG	3017	1_26	102 22 16.0 8.0	5.1 7.6	0.7
ZANG	3003	16_26	102 0 3.0 8.0	-9.9 7.2	-1.4
ZANG	3003	6_26	102 77 88.0 8.0	-3.5 7.8	-0.4
ZANG	3003	2_26	101 51 63.0 8.0	5.3 6.8	0.8
ZANG	3003	17_26	98 83 22.0 8.0	3.8 7.2	0.5
ZANG	3003	16_26	102 0 5.0 8.0	-7.9 7.2	-1.1

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Residuals (critical value = 4.000):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ZANG	3003	16_26	102 0 6.0	-6.9	-1.0
			8.0	7.2	
ZANG	3005	1_26	99 27 45.0	-4.4	-0.6
			8.0	7.5	
ZANG	3005	16_26	98 75 32.0	0.9	0.1
			8.0	7.4	
ZANG	3005	17_26	97 94 50.0	-5.0	-0.6
			8.0	7.8	
ZANG	3005	4_26	98 20 47.0	-4.5	-0.6
			8.0	7.6	
ZANG	3005	1_26	99 27 46.0	-3.4	-0.5
			8.0	7.5	
ZANG	3005	6_26	102 63 48.0	0.8	0.1
			8.0	7.3	
DIST	3002	6_26	238.70450	-0.0000	-0.0398
			0.0010	0.0009	0.16
DIST	3002	3_26	106.15850	0.0001	0.1459
			0.0010	0.0009	1.27
DIST	3002	16_26	150.20540	-0.0001	-0.0923
			0.0010	0.0009	0.58
DIST	3002	1_26	107.83770	-0.0005	-0.4813
			0.0010	0.0009	4.19
DIST	3006	5_26	150.23040	-0.0012	-1.3466
			0.0010	0.0009	8.22
DIST	3006	1_26	181.04210	-0.0007	-0.7438
			0.0010	0.0010	3.93
DIST	3006	16_26	198.66140	-0.0007	-0.7712
			0.0010	0.0010	3.73
DIST	3006	2_26	238.70570	-0.0013	-1.3657
			0.0010	0.0009	5.32
DIST	3006	4_26	291.25830	-0.0011	-1.0844
			0.0010	0.0010	3.63
DIST	3001	5_26	154.91060	0.0001	0.0855
			0.0010	0.0009	0.52
DIST	3001	2_26	107.83820	-0.0010	-1.0441
			0.0010	0.0009	9.07
DIST	3001	6_26	181.04220	-0.0007	-0.7332
			0.0010	0.0010	3.88
DIST	3001	16_26	47.96090	-0.0003	-0.3115
			0.0010	0.0009	6.15
DIST	3001	17_26	172.98720	-0.0013	-1.3833
			0.0010	0.0010	7.62
DIST	3004	5_26	182.04300	-0.0003	-0.3464
			0.0010	0.0010	1.81
DIST	3004	6_26	291.25770	-0.0003	-0.3399
			0.0010	0.0010	1.14
DIST	3004	17_26	61.09840	-0.0012	-1.3413
			0.0010	0.0009	20.45
DIST	3004	16_26	100.59190	-0.0004	-0.4123
			0.0010	0.0010	3.92
DIST	3004	1_26	142.98100	-0.0008	-0.8831
			0.0010	0.0010	5.91
DIST	3017	3_26	118.97790	-0.0001	-0.0592
			0.0010	0.0009	0.45
DIST	3017	4_26	61.09790	-0.0004	-0.3900
			0.0010	0.0009	5.92
DIST	3017	5_26	241.48140	-0.0020	-2.1257
			0.0010	0.0010	8.41
DIST	3017	16_26	141.37260	-0.0003	-0.3547
			0.0010	0.0010	2.40
DIST	3017	1_26	172.98680	-0.0006	-0.6302
			0.0010	0.0010	3.49
DIST	3003	6_26	271.11460	-0.0012	-1.2690
			0.0010	0.0010	4.52
DIST	3003	2_26	106.15930	-0.0005	-0.5308
			0.0010	0.0009	4.61

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Residuals (critical value = 4.000):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIST	3003	17_26	118.97600 0.0010	0.0016 0.0009	1.7910 13.84
DIST	3003	16_26	96.82580 0.0010	-0.0018 0.0009	-1.8653 18.24
DIST	3005	16_26	131.12980 0.0010	0.0001 0.0009	0.0586 0.42
DIST	3005	17_26	241.47410 0.0022	0.0051 0.0022	2.2990 21.08
DIST	3005	4_26	182.04310 0.0010	-0.0005 0.0009	-0.5273 2.74
DIST	3005	1_26	154.91100 0.0010	-0.0003 0.0009	-0.3278 2.00
DIST	3005	6_26	150.22910 0.0010	0.0001 0.0009	0.0778 0.48
ELAT	16_P	16_26	0 00 0.00000 0.0003	-0.0000 0.0000	-0.2233 25.08
ELON	16_P	16_26	0 00 0.00000 0.0003	0.0001 0.0001	0.5188 169.72
EHDF	16_P	16_26	0.40090 0.0010	0.0014 0.0009	1.5976 3549.66
ELAT	1_P	1_26	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 120.37
ELON	1_P	1_26	0 00 0.00000 0.0002	-0.0001 0.0001	-1.0832 315.29
EHDF	1_P	1_26	0.28970 0.0010	0.0000 0.0009	0.0548 164.55
ELAT	3_P	3_26	0 00 0.00000 0.0002	-0.0001 -0.0000	-0.0001 176.72
ELON	3_P	3_26	0 00 0.00000 0.0002	-0.0002 0.0001	-2.3382 575.93
EHDF	3_P	3_26	0.28560 0.0010	-0.0022 0.0009	-2.5529 7727.28
ELAT	6_P	6_26	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 5.51
ELON	6_P	6_26	0 00 0.00000 0.0002	0.0000 0.0001	0.1092 23.78
EHDF	6_P	6_26	0.32600 0.0010	-0.0014 0.0008	-1.7442 4213.93
ELAT	5_P	5_26	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 80.90
ELON	5_P	5_26	0 00 0.00000 0.0002	0.0001 0.0001	1.5282 356.67
EHDF	5_P	5_26	0.28660 0.0030	-0.0023 0.0029	-0.8054 8180.60
ELAT	17_P	17_26	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 40.32
ELON	17_P	17_26	0 00 0.00000 0.0002	-0.0001 0.0001	-1.7840 452.87
EHDF	17_P	17_26	0.28470 0.0010	0.0010 0.0009	1.1941 3651.17
ELAT	4_P	4_26	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 18.81
ELON	4_P	4_26	0 00 0.00000 0.0002	-0.0001 0.0001	-0.7046 183.86
EHDF	4_P	4_26	0.28510 0.0010	-0.0002 0.0009	-0.1845 554.89
ELAT	2_P	2_26	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 127.69
ELON	2_P	2_26	0 00 0.00000 0.0002	-0.0000 0.0001	-0.5290 98.08
EHDF	2_P	2_26	0.28550 0.0030	0.0002 0.0029	0.0591 603.80
ELAT	1_P	3001	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 81.35
ELON	1_P	3001	0 00 0.00000 0.0002	-0.0000 0.0001	-0.1464 63.37

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Residuals (critical value = 4.000):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES
			STD DEV	STD DEV	STD DEV	PPM	
EHDF	1_P	3001		0.28970	0.0012	1.3997	
				0.0010	0.0009	4258.95	
ELAT	3_P	3003	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	148.16	
ELON	3_P	3003	0 00	0.00000	0.0001	0.9235	
				0.0002	0.0001	397.86	
EHDF	3_P	3003		0.28950	-0.0052	-2.7259	
				0.0020	0.0019	18269.57	
ELAT	6_P	3006	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	51.00	
ELON	6_P	3006	0 00	0.00000	-0.0001	-0.5251	
				0.0002	0.0001	196.82	
EHDF	6_P	3006		0.32600	-0.0002	-0.2353	
				0.0010	0.0008	571.97	
ELAT	5_P	3005	0 00	0.00000	-0.0000	-0.0000	
				0.0002	-0.0000	45.39	
ELON	5_P	3005	0 00	0.00000	-0.0000	-0.0346	
				0.0002	0.0001	14.64	
EHDF	5_P	3005		0.28660	-0.0009	-1.1540	
				0.0010	0.0008	3236.41	
ELAT	17_P	3017	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	51.79	
ELON	17_P	3017	0 00	0.00000	0.0001	0.5047	
				0.0002	0.0001	217.07	
EHDF	17_P	3017		0.28640	0.0010	1.1354	
				0.0010	0.0009	3383.67	
ELAT	4_P	3004	0 00	0.00000	-0.0000	-0.0000	
				0.0002	-0.0000	86.82	
ELON	4_P	3004	0 00	0.00000	0.0001	0.5908	
				0.0002	0.0001	268.68	
EHDF	4_P	3004		0.28510	0.0004	0.4570	
				0.0010	0.0009	1394.58	
ELAT	2_P	3002	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	5.91	
ELON	2_P	3002	0 00	0.00000	0.0000	0.1266	
				0.0002	0.0001	52.53	
EHDF	2_P	3002		0.28560	0.0006	0.7265	
				0.0010	0.0008	2101.02	
ELAT	1001	3001	0 00	0.00000	-0.0000	-0.0000	
				0.0002	-0.0000	81208.53	
ELON	1001	3001	0 00	0.00000	-0.0001	-0.6425	
				0.0002	0.0001	139981.7	
EHDF	1001	3001		0.00000	0.0006	0.6580	
				0.0010	0.0009	986812.9	
ELAT	1002	3002	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	803678.5	
ELON	1002	3002	0 00	0.00000	0.0000	0.0082	
				0.0002	0.0001	20842.58	
EHDF	1002	3002		0.00000	0.0000	0.0358	
				0.0010	0.0008	594659.2	
ELAT	1003	3003	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	78824.37	
ELON	1003	3003	0 00	0.00000	0.0001	0.5472	
				0.0002	0.0001	160047.0	
EHDF	1003	3003		0.00000	-0.0004	-0.5332	
				0.0010	0.0008	983957.7	
ELAT	1004	3004	0 00	0.00000	-0.0000	-0.0000	
				0.0002	-0.0000	173114.0	
ELON	1004	3004	0 00	0.00000	0.0001	0.9807	
				0.0002	0.0001	532034.0	
EHDF	1004	3004		0.00000	0.0002	0.2653	
				0.0010	0.0009	828838.6	
ELAT	1005	3005	0 00	0.00000	-0.0000	-0.0000	
				0.0002	-0.0000	89691.28	
ELON	1005	3005	0 00	0.00000	0.0000	0.2103	
				0.0002	0.0001	230065.5	

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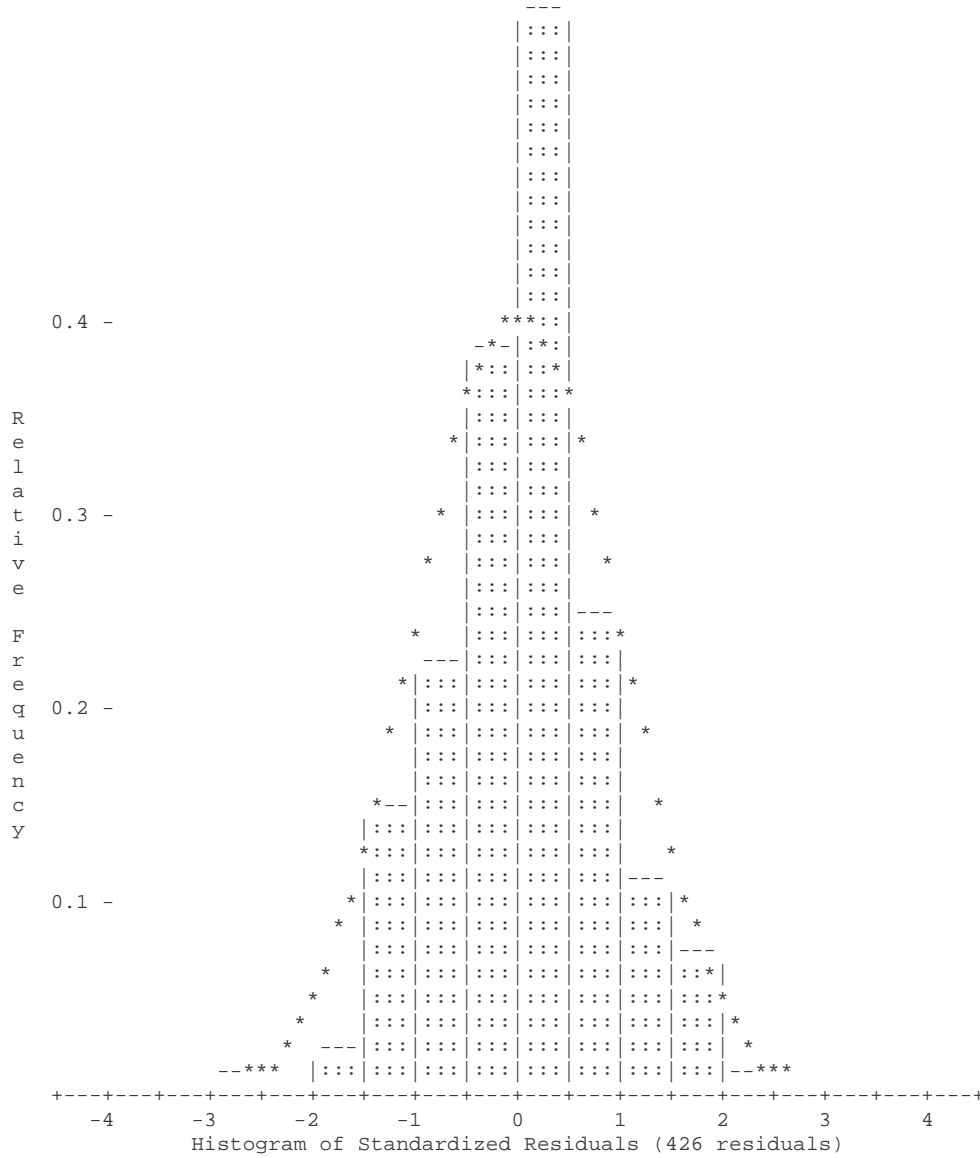
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Residuals (critical value = 4.000):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
EHDF	1005	3005	0.00000 0.0010	0.0001 0.0007	0.1448 969047.9
ELAT	1006	3006	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 34552.82
ELON	1006	3006	0 00 0.00000 0.0002	-0.0001 0.0001	-1.0173 365396.7
EHDF	1006	3006	0.00000 0.0010	-0.0003 0.0007	-0.4395 930207.1
ELAT	1016	3016	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 28814.49
ELON	1016	3016	0 00 0.00000 0.0002	0.0000 0.0001	0.3493 27042.57
EHDF	1016	3016	0.00000 0.0010	0.0012 0.0008	1.4491 999218.4
ELAT	1017	3017	0 00 0.00000 0.0002	0.0001 -0.0000	0.0001 145059.4
ELON	1017	3017	0 00 0.00000 0.0002	0.0000 0.0001	0.2311 80201.09
EHDF	1017	3017	0.00000 0.0010	-0.0003 0.0008	-0.4167 986167.2
ELAT	16_C	16_P	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 0.00
ELON	16_C	16_P	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 0.00
EHDF	16_C	16_P	0.48900 0.0010	-0.0000 0.0000	-0.0000 0.00*
ELAT	16_P	7501	0 00 0.00003 0.0002	-0.0000 0.0001	-0.0000 0.00
ELON	16_P	7501	0 00 0.00023 0.0002	0.0000 0.0001	0.0000 0.00
DIR	2_P	3_P	0 0 0.0 3.0	0.1 1.7	0.1 1.7
DIR	2_P	7232	73 15 21.0 3.0	-0.1 1.7	-0.1 1.7
DIR	3_P	2_P	0 0 0.0 4.0	0.0 2.3	0.0 2.3
DIR	3_P	7232	312 86 59.0 4.0	-0.0 2.3	-0.0 2.3
DIR	4_P	17_P	0 0 0.0 4.0	-0.1 2.0	-0.1 2.0
DIR	4_P	7232	247 30 54.0 4.0	0.1 2.0	0.1 2.0
DIR	5_P	1_P	0 0 0.0 4.0	0.1 1.4	0.1 1.4
DIR	5_P	7232	380 19 27.0 4.0	-0.1 1.4	-0.1 1.4
DIR	6_P	1_P	0 0 0.0 6.0	-0.1 3.3	-0.0 3.3
DIR	6_P	7232	23 55 89.0 6.0	0.1 3.3	0.0 3.3
ZANG	2_P	7232	98 36 44.0 8.0	-21.8 7.5	-2.9 7.5
ZANG	3_P	7232	99 21 49.0 8.0	-16.1 7.5	-2.1 7.5
ZANG	4_P	7232	99 4 75.0 8.0	1.2 7.5	0.2 7.5
ZANG	5_P	7232	94 16 28.0 8.0	21.8 5.8	3.8 5.8
ZANG	6_P	7232	92 82 22.0 8.0	-5.9 7.1	-0.8 7.1

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Residuals (critical value = 4.000):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
EHDF	777	V100	-1.78012	0.0003	1.5728
			0.0003	0.0002	184.76
EHDF	V100	777	1.77993	-0.0001	-0.6640
			0.0003	0.0002	78.01
EHDF	7501_Temp	13	-0.00608	-0.0000	-0.0000
			0.0001	0.0000	3278.69*
EHDF	13	7501_Temp	0.00616	-0.0001	-0.0001
			0.0001	0.0000	9836.07*
EHDF	7501_Temp	10	0.02097	-0.0001	-0.0001
			0.0001	0.0000	3109.30*
EHDF	10	7501_Temp	-0.02088	-0.0000	-0.0000
			0.0001	0.0000	1195.89*
EHDF	10	13	-0.02702	0.0000	0.0000
			0.0001	0.0000	555.45*
EHDF	13	10	0.02695	0.0001	0.0001
			0.0001	0.0000	2036.66*
EHDF	7501_Temp	7501	-0.02000	-0.0000	-0.0000
			0.0001	0.0000	0.00*
EHDF	13	16	3.72217	-0.0000	-0.0087
			0.0002	0.0001	0.34
EHDF	16	13	-3.72213	-0.0000	-0.2694
			0.0002	0.0001	10.41
EHDF	16	16_P	-0.02000	0.0000	0.0000
			0.0001	0.0000	1.36*
EHDF	V100	13	4.23887	0.0000	0.1493
			0.0003	0.0002	6.88
EHDF	13	V100	-4.23887	-0.0000	-0.1738
			0.0002	0.0002	6.88
EHDF	777	50	-3.15489	-0.0003	-1.7539
			0.0002	0.0002	86.34
EHDF	50	777	3.15508	0.0001	0.5307
			0.0002	0.0002	26.12
EHDF	777	5	3.77933	-0.0001	-0.5001
			0.0003	0.0002	30.61
EHDF	5	777	-3.77864	-0.0006	-2.4826
			0.0003	0.0002	151.97
EHDF	5	5_P	-0.07083	0.0001	0.0001
			0.0001	0.0000	0.38*
EHDF	50	5_P	6.86490	-0.0013	-2.9282
			0.0005	0.0004	9.57
EHDF	50	60	-2.19318	-0.0002	-1.1140
			0.0002	0.0002	95.96
EHDF	60	50	2.19339	0.0000	0.0025
			0.0002	0.0002	0.21
EHDF	V100	1111	4.59852	-0.0002	-1.5696
			0.0002	0.0002	52.28
EHDF	1111	60	-8.16691	-0.0001	-0.6321
			0.0003	0.0002	16.08
EHDF	60	1111	8.16733	-0.0003	-1.3890
			0.0003	0.0002	35.34
EHDF	1111	V100	-4.59780	-0.0005	-3.1317
			0.0002	0.0002	104.30
EHDF	6_P	60	-2.80420	0.0000	0.0000
			0.0001	0.0000	0.07*
EHDF	1111	1_P	2.65200	0.0000	0.0000
			0.0001	0.0000	0.88*
EHDF	88	777	-8.10337	-0.0001	-0.6349
			0.0002	0.0002	13.40
EHDF	777	88	8.10340	0.0001	0.3967
			0.0003	0.0002	9.70
EHDF	88	40	-0.16747	-0.0001	-0.0001
			0.0001	0.0000	451.59*
EHDF	40	88	0.16752	0.0000	0.0000
			0.0001	0.0000	153.17*
EHDF	88	170	1.91488	0.0002	1.0680
			0.0002	0.0002	83.71

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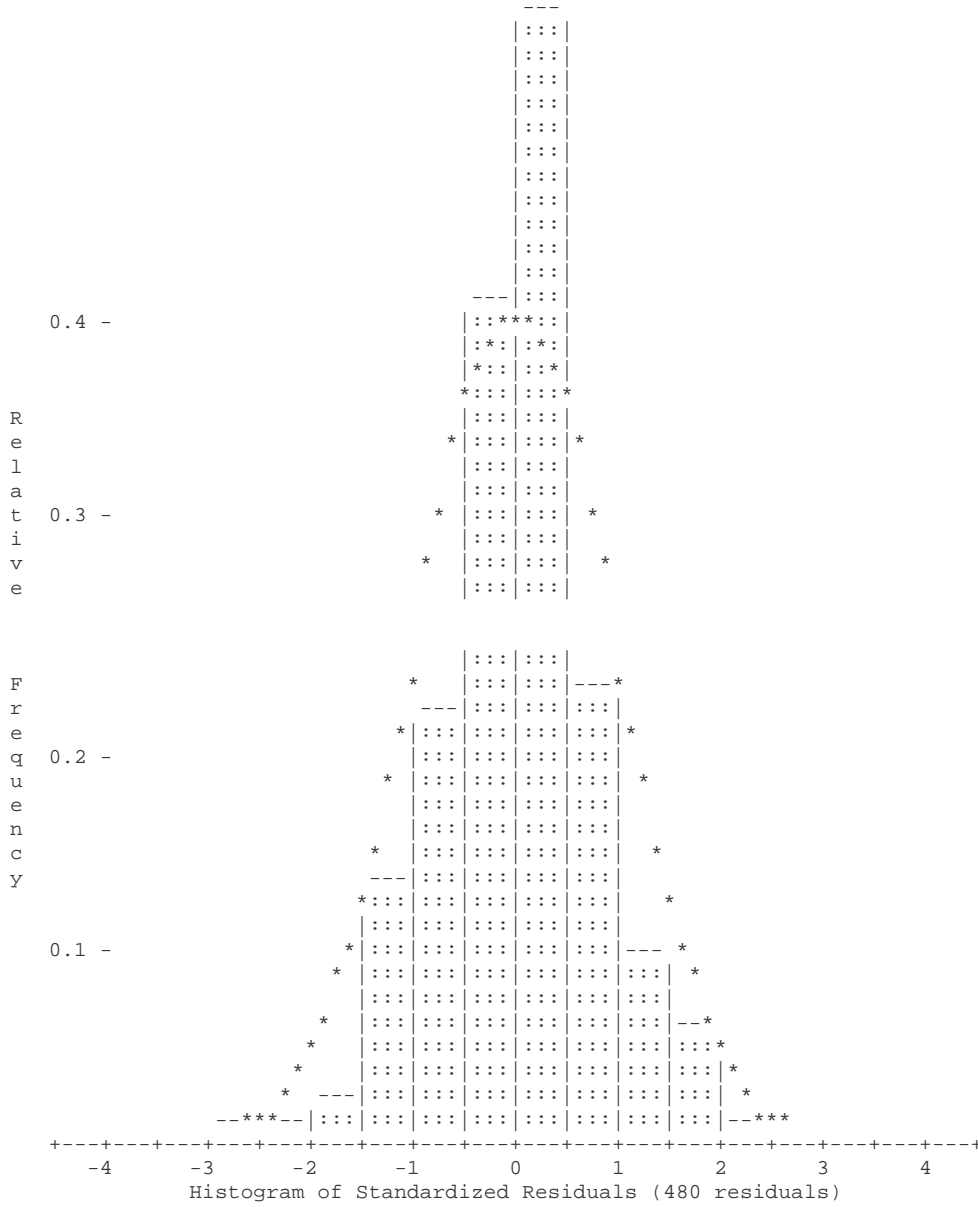
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Residuals (critical value = 4.000):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION	RESIDUAL	STD RES
			STD DEV	STD DEV	PPM
EHDF	88	170	1.91495	0.0001	0.6016
			0.0002	0.0002	47.16
EHDF	170	88	-1.91491	-0.0001	-0.8681
			0.0002	0.0002	68.05
EHDF	40	170	2.08292	-0.0003	-2.2670
			0.0002	0.0001	160.39
EHDF	170	40	-2.08253	-0.0001	-0.3799
			0.0002	0.0001	26.88
EHDF	777	30	7.12531	-0.0001	-0.5624
			0.0002	0.0002	13.70
EHDF	30	777	-7.12547	0.0003	1.4844
			0.0002	0.0002	36.15
EHDF	777	20	5.23259	0.0001	0.8244
			0.0003	0.0002	27.69
EHDF	20	777	-5.23293	0.0002	0.8451
			0.0003	0.0002	37.28
EHDF	30	3_P	2.19670	-0.0001	-0.0001
			0.0001	0.0000	0.67*
EHDF	40	4	0.97957	-0.0000	-0.0000
			0.0001	0.0000	2.61*
EHDF	4	40	-0.97957	0.0000	0.0000
			0.0001	0.0000	2.61*
EHDF	4	4_P	-0.07202	-0.0000	-0.0000
			0.0001	0.0000	0.05*
EHDF	170	17	1.55647	0.0000	0.0000
			0.0001	0.0000	5.01*
EHDF	17	170	-1.55645	-0.0000	-0.0000
			0.0001	0.0000	17.86*
EHDF	17	17_P	-0.07043	0.0000	0.0000
			0.0001	0.0000	0.25*
EHDF	20	2	1.63260	-0.0000	-0.3326
			0.0002	0.0001	24.72
EHDF	2	20	-1.63252	-0.0000	-0.3268
			0.0002	0.0001	24.29
EHDF	2	2_P	-0.07129	-0.0000	-0.0000
			0.0001	0.0000	0.00*
EHDF	88	8	1.79179	0.0000	0.0000
			0.0001	0.0000	0.05*
EHDF	8	88	-1.79180	0.0000	0.0000
			0.0001	0.0000	0.05*
EHDF	8	8GPS	-0.08140	0.0000	0.0000
			0.0010	0.0000	0.01*

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S T A T I S T I C S S U M M A R Y

Residual Critical Value Type	Tau Max
Residual Critical Value	4.0005
Number of Flagged Residuals	0
Convergence Criterion	0.0001
Final Iteration Counter Value	4
Confidence Level Used	95.0000
Estimated Variance Factor	1.0389
Number of Degrees of Freedom	295

Chi-Square Test on the Variance Factor:

8.8965e-01 < 1.0000 < 1.2292e+00 ?

THE TEST PASSES

NOTE: All confidence regions were computed using the following factors:

Variance factor used	=	1.0389
1-D expansion factor	=	1.9600
2-D expansion factor	=	2.4477
3-D expansion factor	=	2.7955

Note that, for relative confidence regions, precisions are computed from the ratio of the major semi-axis and the spatial distance between the two stations.

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2-D and 1-D Station Confidence Regions (95.000 and 95.000 percent):

STATION	MAJOR SEMI-AXIS	AZ	MINOR SEMI-AXIS	VERTICAL
10	0.0000	0	0.0000	0.0021
1001	0.0012	7	0.0009	0.0022
1002	0.0014	65	0.0013	0.0024
1003	0.0012	5	0.0009	0.0024
1004	0.0010	1	0.0004	0.0023
1005	0.0013	0	0.0009	0.0024
1006	0.0018	10	0.0010	0.0024
1016	0.0013	2	0.0010	0.0023
1017	0.0011	18	0.0009	0.0023
1111	0.0000	0	0.0000	0.0021
13	0.0000	0	0.0000	0.0021
16	0.0000	0	0.0000	0.0021
16_26	0.0012	3	0.0008	0.0022
16_C	0.0013	3	0.0011	0.0029
16_P	0.0012	3	0.0010	0.0021
17	0.0000	0	0.0000	0.0020
170	0.0000	0	0.0000	0.0020
17_25	0.0011	13	0.0010	0.0026
17_26	0.0011	14	0.0009	0.0022
17_P	0.0011	15	0.0009	0.0020
1_25	0.0013	5	0.0010	0.0023
1_26	0.0012	12	0.0009	0.0022
1_P	0.0012	8	0.0009	0.0021
2	0.0000	0	0.0000	0.0021
20	0.0000	0	0.0000	0.0021
2_26	0.0014	45	0.0013	0.0024
2_P	0.0014	59	0.0013	0.0021
30	0.0000	0	0.0000	0.0021
3001	0.0012	6	0.0009	0.0022
3002	0.0014	66	0.0013	0.0023
3003	0.0012	6	0.0010	0.0023
3004	0.0010	180	0.0005	0.0022
3005	0.0013	1	0.0009	0.0024
3006	0.0018	10	0.0010	0.0024
3016	0.0012	1	0.0010	0.0023
3017	0.0011	16	0.0009	0.0023
3_25	0.0013	6	0.0010	0.0026
3_26	0.0012	6	0.0010	0.0023
3_P	0.0012	7	0.0009	0.0021
4	0.0000	0	0.0000	0.0020
40	0.0000	0	0.0000	0.0020
4_25	0.0011	180	0.0007	0.0024
4_26	0.0010	5	0.0007	0.0023
4_P	0.0010	1	0.0005	0.0020
5	0.0000	0	0.0000	0.0021
50	0.0000	0	0.0000	0.0021
5_25	0.0013	3	0.0010	0.0027
5_26	0.0013	180	0.0009	0.0026
5_P	0.0012	5	0.0009	0.0021
60	0.0000	0	0.0000	0.0021
6_25	0.0019	10	0.0011	0.0026
6_26	0.0018	10	0.0010	0.0024
6_P	0.0018	10	0.0010	0.0021
7232	0.0029	20	0.0018	0.0025
7501	0.0013	3	0.0011	0.0021
7501_Temp	0.0000	0	0.0000	0.0021
777	0.0000	0	0.0000	0.0020
8	0.0003	0	0.0003	0.0020
88	0.0000	0	0.0000	0.0020
8GPS	0.0002	0	0.0002	0.0002
V100	0.0000	0	0.0000	0.0021

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3D Station Confidence Regions (95.000 percent):

STATION	MAJ-SEMI (AZ,VANG)	MED-SEMI (AZ,VANG)	MIN-SEMI (AZ,VANG)
10	0.0030 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
1001	0.0032 (294, 90)	0.0014 (187, 0)	0.0010 (97, 0)
1002	0.0034 (272, 90)	0.0016 (65, 0)	0.0015 (155, 0)
1003	0.0034 (293, 90)	0.0014 (185, 0)	0.0011 (95, 0)
1004	0.0033 (249, 90)	0.0012 (1, 0)	0.0005 (91, 0)
1005	0.0034 (254, 90)	0.0014 (0, 0)	0.0011 (90, 0)
1006	0.0034 (282, 90)	0.0021 (190, 0)	0.0011 (100, 0)
1016	0.0033 (285, 90)	0.0014 (182, 0)	0.0012 (92, 0)
1017	0.0033 (256, 90)	0.0012 (18, 0)	0.0010 (108, 0)
1111	0.0029 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
13	0.0030 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
16	0.0030 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
16_26	0.0031 (296, 90)	0.0013 (183, 0)	0.0010 (93, 0)
16_C	0.0041 (294, 90)	0.0015 (183, 0)	0.0013 (93, 0)
16_P	0.0030 (295, 90)	0.0014 (183, 0)	0.0011 (93, 0)
17	0.0029 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
170	0.0029 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
17_25	0.0037 (272, 90)	0.0013 (13, 0)	0.0011 (103, 0)
17_26	0.0032 (279, 90)	0.0012 (14, 0)	0.0010 (104, 0)
17_P	0.0029 (258, 90)	0.0012 (15, 0)	0.0010 (105, 0)
1_25	0.0033 (309, 90)	0.0014 (185, 0)	0.0011 (95, 0)
1_26	0.0032 (289, 90)	0.0014 (192, 0)	0.0010 (102, 0)
1_P	0.0030 (303, 90)	0.0014 (188, 0)	0.0010 (98, 0)
2	0.0030 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
20	0.0030 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
2_26	0.0035 (277, 90)	0.0016 (45, 0)	0.0015 (135, 0)
2_P	0.0030 (283, 90)	0.0016 (59, 0)	0.0015 (149, 0)
30	0.0029 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
3001	0.0032 (302, 90)	0.0014 (186, 0)	0.0011 (96, 0)
3002	0.0033 (271, 90)	0.0016 (66, 0)	0.0015 (156, 0)
3003	0.0033 (295, 90)	0.0014 (186, 0)	0.0011 (96, 0)
3004	0.0032 (332, 90)	0.0011 (180, 0)	0.0005 (90, 0)
3005	0.0034 (256, 90)	0.0014 (1, 0)	0.0011 (91, 0)
3006	0.0034 (282, 90)	0.0021 (190, 0)	0.0011 (100, 0)
3016	0.0032 (284, 90)	0.0014 (181, 0)	0.0012 (91, 0)
3017	0.0032 (261, 90)	0.0012 (16, 0)	0.0010 (106, 0)
3_25	0.0037 (241, 90)	0.0015 (6, 0)	0.0012 (96, 0)
3_26	0.0032 (296, 90)	0.0014 (186, 0)	0.0011 (96, 0)
3_P	0.0030 (298, 90)	0.0014 (187, 0)	0.0010 (97, 0)
4	0.0029 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
40	0.0029 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
4_25	0.0035 (309, 90)	0.0012 (180, 0)	0.0008 (90, 0)
4_26	0.0032 (251, 90)	0.0011 (5, 0)	0.0008 (95, 0)
4_P	0.0029 (216, 90)	0.0011 (1, 0)	0.0006 (91, 0)
5	0.0030 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
50	0.0029 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
5_25	0.0039 (241, 90)	0.0015 (3, 0)	0.0011 (93, 0)
5_26	0.0037 (255, 90)	0.0015 (360, 0)	0.0010 (90, 0)
5_P	0.0030 (270, 90)	0.0014 (5, 0)	0.0010 (95, 0)
60	0.0029 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
6_25	0.0038 (299, 90)	0.0021 (190, 0)	0.0012 (100, 0)
6_26	0.0034 (287, 90)	0.0020 (190, 0)	0.0011 (100, 0)
6_P	0.0030 (298, 90)	0.0021 (190, 0)	0.0011 (100, 0)
7232	0.0036 (236, 90)	0.0033 (20, 0)	0.0020 (110, 0)
7501	0.0030 (296, 90)	0.0015 (183, 0)	0.0013 (93, 0)
7501_Temp	0.0030 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
777	0.0029 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
8	0.0029 (334, 90)	0.0003 (224, 0)	0.0003 (134, 0)
88	0.0029 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
8GPS	0.0003 (227, 3)	0.0003 (317, 2)	0.0003 (87, 86)
V100	0.0029 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)

5.11. HartRAO covariance matrix of selected points

*
 * Extracted coordinates follow: (extracted on Tue Jun 21 15:41:51 2005)
 * Source (GeoLab adjustment): HRAO
 * Variance factor of adjustment = 1.038852
 * Variance factor used in computing covariance matrix = 1.038852
 * Number of degrees of freedom of adjustment = 295
 * Number of stations in adjusted network = 61
 * Number of stations extracted = 11
 *

3DC						
XYZ	30302M004	5085352.4810	2668395.8000	-2768731.5720	m	0
XYZ	Pier 5	5085415.4983	2668225.1889	-2768765.9413	m	0
XYZ	Pier 3	5085397.7425	2668410.2415	-2768634.0422	m	0
XYZ	16_C	5085403.6808	2668331.5518	-2768690.1814	m	0
XYZ	Pier 17	5085330.9356	2668447.6608	-2768725.1044	m	0
XYZ	Pier 1	5085428.4379	2668326.4552	-2768649.4294	m	0
XYZ	Pier 2	5085457.9475	2668371.1494	-2768555.8319	m	0
XYZ	Pier 4	5085345.5063	2668392.0148	-2768745.6979	m	0
XYZ	Pier 6	5085499.8113	2668160.3993	-2768659.8145	m	0
XYZ	30302S001	5085442.7809	2668263.6120	-2768696.9181	m	0
XYZ	30302M003	5085401.1066	2668330.2083	-2768688.7731	m	0
COV	CT UPPR					
ELEM	1.03885224091813e-08	-1.45091841527063e-23	1.66920039293086e-22			
ELEM	1.03885974773731e-08	2.6778894654629e-13	1.56851759519912e-13			
ELEM	1.03884632578022e-08	8.76942018149774e-14	-1.21037394812272e-13			
ELEM	1.03885202322629e-08	1.62678454293357e-13	-2.22647786296022e-15			
ELEM	1.03885020824963e-08	-8.60268833194583e-14	-4.26544430786088e-14			
ELEM	1.03884989302988e-08	2.20035815861528e-13	-4.55439437172035e-14			
ELEM	1.03884327957197e-08	2.48927065815332e-13	-1.83311485808019e-13			
ELEM	1.03885317336825e-08	-1.06553030090872e-14	1.88555548202028e-14			
ELEM	1.03885591450046e-08	5.04739938317116e-13	7.98336286457704e-14			
ELEM	1.03885553680487e-08	2.88322508737107e-13	4.50758344164266e-14			
ELEM	1.03885202167029e-08	1.62667312178421e-13	-2.22242983274674e-15			
ELEM	1.03885224091817e-08	2.41300285143663e-23	-6.36054748491378e-14			
ELEM	1.03885171584489e-08	-1.31036998172411e-13	-1.99359044410492e-15			
ELEM	1.03885191777647e-08	-4.09453877287357e-15	-2.80540186200601e-14			
ELEM	1.03885177773048e-08	-5.77831126758686e-14	2.02318323761759e-14			
ELEM	1.03885245026108e-08	4.16776484879799e-14	-3.32168567171038e-14			
ELEM	1.03885165291198e-08	-6.841370773415e-14	-2.37887717471482e-14			
ELEM	1.03885157791291e-08	-4.89901400847627e-14	-2.56058409159196e-16			
ELEM	1.03885228606644e-08	-5.3110589236597e-16	-9.72914730858547e-14			
ELEM	1.03885067104382e-08	-2.00422163222542e-13	-5.63562025860101e-14			
ELEM	1.03885174361645e-08	-1.16097610735809e-13	-2.80522330045004e-14			
ELEM	1.03885177773048e-08	-5.77783570263473e-14				
ELEM	1.03885224091816e-08	-3.90788574680944e-14	2.70270000755223e-14			
ELEM	1.03884408400739e-08	2.92390703929621e-14	-3.3839354822506e-14			
ELEM	1.03885822316302e-08	3.45811535050295e-16	-7.78050438859188e-15			
ELEM	1.03885220207139e-08	1.11271565150758e-14	-5.96195924127233e-15			
ELEM	1.03885457119575e-08	1.03480866547567e-14	-2.11911340055792e-14			
ELEM	1.0388542348143e-08	4.37406329338487e-14	-5.76841851630498e-14			
ELEM	1.03886118619714e-08	-4.64874277988705e-15	5.69035014889973e-15			
ELEM	1.03885130072639e-08	-2.27191257017206e-14	-3.80312616658985e-15			
ELEM	1.03884735847459e-08	-1.81782739387431e-14	-3.42673067390147e-16			
ELEM	1.03884960353468e-08	3.53674871488318e-16	-7.78071885184096e-15			
ELEM	1.03885220185981e-08					
ELEM	9.55057019143095e-07	-1.82209875794506e-08	-3.52503313046612e-07			
ELEM	9.07546474117254e-07	-2.82121918716786e-08	-3.61496814194117e-07			
ELEM	9.06415702323223e-07	-1.51027411655921e-08	-3.63518042033687e-07			
ELEM	8.70108725952953e-07	-4.73923238348955e-09	-3.82248395174379e-07			
ELEM	9.08730742336312e-07	-1.57264360747567e-08	-3.60444158109532e-07			
ELEM	9.08549393772125e-07	-1.25706051692053e-08	-3.59634534003241e-07			
ELEM	8.72603443690414e-07	-2.09520593418881e-08	-3.77472127530029e-07			
ELEM	9.17534426401783e-07	-2.56655187557455e-08	-3.44594093092848e-07			
ELEM	9.28170761422996e-07	-1.84145033995788e-08	-3.54156751308348e-07			
ELEM	9.06638693237821e-07	-1.51027421307772e-08	-3.63626271281206e-07			
ELEM	1.51212381828427e-07	-3.6570650431076e-08	-2.9126898783001e-08			
ELEM	1.44140377322272e-07	-5.92590532599623e-08	-2.07307471388682e-08			
ELEM	9.44251581751526e-08	-4.19699834946459e-08	-6.69570690097821e-09			
ELEM	7.97497503118415e-08	-1.40336029153503e-08	-2.00823435409819e-08			
ELEM	1.01405074193266e-07	-4.0591351951986e-08	-2.05694098760473e-08			
ELEM	1.18899006749129e-07	-4.1680837061038e-08	-1.80069308763775e-08			

ELEM	5.76062846650959e-08	-3.71480496354767e-08	-2.55847745015781e-08
ELEM	1.05495276218791e-07	-5.19621405569065e-08	-2.20473032407798e-08
ELEM	1.23095175251886e-07	-4.47069813514882e-08	-2.07211947754704e-08
ELEM	9.44251581982313e-08	-4.19746196930072e-08	
ELEM	4.00417156347531e-07	-3.6152110345491e-07	-5.7446689273693e-08
ELEM	3.38071613916387e-07	-3.63460370068764e-07	-3.04520077920371e-08
ELEM	3.33922766245267e-07	-3.82300701021985e-07	-9.79672430426358e-09
ELEM	2.67875282836478e-07	-3.60374558783343e-07	-3.1678693216077e-08
ELEM	3.41183315192328e-07	-3.59510595434062e-07	-2.49509309035937e-08
ELEM	3.42270418831529e-07	-3.77497362292704e-07	-4.34722116375056e-08
ELEM	2.77988807103124e-07	-3.44391098868963e-07	-5.22271033220497e-08
ELEM	3.75440708992871e-07	-3.54046065200709e-07	-3.72171189601162e-08
ELEM	3.70863286932252e-07	-3.63587544152414e-07	-3.04520074088071e-08
ELEM	3.33984490480829e-07		
ELEM	9.51725593851758e-07	-1.57450168913992e-08	-3.47962208624513e-07
ELEM	9.07423801823232e-07	-1.46799425928971e-08	-3.60573986628648e-07
ELEM	8.69429471139268e-07	-3.13096490959223e-09	-3.83488749566064e-07
ELEM	9.0955719883119e-07	-1.36870980731214e-08	-3.56658268249437e-07
ELEM	9.16344049848996e-07	-8.1999238114776e-09	-3.44039497960353e-07
ELEM	8.71653712733517e-07	-1.84332428156446e-08	-3.79154944131714e-07
ELEM	9.18536245370755e-07	-2.41493354662616e-08	-3.38431511043654e-07
ELEM	9.12119433522949e-07	-1.53919234496388e-08	-3.54745045502326e-07
ELEM	9.0760355067497e-07	-1.46799435591231e-08	-3.6066122829527e-07
ELEM	1.53963045934951e-07	-3.17087874862359e-08	-1.92715235559004e-08
ELEM	9.47822203838669e-08	-3.90565933996375e-08	-7.37599498791296e-09
ELEM	8.1376548216826e-08	-1.53667579363899e-08	-1.82654049501207e-08
ELEM	1.03389671486778e-07	-3.69569058087485e-08	-1.33652876015328e-08
ELEM	1.23551501318398e-07	-2.68071829824045e-08	-2.17345784386262e-08
ELEM	5.7147020352688e-08	-4.50319310529287e-08	-2.25671560305654e-08
ELEM	1.06487563711514e-07	-4.59116802847782e-08	-2.46100976468177e-08
ELEM	1.2552653309543e-07	-5.01070286726759e-08	-1.92630978090202e-08
ELEM	9.4782220405323e-08	-3.90606827933133e-08	
ELEM	4.03700967958342e-07	-3.60516329904035e-07	-2.96688624913049e-08
ELEM	3.39303126986953e-07	-3.83546227255768e-07	-6.54389374821272e-09
ELEM	2.65426379735722e-07	-3.56598893308725e-07	-2.76364814585632e-08
ELEM	3.47640055832542e-07	-3.44011439365046e-07	-1.63255412650925e-08
ELEM	3.74516687237733e-07	-3.79175582899367e-07	-3.79905986455051e-08
ELEM	2.74483161821285e-07	-3.38475078430502e-07	-4.90155975752621e-08
ELEM	3.85166385199133e-07	-3.54771826817401e-07	-3.10788966844196e-08
ELEM	3.53261915793518e-07	-3.60625717930376e-07	-2.96688621113851e-08
ELEM	3.39356218741271e-07		
ELEM	1.83060578324063e-06	-1.54729970839089e-08	-7.53894749726899e-07
ELEM	8.68531372505189e-07	-6.99996538917211e-09	-3.86415167246231e-07
ELEM	9.2214692634408e-07	-1.29158239538066e-08	-3.63937373297196e-07
ELEM	9.09922719324659e-07	-1.60190496634466e-08	-3.54887176509351e-07
ELEM	8.71981446560077e-07	-2.10549922870309e-08	-3.79708856878049e-07
ELEM	9.21869121145458e-07	-1.63502167000261e-08	-3.49882631678095e-07
ELEM	9.12141086950955e-07	-1.65476243297792e-08	-3.48966025262463e-07
ELEM	9.60449662083644e-07	-1.54729970063804e-08	-3.51731881361444e-07
ELEM	2.19617594561442e-07	-3.0781080379621e-08	-3.41470919973173e-08
ELEM	8.23343395909684e-08	-7.26651991182877e-09	-1.00136420897515e-08
ELEM	9.88749708840302e-08	-1.97688725730236e-08	-6.36823273527972e-09
ELEM	9.47605207949315e-08	-1.23613781217318e-08	-1.78403863319445e-08
ELEM	5.54718212504872e-08	-3.68025473888299e-08	-2.16138738305023e-08
ELEM	9.02908374091593e-08	-4.35307109756412e-08	-2.14905298127476e-08
ELEM	9.77902772517288e-08	-4.35631662988497e-08	-1.54127772423195e-08
ELEM	1.78063504941804e-07	-3.08103080462989e-08	
ELEM	6.43304975464597e-07	-3.86334804380854e-07	-1.46511765642949e-08
ELEM	2.59893819955263e-07	-3.63903942671459e-07	-2.57192785196186e-08
ELEM	3.48978524673438e-07	-3.5481689962778e-07	-3.23606020577702e-08
ELEM	3.50883621624464e-07	-3.79713900249996e-07	-4.36168302922755e-08
ELEM	2.7394046768071e-07	-3.49768899074264e-07	-3.29244446505208e-08
ELEM	3.70770032015517e-07	-3.48974489813867e-07	-3.352366774851205e-08
ELEM	3.62534874989198e-07	-3.51720273545495e-07	-3.07810805448694e-08
ELEM	4.06555080376062e-07		
ELEM	9.05606642941115e-07	-5.00874844758816e-09	-3.50567366379263e-07
ELEM	8.67889351921773e-07	-7.84579428458297e-09	-3.87455330727662e-07
ELEM	8.67340763534869e-07	-1.27812331653271e-08	-3.8794970196535e-07
ELEM	8.73795526920309e-07	-2.45169258246928e-08	-3.76120455952133e-07
ELEM	8.66499647856877e-07	-6.41748092862214e-09	-3.90090135349867e-07
ELEM	8.60540263280875e-07	-2.87248020404642e-09	-4.02230402775061e-07
ELEM	8.6840438896183e-07	-6.9999663124335e-09	-3.86353536010389e-07
ELEM	1.34022707806422e-07	-1.0125187543533e-08	-2.670043978284e-09
ELEM	8.42120406206047e-08	-5.68121305016901e-09	-1.46973951884072e-09
ELEM	8.79880476691017e-08	-3.09711956685727e-09	-1.24292564301869e-08
ELEM	5.47795878858655e-08	-2.55871157587049e-08	1.27367275308834e-09

ELEM	7.07697158130691e-08	2.46445784648976e-09	6.95658996962524e-09
ELEM	7.75854890075783e-08	1.42583511042727e-08	-3.43040435390357e-09
ELEM	8.23343395948175e-08	-7.258902207781e-09	
ELEM	3.53627061214862e-07	-3.87377627059903e-07	-1.63907547930451e-08
ELEM	2.5764498248013e-07	-3.87885576478161e-07	-2.65923622953692e-08
ELEM	2.56382990917991e-07	-3.7613105402483e-07	-5.05907194114033e-08
ELEM	2.81350721387429e-07	-3.9003533371816e-07	-1.35979012375716e-08
ELEM	2.52056941619548e-07	-4.0218620304817e-07	-6.13916501315593e-09
ELEM	2.26966180832392e-07	-3.86283795561144e-07	-1.46511761554196e-08
ELEM	2.5986906293609e-07		
ELEM	9.50127069451129e-07	-1.43165867113198e-08	-3.5137762468315e-07
ELEM	9.15135332200957e-07	-5.26188333817e-10	-3.45375350201079e-07
ELEM	8.71983779999856e-07	-2.1131306388564e-08	-3.79282393349017e-07
ELEM	9.34999319045015e-07	-2.60178776348828e-08	-3.36900048166601e-07
ELEM	9.19516333145717e-07	-2.74540225296665e-08	-3.37647950312882e-07
ELEM	9.22737247736367e-07	-1.29158249367145e-08	-3.64223886781219e-07
ELEM	1.48503571753529e-07	-2.85266207826054e-08	-1.2817187264122e-08
ELEM	1.22240168986795e-07	-2.56917206218119e-08	-1.87411454655774e-08
ELEM	5.43623415917593e-08	-3.86526485332127e-08	-7.41903478127118e-09
ELEM	9.42033784960232e-08	-1.44571833532709e-08	-1.00093113758018e-08
ELEM	1.1626341757857e-07	-2.00116364458933e-08	-9.99728290584074e-09
ELEM	9.88749708951401e-08	-1.97768124664266e-08	
ELEM	3.96645902157303e-07	-3.45432321613993e-07	-2.35248800226435e-10
ELEM	3.7094646226238e-07	-3.79280018670697e-07	-4.38222474424311e-08
ELEM	2.74625649909548e-07	-3.36915290591893e-07	-5.23193907947514e-08
ELEM	4.0424810802073e-07	-3.37625773121986e-07	-5.57590930057371e-08
ELEM	3.87803747306513e-07	-3.64188213581381e-07	-2.57192781358563e-08
ELEM	3.49116496023446e-07		
ELEM	9.84421236414016e-07	7.25266116010724e-09	-3.26294703311286e-07
ELEM	8.72118046805811e-07	-2.06632858175416e-08	-3.78273529047017e-07
ELEM	9.3006114715e-07	2.6803437076135e-08	-3.15120036200867e-07
ELEM	9.30311494520457e-07	-4.57982775127346e-08	-3.20819934724138e-07
ELEM	9.10191170225376e-07	-1.60190506326776e-08	-3.55017469809041e-07
ELEM	2.93871676528549e-07	1.60281134025818e-08	-1.97551433273006e-08
ELEM	5.11062345106403e-08	-4.07192311007163e-08	-2.70223230176768e-08
ELEM	8.52439622381826e-08	-5.49170615930634e-08	2.13516272559581e-08
ELEM	9.26611166833457e-08	4.47197292743149e-08	-6.36181267823403e-09
ELEM	9.47605208020019e-08	-1.23644940517382e-08	
ELEM	4.70791755716688e-07	-3.78252843819453e-07	-4.28872345971341e-08
ELEM	2.76366190750931e-07	-3.15027840009982e-07	5.59490236564165e-08
ELEM	4.33439586344315e-07	-3.20802841603616e-07	-9.38222446942808e-08
ELEM	4.25134200658048e-07	-3.54964791674363e-07	-3.23606016841124e-08
ELEM	3.50955401343876e-07		
ELEM	8.94948301163344e-07	-1.98863228314807e-08	-3.67777378110822e-07
ELEM	8.72749497377711e-07	-2.03059655430365e-08	-3.77487672481381e-07
ELEM	8.81098179692905e-07	-2.26017719548414e-08	-3.64128989495909e-07
ELEM	8.71828128825556e-07	-2.10549932140695e-08	-3.79634444322601e-07
ELEM	6.99953278039025e-08	-4.09704960208687e-08	-2.23331745072798e-08
ELEM	5.85026382800719e-08	-4.60539028874104e-08	-3.23291873921158e-08
ELEM	6.02103463749893e-08	-6.66424911965802e-08	-1.78425125914342e-08
ELEM	5.54718212703865e-08	-3.6801515376544e-08	
ELEM	3.15707353923596e-07	-3.77508970618343e-07	-4.22711343172723e-08
ELEM	2.78167621596925e-07	-3.64155967290361e-07	-4.68597744599706e-08
ELEM	3.07518704778869e-07	-3.79637453901692e-07	-4.36168298908508e-08
ELEM	2.73903364514765e-07		
ELEM	1.00458323021149e-06	-5.04932959463581e-08	-2.38785019264277e-07
ELEM	9.43209062141942e-07	-3.76804857766977e-08	-2.99331515956168e-07
ELEM	9.22260395949059e-07	-1.63502176824607e-08	-3.5007253769116e-07
ELEM	1.89331430552836e-07	-1.01972585953145e-07	-3.20899461792697e-08
ELEM	1.06402971033754e-07	-6.5272707430177e-08	-2.16287117404979e-08
ELEM	9.02908374332744e-08	-4.35235093314449e-08	
ELEM	6.28773266072217e-07	-2.99363043312577e-07	-7.68664363432449e-08
ELEM	4.7199564780553e-07	-3.49993184234587e-07	-3.2924444282509e-08
ELEM	3.70878889213991e-07		
ELEM	1.57384208498802e-06	-4.7648761599563e-08	-9.32854730310902e-08
ELEM	9.12359029818755e-07	-1.65476253013936e-08	-3.4907180443551e-07
ELEM	5.41316035354475e-07	-9.75857990175747e-08	-2.14819305835403e-08
ELEM	9.77902772756575e-08	-4.35673398907161e-08	
ELEM	1.42720040208673e-06	-3.4909219331837e-07	-3.352367711804e-08
ELEM	3.62592002667381e-07		
ELEM	9.82070633972534e-07	-1.54127782972174e-08	-3.42045719080212e-07
ELEM	2.19617594595622e-07	-3.08103076619229e-08	
ELEM	4.43407983464503e-07		

*
* End of extracted coordinates

5.12. SAC ground network adjustment results

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Tue Jun 14 19:12:09 2005

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Input file: D:\Valerie\chantier devis\HRAO\calculs juin\SAC\SAC.iob
Output file: D:\Valerie\chantier devis\HRAO\calculs juin\SAC\SAC.lst
Options file: C:\PROGRA~1\MICROS~3\GeoLab\default.gpj

```

PARAMETERS		OBSERVATIONS	
Description	Number	Description	Number
No. of Stations	34	Directions	53
Coord Parameters	86	Distances	30
Free Latitudes	26	Azimuths	1
Free Longitudes	26	Vertical Angles	0
Free Heights	34	Zenithal Angles	43
Fixed Coordinates	16	Angles	0
Astro. Latitudes	0	Heights	0
Astro. Longitudes	0	Height Differences	38
Geoid Records	0	Auxiliary Params.	0
All Aux. Pars.	14	2-D Coords.	0
Direction Pars.	14	2-D Coord. Diffs.	32
Scale Parameters	0	3-D Coords.	3
Constant Pars.	0	3-D Coord. Diffs.	0
Rotation Pars.	0		
Translation Pars.	0		
-----		-----	
Total Parameters	100	Total Observations	200
Degrees of Freedom =		100	

SUMMARY OF SELECTED OPTIONS

OPTION	SELECTION
Computation Mode	Adjustment
Maximum Iterations	30
Convergence Criterion	0.00010
Residual Rejection Criterion	Tau Max
Confidence Region Types	1D 2D 3D Station
Variance Factor (VF) Known	Yes
Scale Covariance Matrix With VF	Yes
Scale Residual Variances With VF	No
Force Convergence in Max Iters	No
Distances Contribute To Heights	Yes
Compute Full Inverse	Yes
Optimize Band Width	Yes
Generate Initial Coordinates	Yes
Re-Transform Obs After 1st Pass	Yes
Geoid Interpolation Method	Bi-Quadratic

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Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV	m	0
XYZ		100	5084665.2708 0.0008	2670373.0406 0.0010	-2768422.9406 0.0008	m	0
XYZ		1100	5084665.2708 0.0008	2670373.0405 0.0010	-2768422.9405 0.0008	m	0
XYZ		1200	5084653.1982 0.0009	2670347.2437 0.0010	-2768470.7942 0.0007	m	0
XYZ		1403	5084868.0556 0.0015	2670347.2639 0.0013	-2768065.0944 0.0011	m	0
XYZ		1412	5084728.4107 0.0011	2670054.1752 0.0011	-2768650.8848 0.0010	m	0
XYZ		1418	5084555.8009 0.0011	2670542.8063 0.0011	-2768474.4903 0.0010	m	0
XYZ		200	5084653.1982 0.0007	2670347.2436 0.0010	-2768470.7943 0.0007	m	0
XYZ		2000	5084651.9600 0.0001	2670346.5930 0.0001	-2768470.1146 0.0001	m	0
XYZ		200_P	5084652.9073 0.0003	2670347.0909 0.0009	-2768470.6348 0.0006	m	0
XYZ		210	5084653.7004 0.0007	2670347.5060 0.0010	-2768471.0714 0.0007	m	0
XYZ		2100	5084665.2713 0.0008	2670373.0408 0.0010	-2768422.9409 0.0008	m	0
XYZ		220	5084652.9831 0.0008	2670347.1309 0.0010	-2768470.6752 0.0007	m	0
XYZ		2200	5084653.1984 0.0009	2670347.2438 0.0010	-2768470.7944 0.0007	m	0
XYZ		2403	5084868.0577 0.0017	2670347.2649 0.0014	-2768065.0954 0.0012	m	0
XYZ		2412	5084728.4109 0.0011	2670054.1752 0.0011	-2768650.8851 0.0010	m	0
XYZ		2418	5084555.8008 0.0011	2670542.8063 0.0011	-2768474.4902 0.0010	m	0
XYZ		3	5084660.0692 0.0001	2670326.3633 0.0001	-2768482.5204 0.0001	m	0
XYZ		3GPS	5084657.6353 0.0001	2670325.0851 0.0001	-2768481.1863 0.0001	m	0
XYZ		403	5084868.0549 0.0014	2670347.2635 0.0013	-2768065.0940 0.0010	m	0
XYZ		403_P	5084867.8640 0.0016	2670347.1632 0.0014	-2768064.9894 0.0011	m	0
XYZ		412	5084728.4104 0.0009	2670054.1750 0.0011	-2768650.8847 0.0009	m	0
XYZ		4120	5084727.1910 0.0004	2670053.5342 0.0002	-2768650.2147 0.0002	m	0
XYZ		412_P	5084728.1798 0.0006	2670054.0539 0.0010	-2768650.7583 0.0009	m	0
XYZ		412_T	5084728.2369 0.0004	2670054.0835 0.0002	-2768650.7880 0.0002	m	0
XYZ		418	5084555.8007 0.0008	2670542.8063 0.0011	-2768474.4902 0.0009	m	0
XYZ		4180	5084554.5904 0.0003	2670542.1701 0.0002	-2768473.8261 0.0002	m	0
XYZ		418_P	5084555.5720 0.0005	2670542.6861 0.0010	-2768474.3648 0.0009	m	0
XYZ		418_T	5084555.6288 0.0003	2670542.7154 0.0002	-2768474.3952 0.0002	m	0
XYZ		444	5084706.8972 0.0003	2670042.8777 0.0001	-2768639.0902 0.0002	m	0
XYZ		555	5084544.3680 0.0002	2670536.8010 0.0001	-2768468.2225 0.0001	m	0
XYZ		666	5084667.9583 0.0003	2670322.6293 0.0001	-2768451.9476 0.0001	m	0
XYZ		DORIS	5084653.3092 0.0009	2670347.3006 0.0011	-2768470.8569 0.0009	m	0
XYZ		TC2002	5084663.8551 0.0009	2670327.7510 0.0013	-2768470.3898 0.0007	m	0
XYZ		TDA5005	5084657.0482 0.0008	2670349.1633 0.0010	-2768460.0360 0.0011	m	0

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Residuals (critical value = 3.725):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
XCT	3GPS			5084657.63530 0.0001	-0.0000 0.0000	-0.0000 *
YCT	3GPS			2670325.08510 0.0001	0.0000 0.0000	0.0000 *
ZCT	3GPS			-2768481.18630 0.0001	-0.0000 0.0000	-0.0000 *
GAZI		412_P	403_P	18 77 53.1 0.1	0.0 0.0	0.0 *
DIR		2100	412	0 0 5.0 5.0	0.0 4.2	1.8 0.4
DIR		2100	403	124 11 82.0 5.0	-1.0 4.1	-0.3
DIR		2100	418	259 22 32.0 5.0	-0.1 4.0	-0.0
DIR		2100	200	362 48 39.0 5.0	-0.1 3.6	-0.0
DIR		2100	3	376 76 18.0 5.0	-0.6 3.2	-0.2
DIR		2200	403	0 0 0.0 5.0	1.2 3.5	0.3
DIR		2200	100	33 98 49.0 5.0	-0.0 3.1	-0.0
DIR		2200	3	281 48 52.0 5.0	-1.1 2.2	-0.5
DIR		2403	418	0 0 0.0 5.0	1.2 4.3	0.3
DIR		2403	100	20 89 36.0 5.0	1.4 4.3	0.3
DIR		2403	200	25 27 51.0 5.0	-4.2 4.3	-1.0
DIR		2403	412	58 1 21.0 5.0	1.6 4.3	0.4
DIR		2403	418	0 0 0.0 5.0	2.8 3.5	0.8
DIR		2403	3	28 52 27.0 5.0	-2.8 3.5	-0.8
ZANG		2100	412	97 36 67.0 8.0	10.8 7.8	1.4
ZANG		2100	403	100 85 1.0 8.0	8.5 7.6	1.1
ZANG		2100	418	98 6 76.0 8.0	-1.4 7.3	-0.2
ZANG		2100	200	99 44 58.0 8.0	1.0 4.3	0.2
ZANG		2200	403	100 83 7.0 8.0	5.8 7.7	0.8
ZANG		2200	100	100 55 59.0 8.0	0.7 4.1	0.2
ZANG		2403	418	98 63 84.0 8.0	9.3 7.6	1.2
ZANG		2403	100	99 15 56.0 8.0	1.1 7.4	0.1
ZANG		2403	200	99 17 68.0 8.0	18.3 7.5	2.4
ZANG		2403	412	97 92 29.0 14.4	32.5 14.3	2.3
ZANG		2403	418	98 63 82.0 8.0	7.3 7.6	1.0
DIST		2100	412	397.01440 0.0011	-0.0001 0.0010	-0.0893 0.22
DIST		2100	403	412.11650 0.0011	0.0000 0.0010	0.0051 0.01
DIST		2100	418	208.47350 0.0010	0.0006 0.0009	0.6560 2.83
DIST		2100	200	55.68770 0.0010	0.0007 0.0009	0.8185 13.23

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Residuals (critical value = 3.725):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIST	2200	100	55.68790 0.0010	0.0006 0.0009	0.6429 10.37
DIST	2403	418	550.76860 0.0011	-0.0010 0.0010	-0.9914 1.77
DIST	2403	100	412.11710 0.0011	-0.0005 0.0010	-0.5158 1.23
DIST	2403	200	459.08300 0.0011	-0.0011 0.0010	-1.0975 2.36
DIR	2412	418	0 0 0.0 5.0	-2.4 4.4	-0.5
DIR	2412	200	385 86 7.0 5.0	-4.4 4.4	-1.0
DIR	2412	3	385 52 78.0 5.0	2.8 4.4	0.6
DIR	2412	100	380 25 13.0 5.0	1.6 4.5	0.4
DIR	2412	403	341 48 77.0 5.0	2.3 4.4	0.5
DIR	2418	403	0 0 0.0 5.0	1.3 4.0	0.3
DIR	2418	100	355 99 90.0 5.0	-1.5 3.9	-0.4
DIR	2418	412	316 52 41.0 5.0	0.3 4.0	0.1
ZANG	2412	418	101 17 88.0 8.0	6.1 7.8	0.8
ZANG	2412	200	102 88 78.0 8.0	8.9 7.6	1.2
ZANG	2412	100	102 63 93.0 8.0	7.6 7.7	1.0
ZANG	2418	403	101 36 83.0 8.0	-1.4 7.7	-0.2
ZANG	2418	100	101 93 45.0 8.0	-0.6 7.0	-0.1
ZANG	2418	412	98 82 85.0 8.0	11.4 7.8	1.5
DIST	2412	418	547.42320 0.0011	-0.0022 0.0010	-2.1333 3.97
DIST	2412	200	352.10590 0.0011	0.0003 0.0009	0.3401 0.90
DIST	2412	100	397.01510 0.0011	-0.0006 0.0010	-0.6274 1.54
DIST	2412	403	669.74260 0.0012	-0.0021 0.0010	-2.1374 3.13
DIST	2418	100	208.47350 0.0010	0.0006 0.0009	0.7194 3.09
DIST	2418	412	547.42210 0.0011	-0.0012 0.0010	-1.1609 2.16
ELAT	2200	200	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 74488.74
ELON	2200	200	0 00 0.00000 0.0002	-0.0000 0.0001	-0.4233 131825.2
EHDF	2200	200	0.00000 0.0010	-0.0002 0.0007	-0.3291 988471.3
ELAT	2418	418	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 118096.5
ELON	2418	418	0 00 0.00000 0.0002	-0.0000 0.0000	-0.2371 86122.26
EHDF	2418	418	0.00000 0.0010	-0.0001 0.0004	-0.3113 989268.1
ELAT	2412	412	0 00 0.00000 0.0002	0.0001 -0.0000	0.0001 126564.5
ELON	2412	412	0 00 0.00000 0.0002	0.0001 0.0000	1.9760 129467.0
EHDF	2412	412	0.00000 0.0010	-0.0006 0.0003	-2.1121 983473.3

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Residuals (critical value = 3.725):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ELAT	2100	100	0 00	0.00000	0.0000
				0.0002	-0.0000
ELON	2100	100	0 00	0.00000	-0.0000
				0.0002	0.0001
EHDF	2100	100		0.00000	-0.0006
				0.0010	0.0007
ELAT	2403	403	0 00	0.00000	-0.0002
				0.0003	-0.0000
ELON	2403	403	0 00	0.00000	0.0001
				0.0003	0.0000
EHDF	2403	403		0.00000	-0.0033
				0.0020	0.0010
ELAT	3	3GPS	0 00	0.00000	0.0000
				0.0000	0.0000
ELON	3	3GPS	0 00	0.00000	-0.0000
				0.0000	0.0000
DIR	1418	403	0 0	0.0	-2.8
				5.0	4.0
DIR	1418	100	355 99	85.0	-0.5
				5.0	3.9
DIR	1418	412	316 52	34.0	3.2
				5.0	4.0
DIR	1412	418	0 0	0.0	-0.3
				5.0	4.4
DIR	1412	200	385 86	6.0	-1.4
				5.0	4.4
DIR	1412	3	385 52	80.0	2.9
				5.0	4.4
DIR	1412	100	380 25	16.0	0.6
				5.0	4.5
DIR	1412	403	341 48	83.0	-1.9
				5.0	4.4
DIR	1403	418	0 0	0.0	-0.8
				5.0	4.4
DIR	1403	100	20 89	38.0	-2.6
				5.0	4.4
DIR	1403	200	25 27	43.0	1.9
				5.0	4.4
DIR	1403	3	28 52	22.0	-1.3
				5.0	4.3
DIR	1403	412	58 1	18.0	2.8
				5.0	4.4
DIR	1100	412	0 0	0.0	-1.2
				5.0	4.2
DIR	1100	3	376 76	12.0	2.1
				5.0	3.2
DIR	1100	200	362 48	37.0	-1.4
				5.0	3.6
DIR	1100	418	259 22	34.0	-4.6
				5.0	4.0
DIR	1100	403	124 11	73.0	5.1
				5.0	4.1
DIR	1200	412	0 0	0.0	-3.4
				5.0	3.8
DIR	1200	3	4 37	44.0	1.2
				5.0	2.2
DIR	1200	403	122 88	97.0	0.4
				5.0	4.0
DIR	1200	100	156 87	44.0	1.7
				5.0	3.4
ZANG	1418	403	101 36	90.0	5.5
				8.0	7.7
ZANG	1418	100	101 93	43.0	-2.8
				8.0	7.0
ZANG	1418	412	98 82	85.0	11.3
				8.0	7.8

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Residuals (critical value = 3.725):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION		RESIDUAL	STD RES
			STD DEV	STD DEV	STD DEV	PPM
ZANG	1412	418	101 17	82.0	0.5	0.1
				8.0	7.8	
ZANG	1412	200	102 88	76.0	7.5	1.0
				8.0	7.6	
ZANG	1412	100	102 63	89.0	4.0	0.5
				8.0	7.7	
ZANG	1412	403	102 9	7.0	32.9	2.3
				14.4	14.3	
ZANG	1403	418	98 63	80.0	8.2	1.1
				8.0	7.7	
ZANG	1403	100	99 15	62.0	11.0	1.5
				8.0	7.5	
ZANG	1403	200	99 17	56.0	9.7	1.3
				8.0	7.6	
ZANG	1403	412	97 92	8.0	13.9	1.8
				8.0	7.8	
ZANG	1100	412	97 36	61.0	5.9	0.8
				8.0	7.8	
ZANG	1100	200	99 44	49.0	0.1	0.0
				8.0	4.3	
ZANG	1100	418	98 6	73.0	-2.2	-0.3
				8.0	7.3	
ZANG	1100	403	100 84	86.0	-5.4	-0.7
				8.0	7.6	
ZANG	1200	412	97 11	69.0	1.7	0.2
				8.0	7.7	
ZANG	1200	403	100 82	99.0	-1.9	-0.3
				8.0	7.7	
ZANG	1200	100	100 55	56.0	0.1	0.0
				8.0	4.1	
DIST	1418	403	550.76780	-0.0003	-0.2683	
			0.0011	0.0010	0.48	
DIST	1418	100	208.47420	-0.0001	-0.0701	
			0.0010	0.0009	0.30	
DIST	1418	412	547.42070	0.0002	0.1920	
			0.0011	0.0010	0.36	
DIST	1412	418	547.41930	0.0015	1.4486	
			0.0011	0.0010	2.70	
DIST	1412	200	352.10490	0.0010	1.1159	
			0.0011	0.0009	2.96	
DIST	1412	100	397.01340	0.0008	0.8336	
			0.0011	0.0010	2.05	
DIST	1412	403	669.73850	0.0018	1.8019	
			0.0012	0.0010	2.64	
DIST	1403	418	550.76630	0.0012	1.1860	
			0.0011	0.0010	2.13	
DIST	1403	100	412.11630	0.0001	0.1192	
			0.0011	0.0010	0.29	
DIST	1403	200	459.08190	-0.0002	-0.1574	
			0.0011	0.0010	0.34	
DIST	1100	200	55.68830	0.0002	0.2566	
			0.0010	0.0009	4.14	
DIST	1100	403	412.11510	0.0013	1.3100	
			0.0011	0.0010	3.15	
DIST	1200	403	459.08110	0.0006	0.6331	
			0.0011	0.0010	1.38	
DIST	1200	100	55.68820	0.0002	0.2372	
			0.0010	0.0009	3.83	
ELAT	1200	200	0 00	0.00000	-0.0001	-0.0001
				0.0002	-0.0000	916564.6
ELON	1200	200	0 00	0.00000	-0.0000	-0.1259
				0.0002	0.0001	163105.7
EHDF	1200	200		0.00000	-0.0000	-0.0298
				0.0010	0.0007	365152.9
ELAT	1418	418	0 00	0.00000	0.0000	0.0000
				0.0002	-0.0000	50215.47

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Residuals (critical value = 3.725):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES
			STD DEV	STD DEV	STD DEV	PPM	
ELON	1418	418	0 00	0.00000	0.00000	0.1236	
				0.0002	0.0000	30633.53	
EHDF	1418	418		0.00000	-0.0002	-0.4832	
				0.0010	0.0004	998264.3	
ELAT	1412	412	0 00	0.00000	-0.0001	-0.0001	
				0.0002	-0.0000	260474.9	
ELON	1412	412	0 00	0.00000	-0.0001	-2.5945	
				0.0002	0.0000	300162.5	
EHDF	1412	412		0.00000	-0.0003	-1.0999	
				0.0010	0.0003	917637.4	
ELAT	1403	403	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	29209.04	
ELON	1403	403	0 00	0.00000	-0.0000	-1.1401	
				0.0002	0.0000	26907.86	
EHDF	1403	403		0.00000	-0.0008	-3.1438	
				0.0010	0.0003	999210.9	
ELAT	1100	100	0 00	0.00000	-0.0001	-0.0001	
				0.0002	-0.0000	571714.7	
ELON	1100	100	0 00	0.00000	-0.0000	-0.0743	
				0.0002	0.0001	43746.85	
EHDF	1100	100		0.00000	0.0001	0.1233	
				0.0010	0.0007	819279.9	
ELAT	403_P	403	0 00	0.00000	-0.0000	-0.0000	
				0.0002	-0.0000	0.00	
ELON	403_P	403	0 00	0.00000	0.0000	0.5665	
				0.0002	0.0000	0.00	
EHDF	403_P	403		0.23970	-0.0000	-0.0000	
				0.0010	0.0000	0.00*	
ELAT	412_P	412	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	0.00	
ELON	412_P	412	0 00	0.00000	-0.0000	-0.6238	
				0.0002	0.0000	0.00	
EHDF	412_P	412		0.28970	-0.0002	-0.4955	
				0.0010	0.0005	819.42	
ELAT	418_P	418	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	0.00	
ELON	418_P	418	0 00	0.00000	-0.0000	-0.0000	
				0.0002	0.0000	0.00	
EHDF	418_P	418		0.28730	-0.0001	-0.2456	
				0.0010	0.0005	465.40	
ELAT	200_P	200	0 00	0.00000	-0.0000	-0.0000	
				0.0002	-0.0000	0.00	
ELON	200_P	200	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	0.00	
EHDF	200_P	200		0.36480	0.0004	0.6281	
				0.0010	0.0006	1015.52	
DIR	TDA5005	403	0 0	0.0	-0.0	-0.0	
				5.0	0.0	*	
DIR	TDA5005	200	213 80	99.7	0.0	0.0	
				5.0	0.0		
DIR	TDA5005	403	0 0	0.0	-0.0	-0.0	
				5.0	0.0	*	
DIR	TDA5005	210	213 81	67.3	0.0	0.0	
				5.0	0.0		
DIR	TDA5005	220	213 80	89.8	0.0	0.0	
				5.0	0.0		
ZANG	TDA5005	403	100 73	56.6	23.9	3.1	
				8.0	7.7		
ZANG	TDA5005	200	95 44	94.0	-0.7	-0.3	
				8.0	2.6		
ZANG	TDA5005	403	100 73	57.2	24.5	3.2	
				8.0	7.7		
ZANG	TDA5005	210	92 1	5.2	-0.6	-0.2	
				8.0	2.6		
DIST	TDA5005	200		11.58650	0.0000	0.0000	
				0.0010	0.0000	0.00*	

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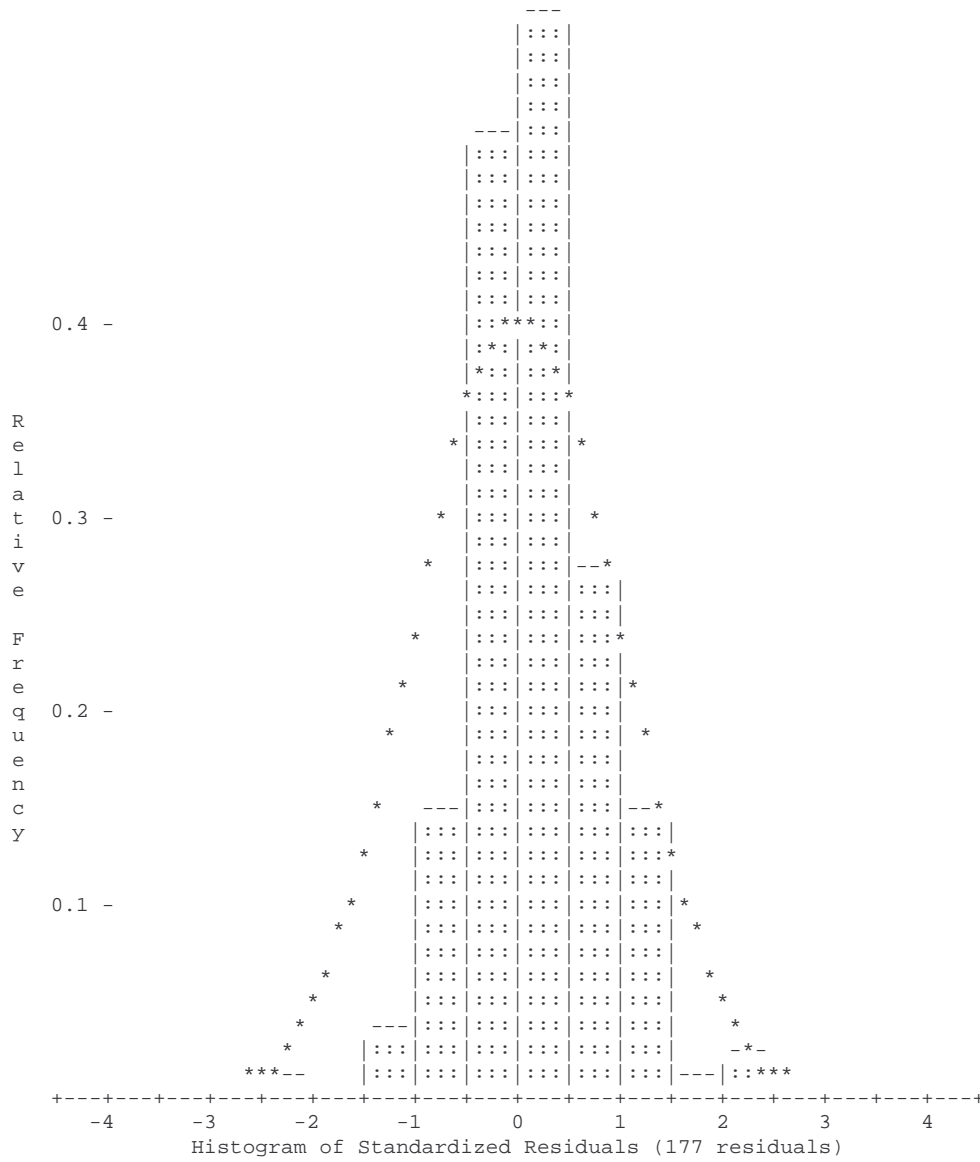
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Residuals (critical value = 3.725):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	RESIDUAL	STD RES
				STD DEV	STD DEV	PPM
DIR		TC2002	403	0 0	0.0	0.0
					5.0	0.0 *
DIR		TC2002	200	112 44	76.0	-0.0
					5.0	0.0
DIR		TC2002	220	112 44	46.0	-0.0
					5.0	0.0
DIR		TC2002	210	112 45	31.5	-0.0
					5.0	0.0
ZANG		TC2002	403	100 86	38.0	28.2
					12.8	12.6
ZANG		TC2002	200	100 45	19.0	-1.6
					8.0	5.0
ZANG		TC2002	220	101 22	70.0	0.0
					8.0	0.0
ZANG		TC2002	210	98 64	50.0	1.1
					8.0	5.0
DIST		TC2002	200		22.21930	0.0000
					0.0010	0.0000
ELAT		210	DORIS	0 00	0.00000	0.0000
					0.0005	-0.0000
ELON		210	DORIS	0 00	0.00000	0.0000
					0.0005	-0.0000
EHDF		200_P	DORIS		0.50470	0.0000
					0.0010	0.0000

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Residuals (critical value = 3.725):

NOTE: Observation values shown are reduced to mark-to-mark.

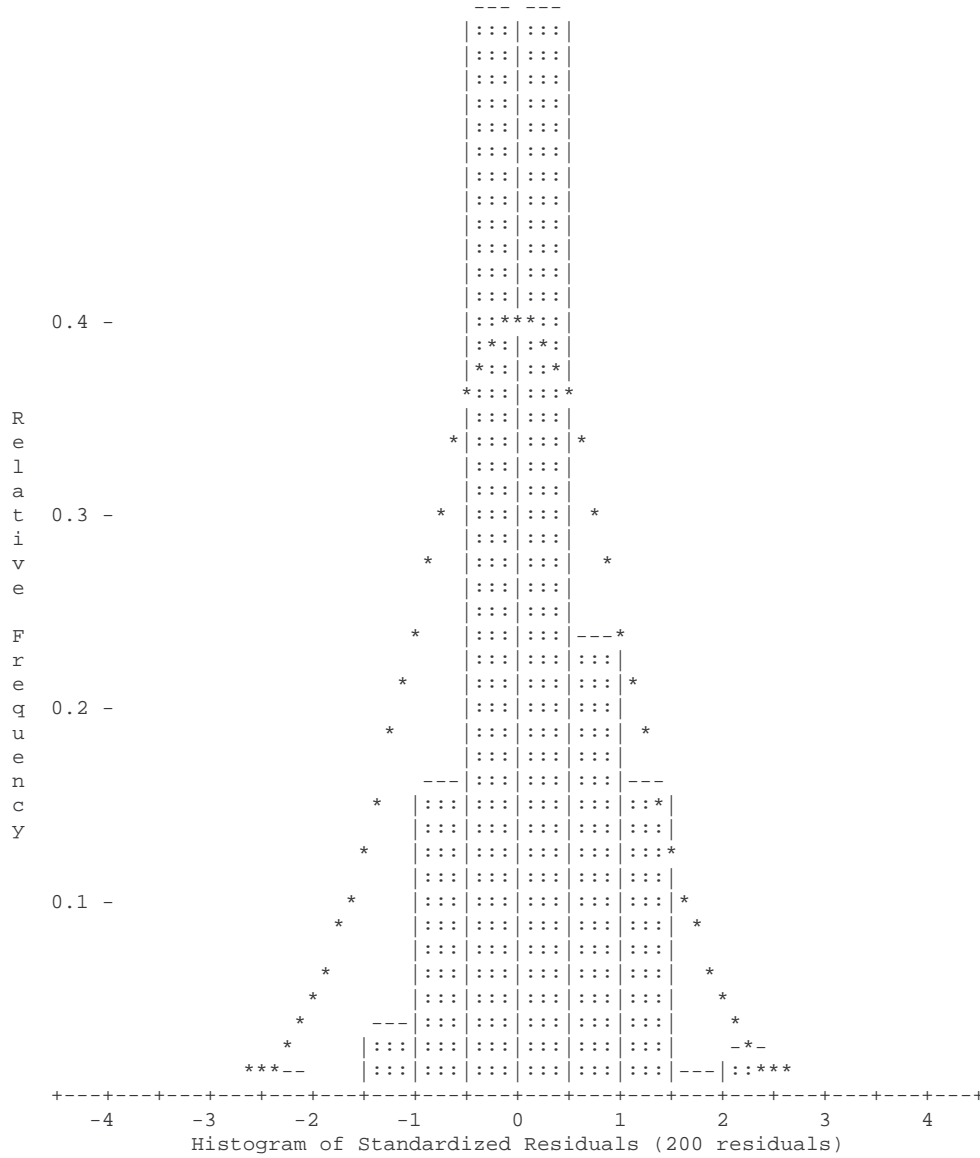
TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
EHDF	2000	555	-6.95441	-0.0001	-0.7437
			0.0003	0.0002	0.63
EHDF	555	2000	6.95466	-0.0001	-0.6082
			0.0003	0.0002	0.51
EHDF	3	2000	-3.41319	-0.0000	-0.0000
			0.0001	0.0000	1.01*
EHDF	2000	3	3.41325	-0.0000	-0.0000
			0.0001	0.0000	1.38*
EHDF	2000	3GPS	0.35748	-0.0000	-0.0000
			0.0001	0.0000	0.21*
EHDF	3GPS	2000	-0.35746	-0.0000	-0.0000
			0.0001	0.0000	0.59*
EHDF	200_P	2000	-1.18992	-0.0001	-0.4398
			0.0002	0.0001	52.45
EHDF	2000	200_P	1.19003	-0.0000	-0.3353
			0.0002	0.0001	39.99
EHDF	444	4120	25.47856	-0.0002	-0.5657
			0.0004	0.0003	6.98
EHDF	4120	412_T	1.31320	0.0000	0.0000
			0.0001	0.0000	2.90*
EHDF	412_T	4120	-1.31321	0.0000	0.0000
			0.0001	0.0000	4.71*
EHDF	4120	444	-25.47825	-0.0001	-0.4198
			0.0004	0.0003	5.18
EHDF	412_T	412_P	-0.07080	-0.0000	-0.0000
			0.0001	0.0000	33.49*
EHDF	555	666	1.74124	0.0003	1.2639
			0.0003	0.0002	1.16
EHDF	666	4180	11.09293	0.0001	0.3729
			0.0003	0.0002	0.35
EHDF	4180	666	-11.09312	0.0001	0.4348
			0.0003	0.0002	0.41
EHDF	666	555	-1.74183	0.0003	1.3240
			0.0003	0.0002	1.22
EHDF	4180	418_T	1.30372	-0.0000	-0.0000
			0.0001	0.0000	19.69*
EHDF	418_T	4180	-1.30367	-0.0000	-0.0000
			0.0001	0.0000	18.66*
EHDF	418_T	418_P	-0.07080	-0.0000	-0.0000
			0.0001	0.0000	18.88*
EHDF	444	555	2.54926	-0.0000	-0.0071
			0.0004	0.0003	0.00
EHDF	555	444	-2.54922	-0.0000	-0.1367
			0.0004	0.0003	0.07
EHDF	3	3GPS	-3.05200	-0.0037	-1.8727
			0.0020	0.0020	1224.14

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S T A T I S T I C S S U M M A R Y

Residual Critical Value Type	Tau Max
Residual Critical Value	3.7251
Number of Flagged Residuals	0
Convergence Criterion	0.0001
Final Iteration Counter Value	2
Confidence Level Used	95.0000
Estimated Variance Factor	1.0311
Number of Degrees of Freedom	100

Chi-Square Test on the Variance Factor:

7.9583e-01 < 1.0000 < 1.3892e+00 ?

THE TEST PASSES

NOTE: All confidence regions were computed using the following factors:

Variance factor used	=	1.0311
1-D expansion factor	=	1.9600
2-D expansion factor	=	2.4477
3-D expansion factor	=	2.7955

Note that, for relative confidence regions, precisions are computed from the ratio of the major semi-axis and the spatial distance between the two stations.

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2-D and 1-D Station Confidence Regions (95.000 and 95.000 percent):

STATION	MAJOR SEMI-AXIS	AZ	MINOR SEMI-AXIS	VERTICAL
100	0.0028	49	0.0009	0.0019
1100	0.0028	49	0.0009	0.0019
1200	0.0027	57	0.0005	0.0020
1403	0.0031	57	0.0013	0.0036
1412	0.0029	49	0.0018	0.0026
1418	0.0030	46	0.0016	0.0024
200	0.0026	56	0.0006	0.0016
2000	0.0000	0	0.0000	0.0002
200_P	0.0027	56	0.0008	0.0004
210	0.0027	55	0.0008	0.0017
2100	0.0028	49	0.0009	0.0019
220	0.0027	55	0.0008	0.0018
2200	0.0027	57	0.0005	0.0020
2403	0.0031	57	0.0013	0.0042
2412	0.0029	49	0.0018	0.0026
2418	0.0030	46	0.0016	0.0024
3	0.0003	0	0.0003	0.0003
3GPS	0.0002	0	0.0002	0.0002
403	0.0030	56	0.0012	0.0034
403_P	0.0030	55	0.0013	0.0039
412	0.0029	49	0.0018	0.0019
4120	0.0000	0	0.0000	0.0009
412_P	0.0029	48	0.0018	0.0009
412_T	0.0000	0	0.0000	0.0009
418	0.0030	47	0.0016	0.0018
4180	0.0000	0	0.0000	0.0008
418_P	0.0030	47	0.0017	0.0008
418_T	0.0000	0	0.0000	0.0008
444	0.0000	0	0.0000	0.0007
555	0.0000	0	0.0000	0.0004
666	0.0000	0	0.0000	0.0006
DORIS	0.0030	55	0.0015	0.0020
TC2002	0.0034	74	0.0014	0.0017
TDA5005	0.0032	30	0.0018	0.0017

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3D Station Confidence Regions (95.000 percent):

STATION	MAJ-SEMI (AZ,VANG)	MED-SEMI (AZ,VANG)	MIN-SEMI (AZ,VANG)
100	0.0032 (49, 0)	0.0026 (241, 90)	0.0010 (139, 0)
1100	0.0032 (49, 0)	0.0027 (237, 90)	0.0011 (139, 0)
1200	0.0031 (57, 1)	0.0029 (239, 89)	0.0006 (147, 0)
1403	0.0052 (35, 89)	0.0035 (237, 1)	0.0015 (147, 0)
1412	0.0037 (44, 84)	0.0033 (229, 6)	0.0021 (139, 1)
1418	0.0035 (31, 87)	0.0034 (226, 3)	0.0018 (136, 1)
200	0.0030 (56, 0)	0.0023 (244, 90)	0.0007 (146, 0)
2000	0.0003 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
200_P	0.0031 (56, 0)	0.0009 (326, 0)	0.0005 (162, 90)
210	0.0031 (55, 0)	0.0024 (243, 90)	0.0009 (145, 0)
2100	0.0032 (49, 0)	0.0027 (239, 90)	0.0011 (139, 0)
220	0.0031 (55, 0)	0.0025 (241, 90)	0.0009 (145, 0)
2200	0.0031 (57, 1)	0.0029 (238, 89)	0.0006 (147, 0)
2403	0.0059 (22, 89)	0.0036 (237, 1)	0.0015 (147, 0)
2412	0.0037 (44, 84)	0.0033 (229, 6)	0.0021 (139, 1)
2418	0.0035 (23, 88)	0.0034 (226, 2)	0.0019 (136, 1)
3	0.0004 (122, 90)	0.0003 (257, 0)	0.0003 (347, 0)
3GPS	0.0003 (257, 1)	0.0003 (161, 80)	0.0003 (347, 10)
403	0.0048 (40, 88)	0.0035 (236, 2)	0.0014 (146, 0)
403_P	0.0056 (36, 89)	0.0035 (235, 1)	0.0015 (145, 0)
412	0.0033 (49, 3)	0.0027 (244, 87)	0.0020 (139, 1)
4120	0.0013 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
412_P	0.0033 (48, 0)	0.0020 (318, 0)	0.0014 (182, 90)
412_T	0.0013 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
418	0.0034 (47, 0)	0.0025 (308, 88)	0.0018 (137, 2)
4180	0.0011 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
418_P	0.0034 (47, 0)	0.0019 (317, 0)	0.0011 (140, 90)
418_T	0.0011 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
444	0.0010 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
555	0.0006 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
666	0.0009 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
DORIS	0.0034 (55, 0)	0.0029 (241, 90)	0.0017 (145, 0)
TC2002	0.0039 (74, 0)	0.0024 (297, 90)	0.0016 (164, 0)
TDA5005	0.0037 (30, 0)	0.0024 (238, 90)	0.0021 (120, 0)

5.13. SAC network covariance matrix of selected points

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*
* Extracted coordinates follow: (extracted on Tue Jun 21 15:45:09 2005)
* Source (GeoLab adjustment): SAC
* Variance factor of adjustment = 1.031407
* Variance factor used in computing covariance matrix = 1.031407
* Number of degrees of freedom of adjustment = 100
* Number of stations in adjusted network = 34
* Number of stations extracted = 4
*
3DC
XYZ      30302M009      5084657.6353      2670325.0851      -2768481.1863 m      0
XYZ      30302M008      5084652.9073      2670347.0909      -2768470.6348 m      0
XYZ      HARB ARP      5084660.0692      2670326.3633      -2768482.5204 m      0
XYZ      30302S006      5084653.3092      2670347.3006      -2768470.8569 m      0
COV  CT  UPPR
ELEM     1.03140741612933e-08      3.00358852771773e-23      -1.95102341256709e-23
ELEM     1.03140738256966e-08      -7.59965136443259e-15      -4.61111060685152e-16
ELEM     1.03140741612932e-08      3.61895556959784e-23      -6.21677929121885e-24
ELEM     1.03140738257091e-08      -7.59919289118965e-15      -4.61085351123307e-16
ELEM     1.03140741612932e-08      6.55522101908762e-23      7.37027504856166e-15
ELEM     1.03140746512657e-08      1.51873128929091e-14      3.57489901682224e-23
ELEM     1.03140741612932e-08      7.78615127436628e-23      7.36985639346058e-15
ELEM     1.0314074651133e-08      1.51864502056761e-14
ELEM     1.03140741612932e-08      -4.61125587562003e-16      -1.56599785120473e-14
ELEM     1.03140730992668e-08      -4.91784723556917e-24      7.82869096438188e-23
ELEM     1.03140741612932e-08      -4.61099880252287e-16      -1.56590337739151e-14
ELEM     1.03140730993198e-08
ELEM     2.1189686261409e-07      2.03755116400202e-07      3.62560662749964e-07
ELEM     1.46742896471329e-08      -8.35944875154117e-15      -1.61544320978628e-09
ELEM     2.04032734657785e-07      2.03755273908561e-07      3.46355708241912e-07
ELEM     3.50727412385828e-07      4.19861224333447e-07      8.1073857104689e-15
ELEM     1.13454821163922e-08      1.67060037890775e-14      2.0375510949566e-07
ELEM     3.0947126231414e-07      4.19861210105833e-07
ELEM     7.8304783382217e-07      -1.61544320980072e-09      -1.72260577504732e-14
ELEM     1.21294411486567e-08      3.46355708241798e-07      4.19861548897676e-07
ELEM     7.49655631651887e-07
ELEM     1.88379029041108e-08      1.66381038631644e-19      -3.63600897408139e-09
ELEM     1.46742896471466e-08      -8.35894443161881e-15      -1.615443209758e-09
ELEM     1.13454815774226e-08      -8.0641921732213e-20      8.106925189701e-15
ELEM     1.13454821162463e-08      1.67050548327985e-14
ELEM     1.3110006112703e-08      -1.61544320977245e-09      -1.72250185392415e-14
ELEM     1.2129441148715e-08
ELEM     1.09858293055889e-06      1.98244575271752e-07      6.43454153666265e-08
ELEM     6.08646017502827e-07      4.08506110505703e-07
ELEM     1.19994788882256e-06
*
* End of extracted coordinates
*

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5.14. Global results listing

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GLOBAL.iob
Microsearch GeoLab, V2001.9.20.0      GRS80      UNITS: m,GRAD Page 0001
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Tue Jun 14 18:50:05 2005

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Input file: D:\Valerie\chantier devis\HRAO\calculs juin\GLOBAL\1 point fixe\GLOBAL.iob
Output file: D:\Valerie\chantier devis\HRAO\calculs juin\GLOBAL\1 point fixe\GLOBAL.lst
Options file: C:\PROGRA~1\MICROS~3\GeoLab\default.gpj

```

PARAMETERS		OBSERVATIONS	
Description	Number	Description	Number
No. of Stations	95	Directions	169
Coord Parameters	233	Distances	106
Free Latitudes	69	Azimuths	0
Free Longitudes	69	Vertical Angles	0
Free Heights	95	Zenithal Angles	152
Fixed Coordinates	52	Angles	0
Astro. Latitudes	0	Heights	0
Astro. Longitudes	0	Height Differences	131
Geoid Records	0	Auxiliary Params.	0
All Aux. Pars.	52	2-D Coords.	0
Direction Pars.	52	2-D Coord. Diffs.	114
Scale Parameters	0	3-D Coords.	3
Constant Pars.	0	3-D Coord. Diffs.	24
Rotation Pars.	0		
Translation Pars.	0		
	-----		-----
Total Parameters	285	Total Observations	699
Degrees of Freedom =		414	

SUMMARY OF SELECTED OPTIONS

OPTION	SELECTION
Computation Mode	Adjustment
Maximum Iterations	30
Convergence Criterion	0.00010
Residual Rejection Criterion	Tau Max
Confidence Region Types	1D 2D 3D Station
Variance Factor (VF) Known	Yes
Scale Covariance Matrix With VF	Yes
Scale Residual Variances With VF	No
Force Convergence in Max Iters	No
Distances Contribute To Heights	Yes
Compute Full Inverse	Yes
Optimize Band Width	Yes
Generate Initial Coordinates	Yes
Re-Transform Obs After 1st Pass	Yes
Geoid Interpolation Method	Bi-Quadratic


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Adjusted PLH Coordinates:

CODE	FFF	STATION	LATITUDE STD DEV	LONGITUDE STD DEV	ELIP-HEIGHT STD DEV		
PLH	000	200_P	S 25 53 12.67361 0.0008	E 27 42 26.85810 0.0008	1558.9272 0.0015	m	0
PLH	000	210	S 25 53 12.67367 0.0008	E 27 42 26.85805 0.0008	1559.9230 0.0017	m	0
PLH	000	2100	S 25 53 10.95325 0.0008	E 27 42 27.47674 0.0008	1558.8071 0.0018	m	0
PLH	000	220	S 25 53 12.67358 0.0008	E 27 42 26.85810 0.0008	1559.0217 0.0018	m	0
PLH	000	2200	S 25 53 12.67361 0.0008	E 27 42 26.85810 0.0008	1559.2924 0.0018	m	0
PLH	000	2403	S 25 52 58.11794 0.0009	E 27 42 23.27100 0.0015	1553.3259 0.0026	m	0
PLH	000	2412	S 25 53 18.92529 0.0010	E 27 42 16.28350 0.0009	1575.2444 0.0020	m	0
PLH	000	2418	S 25 53 12.71492 0.0010	E 27 42 34.70268 0.0008	1565.1372 0.0020	m	0
PLH	000	2_26	S 25 53 18.08006 0.0006	E 27 41 10.58451 0.0009	1411.4353 0.0012	m	0
PLH	000	2_P	S 25 53 18.08006 0.0006	E 27 41 10.58451 0.0009	1411.1497 0.0010	m	0
PLH	000	3	S 25 53 13.06775 0.0007	E 27 42 26.07944 0.0006	1561.1504 0.0015	m	0
PLH	110	30	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1411.4808 0.0010	m	0
PLH	000	3001	S 25 53 21.48091 0.0005	E 27 41 9.65551 0.0005	1410.1171 0.0011	m	0
PLH	000	3002	S 25 53 18.08006 0.0006	E 27 41 10.58451 0.0009	1411.4359 0.0011	m	0
PLH	000	3003	S 25 53 20.86452 0.0005	E 27 41 12.83247 0.0006	1413.9618 0.0011	m	0
PLH	000	3004	S 25 53 24.90419 0.0004	E 27 41 13.12451 0.0002	1413.4846 0.0011	m	0
PLH	000	3005	S 25 53 25.71620 0.0008	E 27 41 6.65073 0.0004	1408.3498 0.0011	m	0
PLH	000	3006	S 25 53 21.98232 0.0011	E 27 41 3.18320 0.0005	1402.1371 0.0012	m	0
PLH	000	3016	S 25 53 22.94937 0.0005	E 27 41 10.23073 0.0005	1410.9187 0.0011	m	0
PLH	000	3017	S 25 53 24.11855 0.0005	E 27 41 15.13743 0.0004	1416.1476 0.0011	m	0
PLH	000	3GPS	S 25 53 13.06775 0.0007	E 27 42 26.07944 0.0006	1558.0947 0.0015	m	0
PLH	000	3_25	S 25 53 20.86452 0.0005	E 27 41 12.83247 0.0006	1413.9626 0.0013	m	0
PLH	000	3_26	S 25 53 20.86453 0.0005	E 27 41 12.83246 0.0006	1413.9609 0.0011	m	0
PLH	000	3_P	S 25 53 20.86452 0.0005	E 27 41 12.83247 0.0006	1413.6775 0.0010	m	0
PLH	110	4	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1413.2712 0.0010	m	0
PLH	110	40	S 25 53 22.72541 0.0000	E 27 41 10.23942 0.0000	1412.2916 0.0010	m	0
PLH	000	403	S 25 52 58.11795 0.0009	E 27 42 23.27100 0.0015	1553.3223 0.0022	m	0
PLH	000	403_P	S 25 52 58.11795 0.0009	E 27 42 23.27100 0.0015	1553.0823 0.0024	m	0
PLH	000	412	S 25 53 18.92529 0.0010	E 27 42 16.28350 0.0008	1575.2438 0.0018	m	0
PLH	110	4120	S 25 53 18.92525 0.0000	E 27 42 16.28351 0.0000	1573.7120 0.0016	m	0
PLH	000	412_P	S 25 53 18.92529 0.0010	E 27 42 16.28350 0.0008	1574.9544 0.0016	m	0
PLH	110	412_T	S 25 53 18.92525 0.0000	E 27 42 16.28351 0.0000	1575.0252 0.0016	m	0
PLH	000	418	S 25 53 12.71492 0.0010	E 27 42 34.70268 0.0008	1565.1371 0.0018	m	0
PLH	110	4180	S 25 53 12.71490 0.0000	E 27 42 34.70268 0.0000	1563.6170 0.0016	m	0

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Adjusted PLH Coordinates:

CODE	FFF	STATION		LATITUDE STD DEV		LONGITUDE STD DEV		ELIP-HEIGHT STD DEV	
PLH	000	418_P	S 25 53	12.71492 0.0010	E 27 42	34.70268 0.0008		1564.8499 m 0.0016	0
PLH	110	418_T	S 25 53	12.71490 0.0000	E 27 42	34.70268 0.0000		1564.9207 m 0.0016	0
PLH	110	444	S 25 53	18.92525 0.0000	E 27 42	16.28351 0.0000		1548.2335 m 0.0016	0
PLH	000	4_25	S 25 53	24.90419 0.0004	E 27 41	13.12451 0.0003		1413.4825 m 0.0012	0
PLH	000	4_26	S 25 53	24.90419 0.0004	E 27 41	13.12451 0.0003		1413.4841 m 0.0011	0
PLH	000	4_P	S 25 53	24.90419 0.0004	E 27 41	13.12451 0.0002		1413.1991 m 0.0010	0
PLH	110	5	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1408.1349 m 0.0010	0
PLH	110	50	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1401.2005 m 0.0010	0
PLH	110	555	S 25 53	12.71490 0.0000	E 27 42	34.70268 0.0000		1550.7826 m 0.0015	0
PLH	000	5_25	S 25 53	25.71620 0.0008	E 27 41	6.65073 0.0004		1408.3486 m 0.0013	0
PLH	000	5_26	S 25 53	25.71620 0.0008	E 27 41	6.65074 0.0004		1408.3484 m 0.0013	0
PLH	000	5_P	S 25 53	25.71620 0.0008	E 27 41	6.65073 0.0004		1408.0641 m 0.0010	0
PLH	110	60	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1399.0071 m 0.0010	0
PLH	110	666	S 25 53	18.78645 0.0000	E 27 41	38.05165 0.0000		1552.5241 m 0.0015	0
PLH	000	6_25	S 25 53	21.98232 0.0011	E 27 41	3.18320 0.0005		1402.1038 m 0.0013	0
PLH	000	6_26	S 25 53	21.98232 0.0011	E 27 41	3.18320 0.0005		1402.1359 m 0.0012	0
PLH	000	6_P	S 25 53	21.98232 0.0011	E 27 41	3.18320 0.0005		1401.8113 m 0.0010	0
PLH	000	7232	S 25 53	23.10290 0.0012	E 27 41	7.41748 0.0008		1415.7198 m 0.0012	0
PLH	000	7501	S 25 53	22.94940 0.0006	E 27 41	10.23096 0.0005		1406.8009 m 0.0010	0
PLH	110	7501_Temp	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1406.8209 m 0.0010	0
PLH	110	777	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1404.3557 m 0.0010	0
PLH	000	8	S 25 53	24.37877 0.0001	E 27 41	13.12850 0.0001		1414.2509 m 0.0010	0
PLH	110	88	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1412.4591 m 0.0010	0
PLH	000	8GPS	S 25 53	24.37877 0.0001	E 27 41	13.12850 0.0001		1414.1700 m 0.0001	0
PLH	000	DORIS	S 25 53	12.67367 0.0010	E 27 42	26.85805 0.0010		1559.4319 m 0.0019	0
PLH	000	TC2002	S 25 53	12.65652 0.0008	E 27 42	26.06034 0.0013		1559.4499 m 0.0017	0
PLH	000	TDA5005	S 25 53	12.29817 0.0013	E 27 42	26.85484 0.0008		1558.4647 m 0.0017	0
PLH	110	V100	S 25 53	22.72541 0.0000	E 27 41	10.23942 0.0000		1402.5759 m 0.0010	0

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Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV		
XYZ		10	5085403.6953 0.0008	2668331.8325 0.0004	-2768682.5881 0.0004	m	0
XYZ		100	5084665.2707 0.0015	2670373.0399 0.0011	-2768422.9405 0.0010	m	0
XYZ		1001	5085428.6689 0.0009	2668326.5765 0.0007	-2768649.5558 0.0007	m	0
XYZ		1002	5085458.1751 0.0010	2668371.2689 0.0010	-2768555.9565 0.0007	m	0
XYZ		1003	5085397.9690 0.0010	2668410.3605 0.0007	-2768634.1662 0.0007	m	0
XYZ		1004	5085345.7333 0.0009	2668392.1338 0.0005	-2768745.8222 0.0006	m	0
XYZ		1005	5085415.7255 0.0010	2668225.3082 0.0006	-2768766.0657 0.0009	m	0
XYZ		1006	5085500.0708 0.0010	2668160.5356 0.0008	-2768659.9566 0.0011	m	0
XYZ		1016	5085404.3891 0.0010	2668331.9234 0.0007	-2768690.5694 0.0007	m	0
XYZ		1017	5085331.1644 0.0009	2668447.7810 0.0006	-2768725.2298 0.0007	m	0
XYZ		1100	5084665.2706 0.0015	2670373.0399 0.0011	-2768422.9404 0.0011	m	0
XYZ		1111	5085403.9601 0.0008	2668331.9715 0.0004	-2768682.7332 0.0004	m	0
XYZ		1200	5084653.1981 0.0015	2670347.2431 0.0011	-2768470.7942 0.0010	m	0
XYZ		13	5085403.6738 0.0008	2668331.8212 0.0004	-2768682.5763 0.0004	m	0
XYZ		1403	5084868.0551 0.0020	2670347.2627 0.0017	-2768065.0942 0.0013	m	0
XYZ		1412	5084728.4109 0.0017	2670054.1746 0.0012	-2768650.8847 0.0012	m	0
XYZ		1418	5084555.8008 0.0016	2670542.8057 0.0012	-2768474.4901 0.0012	m	0
XYZ		16	5085406.6390 0.0008	2668333.3771 0.0004	-2768684.2015 0.0004	m	0
XYZ		16_26	5085404.3905 0.0009	2668331.9243 0.0006	-2768690.5702 0.0006	m	0
XYZ		16_C	5085403.6805 0.0012	2668331.5517 0.0008	-2768690.1810 0.0008	m	0
XYZ		16_P	5085404.0700 0.0008	2668331.7561 0.0006	-2768690.3946 0.0006	m	0
XYZ		17	5085410.9358 0.0008	2668335.6317 0.0004	-2768686.5566 0.0004	m	0
XYZ		170	5085409.6959 0.0008	2668334.9810 0.0004	-2768685.8770 0.0004	m	0
XYZ		17_25	5085331.1622 0.0011	2668447.7798 0.0007	-2768725.2285 0.0007	m	0
XYZ		17_26	5085331.1629 0.0009	2668447.7800 0.0006	-2768725.2289 0.0007	m	0
XYZ		17_P	5085330.9352 0.0008	2668447.6607 0.0005	-2768725.1042 0.0006	m	0
XYZ		1_25	5085428.6668 0.0009	2668326.5754 0.0007	-2768649.5546 0.0007	m	0
XYZ		1_26	5085428.6684 0.0009	2668326.5761 0.0007	-2768649.5556 0.0007	m	0
XYZ		1_P	5085428.4376 0.0008	2668326.4551 0.0007	-2768649.4291 0.0006	m	0
XYZ		2	5085407.1839 0.0008	2668333.6630 0.0004	-2768684.5002 0.0004	m	0
XYZ		20	5085405.8833 0.0008	2668332.9806 0.0004	-2768683.7874 0.0004	m	0
XYZ		200	5084653.1981 0.0014	2670347.2431 0.0011	-2768470.7942 0.0010	m	0
XYZ		2000	5084651.9598 0.0012	2670346.5929 0.0006	-2768470.1145 0.0007	m	0
XYZ		200_P	5084652.9073 0.0013	2670347.0904 0.0010	-2768470.6349 0.0009	m	0

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Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV		
XYZ		210	5084653.7003 0.0014	2670347.5055 0.0011	-2768471.0714 0.0010	m	0
XYZ		2100	5084665.2712 0.0015	2670373.0402 0.0011	-2768422.9408 0.0011	m	0
XYZ		220	5084652.9829 0.0015	2670347.1303 0.0011	-2768470.6752 0.0010	m	0
XYZ		2200	5084653.1982 0.0015	2670347.2432 0.0011	-2768470.7944 0.0010	m	0
XYZ		2403	5084868.0573 0.0022	2670347.2638 0.0018	-2768065.0952 0.0014	m	0
XYZ		2412	5084728.4112 0.0017	2670054.1746 0.0012	-2768650.8850 0.0012	m	0
XYZ		2418	5084555.8007 0.0016	2670542.8057 0.0012	-2768474.4901 0.0012	m	0
XYZ		2_26	5085458.1748 0.0010	2668371.2687 0.0010	-2768555.9563 0.0007	m	0
XYZ		2_P	5085457.9472 0.0009	2668371.1493 0.0010	-2768555.8316 0.0007	m	0
XYZ		3	5084660.0691 0.0013	2670326.3629 0.0009	-2768482.5205 0.0009	m	0
XYZ		30	5085407.3909 0.0008	2668333.7716 0.0004	-2768684.6137 0.0004	m	0
XYZ		3001	5085428.6694 0.0009	2668326.5767 0.0007	-2768649.5561 0.0007	m	0
XYZ		3002	5085458.1752 0.0010	2668371.2689 0.0010	-2768555.9565 0.0007	m	0
XYZ		3003	5085397.9687 0.0010	2668410.3604 0.0007	-2768634.1659 0.0007	m	0
XYZ		3004	5085345.7334 0.0009	2668392.1340 0.0005	-2768745.8223 0.0006	m	0
XYZ		3005	5085415.7256 0.0010	2668225.3082 0.0006	-2768766.0657 0.0009	m	0
XYZ		3006	5085500.0706 0.0010	2668160.5354 0.0008	-2768659.9564 0.0011	m	0
XYZ		3016	5085404.3901 0.0009	2668331.9240 0.0006	-2768690.5700 0.0007	m	0
XYZ		3017	5085331.1641 0.0009	2668447.7809 0.0006	-2768725.2296 0.0007	m	0
XYZ		3GPS	5084657.6352 0.0013	2670325.0847 0.0009	-2768481.1863 0.0009	m	0
XYZ		3_25	5085397.9693 0.0011	2668410.3606 0.0008	-2768634.1663 0.0007	m	0
XYZ		3_26	5085397.9680 0.0009	2668410.3598 0.0007	-2768634.1656 0.0006	m	0
XYZ		3_P	5085397.7422 0.0008	2668410.2414 0.0007	-2768634.0418 0.0006	m	0
XYZ		4	5085408.8172 0.0008	2668334.5200 0.0004	-2768685.3954 0.0004	m	0
XYZ		40	5085408.0368 0.0008	2668334.1105 0.0004	-2768684.9677 0.0004	m	0
XYZ		403	5084868.0544 0.0019	2670347.2623 0.0017	-2768065.0937 0.0012	m	0
XYZ		403_P	5084867.8632 0.0020	2670347.1619 0.0017	-2768064.9890 0.0013	m	0
XYZ		412	5084728.4107 0.0015	2670054.1744 0.0011	-2768650.8846 0.0012	m	0
XYZ		4120	5084727.1910 0.0013	2670053.5342 0.0007	-2768650.2147 0.0007	m	0
XYZ		412_P	5084728.1802 0.0014	2670054.0534 0.0010	-2768650.7583 0.0011	m	0
XYZ		412_T	5084728.2369 0.0013	2670054.0835 0.0007	-2768650.7881 0.0007	m	0
XYZ		418	5084555.8006 0.0015	2670542.8056 0.0011	-2768474.4901 0.0011	m	0
XYZ		4180	5084554.5901 0.0012	2670542.1699 0.0007	-2768473.8259 0.0007	m	0
XYZ		418_P	5084555.5719 0.0013	2670542.6855 0.0010	-2768474.3647 0.0011	m	0

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Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV		
XYZ		418_T	5084555.6285 0.0012	2670542.7153 0.0007	-2768474.3951 0.0007	m	0
XYZ		444	5084706.8972 0.0012	2670042.8777 0.0006	-2768639.0902 0.0007	m	0
XYZ		4_25	5085345.7318 0.0010	2668392.1331 0.0006	-2768745.8214 0.0007	m	0
XYZ		4_26	5085345.7330 0.0009	2668392.1337 0.0005	-2768745.8220 0.0006	m	0
XYZ		4_P	5085345.5060 0.0008	2668392.0146 0.0005	-2768745.6976 0.0006	m	0
XYZ		5	5085404.7254 0.0008	2668332.3730 0.0004	-2768683.1527 0.0004	m	0
XYZ		50	5085399.2013 0.0008	2668329.4745 0.0004	-2768680.1249 0.0004	m	0
XYZ		555	5084544.3678 0.0012	2670536.8009 0.0006	-2768468.2224 0.0007	m	0
XYZ		5_25	5085415.7247 0.0012	2668225.3077 0.0007	-2768766.0652 0.0009	m	0
XYZ		5_26	5085415.7245 0.0011	2668225.3077 0.0006	-2768766.0651 0.0009	m	0
XYZ		5_P	5085415.4980 0.0009	2668225.1888 0.0005	-2768765.9410 0.0008	m	0
XYZ		60	5085397.4539 0.0008	2668328.5577 0.0004	-2768679.1671 0.0004	m	0
XYZ		666	5085206.7806 0.0012	2669103.0255 0.0006	-2768637.1199 0.0007	m	0
XYZ		6_25	5085500.0440 0.0011	2668160.5215 0.0008	-2768659.9419 0.0012	m	0
XYZ		6_26	5085500.0696 0.0010	2668160.5349 0.0008	-2768659.9559 0.0011	m	0
XYZ		6_P	5085499.8110 0.0009	2668160.3992 0.0007	-2768659.8142 0.0011	m	0
XYZ		7232	5085442.7806 0.0011	2668263.6119 0.0010	-2768696.9178 0.0012	m	0
XYZ		7501	5085401.1063 0.0009	2668330.2082 0.0006	-2768688.7728 0.0007	m	0
XYZ		7501_Temp	5085403.6786 0.0008	2668331.8238 0.0004	-2768682.5789 0.0004	m	0
XYZ		777	5085401.7148 0.0008	2668330.7933 0.0004	-2768681.5025 0.0004	m	0
XYZ		8	5085352.5455 0.0008	2668395.8339 0.0004	-2768731.6074 0.0004	m	0
XYZ		88	5085408.1703 0.0008	2668334.1806 0.0004	-2768685.0408 0.0004	m	0
XYZ		8GPS	5085352.4810 0.0001	2668395.8000 0.0001	-2768731.5720 0.0001	m	0
XYZ		DORIS	5084653.3091 0.0016	2670347.3000 0.0012	-2768470.8569 0.0012	m	0
XYZ		TC2002	5084663.8549 0.0015	2670327.7504 0.0014	-2768470.3897 0.0010	m	0
XYZ		TDA5005	5084657.0480 0.0015	2670349.1627 0.0011	-2768460.0360 0.0014	m	0
XYZ		V100	5085400.2969 0.0008	2668330.0494 0.0004	-2768680.7254 0.0004	m	0

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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES PPM
				STD	DEV	STD	DEV	
DIR		1006	16_26	43	18	11.0	1.8	0.4
						5.0	4.5	
DIR		1006	5_26	89	11	81.0	-1.8	-0.4
						5.0	4.4	
DIR		1006	4_26	53	59	76.0	0.5	0.1
						5.0	4.5	
DIR		1001	2_26	0	0	0.0	7.3	1.8
						5.0	4.1	
DIR		1001	3_26	71	12	82.0	-0.1	-0.0
						5.0	4.2	
DIR		1001	17_26	115	70	27.0	-11.5	-2.6
						5.0	4.5	
DIR		1001	8	132	1	28.0	0.5	0.1
						5.0	4.5	
DIR		1001	4_26	137	34	76.0	-5.5	-1.2
						5.0	4.5	
DIR		1001	16_26	162	90	3.0	2.2	0.6
						5.0	3.8	
DIR		1001	5_26	220	90	7.0	2.3	0.5
						5.0	4.4	
DIR		1001	6_26	279	13	92.0	4.8	1.1
						5.0	4.3	
ZANG		1004	5_26	101	79	82.0	9.3	1.3
						8.0	7.4	
ZANG		1004	1_26	101	50	25.0	18.3	2.5
						8.0	7.5	
ZANG		1004	16_26	101	62	38.0	-3.0	-0.4
						8.0	7.1	
ZANG		1004	17_26	97	22	50.0	-11.0	-1.8
						8.0	6.0	
ZANG		1004	6_26	102	48	35.0	9.1	1.2
						8.0	7.8	
ZANG		1017	3_26	101	17	11.0	1.9	0.3
						8.0	7.2	
ZANG		1017	5_26	102	5	94.0	16.0	2.1
						8.0	7.6	
ZANG		1017	4_26	102	77	73.0	4.0	0.7
						8.0	5.8	
ZANG		1017	16_26	102	35	62.0	3.9	0.5
						8.0	7.5	
ZANG		1017	1_26	102	22	12.0	-0.2	-0.0
						8.0	7.6	
ZANG		1003	17_26	98	83	30.0	9.6	1.3
						8.0	7.2	
ZANG		1003	1_26	102	70	46.0	-8.7	-1.3
						8.0	6.5	
ZANG		1003	16_26	102	0	19.0	3.4	0.5
						8.0	7.0	
ZANG		1003	2_26	101	51	50.0	-10.1	-1.5
						8.0	6.7	
ZANG		1005	1_26	99	27	42.0	-7.0	-0.9
						8.0	7.4	
ZANG		1005	17_26	97	94	52.0	-2.7	-0.3
						8.0	7.8	
ZANG		1005	4_26	98	20	49.0	-2.2	-0.3
						8.0	7.6	
ZANG		1005	6_26	102	63	42.0	-4.7	-0.7
						8.0	7.3	
ZANG		1005	16_26	98	75	29.0	-1.6	-0.2
						8.0	7.3	
ZANG		1002	1_26	100	77	95.0	-2.7	-0.4
						8.0	6.9	
ZANG		1002	3_26	98	48	65.0	3.7	0.5
						8.0	7.0	
ZANG		1002	6_26	102	48	25.0	4.2	0.5
						8.0	7.7	

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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ZANG	1002	16_26	100 22 1.0	4.1	0.5
			8.0	7.5	
ZANG	1006	2_26	97 52 2.0	-6.3	-0.8
			8.0	7.7	
ZANG	1006	3_26	97 22 43.0	1.9	0.2
			8.0	7.8	
ZANG	1006	1_26	97 19 39.0	-5.0	-0.7
			8.0	7.6	
ZANG	1006	16_26	97 18 65.0	6.2	0.8
			8.0	7.7	
ZANG	1006	5_26	97 36 88.0	7.9	1.1
			8.0	7.0	
ZANG	1006	4_26	97 52 4.0	-3.1	-0.4
			8.0	7.8	
ZANG	1001	2_26	99 22 20.0	0.3	0.0
			8.0	6.9	
ZANG	1001	3_26	97 29 69.0	1.2	0.2
			8.0	6.9	
ZANG	1001	17_26	97 78 18.0	3.4	0.4
			8.0	7.7	
ZANG	1001	4_26	98 50 8.0	-3.8	-0.5
			8.0	7.5	
ZANG	1001	16_26	98 93 50.0	3.3	0.6
			8.0	5.6	
ZANG	1001	5_26	100 72 69.0	-5.4	-0.7
			8.0	7.2	
ZANG	1001	6_26	102 80 74.0	-7.4	-1.0
			8.0	7.6	
DIST	1004	5_26	182.04090	0.0016	1.6580
			0.0010	0.0010	8.70
DIST	1004	1_26	142.97950	0.0005	0.5493
			0.0010	0.0010	3.68
DIST	1004	16_26	100.59100	0.0004	0.3686
			0.0010	0.0010	3.51
DIST	1004	17_26	61.09680	0.0005	0.5447
			0.0010	0.0009	8.31
DIST	1004	6_26	291.25660	0.0006	0.5860
			0.0010	0.0010	1.98
DIST	1017	5_26	241.47750	0.0018	1.9134
			0.0010	0.0010	7.57
DIST	1017	4_26	61.09690	0.0006	0.6734
			0.0010	0.0009	10.22
DIST	1017	16_26	141.37260	-0.0003	-0.3418
			0.0010	0.0010	2.31
DIST	1017	1_26	172.98640	-0.0002	-0.1692
			0.0010	0.0010	0.94
DIST	1003	17_26	118.97660	0.0011	1.2257
			0.0010	0.0009	9.52
DIST	1003	1_26	90.54870	0.0002	0.2392
			0.0010	0.0009	2.50
DIST	1003	16_26	96.82380	0.0002	0.2570
			0.0010	0.0009	2.52
DIST	1003	2_26	106.15730	0.0015	1.6257
			0.0010	0.0009	14.14
DIST	1005	1_26	154.91070	-0.0000	-0.0057
			0.0010	0.0009	0.03
DIST	1005	17_26	241.47990	-0.0007	-0.7321
			0.0010	0.0010	2.89
DIST	1005	4_26	182.04250	0.0001	0.1004
			0.0010	0.0009	0.52
DIST	1005	6_26	150.22910	0.0000	0.0036
			0.0010	0.0009	0.02
DIST	1005	16_26	131.13020	-0.0003	-0.3444
			0.0010	0.0009	2.49
DIST	1002	1_26	107.83720	0.0000	0.0404
			0.0010	0.0009	0.35

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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES
			STD DEV	STD DEV	STD DEV	PPM	
DIST	1002	3_26	106.15730	0.0013	0.0013	1.4150	
			0.0010	0.0009	0.0009	12.28	
DIST	1002	6_26	238.70370	0.0008	0.0008	0.8347	
			0.0010	0.0009	0.0009	3.28	
DIST	1002	16_26	150.20510	0.0002	0.0002	0.2168	
			0.0010	0.0009	0.0009	1.36	
DIST	1006	3_26	271.11130	0.0017	0.0017	1.7635	
			0.0010	0.0010	0.0010	6.26	
DIST	1006	1_26	181.04040	0.0009	0.0009	0.9109	
			0.0010	0.0010	0.0010	4.82	
DIST	1006	16_26	198.65990	0.0006	0.0006	0.6524	
			0.0010	0.0010	0.0010	3.16	
DIST	1006	5_26	150.22910	-0.0001	-0.0001	-0.0889	
			0.0010	0.0009	0.0009	0.55	
DIST	1006	4_26	291.25560	0.0015	0.0015	1.5242	
			0.0010	0.0010	0.0010	5.13	
DIST	1001	2_26	107.83620	0.0010	0.0010	1.0631	
			0.0010	0.0009	0.0009	9.24	
DIST	1001	3_26	90.54780	0.0007	0.0007	0.7072	
			0.0010	0.0009	0.0009	7.40	
DIST	1001	17_26	172.98040	0.0055	0.0055	2.4708	
			0.0022	0.0022	0.0022	31.66	
DIST	1001	4_26	142.97900	0.0010	0.0010	1.0273	
			0.0010	0.0010	0.0010	6.86	
DIST	1001	16_26	47.96020	0.0004	0.0004	0.4535	
			0.0010	0.0009	0.0009	8.96	
DIST	1001	5_26	154.91100	-0.0002	-0.0002	-0.2615	
			0.0010	0.0009	0.0009	1.60	
DIST	1001	6_26	181.04070	0.0009	0.0009	0.9031	
			0.0010	0.0010	0.0010	4.79	
ELAT	1_P	1001	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	80.79	
ELON	1_P	1001	0 00	0.00000	0.0001	0.4816	
				0.0002	0.0001	212.43	
EHDF	1_P	1001		0.28970	0.0007	0.7555	
				0.0010	0.0009	2290.22	
ELAT	3_P	1003	0 00	0.00000	-0.0000	-0.0000	
				0.0002	-0.0000	18.97	
ELON	3_P	1003	0 00	0.00000	0.0000	0.3017	
				0.0002	0.0001	130.97	
EHDF	3_P	1003		0.28950	-0.0048	-2.5051	
				0.0020	0.0019	16689.05	
ELAT	6_P	1006	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	22.11	
ELON	6_P	1006	0 00	0.00000	0.0001	0.4951	
				0.0002	0.0001	186.31	
EHDF	6_P	1006		0.32600	0.0001	0.1674	
				0.0010	0.0008	391.41	
ELAT	5_P	1005	0 00	0.00000	-0.0000	-0.0000	
				0.0002	-0.0000	24.36	
ELON	5_P	1005	0 00	0.00000	-0.0000	-0.2599	
				0.0002	0.0001	110.98	
EHDF	5_P	1005		0.28660	-0.0010	-1.3157	
				0.0010	0.0008	3628.87	
ELAT	17_P	1017	0 00	0.00000	-0.0000	-0.0000	
				0.0002	-0.0000	150.28	
ELON	17_P	1017	0 00	0.00000	0.0000	0.2887	
				0.0002	0.0001	123.51	
EHDF	17_P	1017		0.28640	0.0013	1.5797	
				0.0010	0.0008	4577.17	
ELAT	4_P	1004	0 00	0.00000	0.0000	0.0000	
				0.0002	-0.0000	88.03	
ELON	4_P	1004	0 00	0.00000	-0.0001	-0.5598	
				0.0002	0.0001	257.50	
EHDF	4_P	1004		0.28510	0.0002	0.1998	
				0.0010	0.0008	587.58	

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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ELAT	2_P	1002	0 00 0.00000	-0.0000	-0.0000
			0.0002	-0.0000	129.39
ELON	2_P	1002	0 00 0.00000	0.0000	0.1051
			0.0002	0.0001	43.69
EHDF	2_P	1002	0.28560	0.0006	0.7190
			0.0010	0.0008	2003.18
DIR	1016	5_25	0 0 0.0	-2.2	-0.4
			8.0	5.5	
DIR	1016	6_25	54 59 62.0	2.2	0.4
			8.0	5.5	
DIR	1016	17_25	0 0 0.0	14.1	3.4
			8.0	4.2	
DIR	1016	8	15 39 5.0	-36.0	-3.4
			12.8	10.7	
DIR	1016	6_25	0 0 0.0	7.5	1.5
			8.0	5.2	
DIR	1016	1_25	68 73 90.0	-7.5	-1.5
			8.0	5.2	
ZANG	1016	4_25	98 37 73.0	3.3	0.4
			10.0	8.8	
ZANG	1016	5_25	101 24 97.0	17.8	2.0
			10.0	9.0	
ZANG	1016	6_25	102 82 62.0	-1.1	-0.1
			10.0	9.5	
ZANG	1016	17_25	97 64 36.0	-24.6	-2.7
			10.0	9.1	
ZANG	1016	6_25	102 82 42.0	-21.1	-2.2
			10.0	9.5	
ZANG	1016	1_25	101 6 60.0	-9.8	-1.4
			10.0	6.9	
DIST	1016	4_25	100.59360	-0.0020	-1.0344
			0.0020	0.0020	20.14
DIST	1016	5_25	131.13120	-0.0014	-0.7071
			0.0020	0.0020	10.56
DIST	1016	17_25	141.37390	-0.0016	-0.8009
			0.0020	0.0020	11.10
DIST	1016	1_25	47.95930	0.0013	0.6624
			0.0020	0.0020	27.01
ELAT	16_P	1016	0 00 0.00000	0.0000	0.1703
			0.0003	0.0001	54.17
ELON	16_P	1016	0 00 0.00000	-0.0001	-0.2506
			0.0003	0.0002	130.06
EHDF	16_P	1016	0.40140	-0.0009	-1.0552
			0.0010	0.0008	2131.99
ELAT	8	8GPS	0 00 0.00000	-0.0000	-0.0000
			0.0001	-0.0000	52.93
ELON	8	8GPS	0 00 0.00000	-0.0000	-0.7291
			0.0001	0.0000	39.36
DIR	3016	1_25	68 73 55.0	0.3	0.1
			5.0	2.8	
DIR	3016	3_25	144 26 16.0	-0.3	-0.1
			5.0	2.8	
DIR	3016	5_25	345 40 42.0	0.0	0.0
			5.0	0.0	*
DIR	3016	5_25	0 0 0.0	-4.3	-1.2
			5.0	3.6	
DIR	3016	17_25	261 41 5.0	0.2	0.0
			5.0	4.1	
DIR	3016	4_25	285 84 89.0	2.1	0.5
			5.0	4.0	
DIR	3016	8	276 79 58.0	2.1	0.5
			5.0	3.9	
ZANG	3016	6_25	102 82 70.0	3.0	0.4
			8.0	7.5	
ZANG	3016	1_25	101 6 84.0	-2.0	-0.4
			8.0	4.8	


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Residuals (critical value = 4.098):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ZANG		3016	3_25	97 99 93.0	4.9	0.8
				8.0	5.8	
ZANG		3016	6_25	102 82 67.0	-0.0	-0.0
				8.0	7.5	
ZANG		3016	5_25	101 24 83.0	-2.1	-0.3
				8.0	7.0	
ZANG		3016	5_25	101 24 83.0	-2.1	-0.3
				8.0	7.0	
ZANG		3016	17_25	97 64 79.0	12.9	1.9
				8.0	6.9	
ZANG		3016	4_25	98 37 88.0	10.6	1.6
				8.0	6.8	
ZANG		3016	5_25	101 24 84.0	-1.1	-0.2
				8.0	7.0	
ZANG		3016	4_25	98 37 75.0	-2.4	-0.3
				8.0	6.8	
DIST		3016	1_25	47.96140	-0.0007	-0.8072
				0.0010	0.0009	15.40
DIST		3016	3_25	96.82400	0.0001	0.1220
				0.0010	0.0009	1.15
DIST		3016	5_25	131.13090	-0.0011	-1.1504
				0.0010	0.0009	8.07
DIST		3016	17_25	141.37240	-0.0002	-0.1698
				0.0010	0.0009	1.10
DIST		3016	4_25	100.59200	-0.0005	-0.5504
				0.0010	0.0009	5.03
ELAT		16_P	3016	0 00 0.00000	-0.0000	-0.1150
				0.0003	0.0001	35.81
ELON		16_P	3016	0 00 0.00000	-0.0000	-0.0945
				0.0003	0.0002	44.71
EHDF		16_P	3016	0.40140	0.0004	0.4284
				0.0010	0.0008	906.12
ELAT		1_P	1_25	0 00 0.00000	0.0000	0.0000
				0.0002	-0.0000	117.84
ELON		1_P	1_25	0 00 0.00000	0.0000	0.7274
				0.0002	0.0001	160.48
EHDF		1_P	1_25	0.28600	0.0017	2.0957
				0.0010	0.0008	5912.05
ELAT		3_P	3_25	0 00 0.00000	-0.0000	-0.0000
				0.0002	-0.0000	19.81
ELON		3_P	3_25	0 00 0.00000	-0.0000	-0.0258
				0.0002	0.0000	3.19
EHDF		3_P	3_25	0.28560	-0.0005	-0.8485
				0.0010	0.0006	1772.45
ELAT		6_P	6_25	0 00 0.00000	-0.0000	-0.0000
				0.0002	-0.0000	66.02
ELON		6_P	6_25	0 00 0.00000	-0.0000	-1.2759
				0.0002	0.0000	10.02
EHDF		6_P	6_25	0.29190	0.0006	1.0033
				0.0010	0.0006	1925.07
ELAT		5_P	5_25	0 00 0.00000	-0.0000	-0.0000
				0.0002	-0.0000	17.93
ELON		5_P	5_25	0 00 0.00000	-0.0001	-1.8120
				0.0002	0.0000	240.75
EHDF		5_P	5_25	0.28640	-0.0019	-1.0919
				0.0020	0.0018	6838.83
ELAT		17_P	17_25	0 00 0.00000	0.0000	0.0000
				0.0002	-0.0000	118.94
ELON		17_P	17_25	0 00 0.00000	0.0000	0.8015
				0.0002	0.0000	110.17
EHDF		17_P	17_25	0.28470	0.0002	0.3922
				0.0010	0.0006	768.34
ELAT		4_P	4_25	0 00 0.00000	-0.0000	-0.0000
				0.0002	-0.0000	24.83
ELON		4_P	4_25	0 00 0.00000	0.0000	1.1180
				0.0002	0.0000	158.67

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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION		RESIDUAL	STD RES
			STD DEV	STD DEV	STD DEV	PPM
EHDF	4_P	4_25		0.28440	-0.0010	-1.3865
				0.0010	0.0007	3532.85
DIR	3002	3_26	0 0	0.0	-0.7	-0.2
				5.0	3.3	
DIR	3002	6_26	106 55	75.0	0.7	0.2
				5.0	3.3	
DIR	3002	3_26	0 0	0.0	-3.0	-0.8
				5.0	3.9	
DIR	3002	16_26	44 33	17.0	3.3	0.8
				5.0	4.0	
DIR	3002	1_26	55 57	59.0	-0.4	-0.1
				5.0	3.9	
DIR	3006	1_26	0 0	0.0	-5.3	-1.5
				5.0	3.4	
DIR	3006	5_26	60 95	90.0	5.3	1.5
				5.0	3.4	
DIR	3006	1_26	0 0	0.0	4.8	1.2
				5.0	4.0	
DIR	3006	16_26	15 2	44.0	-4.7	-1.2
				5.0	4.0	
DIR	3006	2_26	371 84	31.0	-0.1	-0.0
				5.0	4.0	
DIR	3006	1_26	0 0	0.0	0.9	0.3
				5.0	3.5	
DIR	3006	4_26	25 44	0.0	-0.9	-0.3
				5.0	3.5	
DIR	3001	6_26	0 0	0.0	-5.8	-1.5
				5.0	3.9	
DIR	3001	8	252 87	21.0	4.4	1.1
				5.0	3.8	
DIR	3001	5_26	341 76	5.0	1.4	0.4
				5.0	3.9	
DIR	3001	6_26	0 0	0.0	-1.9	-0.6
				5.0	3.2	
DIR	3001	2_26	120 86	7.0	1.9	0.6
				5.0	3.2	
DIR	3001	6_26	0 0	0.0	-2.5	-0.8
				5.0	3.0	
DIR	3001	16_26	283 76	2.0	2.5	0.8
				5.0	3.0	
DIR	3001	2_26	0 0	0.0	0.9	0.2
				5.0	3.7	
DIR	3001	17_26	115 70	5.0	3.3	0.9
				5.0	3.8	
DIR	3001	3_26	71 12	79.0	-4.2	-1.1
				5.0	3.8	
DIR	3004	17_26	0 0	0.0	-1.8	-0.5
				5.0	3.7	
DIR	3004	5_26	217 16	5.0	-1.8	-0.5
				5.0	3.9	
DIR	3004	6_26	245 93	22.0	3.7	0.9
				5.0	4.0	
DIR	3004	17_26	0 0	0.0	-3.6	-1.5
				5.0	2.3	
DIR	3004	8	326 36	92.0	3.6	1.5
				5.0	2.3	
DIR	3004	17_26	0 0	0.0	2.4	0.8
				5.0	3.2	
DIR	3004	16_26	266 76	98.0	-2.4	-0.8
				5.0	3.2	
DIR	3004	17_26	0 0	0.0	2.1	0.6
				5.0	3.3	
DIR	3004	1_26	278 70	6.0	-2.1	-0.6
				5.0	3.3	
DIR	3017	4_26	0 0	0.0	0.7	0.2
				5.0	3.2	

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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION		RESIDUAL	STD RES
			STD DEV	STD DEV	STD DEV	PPM
DIR	3017	3_26	89 65	65.0	-0.7	-0.2
				5.0	3.2	
DIR	3017	4_26	0 0	0.0	-2.8	-0.9
				5.0	3.0	
DIR	3017	8	16 87	73.0	2.8	0.9
				5.0	3.0	
DIR	3017	4_26	0 0	0.0	4.1	1.0
				5.0	3.9	
DIR	3017	5_26	12 87	1.0	-1.6	-0.4
				5.0	4.2	
DIR	3017	16_26	42 33	10.0	-0.2	-0.0
				5.0	4.2	
DIR	3017	1_26	57 5	52.0	-2.3	-0.6
				5.0	4.2	
DIR	3003	16_26	0 0	0.0	1.2	0.3
				5.0	3.9	
DIR	3003	6_26	38 4	27.0	8.5	2.1
				5.0	4.0	
DIR	3003	2_26	105 99	82.0	-2.1	-0.6
				5.0	3.8	
DIR	3003	17_26	309 87	97.0	-27.1	-3.1
				9.4	8.7	
DIR	3003	16_26	0 0	0.0	2.7	0.8
				5.0	3.3	
DIR	3003	8	341 31	21.0	-2.7	-0.8
				5.0	3.3	
DIR	3005	1_26	0 0	0.0	0.6	0.1
				5.0	4.4	
DIR	3005	16_26	18 66	56.0	0.5	0.1
				5.0	4.3	
DIR	3005	8	49 39	22.0	-1.8	-0.4
				5.0	4.4	
DIR	3005	17_26	50 61	50.0	5.7	1.3
				5.0	4.4	
DIR	3005	4_26	54 90	69.0	-5.1	-1.2
				5.0	4.4	
DIR	3005	1_26	0 0	0.0	4.0	1.2
				5.0	3.4	
DIR	3005	6_26	319 19	97.0	-4.0	-1.2
				5.0	3.4	
ZANG	3002	3_26	98 48	60.0	-1.5	-0.2
				8.0	7.3	
ZANG	3002	6_26	102 48	25.0	4.1	0.5
				8.0	7.7	
ZANG	3002	3_26	98 48	64.0	2.5	0.3
				8.0	7.3	
ZANG	3002	3_26	98 48	66.0	4.5	0.6
				8.0	7.3	
ZANG	3002	16_26	100 21	97.0	-0.0	-0.0
				8.0	7.6	
ZANG	3002	1_26	100 77	97.0	-0.8	-0.1
				8.0	7.0	
ZANG	3006	1_26	97 19	42.0	-0.9	-0.1
				8.0	7.6	
ZANG	3006	5_26	97 36	68.0	-10.8	-1.5
				8.0	7.0	
ZANG	3006	1_26	97 19	39.0	-3.9	-0.5
				8.0	7.6	
ZANG	3006	16_26	97 18	61.0	3.2	0.4
				8.0	7.7	
ZANG	3006	2_26	97 52	8.0	0.5	0.1
				8.0	7.7	
ZANG	3006	1_26	97 19	42.0	-0.9	-0.1
				8.0	7.6	
ZANG	3006	4_26	97 52	19.0	12.6	1.6
				8.0	7.8	

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Residuals (critical value = 4.098):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	RESIDUAL	STD RES
				STD DEV	STD DEV	PPM
ZANG		3006	1_26	97 19	45.0	2.1
					8.0	7.6
ZANG		3001	6_26	102 80	87.0	3.6
					8.0	7.7
ZANG		3001	5_26	100 72	72.0	-4.8
					8.0	7.2
ZANG		3001	6_26	102 80	93.0	9.6
					8.0	7.7
ZANG		3001	2_26	99 22	27.0	3.9
					8.0	7.1
ZANG		3001	6_26	102 80	84.0	0.6
					8.0	7.7
ZANG		3001	16_26	98 93	50.0	-4.3
					8.0	5.7
ZANG		3001	6_26	102 80	90.0	6.6
					8.0	7.7
ZANG		3001	2_26	99 22	27.0	3.9
					8.0	7.1
ZANG		3001	17_26	97 78	28.0	11.3
					8.0	7.7
ZANG		3001	3_26	97 29	77.0	5.2
					8.0	6.9
ZANG		3004	17_26	97 22	63.0	-0.3
					8.0	7.3
ZANG		3004	5_26	101 79	70.0	-3.4
					8.0	7.4
ZANG		3004	6_26	102 48	38.0	11.6
					8.0	7.8
ZANG		3004	17_26	97 22	64.0	0.7
					8.0	7.3
ZANG		3004	17_26	97 22	62.0	-1.3
					8.0	7.3
ZANG		3004	16_26	101 62	45.0	2.6
					8.0	7.3
ZANG		3004	17_26	97 22	61.0	-2.3
					8.0	7.3
ZANG		3004	17_26	97 22	61.0	-2.3
					8.0	7.3
ZANG		3004	1_26	101 50	23.0	15.3
					8.0	7.5
ZANG		3017	4_26	102 77	65.0	-0.4
					8.0	6.9
ZANG		3017	3_26	101 17	10.0	2.8
					8.0	7.2
ZANG		3017	4_26	102 77	64.0	-1.4
					8.0	6.9
ZANG		3017	4_26	102 77	66.0	0.6
					8.0	6.9
ZANG		3017	5_26	102 5	82.0	4.9
					8.0	7.6
ZANG		3017	16_26	102 35	56.0	-0.5
					8.0	7.6
ZANG		3017	1_26	102 22	16.0	5.1
					8.0	7.6
ZANG		3003	16_26	102 0	3.0	-9.9
					8.0	7.2
ZANG		3003	6_26	102 77	88.0	-3.5
					8.0	7.8
ZANG		3003	2_26	101 51	63.0	5.3
					8.0	6.8
ZANG		3003	17_26	98 83	22.0	3.8
					8.0	7.2
ZANG		3003	16_26	102 0	5.0	-7.9
					8.0	7.2
ZANG		3003	16_26	102 0	6.0	-6.9
					8.0	7.2

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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ZANG	3005	1_26	99 27 45.0	-4.4	-0.6
			8.0	7.5	
ZANG	3005	16_26	98 75 32.0	0.8	0.1
			8.0	7.4	
ZANG	3005	17_26	97 94 50.0	-5.0	-0.6
			8.0	7.8	
ZANG	3005	4_26	98 20 47.0	-4.6	-0.6
			8.0	7.6	
ZANG	3005	1_26	99 27 46.0	-3.4	-0.5
			8.0	7.5	
ZANG	3005	6_26	102 63 48.0	0.8	0.1
			8.0	7.3	
DIST	3002	6_26	238.70450	0.0000	0.0038
			0.0010	0.0009	0.01
DIST	3002	3_26	106.15850	0.0001	0.1443
			0.0010	0.0009	1.25
DIST	3002	16_26	150.20540	-0.0001	-0.0624
			0.0010	0.0009	0.39
DIST	3002	1_26	107.83770	-0.0004	-0.4522
			0.0010	0.0009	3.94
DIST	3006	5_26	150.23040	-0.0013	-1.3874
			0.0010	0.0009	8.52
DIST	3006	1_26	181.04210	-0.0007	-0.7229
			0.0010	0.0010	3.82
DIST	3006	16_26	198.66140	-0.0007	-0.7636
			0.0010	0.0010	3.70
DIST	3006	2_26	238.70570	-0.0012	-1.3086
			0.0010	0.0009	5.11
DIST	3006	4_26	291.25830	-0.0011	-1.0965
			0.0010	0.0010	3.69
DIST	3001	5_26	154.91060	0.0001	0.0773
			0.0010	0.0009	0.47
DIST	3001	2_26	107.83820	-0.0009	-1.0074
			0.0010	0.0009	8.75
DIST	3001	6_26	181.04220	-0.0007	-0.7219
			0.0010	0.0010	3.83
DIST	3001	16_26	47.96090	-0.0003	-0.3154
			0.0010	0.0009	6.22
DIST	3001	17_26	172.98720	-0.0013	-1.3574
			0.0010	0.0010	7.48
DIST	3004	5_26	182.04300	-0.0004	-0.3899
			0.0010	0.0010	2.04
DIST	3004	6_26	291.25770	-0.0004	-0.3675
			0.0010	0.0010	1.24
DIST	3004	17_26	61.09840	-0.0012	-1.3054
			0.0010	0.0009	19.93
DIST	3004	16_26	100.59190	-0.0004	-0.4138
			0.0010	0.0010	3.94
DIST	3004	1_26	142.98100	-0.0008	-0.8709
			0.0010	0.0010	5.84
DIST	3017	3_26	118.97790	0.0000	0.0423
			0.0010	0.0009	0.33
DIST	3017	4_26	61.09790	-0.0003	-0.3716
			0.0010	0.0009	5.64
DIST	3017	5_26	241.48140	-0.0020	-2.1389
			0.0010	0.0010	8.47
DIST	3017	16_26	141.37260	-0.0003	-0.3431
			0.0010	0.0010	2.32
DIST	3017	1_26	172.98680	-0.0006	-0.6013
			0.0010	0.0010	3.34
DIST	3003	6_26	271.11460	-0.0012	-1.2017
			0.0010	0.0010	4.29
DIST	3003	2_26	106.15930	-0.0005	-0.5376
			0.0010	0.0009	4.68
DIST	3003	17_26	118.97600	0.0017	1.8761
			0.0010	0.0009	14.57

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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIST	3003	16_26	96.82580 0.0010	-0.0017 0.0009	-1.7878 17.50
DIST	3005	16_26	131.12980 0.0010	0.0001 0.0009	0.0608 0.44
DIST	3005	17_26	241.47410 0.0022	0.0051 0.0022	2.2925 21.02
DIST	3005	4_26	182.04310 0.0010	-0.0005 0.0009	-0.5605 2.92
DIST	3005	1_26	154.91100 0.0010	-0.0003 0.0009	-0.3301 2.02
DIST	3005	6_26	150.22910 0.0010	0.0000 0.0009	0.0338 0.21
ELAT	16_P	16_26	0 00 0.00000 0.0003	-0.0000 0.0000	-0.1080 12.17
ELON	16_P	16_26	0 00 0.00000 0.0003	0.0001 0.0001	0.4881 159.74
EHDF	16_P	16_26	0.40090 0.0010	0.0014 0.0009	1.5985 3551.61
ELAT	1_P	1_26	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 110.19
ELON	1_P	1_26	0 00 0.00000 0.0002	-0.0001 0.0001	-1.0423 303.64
EHDF	1_P	1_26	0.28970 0.0010	0.0000 0.0009	0.0562 168.59
ELAT	3_P	3_26	0 00 0.00000 0.0002	-0.0001 -0.0000	-0.0001 240.91
ELON	3_P	3_26	0 00 0.00000 0.0002	-0.0002 0.0001	-2.4324 605.11
EHDF	3_P	3_26	0.28560 0.0010	-0.0022 0.0009	-2.5205 7629.08
ELAT	6_P	6_26	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 28.72
ELON	6_P	6_26	0 00 0.00000 0.0002	0.0000 0.0001	0.1616 35.90
EHDF	6_P	6_26	0.32600 0.0010	-0.0014 0.0008	-1.7454 4216.88
ELAT	5_P	5_26	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 67.58
ELON	5_P	5_26	0 00 0.00000 0.0002	0.0001 0.0001	1.4408 345.14
EHDF	5_P	5_26	0.28660 0.0030	-0.0023 0.0029	-0.8086 8213.16
ELAT	17_P	17_26	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 3.93
ELON	17_P	17_26	0 00 0.00000 0.0002	-0.0001 0.0001	-1.7815 452.44
EHDF	17_P	17_26	0.28470 0.0010	0.0010 0.0009	1.1891 3635.91
ELAT	4_P	4_26	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 9.25
ELON	4_P	4_26	0 00 0.00000 0.0002	-0.0000 0.0001	-0.5856 154.67
EHDF	4_P	4_26	0.28510 0.0010	-0.0002 0.0009	-0.1898 570.69
ELAT	2_P	2_26	0 00 0.00000 0.0002	0.0000 -0.0000	0.0000 126.38
ELON	2_P	2_26	0 00 0.00000 0.0002	-0.0000 0.0001	-0.4963 92.03
EHDF	2_P	2_26	0.28550 0.0030	0.0002 0.0029	0.0595 608.07
ELAT	1_P	3001	0 00 0.00000 0.0002	-0.0000 -0.0000	-0.0000 85.93
ELON	1_P	3001	0 00 0.00000 0.0002	-0.0000 0.0001	-0.1589 68.82
EHDF	1_P	3001	0.28970 0.0010	0.0012 0.0009	1.3987 4256.16

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Residuals (critical value = 4.098):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ELAT	3_P	3003	0 00 0.00000	0.0000	0.0000
				0.0002	-0.0000
					103.73
ELON	3_P	3003	0 00 0.00000	0.0001	0.8593
				0.0002	0.0001
					371.01
EHDF	3_P	3003	0.28950	-0.0052	-2.7086
				0.0020	0.0019
					18152.10
ELAT	6_P	3006	0 00 0.00000	0.0000	0.0000
				0.0002	-0.0000
					58.77
ELON	6_P	3006	0 00 0.00000	-0.0001	-0.5153
				0.0002	0.0001
					193.69
EHDF	6_P	3006	0.32600	-0.0002	-0.2365
				0.0010	0.0008
					574.90
ELAT	5_P	3005	0 00 0.00000	-0.0000	-0.0000
				0.0002	-0.0000
					56.47
ELON	5_P	3005	0 00 0.00000	-0.0000	-0.0503
				0.0002	0.0001
					21.35
EHDF	5_P	3005	0.28660	-0.0009	-1.1610
				0.0010	0.0008
					3256.39
ELAT	17_P	3017	0 00 0.00000	0.0000	0.0000
				0.0002	-0.0000
					40.36
ELON	17_P	3017	0 00 0.00000	0.0001	0.5005
				0.0002	0.0001
					215.29
EHDF	17_P	3017	0.28640	0.0010	1.1299
				0.0010	0.0009
					3367.19
ELAT	4_P	3004	0 00 0.00000	-0.0000	-0.0000
				0.0002	-0.0000
					77.97
ELON	4_P	3004	0 00 0.00000	0.0001	0.5608
				0.0002	0.0001
					255.34
EHDF	4_P	3004	0.28510	0.0004	0.4512
				0.0010	0.0009
					1376.79
ELAT	2_P	3002	0 00 0.00000	0.0000	0.0000
				0.0002	-0.0000
					1.74
ELON	2_P	3002	0 00 0.00000	0.0000	0.1148
				0.0002	0.0001
					47.64
EHDF	2_P	3002	0.28560	0.0006	0.7250
				0.0010	0.0008
					2096.62
ELAT	1001	3001	0 00 0.00000	-0.0000	-0.0000
				0.0002	-0.0000
					83393.24
ELON	1001	3001	0 00 0.00000	-0.0001	-0.6453
				0.0002	0.0001
					140604.5
EHDF	1001	3001	0.00000	0.0006	0.6577
				0.0010	0.0009
					986547.5
ELAT	1002	3002	0 00 0.00000	0.0000	0.0000
				0.0002	-0.0000
					813521.9
ELON	1002	3002	0 00 0.00000	0.0000	0.0096
				0.0002	0.0001
					24563.72
EHDF	1002	3002	0.00000	0.0000	0.0348
				0.0010	0.0008
					580988.9
ELAT	1003	3003	0 00 0.00000	0.0000	0.0000
				0.0002	-0.0000
					83823.69
ELON	1003	3003	0 00 0.00000	0.0001	0.5602
				0.0002	0.0001
					163827.3
EHDF	1003	3003	0.00000	-0.0004	-0.5327
				0.0010	0.0008
					982918.0
ELAT	1004	3004	0 00 0.00000	-0.0000	-0.0000
				0.0002	-0.0000
					173571.8
ELON	1004	3004	0 00 0.00000	0.0001	0.9883
				0.0002	0.0001
					536232.3
EHDF	1004	3004	0.00000	0.0002	0.2644
				0.0010	0.0009
					826029.3
ELAT	1005	3005	0 00 0.00000	-0.0000	-0.0000
				0.0002	-0.0000
					83821.42
ELON	1005	3005	0 00 0.00000	0.0000	0.2134
				0.0002	0.0001
					233820.7
EHDF	1005	3005	0.00000	0.0001	0.1445
				0.0010	0.0007
					968672.7

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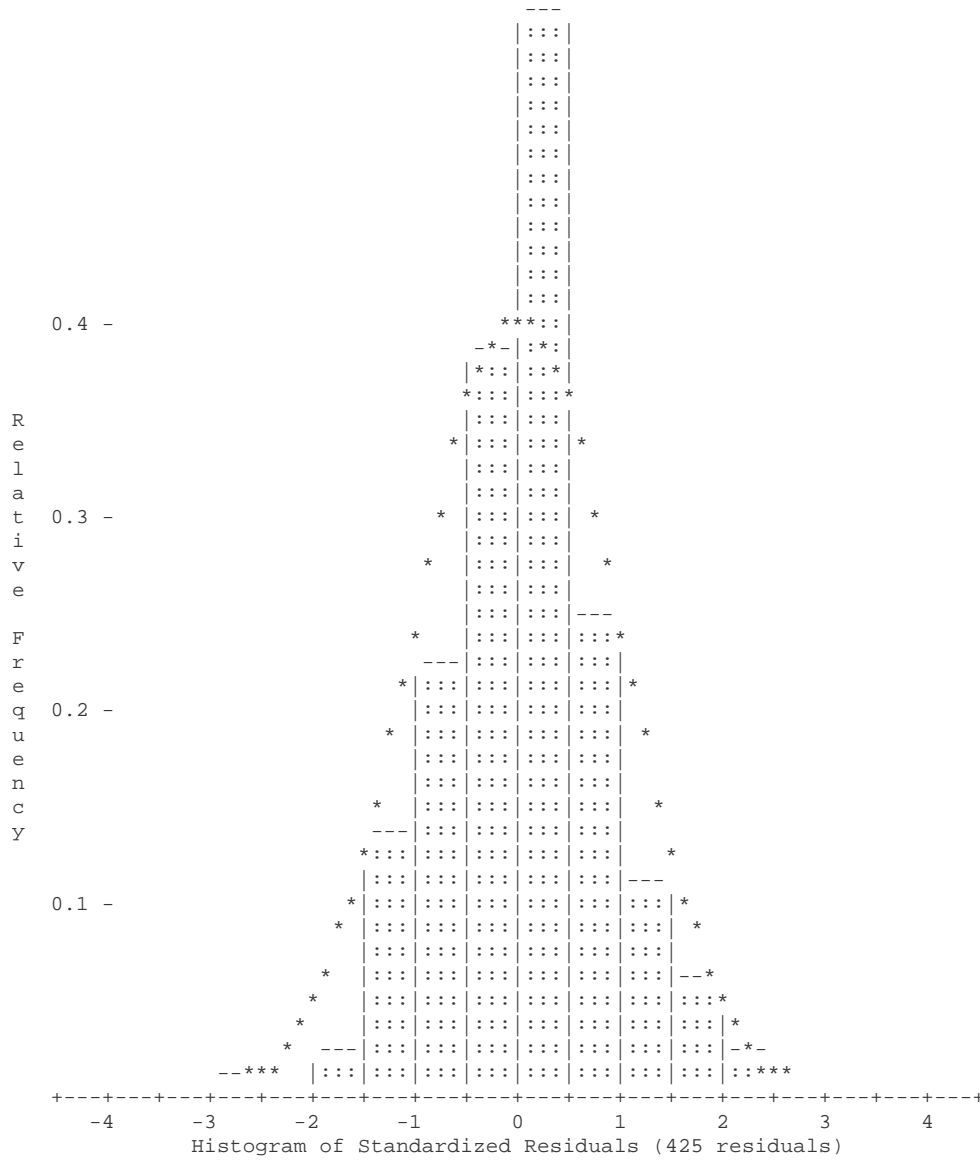
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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ELAT	1006	3006	0 00 0.00000	0.0000	0.0000
				0.0002	-0.0000 35249.50
ELON	1006	3006	0 00 0.00000	-0.0001	-1.0191
				0.0002	0.0001 365763.7
EHDF	1006	3006	0.00000	-0.0003	-0.4398
				0.0010	0.0007 930039.6
ELAT	1016	3016	0 00 0.00000	-0.0000	-0.0000
				0.0002	-0.0000 29601.34
ELON	1016	3016	0 00 0.00000	0.0000	0.3613
				0.0002	0.0001 27998.89
EHDF	1016	3016	0.00000	0.0012	1.4478
				0.0010	0.0008 999167.4
ELAT	1017	3017	0 00 0.00000	0.0001	0.0001
				0.0002	-0.0000 154657.0
ELON	1017	3017	0 00 0.00000	0.0000	0.2140
				0.0002	0.0001 74260.40
EHDF	1017	3017	0.00000	-0.0003	-0.4163
				0.0010	0.0008 985175.7
ELAT	16_C	16_P	0 00 0.00000	0.0000	0.0000
				0.0002	-0.0000 0.00
ELON	16_C	16_P	0 00 0.00000	0.0000	0.0000
				0.0002	0.0000 0.00
EHDF	16_C	16_P	0.48900	0.0000	0.0000
				0.0010	0.0000 0.00*
ELAT	16_P	7501	0 00 0.00003	-0.0000	-0.0000
				0.0002	0.0001 0.00
ELON	16_P	7501	0 00 0.00023	0.0000	0.0000
				0.0002	0.0001 0.00
DIR	2_P	3_P	0 0 0.0	-0.0	-0.0
				3.0	1.7
DIR	2_P	7232	73 15 21.0	0.0	0.0
				3.0	1.7
DIR	3_P	2_P	0 0 0.0	-0.0	-0.0
				4.0	2.3
DIR	3_P	7232	312 86 59.0	0.0	0.0
				4.0	2.3
DIR	4_P	17_P	0 0 0.0	-0.0	-0.0
				4.0	2.0
DIR	4_P	7232	247 30 54.0	0.0	0.0
				4.0	2.0
DIR	5_P	1_P	0 0 0.0	-0.0	-0.0
				4.0	1.4
DIR	5_P	7232	380 19 27.0	0.0	0.0
				4.0	1.4
DIR	6_P	1_P	0 0 0.0	-0.1	-0.0
				6.0	3.3
DIR	6_P	7232	23 55 89.0	0.1	0.0
				6.0	3.3
ZANG	2_P	7232	98 36 44.0	-21.8	-2.9
				8.0	7.5
ZANG	3_P	7232	99 21 49.0	-15.9	-2.1
				8.0	7.5
ZANG	4_P	7232	99 4 75.0	1.2	0.2
				8.0	7.5
ZANG	5_P	7232	94 16 28.0	21.8	3.7
				8.0	5.8
ZANG	6_P	7232	92 82 22.0	-5.9	-0.8
				8.0	7.1

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GLOBAL.iob
Microsearch GeoLab, V2001.9.20.0 GRS80 UNITS: m,GRAD Page 0035
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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	RESIDUAL	STD RES
				STD DEV	STD DEV	PPM
EHDF		777	V100	-1.78012	0.0003	1.5814
				0.0003	0.0002	185.80
EHDF		V100	777	1.77993	-0.0001	-0.6728
				0.0003	0.0002	79.04
EHDF		7501_Temp	13	-0.00608	-0.0000	-0.0000
				0.0001	0.0000	3278.69*
EHDF		13	7501_Temp	0.00616	-0.0001	-0.0001
				0.0001	0.0000	9836.07*
EHDF		7501_Temp	10	0.02097	-0.0001	-0.0001
				0.0001	0.0000	3109.30*
EHDF		10	7501_Temp	-0.02088	-0.0000	-0.0000
				0.0001	0.0000	1195.89*
EHDF		10	13	-0.02702	0.0000	0.0000
				0.0001	0.0000	555.45*
EHDF		13	10	0.02695	0.0001	0.0001
				0.0001	0.0000	2036.66*
EHDF		7501_Temp	7501	-0.02000	-0.0000	-0.0000
				0.0001	0.0000	0.00*
EHDF		13	16	3.72217	-0.0000	-0.0085
				0.0002	0.0001	0.33
EHDF		16	13	-3.72213	-0.0000	-0.2696
				0.0002	0.0001	10.42
EHDF		16	16_P	-0.02000	0.0000	0.0000
				0.0001	0.0000	1.36*
EHDF		V100	13	4.23887	0.0000	0.1495
				0.0003	0.0002	6.89
EHDF		13	V100	-4.23887	-0.0000	-0.1741
				0.0002	0.0002	6.89
EHDF		777	50	-3.15489	-0.0003	-1.7374
				0.0002	0.0002	85.55
EHDF		50	777	3.15508	0.0001	0.5145
				0.0002	0.0002	25.33
EHDF		777	5	3.77933	-0.0001	-0.4482
				0.0003	0.0002	27.47
EHDF		5	777	-3.77864	-0.0006	-2.5306
				0.0003	0.0002	155.11
EHDF		5	5_P	-0.07083	0.0001	0.0001
				0.0001	0.0000	0.39*
EHDF		50	5_P	6.86490	-0.0013	-2.8996
				0.0005	0.0004	9.48
EHDF		50	60	-2.19318	-0.0002	-1.1018
				0.0002	0.0002	94.95
EHDF		60	50	2.19339	-0.0000	-0.0092
				0.0002	0.0002	0.80
EHDF		V100	1111	4.59852	-0.0002	-1.5626
				0.0002	0.0002	52.05
EHDF		1111	60	-8.16691	-0.0001	-0.6232
				0.0003	0.0002	15.86
EHDF		60	1111	8.16733	-0.0003	-1.3975
				0.0003	0.0002	35.57
EHDF		1111	V100	-4.59780	-0.0005	-3.1384
				0.0002	0.0002	104.53
EHDF		6_P	60	-2.80420	0.0000	0.0000
				0.0001	0.0000	0.06*
EHDF		1111	1_P	2.65200	0.0000	0.0000
				0.0001	0.0000	0.88*
EHDF		88	777	-8.10337	-0.0001	-0.7033
				0.0002	0.0002	14.88
EHDF		777	88	8.10340	0.0001	0.4563
				0.0003	0.0002	11.18
EHDF		88	40	-0.16747	-0.0001	-0.0001
				0.0001	0.0000	452.29*
EHDF		40	88	0.16752	0.0000	0.0000
				0.0001	0.0000	153.86*
EHDF		88	170	1.91488	0.0002	1.0670
				0.0002	0.0002	83.63

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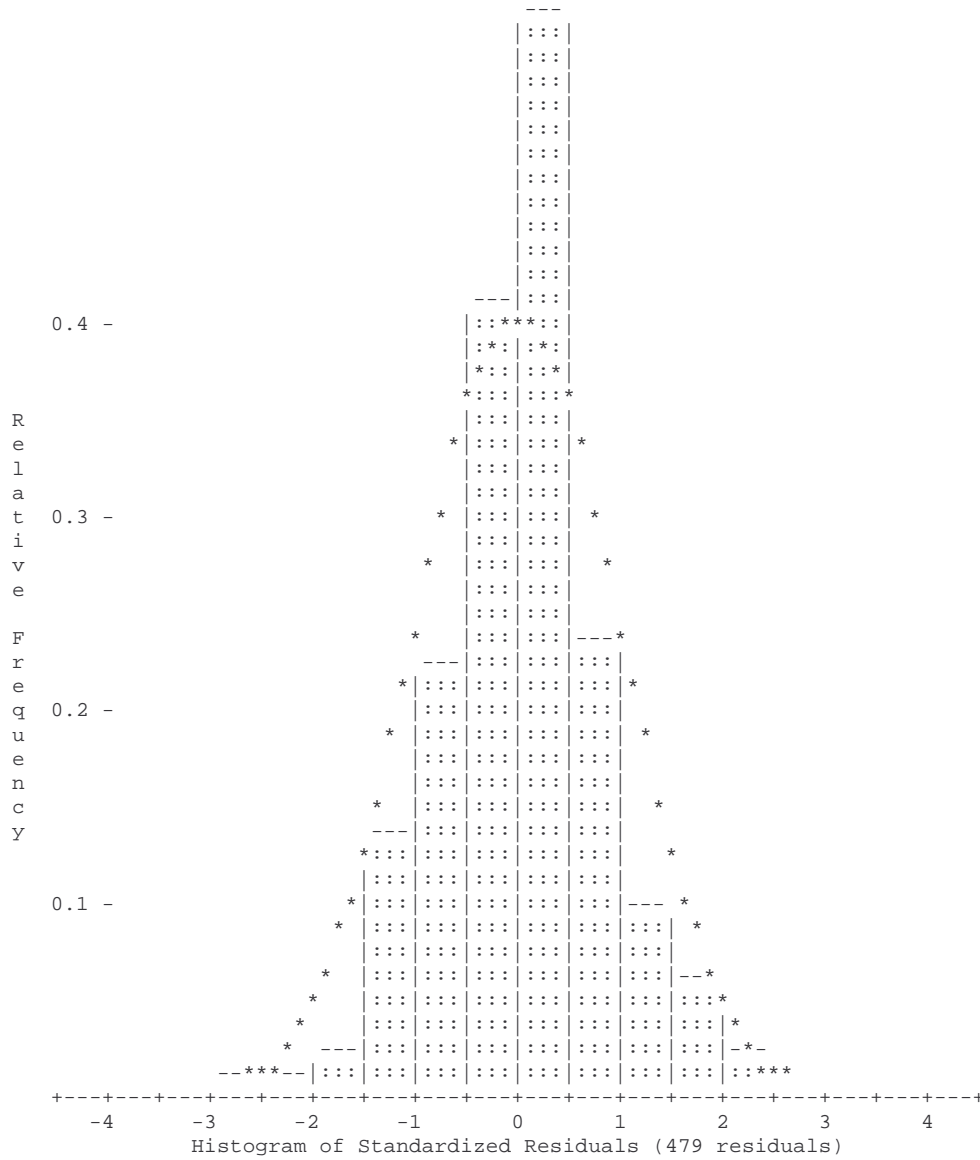
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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION	RESIDUAL	STD RES
			STD DEV	STD DEV	PPM
EHDF	88	170	1.91495	0.0001	0.6007
			0.0002	0.0002	47.08
EHDF	170	88	-1.91491	-0.0001	-0.8671
			0.0002	0.0002	67.97
EHDF	40	170	2.08292	-0.0003	-2.2672
			0.0002	0.0001	160.41
EHDF	170	40	-2.08253	-0.0001	-0.3797
			0.0002	0.0001	26.86
EHDF	777	30	7.12531	-0.0001	-0.6987
			0.0002	0.0002	17.04
EHDF	30	777	-7.12547	0.0003	1.6194
			0.0002	0.0002	39.50
EHDF	777	20	5.23259	0.0001	0.8242
			0.0003	0.0002	27.68
EHDF	20	777	-5.23293	0.0002	0.8453
			0.0003	0.0002	37.29
EHDF	30	3_P	2.19670	-0.0001	-0.0001
			0.0001	0.0000	0.76*
EHDF	40	4	0.97957	-0.0000	-0.0000
			0.0001	0.0000	2.72*
EHDF	4	40	-0.97957	0.0000	0.0000
			0.0001	0.0000	2.72*
EHDF	4	4_P	-0.07202	-0.0000	-0.0000
			0.0001	0.0000	0.05*
EHDF	170	17	1.55647	0.0000	0.0000
			0.0001	0.0000	4.95*
EHDF	17	170	-1.55645	-0.0000	-0.0000
			0.0001	0.0000	17.80*
EHDF	17	17_P	-0.07043	0.0000	0.0000
			0.0001	0.0000	0.25*
EHDF	20	2	1.63260	-0.0000	-0.3327
			0.0002	0.0001	24.72
EHDF	2	20	-1.63252	-0.0000	-0.3267
			0.0002	0.0001	24.28
EHDF	2	2_P	-0.07129	-0.0000	-0.0000
			0.0001	0.0000	0.00*
EHDF	88	8	1.79179	0.0000	0.0000
			0.0001	0.0000	0.07*
EHDF	8	88	-1.79180	0.0000	0.0000
			0.0001	0.0000	0.03*
EHDF	8	8GPS	-0.08140	0.0004	1.0221
			0.0010	0.0004	5228.42

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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION		STD RES
				STD DEV	RESIDUAL	
				STD DEV	STD DEV	PPM
ZANG		1403	418	98 63	80.0	1.1
					8.0	
					7.7	
ZANG		1403	100	99 15	62.0	1.6
					8.0	
					7.6	
ZANG		1403	200	99 17	56.0	1.4
					8.0	
					7.7	
ZANG		1403	412	97 92	8.0	1.9
					8.0	
					7.8	
ZANG		1100	412	97 36	61.0	0.8
					8.0	
					7.8	
ZANG		1100	200	99 44	49.0	0.0
					8.0	
					4.3	
ZANG		1100	418	98 6	73.0	-0.3
					8.0	
					7.3	
ZANG		1100	403	100 84	86.0	-0.8
					8.0	
					7.6	
ZANG		1200	412	97 11	69.0	0.3
					8.0	
					7.7	
ZANG		1200	403	100 82	99.0	-0.4
					8.0	
					7.7	
ZANG		1200	100	100 55	56.0	0.0
					8.0	
					4.1	
DIST		1418	403		550.76780	-0.1995
					0.0011	0.36
DIST		1418	100		208.47420	-0.1487
					0.0010	0.65
DIST		1418	412		547.42070	0.2617
					0.0011	0.49
DIST		1412	418		547.41930	1.5024
					0.0011	2.83
DIST		1412	200		352.10490	1.1677
					0.0011	3.13
DIST		1412	100		397.01340	0.8525
					0.0011	2.10
DIST		1412	403		669.73850	1.5013
					0.0012	2.27
DIST		1403	418		550.76630	1.2278
					0.0011	2.24
DIST		1403	100		412.11630	0.1691
					0.0011	0.41
DIST		1403	200		459.08190	-0.1043
					0.0011	0.23
DIST		1100	200		55.68830	0.2637
					0.0010	4.28
DIST		1100	403		412.11510	1.3651
					0.0011	3.29
DIST		1200	403		459.08110	0.6912
					0.0011	1.52
DIST		1200	100		55.68820	0.2515
					0.0010	4.10
ELAT		1200	200	0 00	0.00000	-0.0000
					0.0002	962227.4
ELON		1200	200	0 00	0.00000	-0.1514
					0.0002	242628.5
EHDF		1200	200		0.00000	-0.0082
					0.0010	123490.7
ELAT		1418	418	0 00	0.00000	0.0000
					0.0002	50439.17
ELON		1418	418	0 00	0.00000	0.1482
					0.0002	37830.41
EHDF		1418	418		0.00000	-0.4791
					0.0010	998000.4
ELAT		1412	412	0 00	0.00000	-0.0001
					0.0002	268208.2
ELON		1412	412	0 00	0.00000	-2.6118
					0.0002	334410.5


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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
EHDF	1412	412	0.00000	-0.0003	-0.9951
			0.0010	0.0003	903459.1
ELAT	1403	403	0 00	0.00000	0.0000
			0.0002	-0.0000	32011.33
ELON	1403	403	0 00	0.00000	-0.0000
			0.0002	0.0000	-1.2371
EHDF	1403	403	0.00000	-0.0009	-3.3644
			0.0010	0.0003	999114.8
ELAT	1100	100	0 00	0.00000	-0.0001
			0.0002	-0.0000	-0.0001
ELON	1100	100	0 00	0.00000	-0.0000
			0.0002	0.0001	596613.1
EHDF	1100	100	0.00000	0.0001	91359.77
			0.0010	0.0001	0.1123
ELAT	403_P	403	0 00	0.00000	-0.0000
			0.0002	-0.0000	-0.0000
ELON	403_P	403	0 00	0.00000	0.0000
			0.0002	0.0000	10.16
EHDF	403_P	403	0.23970	0.0003	0.9880
			0.0010	0.0002	59.12
ELAT	412_P	412	0 00	0.00000	-0.0000
			0.0002	-0.0000	1179.71
ELON	412_P	412	0 00	0.00000	-0.0000
			0.0002	0.0000	-0.0000
EHDF	412_P	412	0.28970	-0.0004	49.47
			0.0010	0.0005	0.5559
ELAT	418_P	418	0 00	0.00000	-0.0000
			0.0002	-0.0000	52.33
ELON	418_P	418	0 00	0.00000	-0.0000
			0.0002	0.0000	-0.7675
EHDF	418_P	418	0.28730	-0.0001	1273.76
			0.0010	0.0005	-0.0000
ELAT	200_P	200	0 00	0.00000	-0.0000
			0.0002	-0.0000	2.11
ELON	200_P	200	0 00	0.00000	-0.0000
			0.0002	0.0000	-0.1265
EHDF	200_P	200	0.36480	0.0002	14.53
			0.0010	0.0006	-0.2610
DIR	TDA5005	403	0 0	0.0	496.96
				5.0	-0.0000
DIR	TDA5005	200	213 80	99.7	-0.0000
				5.0	26.08
DIR	TDA5005	403	0 0	0.0	-0.0000
				5.0	-0.0405
DIR	TDA5005	210	213 81	67.3	2.55
				5.0	0.0000
DIR	TDA5005	220	213 80	89.8	0.3827
				5.0	624.93
ZANG	TDA5005	403	100 73	56.6	0.0
				8.0	0.0
ZANG	TDA5005	200	95 44	94.0	0.0
				8.0	0.0
ZANG	TDA5005	403	100 73	57.2	0.0
				8.0	0.0
ZANG	TDA5005	210	92 1	5.2	0.0
				8.0	0.0
DIST	TDA5005	200		11.58650	0.0000
				0.0010	0.0000
DIR	TC2002	403	0 0	0.0	0.00*
				5.0	0.0
DIR	TC2002	200	112 44	76.0	-0.0
				5.0	0.0
DIR	TC2002	220	112 44	46.0	-0.0
				5.0	0.0
DIR	TC2002	210	112 45	31.5	-0.0
				5.0	0.0

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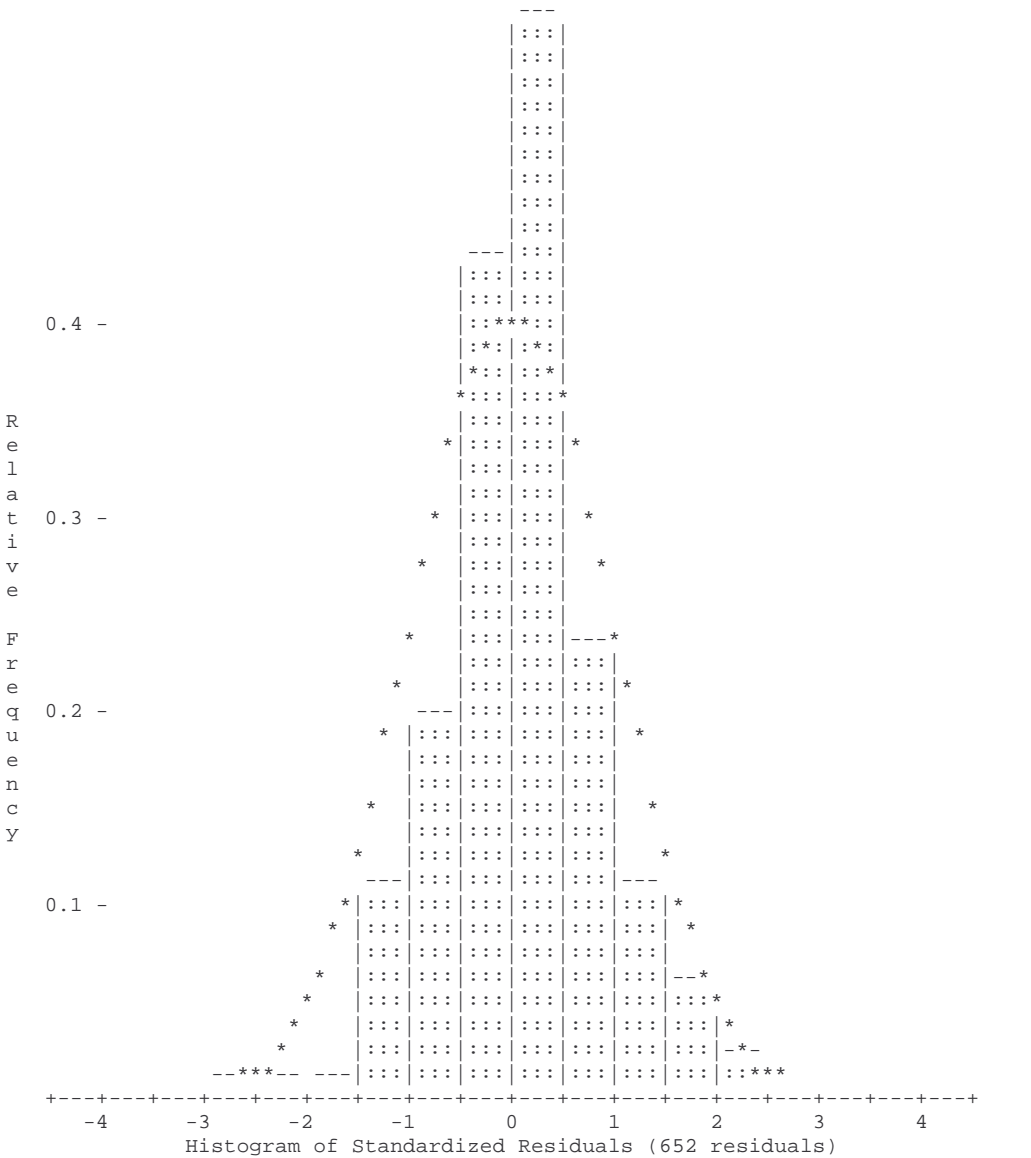
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Residuals (critical value = 4.098):
NOTE: Observation values shown are reduced to mark-to-mark.

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TYPE AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ZANG	TC2002	403	100 86 38.0	27.2	2.2
ZANG	TC2002	200	100 45 19.0	-1.6	-0.3
ZANG	TC2002	220	101 22 70.0	0.0	0.0
ZANG	TC2002	210	98 64 50.0	1.1	0.2
DIST	TC2002	200	22.21930	0.0000	0.0000
ELAT	210	DORIS	0 00 0.00000	0.0000	0.0000
ELON	210	DORIS	0 00 0.00000	-0.0000	-0.0000
EHDF	200_P	DORIS	0.50470	0.0000	0.0000



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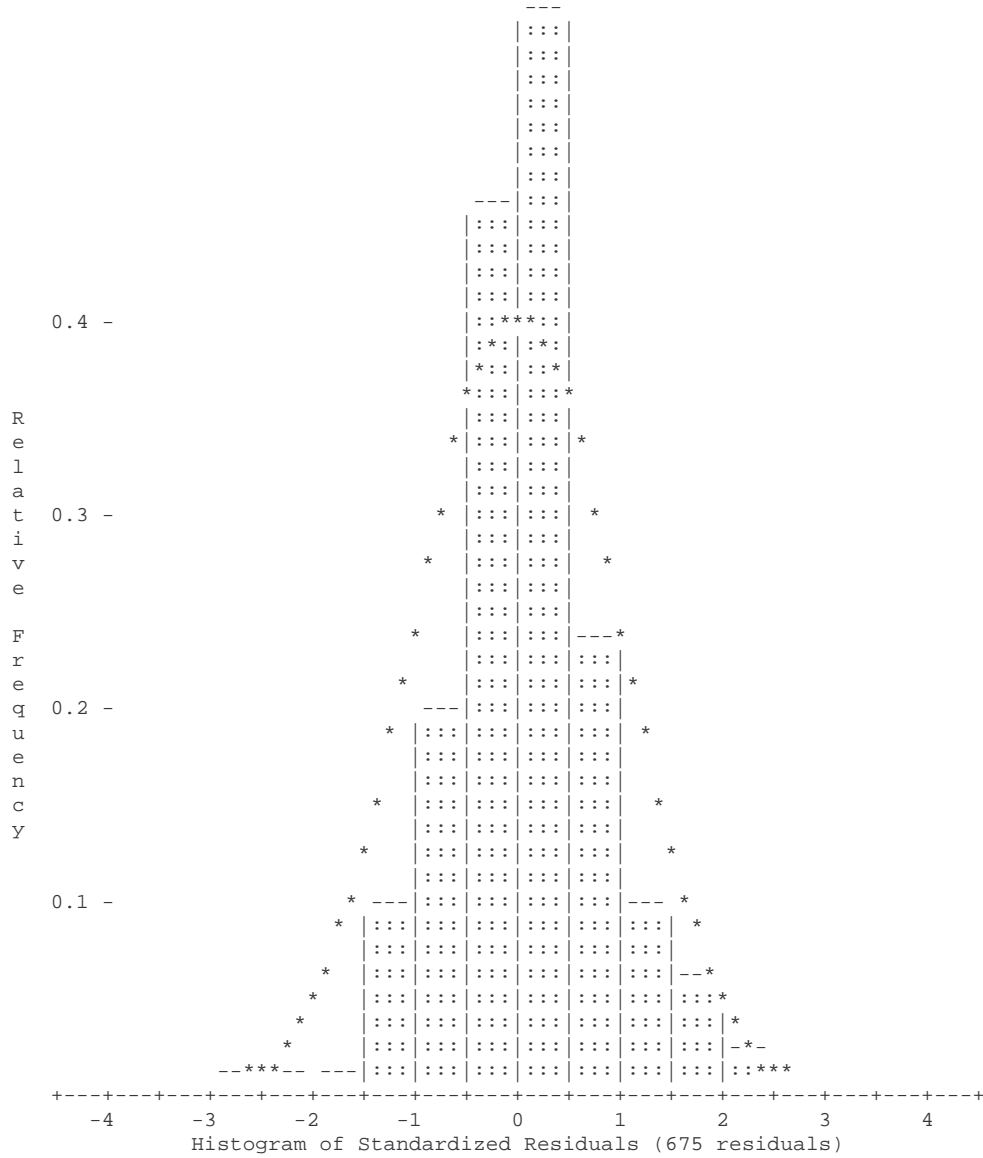
Microsearch GeoLab, V2001.9.20.0 GRS80 UNITS: m,GRAD Page 0049

Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION	RESIDUAL	STD RES
			STD DEV	STD DEV	PPM
EHDF	2000	555	-6.95441	-0.0001	-0.7593
			0.0003	0.0002	0.64
EHDF	555	2000	6.95466	-0.0001	-0.5885
			0.0003	0.0002	0.50
EHDF	3	2000	-3.41319	-0.0000	-0.0000
			0.0001	0.0000	1.01*
EHDF	2000	3	3.41325	-0.0000	-0.0000
			0.0001	0.0000	1.38*
EHDF	2000	3GPS	0.35748	-0.0000	-0.0000
			0.0001	0.0000	0.11*
EHDF	3GPS	2000	-0.35746	-0.0000	-0.0000
			0.0001	0.0000	0.70*
EHDF	200_P	2000	-1.18992	-0.0001	-0.3775
			0.0002	0.0001	45.05
EHDF	2000	200_P	1.19003	-0.0001	-0.3972
			0.0002	0.0001	47.39
EHDF	444	4120	25.47856	-0.0000	-0.1337
			0.0004	0.0003	1.66
EHDF	4120	412_T	1.31320	0.0000	0.0000
			0.0001	0.0000	8.24*
EHDF	412_T	4120	-1.31321	-0.0000	-0.0000
			0.0001	0.0000	0.63*
EHDF	4120	444	-25.47825	-0.0003	-0.8466
			0.0004	0.0003	10.51
EHDF	412_T	412_P	-0.07080	0.0000	0.0000
			0.0001	0.0000	164.49*
EHDF	555	666	1.74124	0.0002	0.9241
			0.0003	0.0002	0.13
EHDF	666	4180	11.09293	0.0000	0.0258
			0.0003	0.0002	0.00
EHDF	4180	666	-11.09312	0.0002	0.7792
			0.0003	0.0002	0.12
EHDF	666	555	-1.74183	0.0004	1.6552
			0.0003	0.0002	0.24
EHDF	4180	418_T	1.30372	-0.0000	-0.0000
			0.0001	0.0000	25.44*
EHDF	418_T	4180	-1.30367	-0.0000	-0.0000
			0.0001	0.0000	12.91*
EHDF	418_T	418_P	-0.07080	-0.0000	-0.0000
			0.0001	0.0000	230.59*
EHDF	444	555	2.54926	-0.0001	-0.3886
			0.0004	0.0003	0.20
EHDF	555	444	-2.54922	0.0001	0.2454
			0.0004	0.0003	0.13
EHDF	3	3GPS	-3.05200	-0.0037	-1.8713
			0.0020	0.0020	1223.26

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Residuals (critical value = 4.098):

NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO	OBSERVATION	RESIDUAL	STD RES
			STD DEV	STD DEV	PPM
XCT	8GPS	3GPS	-694.84570 0.0015	-0.0001 0.0009	-0.0603 0.03
YCT	8GPS	3GPS	1929.28510 0.0010	-0.0004 0.0006	-0.7676 0.21
ZCT	8GPS	3GPS	250.38570 0.0010	-0.0000 0.0006	-0.0525 0.01
XCT	8GPS	412_P	-624.29460 0.0025	-0.0062 0.0021	-2.9741 3.48
YCT	8GPS	412_P	1658.25710 0.0018	-0.0037 0.0015	-2.5117 2.11
ZCT	8GPS	412_P	80.81160 0.0017	0.0021 0.0013	1.6209 1.20
XCT	8GPS	418_P	-796.91650 0.0024	0.0074 0.0020	3.7289 3.21
YCT	8GPS	418_P	2146.88160 0.0017	0.0039 0.0014	2.7121 1.68
ZCT	8GPS	418_P	257.21190 0.0016	-0.0046 0.0013	-3.6658 1.99
XCT	8GPS	3_P	45.25630 0.0026	0.0049 0.0024	2.0163 45.06
YCT	8GPS	3_P	14.44000 0.0019	0.0014 0.0018	0.8070 13.28
ZCT	8GPS	3_P	97.53500 0.0017	-0.0048 0.0016	-2.9308 44.44
XCT	8GPS	6_P	147.32900 0.0027	0.0010 0.0026	0.4009 3.57
YCT	8GPS	6_P	-235.40130 0.0020	0.0005 0.0019	0.2831 1.84
ZCT	8GPS	6_P	71.75840 0.0018	-0.0006 0.0015	-0.3758 1.98
XCT	8GPS	403_P	-484.62500 0.0053	0.0072 0.0049	1.4730 3.42
YCT	8GPS	403_P	1951.35650 0.0036	0.0054 0.0032	1.7132 2.55
ZCT	8GPS	403_P	666.58750 0.0032	-0.0045 0.0030	-1.5028 2.11
XCT	8GPS	5_P	63.01740 0.0025	-0.0004 0.0023	-0.1573 1.98
YCT	8GPS	5_P	-170.61030 0.0018	-0.0009 0.0017	-0.5012 4.71
ZCT	8GPS	5_P	-34.36820 0.0017	-0.0008 0.0015	-0.5282 4.22
XCT	8GPS	200_P	-699.57920 0.0037	0.0055 0.0035	1.5838 2.64
YCT	8GPS	200_P	1951.28770 0.0027	0.0027 0.0025	1.0764 1.28
ZCT	8GPS	200_P	260.94110 0.0025	-0.0040 0.0023	-1.6985 1.90

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S T A T I S T I C S S U M M A R Y

Residual Critical Value Type	Tau Max
Residual Critical Value	4.0983
Number of Flagged Residuals	0
Convergence Criterion	0.0001
Final Iteration Counter Value	4
Confidence Level Used	95.0000
Estimated Variance Factor	1.0940
Number of Degrees of Freedom	414

Chi-Square Test on the Variance Factor:

9.5901e-01 < 1.0000 < 1.2598e+00 ?

THE TEST PASSES

NOTE: All confidence regions were computed using the following factors:

Variance factor used	=	1.0940
1-D expansion factor	=	1.9600
2-D expansion factor	=	2.4477
3-D expansion factor	=	2.7955

Note that, for relative confidence regions, precisions are computed from the ratio of the major semi-axis and the spatial distance between the two stations.

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2-D and 1-D Station Confidence Regions (95.000 and 95.000 percent):

STATION	MAJOR SEMI-AXIS	AZ	MINOR SEMI-AXIS	VERTICAL
10	0.0000	0	0.0000	0.0020
100	0.0022	37	0.0017	0.0035
1001	0.0015	39	0.0010	0.0021
1002	0.0023	77	0.0013	0.0023
1003	0.0014	102	0.0011	0.0023
1004	0.0010	3	0.0005	0.0022
1005	0.0020	167	0.0009	0.0023
1006	0.0029	15	0.0010	0.0023
1016	0.0014	21	0.0011	0.0022
1017	0.0012	6	0.0009	0.0022
1100	0.0023	38	0.0017	0.0035
1111	0.0000	0	0.0000	0.0019
1200	0.0022	47	0.0016	0.0036
13	0.0000	0	0.0000	0.0020
1403	0.0037	74	0.0019	0.0046
1412	0.0025	165	0.0021	0.0039
1418	0.0025	17	0.0018	0.0039
16	0.0000	0	0.0000	0.0020
16_26	0.0013	19	0.0009	0.0021
16_C	0.0014	20	0.0011	0.0028
16_P	0.0014	20	0.0010	0.0020
17	0.0000	0	0.0000	0.0019
170	0.0000	0	0.0000	0.0019
17_25	0.0013	3	0.0010	0.0025
17_26	0.0013	4	0.0009	0.0021
17_P	0.0012	4	0.0009	0.0019

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2-D and 1-D Station Confidence Regions (95.000 and 95.000 percent):

STATION	MAJOR SEMI-AXIS	AZ	MINOR SEMI-AXIS	VERTICAL
1_25	0.0016	38	0.0011	0.0022
1_26	0.0015	40	0.0010	0.0021
1_P	0.0015	39	0.0010	0.0019
2	0.0000	0	0.0000	0.0020
20	0.0000	0	0.0000	0.0019
200	0.0022	45	0.0016	0.0034
2000	0.0000	0	0.0000	0.0030
200_P	0.0022	44	0.0016	0.0030
210	0.0022	42	0.0017	0.0034
2100	0.0022	37	0.0017	0.0035
220	0.0022	42	0.0017	0.0035
2200	0.0022	47	0.0016	0.0036
2403	0.0038	74	0.0020	0.0051
2412	0.0025	165	0.0021	0.0040
2418	0.0025	17	0.0019	0.0039
2_26	0.0023	75	0.0013	0.0023
2_P	0.0023	76	0.0013	0.0020
3	0.0018	33	0.0015	0.0030
30	0.0000	0	0.0000	0.0019
3001	0.0015	40	0.0010	0.0021
3002	0.0023	77	0.0013	0.0022
3003	0.0014	101	0.0012	0.0022
3004	0.0010	2	0.0005	0.0021
3005	0.0020	168	0.0009	0.0022
3006	0.0029	15	0.0010	0.0023
3016	0.0013	21	0.0011	0.0022
3017	0.0013	5	0.0009	0.0022
3GPS	0.0018	33	0.0015	0.0030
3_25	0.0015	101	0.0012	0.0025
3_26	0.0014	100	0.0012	0.0021
3_P	0.0014	100	0.0011	0.0019
4	0.0000	0	0.0000	0.0019
40	0.0000	0	0.0000	0.0019
403	0.0037	74	0.0019	0.0044
403_P	0.0037	74	0.0020	0.0048
412	0.0025	166	0.0020	0.0035
4120	0.0000	0	0.0000	0.0031
412_P	0.0025	169	0.0021	0.0031
412_T	0.0000	0	0.0000	0.0031
418	0.0025	17	0.0018	0.0035
4180	0.0000	0	0.0000	0.0031
418_P	0.0025	18	0.0018	0.0031
418_T	0.0000	0	0.0000	0.0031
444	0.0000	0	0.0000	0.0030
4_25	0.0011	3	0.0007	0.0024
4_26	0.0010	9	0.0007	0.0021
4_P	0.0010	4	0.0006	0.0019
5	0.0000	0	0.0000	0.0019
50	0.0000	0	0.0000	0.0019
555	0.0000	0	0.0000	0.0030
5_25	0.0020	168	0.0010	0.0026
5_26	0.0020	168	0.0009	0.0025
5_P	0.0020	168	0.0009	0.0019
60	0.0000	0	0.0000	0.0019
666	0.0000	0	0.0000	0.0030
6_25	0.0029	15	0.0011	0.0026
6_26	0.0029	15	0.0009	0.0023
6_P	0.0028	15	0.0009	0.0019
7232	0.0032	20	0.0018	0.0024
7501	0.0014	20	0.0011	0.0020
7501_Temp	0.0000	0	0.0000	0.0020
777	0.0000	0	0.0000	0.0019
8	0.0003	2	0.0003	0.0019
88	0.0000	0	0.0000	0.0019
8GPS	0.0003	180	0.0003	0.0002
DORIS	0.0026	42	0.0021	0.0036
TC2002	0.0032	84	0.0020	0.0034
TDA5005	0.0032	8	0.0019	0.0034
V100	0.0000	0	0.0000	0.0019

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3D Station Confidence Regions (95.000 percent):

STATION	MAJ-SEMI (AZ,VANG)	MED-SEMI (AZ,VANG)	MIN-SEMI (AZ,VANG)
10	0.0028 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
100	0.0050 (35, 87)	0.0025 (218, 3)	0.0019 (128, 0)
1001	0.0030 (40, 89)	0.0017 (219, 1)	0.0011 (309, 0)
1002	0.0032 (72, 87)	0.0026 (257, 3)	0.0015 (167, 0)
1003	0.0032 (76, 89)	0.0016 (282, 1)	0.0013 (192, 0)
1004	0.0031 (301, 90)	0.0012 (183, 0)	0.0005 (93, 0)
1005	0.0032 (348, 88)	0.0023 (167, 2)	0.0011 (257, 0)
1006	0.0033 (15, 58)	0.0032 (195, 32)	0.0011 (105, 0)
1016	0.0032 (30, 89)	0.0016 (201, 1)	0.0012 (291, 0)
1017	0.0031 (177, 90)	0.0014 (6, 0)	0.0011 (276, 0)
1100	0.0051 (36, 87)	0.0026 (218, 3)	0.0019 (128, 0)
1111	0.0028 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
1200	0.0051 (38, 87)	0.0025 (227, 3)	0.0018 (137, 0)
13	0.0028 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
1403	0.0066 (39, 88)	0.0042 (254, 2)	0.0022 (164, 1)
1412	0.0056 (44, 87)	0.0029 (164, 1)	0.0024 (254, 2)
1418	0.0055 (32, 87)	0.0029 (197, 3)	0.0021 (287, 1)
16	0.0028 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
16_26	0.0029 (26, 89)	0.0015 (199, 1)	0.0010 (289, 0)
16_C	0.0041 (33, 90)	0.0017 (200, 0)	0.0013 (290, 0)
16_P	0.0028 (32, 89)	0.0015 (200, 1)	0.0012 (290, 0)
17	0.0027 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
170	0.0027 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
17_25	0.0036 (175, 90)	0.0015 (3, 0)	0.0012 (273, 0)
17_26	0.0030 (159, 90)	0.0014 (4, 0)	0.0011 (274, 0)
17_P	0.0027 (153, 90)	0.0014 (4, 0)	0.0010 (274, 0)
1_25	0.0032 (43, 89)	0.0018 (218, 1)	0.0012 (308, 0)
1_26	0.0030 (38, 89)	0.0018 (220, 1)	0.0011 (130, 0)
1_P	0.0028 (43, 88)	0.0017 (219, 2)	0.0011 (309, 0)
2	0.0028 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
20	0.0028 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
200	0.0048 (38, 87)	0.0025 (225, 3)	0.0018 (135, 0)
2000	0.0043 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
200_P	0.0043 (39, 86)	0.0025 (225, 4)	0.0019 (135, 0)
210	0.0049 (38, 87)	0.0025 (223, 3)	0.0019 (133, 0)
2100	0.0051 (35, 87)	0.0026 (217, 3)	0.0019 (127, 0)
220	0.0050 (38, 87)	0.0025 (223, 3)	0.0019 (133, 0)
2200	0.0052 (38, 87)	0.0025 (227, 3)	0.0018 (137, 0)
2403	0.0073 (33, 88)	0.0043 (254, 1)	0.0023 (164, 1)
2412	0.0056 (44, 87)	0.0029 (164, 1)	0.0024 (254, 2)
2418	0.0055 (33, 87)	0.0029 (196, 2)	0.0021 (286, 1)
2_26	0.0033 (70, 88)	0.0026 (255, 2)	0.0015 (165, 0)
2_P	0.0028 (75, 79)	0.0026 (256, 11)	0.0014 (166, 0)
3	0.0043 (33, 87)	0.0020 (213, 3)	0.0017 (123, 0)
30	0.0027 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
3001	0.0030 (41, 89)	0.0017 (220, 1)	0.0012 (310, 0)
3002	0.0031 (73, 87)	0.0026 (257, 3)	0.0015 (167, 0)
3003	0.0032 (76, 89)	0.0016 (281, 1)	0.0013 (191, 0)
3004	0.0030 (310, 90)	0.0011 (182, 0)	0.0006 (92, 0)
3005	0.0032 (349, 88)	0.0023 (168, 2)	0.0011 (258, 0)
3006	0.0033 (15, 35)	0.0032 (195, 55)	0.0011 (105, 0)
3016	0.0031 (28, 89)	0.0015 (201, 1)	0.0012 (291, 0)
3017	0.0031 (168, 90)	0.0014 (5, 0)	0.0011 (275, 0)
3GPS	0.0043 (32, 87)	0.0020 (213, 3)	0.0017 (123, 0)
3_25	0.0036 (82, 89)	0.0017 (281, 1)	0.0014 (191, 0)
3_26	0.0031 (77, 89)	0.0016 (280, 1)	0.0013 (190, 0)
3_P	0.0028 (80, 89)	0.0016 (280, 1)	0.0013 (190, 0)
4	0.0027 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
40	0.0027 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
403	0.0063 (42, 87)	0.0042 (254, 2)	0.0022 (164, 2)
403_P	0.0068 (40, 88)	0.0042 (254, 2)	0.0022 (164, 1)
412	0.0050 (44, 87)	0.0028 (166, 2)	0.0023 (256, 3)
4120	0.0044 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
412_P	0.0044 (43, 86)	0.0028 (168, 2)	0.0023 (258, 3)
412_T	0.0044 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
418	0.0049 (33, 86)	0.0028 (197, 3)	0.0021 (287, 1)
4180	0.0044 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
418_P	0.0044 (34, 85)	0.0028 (198, 5)	0.0021 (288, 1)

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=====
3D Station Confidence Regions (95.000 percent):
STATION          MAJ-SEMI (AZ,VANG)      MED-SEMI (AZ,VANG)      MIN-SEMI (AZ,VANG)
-----
418_T            0.0044 ( 0, 90)        0.0000 ( 90, 0)        0.0000 ( 0, 0)
444              0.0043 ( 0, 90)        0.0000 ( 90, 0)        0.0000 ( 0, 0)
4_25            0.0034 (310, 90)        0.0012 (183, 0)        0.0009 ( 93, 0)
4_26            0.0031 (282, 90)        0.0011 (189, 0)        0.0008 ( 99, 0)
4_P             0.0027 (310, 90)        0.0011 (184, 0)        0.0006 ( 94, 0)
5               0.0028 ( 0, 90)        0.0000 ( 90, 0)        0.0000 ( 0, 0)
50              0.0027 ( 0, 90)        0.0000 ( 90, 0)        0.0000 ( 0, 0)
555             0.0043 ( 0, 90)        0.0000 ( 90, 0)        0.0000 ( 0, 0)
5_25            0.0038 (353, 89)        0.0023 (168, 1)        0.0012 (258, 0)
5_26            0.0036 (340, 89)        0.0023 (168, 1)        0.0011 ( 78, 0)
5_P             0.0028 (352, 87)        0.0022 (168, 3)        0.0010 (258, 0)
60              0.0027 ( 0, 90)        0.0000 ( 90, 0)        0.0000 ( 0, 0)
666             0.0043 ( 0, 90)        0.0000 ( 90, 0)        0.0000 ( 0, 0)
6_25            0.0037 ( 16, 84)        0.0033 (195, 6)        0.0012 (285, 0)
6_26            0.0033 ( 15, 39)        0.0032 (195, 51)       0.0011 (105, 0)
6_P             0.0032 ( 15, 5)         0.0028 (193, 85)       0.0011 (285, 0)
7232            0.0036 ( 20, 6)         0.0034 (200, 84)       0.0021 (290, 0)
7501            0.0028 ( 32, 89)        0.0017 (200, 1)        0.0013 (290, 0)
7501_Temp       0.0028 ( 0, 90)        0.0000 ( 90, 0)        0.0000 ( 0, 0)
777             0.0027 ( 0, 90)        0.0000 ( 90, 0)        0.0000 ( 0, 0)
8               0.0027 ( 75, 90)        0.0003 (200, 0)        0.0003 (290, 0)
88              0.0027 ( 0, 90)        0.0000 ( 90, 0)        0.0000 ( 0, 0)
8GPS            0.0003 (162, 89)        0.0003 (340, 1)        0.0003 ( 70, 0)
DORIS           0.0052 ( 38, 87)        0.0029 (223, 3)        0.0024 (133, 0)
TC2002          0.0049 ( 53, 86)        0.0036 (265, 4)        0.0022 (175, 2)
TDA5005         0.0049 ( 24, 85)        0.0037 (188, 5)        0.0021 (278, 1)
V100            0.0027 ( 0, 90)        0.0000 ( 90, 0)        0.0000 ( 0, 0)

```

And for the main interesting points :

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2-D and 1-D Relative Station Confidence Regions (95.000 and 95.000 percent):
FROM      TO          MAJ-SEMI  AZ  MIN-SEMI  VERTICAL   DISTANCE   PPM
-----
3GPS      7232         0.0033   25  0.0022    0.0034    2216.4529   1.51
3GPS      7501         0.0020   41  0.0017    0.0031    2139.0122   0.93
3GPS      8GPS         0.0018   33  0.0015    0.0030    2065.8274   0.85
3GPS      DORIS        0.0024   54  0.0015    0.0021     24.8784   95.41
7232      7501         0.0029   21  0.0019    0.0016     78.9820   36.60
7232      8GPS         0.0032   20  0.0018    0.0024    163.7945   19.33
7232      DORIS        0.0037   28  0.0027    0.0040    2239.6707   1.67
7501      8GPS         0.0014   20  0.0011    0.0020     92.1872   15.46
7501      DORIS        0.0027   46  0.0023    0.0037    2162.2551   1.24
8GPS      DORIS        0.0026   42  0.0021    0.0036    2089.2980   1.22

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Tue Jun 14 18:50:07 2005

5.15. Global results covariance matrix of selected points

*
 * Extracted coordinates follow: (extracted on Tue Jun 14 18:50:50 2005)
 * Source (GeoLab adjustment): GLOBAL
 * Variance factor of adjustment = 1.093986
 * Variance factor used in computing covariance matrix = 1.093986
 * Number of degrees of freedom of adjustment = 414
 * Number of stations in adjusted network = 95
 * Number of stations extracted = 5
 *

3DC						
XYZ	HRAO	30302M004	5085352.4810	2668395.8000	-2768731.5720 m	0
XYZ	7232	30302S001	5085442.7806	2668263.6119	-2768696.9178 m	0
XYZ	7501	30302M003	5085401.1063	2668330.2082	-2768688.7728 m	0
XYZ	HARB	30302M009	5084657.6352	2670325.0847	-2768481.1863 m	0
XYZ	HBKB	30302S006	5084653.3091	2670347.3000	-2768470.8569 m	0
COV CT UPPR						
ELEM	1.	09398571476026e-08	-1.46564146277018e-20	-2.59907244930647e-20		
ELEM	1.	09398895206428e-08	3.03130406540931e-13	5.07640930380756e-14		
ELEM	1.	0939852268837e-08	-7.15694164636988e-14	-5.52676463713544e-15		
ELEM	1.	09398554428398e-08	-3.25915536607562e-12	-2.14978968409558e-12		
ELEM	1.	09398404149864e-08	-3.28924549917124e-12	-2.18069933916461e-12		
ELEM	1.	09398571475564e-08	-3.08444329555057e-20	-1.00305683560651e-13		
ELEM	1.	09398520078023e-08	-9.62988984831045e-14	1.7126979564169e-13		
ELEM	1.	09398536037849e-08	-8.24460174520677e-15	3.35237633255179e-12		
ELEM	1.	09398480986886e-08	2.52492224942681e-13	3.35862877174233e-12		
ELEM	1.	09398456579836e-08	2.65437217253029e-13			
ELEM	1.	09398571475625e-08	-2.46983890155726e-14	-1.15030136028602e-15		
ELEM	1.	09398356889496e-08	7.90000476476672e-17	-3.71725848879278e-14		
ELEM	1.	09398615424164e-08	2.14709202090656e-12	-2.95649890987759e-13		
ELEM	1.	09398549150861e-08	2.15225351751444e-12	-3.04189270690506e-13		
ELEM	1.	09398650666477e-08				
ELEM	1.	54753218779046e-06	-6.76579979313996e-08	7.51037711057446e-08		
ELEM	8.	30357615001354e-07	-3.16741742428554e-08	-2.31824125805338e-07		
ELEM	3.	72909057083159e-07	-3.05661063970334e-08	-9.60325466607589e-08		
ELEM	3.	80411847595698e-07	-2.33950575183024e-08	-8.13771418131889e-08		
ELEM	5.	63845408263824e-07	-1.35201690443131e-07	-2.09354296224955e-09		
ELEM	8.	56728920563591e-08	-7.9275355922781e-09	-1.97153049433206e-08		
ELEM	5.	8497676046597e-08	-2.84976751862962e-08	-2.16273094300236e-08		
ELEM	5.	78665653952255e-08	-3.24861247028581e-08			
ELEM	1.	61726235872143e-06	-2.38916362487429e-07	-6.09421387687561e-08		
ELEM	4.	19982587550839e-07	-9.95301412694271e-08	-4.0326608261306e-08		
ELEM	2.	06588209816441e-07	-8.3147652749628e-08	-2.38706889388852e-08		
ELEM	2.	40861247771744e-07				
ELEM	8.	91451246411988e-07	-5.76900946161348e-09	-2.51941507754961e-07		
ELEM	3.	60626813407761e-07	-2.33652331332828e-08	-1.16377684693299e-07		
ELEM	3.	65249256772836e-07	-1.8974278902119e-08	-1.07670380481543e-07		
ELEM	2.	2266280600872e-07	-1.51191813051005e-08	-5.55309198164315e-09		
ELEM	4.	10752768318487e-08	-1.99593390621438e-09	-4.30048609417063e-09		
ELEM	4.	3147297435027e-08	5.65693531912891e-10			
ELEM	4.	6416039944145e-07	-1.20479725372802e-07	-2.55227889777356e-08		
ELEM	1.	62468675956368e-07	-1.10050280001286e-07	-1.48199384025393e-08		
ELEM	1.	84433021012971e-07				
ELEM	2.	07182162500875e-06	1.29046539177499e-08	-6.54614607480349e-07		
ELEM	2.	05037473819125e-06	-7.38904869701771e-09	-6.90456026246491e-07		
ELEM	3.	77491585411528e-07	8.06140076144754e-09	-1.99601595896551e-08		
ELEM	3.	23257662361718e-07	-5.9637534100837e-08			
ELEM	7.	94792093205593e-07	-7.11289431967343e-07	-6.03365114772172e-08		
ELEM	6.	73996078293844e-07				
ELEM	3.	09484561264424e-06	5.69661330362904e-08	-8.61221600544298e-07		
ELEM	7.	61194690876116e-07	7.19277874330001e-08			
ELEM	1.	43860052113185e-06				

*
 * End of extracted coordinates

5.16. IGS/NGS elevation-dependent phase center models

TRIMBLE	TRM29659.00	(0)	96/06/30
0.0	0.0	110.0	
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
0.0	0.0	128.0	
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
ASHTECH	AOAD/M_T	(0)	96/06/30
0.0	0.0	110.0	
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
0.0	0.0	128.0	
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0
LEICA	LEIAT504	(2)	99/02/05
.3	-.3	109.3	
.0 .0	-.1 -.1	.0 .0	.1 .1 .1
.1 .2	.2 .3	.4 .5 .6	.0 .0
1.1	1.1	128.2	
.0 -.1	-.1 -.1	.0 .0	.0 .0 -.1
-.2 -.2	-.3 -.3	-.2 -.1	.3 .0 .0

5.17. SINEX file : 30302_IGN_2003-214.SNX

```

%=SNX 1.00 IGN 05:166:00000 IGN 03:214:00000 03:214:00000 C 00015
*-----
+FILE/COMMENT
* File created by geotosnx software (Z.Altamimi)
* Original input file: 30302.cov
* Matrix Scalling Factor used:          1.0000000000
-FILE/COMMENT
*-----
+SITE/ID
*CODE PT __DOMES__ T _STATION DESCRIPTION_ APPROX_LON_ APPROX_LAT_ _APP_H_
HRAO A 30302M004 30302M004 27 41 13.1 -25 53 24.3 1414.2
7232 A 30302S001 30302S001 27 41 07.4 -25 53 23.1 1415.7
7501 A 30302M003 30302M003 27 41 10.2 -25 53 22.9 1406.8
HARB A 30302M009 30302M009 27 42 26.0 -25 53 13.0 1558.1
HBKB A 30302S006 30302S006 27 42 26.8 -25 53 12.6 1559.4
-SITE/ID
*-----
+SOLUTION/EPOCHS
*Code PT SOLN T Data_start__ Data_end_____ Mean_epoch__
-SOLUTION/EPOCHS
*-----
+SOLUTION/ESTIMATE
*INDEX TYPE__ CODE PT SOLN _REF_EPOCH_ UNIT S _ESTIMATED VALUE_ _STD_DEV_
  1 STAX HRAO A 1 03:214:00000 m 2 0.508535248100000E+07 0.10459E-03
  2 STAY HRAO A 1 03:214:00000 m 2 0.266839580000000E+07 0.10459E-03
  3 STAZ HRAO A 1 03:214:00000 m 2 -.276873157200000E+07 0.10459E-03
  4 STAX 7232 A 1 03:214:00000 m 2 0.508544278060000E+07 0.12440E-02
  5 STAY 7232 A 1 03:214:00000 m 2 0.266826361190000E+07 0.75090E-03
  6 STAZ 7232 A 1 03:214:00000 m 2 -.276869691780000E+07 0.12717E-02
  7 STAX 7501 A 1 03:214:00000 m 2 0.508540110630000E+07 0.94417E-03
  8 STAY 7501 A 1 03:214:00000 m 2 0.266833020820000E+07 0.47187E-03
  9 STAZ 7501 A 1 03:214:00000 m 2 -.276868877280000E+07 0.68129E-03
 10 STAX HARB A 1 03:214:00000 m 2 0.508465763520000E+07 0.14394E-02
 11 STAY HARB A 1 03:214:00000 m 2 0.267032508470000E+07 0.61440E-03
 12 STAZ HARB A 1 03:214:00000 m 2 -.276848118630000E+07 0.89151E-03
 13 STAX HBKB A 1 03:214:00000 m 2 0.508465330910000E+07 0.17592E-02
 14 STAY HBKB A 1 03:214:00000 m 2 0.267034730000000E+07 0.87246E-03
 15 STAZ HBKB A 1 03:214:00000 m 2 -.276847085690000E+07 0.11994E-02
-SOLUTION/ESTIMATE
*-----
+SOLUTION/MATRIX_ESTIMATE L COVA
*PARA1 PARA2 _PARA2+0_ _PARA2+1_ _PARA2+2_
  1 1 0.109398571476026E-07
  2 1 -.146564146277018E-19 0.109398571475564E-07
  3 1 -.259907244930647E-19 -.308444329555057E-19 0.109398571475625E-07
  4 1 0.109398895206428E-07 -.100305683560651E-12 -.246983890155726E-13
  4 4 0.154753218779046E-05
  5 1 0.303130406540931E-12 0.109398520078023E-07 -.115030136028602E-14
  5 4 -.676579979313996E-07 0.563845408263824E-06
  6 1 0.507640930380756E-13 -.962988984831045E-13 0.109398356889496E-07
  6 4 0.751037711057446E-07 -.135201690443131E-06 0.161726235872143E-05
  7 1 0.109398522688370E-07 0.171269795641690E-12 0.790000476476672E-16
  7 4 0.830357615001354E-06 -.209354296224955E-08 -.238916362487429E-06
  7 7 0.891451246411988E-06
  8 1 -.715694164636988E-13 0.109398536037849E-07 -.371725848879278E-13
  8 4 -.316741742428554E-07 0.856728920563591E-07 -.609421387687561E-07
  8 7 -.576900946161348E-08 0.222662806008720E-06

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9      1 -.552676463713544E-14 -.824460174520677E-14 0.109398615424164E-07
9      4 -.231824125805338E-06 -.792753559227810E-08 0.419982587550839E-06
9      7 -.251941507754961E-06 -.151191813051005E-07 0.464160399441450E-06
10     1 0.109398554428398E-07 0.335237633255179E-11 0.214709202090656E-11
10     4 0.372909057083159E-06 -.197153049433206E-07 -.995301412694271E-07
10     7 0.360626813407761E-06 -.555309198164315E-08 -.120479725372802E-06
10    10 0.207182162500875E-05
11     1 -.325915536607562E-11 0.109398480986886E-07 -.295649890987759E-12
11     4 -.305661063970334E-07 0.584976760465970E-07 -.403266082613060E-07
11     7 -.233652331332828E-07 0.410752768318487E-07 -.255227889777356E-07
11    10 0.129046539177499E-07 0.377491585411528E-06
12     1 -.214978968409558E-11 0.252492224942681E-12 0.109398549150861E-07
12     4 -.960325466607589E-07 -.284976751862962E-07 0.206588209816441E-06
12     7 -.116377684693299E-06 -.199593390621438E-08 0.162468675956368E-06
12    10 -.654614607480349E-06 0.806140076144754E-08 0.794792093205593E-06
13     1 0.109398404149864E-07 0.335862877174233E-11 0.215225351751444E-11
13     4 0.380411847595698E-06 -.216273094300236E-07 -.831476527496280E-07
13     7 0.365249256772836E-06 -.430048609417063E-08 -.110050280001286E-06
13    10 0.205037473819125E-05 -.199601595896551E-07 -.711289431967343E-06
13    13 0.309484561264424E-05
14     1 -.328924549917124E-11 0.109398456579836E-07 -.304189270690506E-12
14     4 -.233950575183024E-07 0.578665653952255E-07 -.238706889388852E-07
14     7 -.189742789021190E-07 0.431472974350270E-07 -.148199384025393E-07
14    10 -.738904869701771E-08 0.323257662361718E-06 -.603365114772172E-07
14    13 0.569661330362904E-07 0.761194690876116E-06
15     1 -.218069933916461E-11 0.265437217253029E-12 0.109398650666477E-07
15     4 -.813771418131889E-07 -.324861247028581E-07 0.240861247771744E-06
15     7 -.107670380481543E-06 0.565693531912891E-09 0.184433021012971E-06
15    10 -.690456026246491E-06 -.596375341008370E-07 0.673996078293844E-06
15    13 -.861221600544298E-06 0.719277874330001E-07 0.143860052113185E-05

```

-SOLUTION/MATRIX_ESTIMATE L COVA
 %ENDSNX