



SHESHAN CO-LOCATION SURVEY



Report and results

Surveyed on November 2003
Reported on December 2005

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Introduction

The ITRF is the result of a combination of the different terrestrial reference frames provided by the four space geodetic techniques GPS, VLBI, SLR and DORIS. To perform this combination between independant reference frames, it is necessary to get some co-location sites where the various techniques are observing and whose ties 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 are installed or replaced on these sites. Then, the ties with the existent techniques on the site have to be determined.

In this frame, it has been decided as one of the top priorities to survey the Sheshan co-location site (China). Some of the ties at Sheshan were missing (VLBI and SLR with GPS), and the one between the VLBI and SLR points was inconsistent.

This document presents the results of the Sheshan local ties survey with as many details as necessary about the observations and the computations to fully understand the content of the resulting SINEX file.

Acknowledgements

We would like to express our special thanks to Professor YANG Fumin and Dr. LI Jingling and all their colleagues and students from the Shanghai Astronomic Observatory (SHAO), not only for their very cooperative work in a technical and administrative point of view, but also for the “extras” which made us really enjoy our stay in Shanghai and made this work a success.

We would also like to express our thanks to all the people working at the Sheshan VLBI station and at the Laser station for their very warmful welcome and useful help which also contributed to the success of this work.

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1. Co-location site description

The Sheshan ITRF site is located in Sheshan area, about 30 km southwest of Shanghai. Sheshan station is the observational base of Shanghai Astronomical Observatory (SHAO), Chinese Academy of Sciences (CAS), where there are the main following equipments :

- Very Long Baseline Interferometry (VLBI) station, with a 25 m radio telescope with a set of hydrogen masers.
- Third-generation Satellite Laser Ranging (SLR) station, with a 60 cm telescope.
- Global Positioning System (GPS) station.

Sheshan co-location site can be divided into two main sub-sites :

On one site, one can find the 25 m VLBI radiotelescope and the IGS GPS station (SHAO).

The second one is the running SLR station site. It should be moved to another site within the next months or year, about 500 m further on the other site of the small hill.

A local control network was set up from which the instruments were observed and tied together with terrestrial and GPS observations, including the future SLR station site.

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1.1. ITRF space geodetic techniques

1.1.1. SHAO IGS GPS station



Global view of the antenna with the dome (JPLA model)



The GPS receiver and the PC

DOMES number : 21605M002
<p>A photograph of the SHAO reference point, which is a concrete pillar with a metal mark on top. The antenna dome is removed. A dashed line with an arrow points to the mark. The background shows a landscape with hills.</p>
<i>SHAO mark and antenna without its dome</i>
<p>The station reference point is a mark distinct from the antenna one. (cf annexes 5.1 and 5.2).</p>

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1.1.2. SLR station

DOMES number : 21605S001



Current location : building hosting the SLR telescope



Global view of the telescope

The SLR System Reference Point (SRP) is the point in the telescope optics where the two rotation axes intersect(cf annexe 5.3.). This reference point can not be materialized.

On the new SLR site, a survey point has been tied by GPS observations and included in the survey network. It is located on the terrace roof of the building which will host the new SLR station. The point is materialized by a screw used as forced centring. The reference height is the top of this screw.

DOMES number : 21605M101



Future location : global view of the site



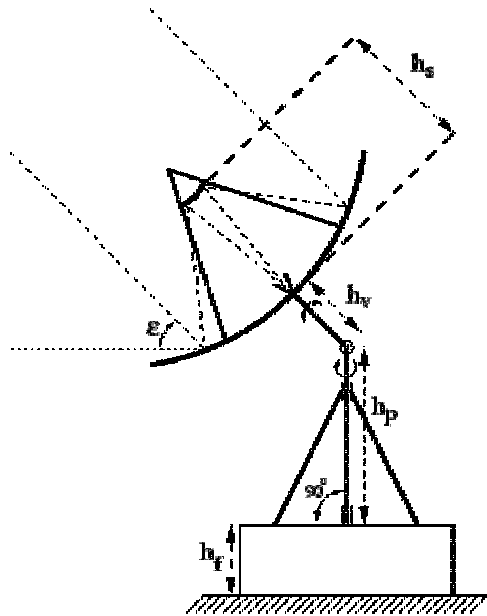
Reference point

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1.1.3. VLBI station

The Sheshan 25-m radio telescope is an alt-az antenna run by SHAO. It has been in operation since 1987, and it is one of the five main facilities of the Chinese National Astronomical Observatory. The station is a member of the European VLBI Network (EVN), the International VLBI Service for Geodesy and Astrometry (IVS), and the Asia Pacific Telescope.

DOMES number : 21605S009



Global view of the VLBI antenna

The measurement data is received at the phase centre of the receiver feed horn. The VLBI reference point is generally described as the point where the two rotation axes intersect.

Levelling benchmarks fixed on the VLBI platform base have been tied to the survey control network to realize a stability control system.

1.2. Other points of interest

1.2.1. EGNOS GPS station

The antenna is set up on a metallic support on top of a concrete pier. The EGNOS reference point is located at the top and centre of the metallic support.

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Choke Ring antenna of EGNOS GPS station



Reference point

1.2.2. Survey control points and temporary stations

A survey network was set up, from which the instruments were observed and tied together with GPS and conventional observations. Some points with well identified markers should be used and included in future surveys.

- VLBI station : 4 points (1, 2, 4 and 5) equipped with self-centring devices and one domed brass mark (7) surrounding the space geodetic instruments.
(cf Annexe 5.7.)
- current SLR site : 1 domed brass mark in a corner of the roof terrace.
- new SLR site : 1 concrete pillar with self-centring device on the edge of the SLR terrace roof. This point should be used as a reference and included in a local network to intersect the future new telescope position.

Some temporary points have also been set up and included in the survey network :

- 3 heavy tripods on the VLBI building roof, on the cable car building and on the current SLR station roof terrace
- a metallic pillar on a building roof near the VLBI building

They were all equipped with forced-centring devices. The heights (tacheometres, trefoils, prisms, even GPS antenna) refer to the top and the centre of these centring devices.

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2. Survey description

2.1. Organization

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

- Shanghai Astronomical Observatory (SHAO)
- Tongji University of Shanghai
- NASA Goddard Space Flight Center (GSFC)
- Institut Géographique National (IGN)

The survey team gathered 4 members ; Jim Long, coming from NASA/GSFC, who has experience in numerous local ties surveys ; Valérie Michel and Stéphane Kaloustian from the Special Works unit of IGN, which mainly deals with micro-geodesy and metrology ; Bruno Garayt from the IGN geodetic research laboratory.

Dr. Jinling Li, Head of the Shanghai Observatory VLBI group from the Shanghai Astronomic Observatory (SHAO) and two students from the Tongji University of Shanghai and the Shanghai astronomic Observatory gave us their support during the survey.

Also, this project took many benefits of support from the VLBI and SLR stations staff and facilities.



VLBI antenna operator

The survey took place from November the 22nd to December, the 3rd 2003. The meteorological conditions were stable during the survey (clouds with some rain). 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 conventional topometric survey instruments and equipments belong to IGN or NASA and had been temporarily imported for the needs of the survey. Some GPS equipments have been lent by the Tongji University.

2.2.1. Instruments

Leica total stations (TC2002, TDA5005 and T3000) 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. 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 0.01mm.

For the GPS observations, Leica SR530 receivers with Leica AT504 choke ring antennas and Ashtech UZ-12 receiver with Ashtech ASH701945-02 rev C choke ring antenna 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 been also brought for this type of fieldworks. These accessories included such items as :

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



Platform with translation stage on vertical axis

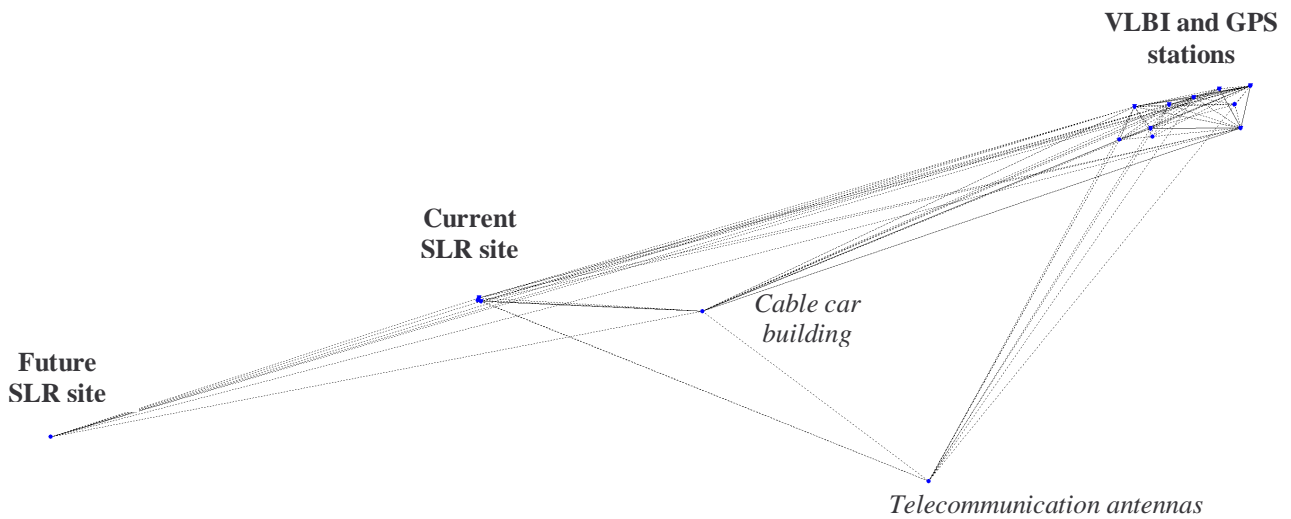
- § 0.5m, 1.8m and 3.0m long Invar levelling rods that are all calibrated and associated to each other;
- § calibrated trefoils targets, prisms;
- § trivet plates and tribachs regularly calibrated.

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2.3. Survey network and geodetic instruments observations

2.3.1. Strategy

All the survey was conducted in order to provide the highest accuracy in the determination of the 3D vectors between the observing instruments. This survey encountered many difficulties so that the strategy has been to mix GPS and topometric observations.



The survey network

The main difficulties were :

- the 2 subsites and the future SLR site are not directly visible from each other :
 - the VLBI site and running SLR one are separated by a hill
 - the 2 SLR sites (the running one and the new one) are on 2 different sides of another hill
- the SLR and VLBI reference points are not materialized and can not be observed directly.
- the SLR is installed at the top of a 2 stage building, in a narrow place with some surrounding trees.

Therefore, it has been decided to :

- set up one temporary station on a cable car building roof at the top of the hill between the VLBI and current SLR sites. From this point, the 2 subsites could have been tied with GPS and conventional observations.
- tie the future SLR site to the 2 other subsites with GPS observations with long sessions (many days).

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- establish a ground network polygon on the VLBI sites. It has been observed by high precision topometry in order to ensure the best accuracy in the link between the IGS permanent station and the VLBI one, including the 4 reference points, the 2 temporary ones and the brass mark.
- set up 2 points observed by GPS and conventional observations on the SLR terrace to intersect and level the telescope.
- use the telecommunication antennas as orientation.

2.3.2. Observations

2.3.2.1. Survey network principles

All the visible lines of sights have been observed with the tacheometres described in 2.2.1 (the survey network is presented in 2.3.1).

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.

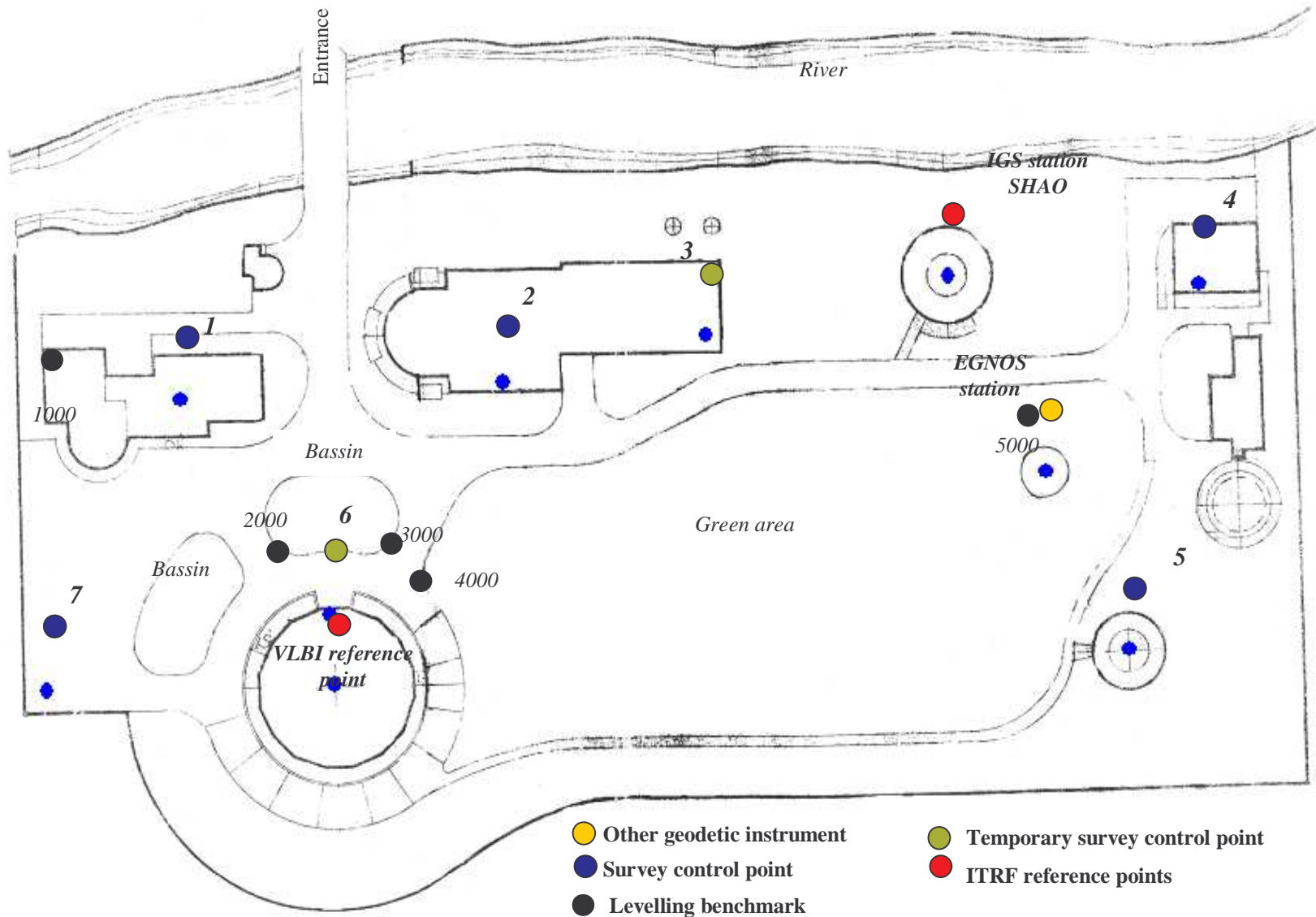
On each point, two different total stations were set up and two different operators observed, in order to avoid any systematic effect. Heights and levelling were controlled before and after each set up.

So as to tie the current SLR site and the VLBI one with conventional observations, some communications antennas outside the VLBI station and also visible from the cable car station have been intersected.

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 mm n, where n is the number of traverse legs, a third run was completed.

The survey points 1, 2, 4, 5 and 7 were included in the direct levelling network as well as a levelling benchmark at the bottom of the EGNOS concrete pier (5000), 3 ones on the VLBI buiding (2000, 3000, 4000) and one on the southwest corner of the residence building (1000).

The VLBI station survey points



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2.3.2.2. SLR System Reference Point (SRP)

The reference point has been determined in two successive steps : the first one to materialize its horizontal position, the second one to measure the vertical eccentricity between the reference point and a horizontal plane defined on top of the tribrach placed on the translation stage.

In a first step, the SLR vertical rotation axis was determined. It has been materialized by setting up a platform on its top. The centre of the platform should be invariant by any telescope horizontal rotation.

The platform is actually a translation stage. Once the telescope points at a zenith angle of 90° , a target on the translation stage was sighted from one total station set up on a tripod 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 of the two directions. The same thing was done with the SLR telescope oriented at a direction of 90° from the original position. This operation was repeated until the target doesn't move anymore when sighted with the total station, regardless the direction the SLR is pointing. The platform is therefore on the vertical rotation axis.

A virtual horizontal rotation axis piercing point was graphically marked on a paper stuck onto the tube. Then, the offset from the platform on the top of the SLR to the intersection point has to be determined.

It is the result of the two following values :

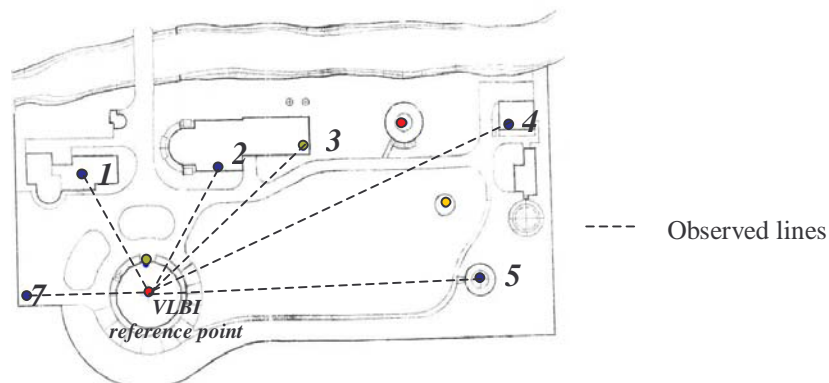
- Height difference between the top of the trybrach on the translation stage on the vertical axis, and the top of the horizontal axis by direct levelling.
- Distance from the top of the horizontal axis to the centre with a calliper gauge.

Annexe 5.3. shows some pictures.

2.3.2.3. VLBI reference point

VLBI reference point is defined by the intersection of the two rotation axes if they do intersect (Sheshan case) ; if not, by the orthogonal projection of the secondary axis on the primary axis.

Therefore, the determination of the VLBI reference point leads to the determination of the two axes. The general method to determine an axis is to observe a target installed on the antenna from the different points of the topometric network while the antenna is rotating around this axis.



The survey network for the VLBI reference point determination



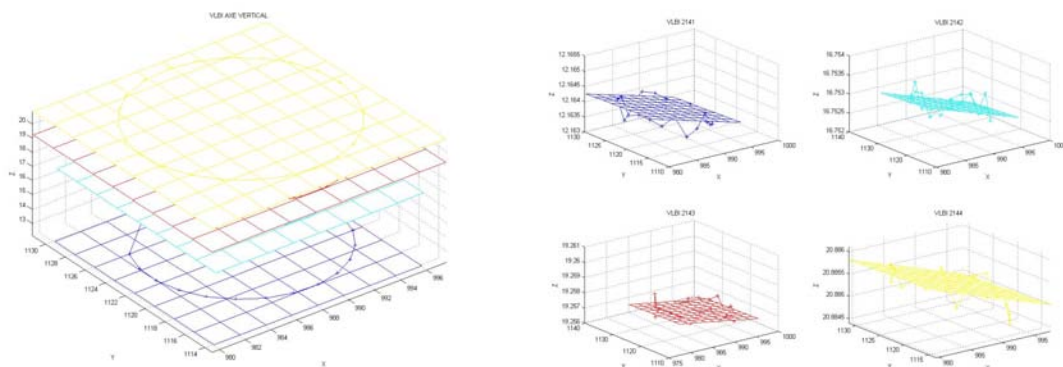
Target placed on the VLBI antenna structure

The vertical Axis

The vertical axis has been determined by observing 4 targets installed on the part of the antenna linked to this axis at different heights. Each target describes a circle, inscribed in a plane orthogonal to the vertical axis.

The antenna described the whole horizontal circle by 15° step. In this way, 24 positions have been determined for each horizontal circle.

The measurements took place on November 2003, the 26th between 8:30 am and 2:00 pm. At least three instruments could sight the target in an optimized geometry to perform each intersection. Consequently, the tacheometers had to be moved from one of the seven points of the polygon to another.



The 4 observed plans and circles and their residuals.

The horizontal axis

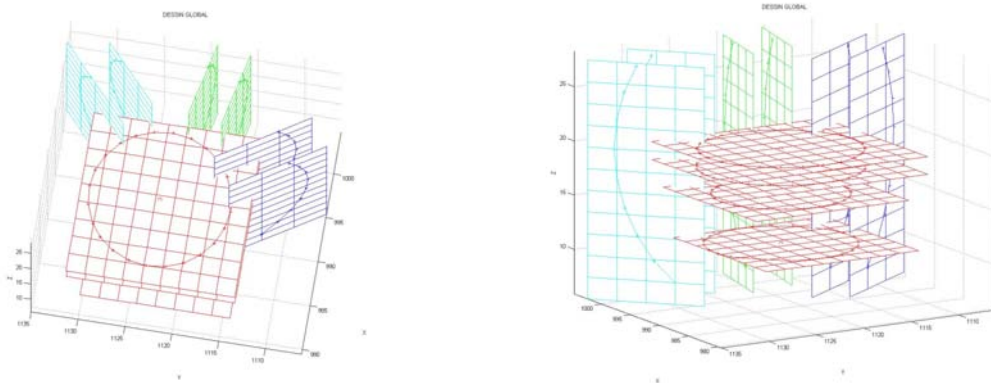
The horizontal axis has been observed through two targets set up on the antenna part linked to the secondary axis. The target could only describe an arc of the vertical circle and nine positions have been recorded with 10° steps. In order to fulfill the lack of redundancy and the shortness of the arcs of circle, it has been decided to operate three times the same observation in three different orientations around the vertical axis.

The measurement took place on November 2003, the 27th between 01:00 pm and 05:00 pm. The same strategy of observation has been used.

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The precision of the 3x2x9 points goes from 0.2 mm to 0.3 mm thanks to a good geometry of the observation figure.

Each target describes an arc of a circle, inscribed in a plane orthogonal to the horizontal axis oriented toward one specific direction. Independent adjustments let check the parallelism of the 2 planes described by the both targets in a given orientation so that the horizontality of this secondary axis. These results led to the adjustment with constraint and the horizontality of this secondary axis has then be determined. The 3 different orientations give 3 different horizontal axis what let the horizontality be controlled.



Views of the circles or arcs of circles described by the different targets when rotating the antenna

2.3.2.4. GPS antenna intersections

For the SHAO and EGNOS GPS antennas, the same procedure has been followed since the antennas could not be removed : the reference point had to be determined indirectly.

As far as the planimetric position is concerned, from each station pointing at the antennas, both right side and left side of an element theoretically centered on the phase center of the antenna have been observed. This element has been chosen so that it is well defined for the operator : the choke ring antennas elements. In the adjustment, the mean direction of two observations from a same station, was used to process the planimetric position.

Then, as far as the altimetric position is concerned, the zenithal angles have been measured on a well defined element of the antenna. Then, the resulting position have been reduced to the reference point using the manufacture values.

The SHAO antenna height was measured on three different points on the choke ring antenna. It differs by less than 1mm from the value provided by the sitelog and used for the GPS observations.

2.3.2.5. GPS observations

In order to tie the 3 sub-sites and the IGS SHAO station, GPS observations have been conducted during many sessions.

The SHAO IGS station dome has been removed during all the conventional survey so as to facilitate the observations. But to tie the station to the survey network and the other instruments, only the GPS observations with the dome have been used to be consistent with the IGS solution.

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The GPS observations for the piers and the temporary stations were carried out during the survey with the following specifications :

- § Cut-off angle 10°
- § Data recording rate 30 s

A table suming up the GPS observations is presented in annexe 5.6.

3. Computations

3.1. On-site validation

3.1.1. Survey control networks

It has been pre-processed on site in order to point out any problems consequently to the 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 outliers have been detected and the precision has been estimated in order to check if the requirements of such a survey were achieved.

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 network has been also validated on site by adjustments between 2 successive benchmarks, and finally by a global adjustment.

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 the BERNESE software version 4.2.

The antenna excentricity from the SHAO sitelog was used to get the station reference point position.

The main features of the adopted processing strategy are presented in the followig 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 5.15) • Solid Earth tides applied (IERS Conventions 96) • Orbits and ERPs : IGS final products
Processing parameters	<ul style="list-style-type: none"> • Elevation dependant weighting • Elevation cutoff angle : 10 degrees • Troposphere model : Saastamoinen

Estimated parameters :	<ul style="list-style-type: none"> • Adjustment : Weighted least-squares algorithms • Ambiguity resolution : SIGMA strategy • Solved ambiguities introduced to daily solutions • Daily final solutions : L1 only • Constrained solutions (no stations fixed) • No troposphere zenith delays estimation
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Daily solutions were produced and correlations correctly modelled. The corresponding NEQs were combined using ADDNEQ program providing a full covariance matrix given in annexe 5.10.

COMPARISON OF STATION COORDINATES WITH RESPECT TO THE COMBINED SOLUTION IN MM
- UNWEIGHTED RMS OF INDIVIDUAL COORDINATE RESIDUALS

TOTAL NUMBER OF STATIONS: 8

NUM	STATION	#FIL	C	RMS	1	2	3	4	5	6	7	8
5	30	7	N	1.0	-.6	.1	.3	-.4	-2.3	-.6	.4	
	Current SLR station	E		1.0	-.3	-1.0	-.5	2.0	-.1	.7	-.2	
	Survey point 30	U		1.7	.0	.4	.6	.7	-2.3	2.6	-2.2	
4	40	8	N	1.3	-.3	.3	.2	-.6	-2.6	-.6	.9	1.8
	New Laser site	E		1.0	-.5	-1.2	-.5	2.0	.0	.7	-.2	1.0
	Survey point 40	U		2.5	-.4	-1.1	-.3	1.7	-2.3	3.1	.3	4.7
2	5	8	N	.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1
	VLBI site	E		.0	.0	.0	.0	.0	.0	.0	.0	-.1
	Survey point 5	U		.0	.0	.0	.0	.0	.0	.0	.0	.0
6	1	4	N	.7	-.7		.5	-.6	-.4			
	VLBI site	E		.5	.3		.2	.9	-.1			
	Survey point 1	U		1.5	-.9		-.6	1.7	1.6			
7	2	2	N	1.4				-1.3	-.4			
	VLBI site	E		1.5				1.5	-.1			
	Survey point 2	U		.9				-.2	.8			
3	20	1	N	.0						-.4		
	Cable car building	E		.0						.5		
	Temporary station	U		.0						1.8		
8	35	1	N	.0							.9	
	Current SLR station	E		.0							-.2	
	Vertical Axis	U		.0							.3	
10	4	2	N	.4							.2	.4
	VLBI site	E		.4							-.3	.2
	Survey point 4	U		.7							-.6	.3

For this solution, the survey point 5 has been constrained (1 mm) to first results coming from a preliminary constrained adjustment on ITRF2000 IGS station coordinates at observations epoch.

3.3. VLBI Reference point

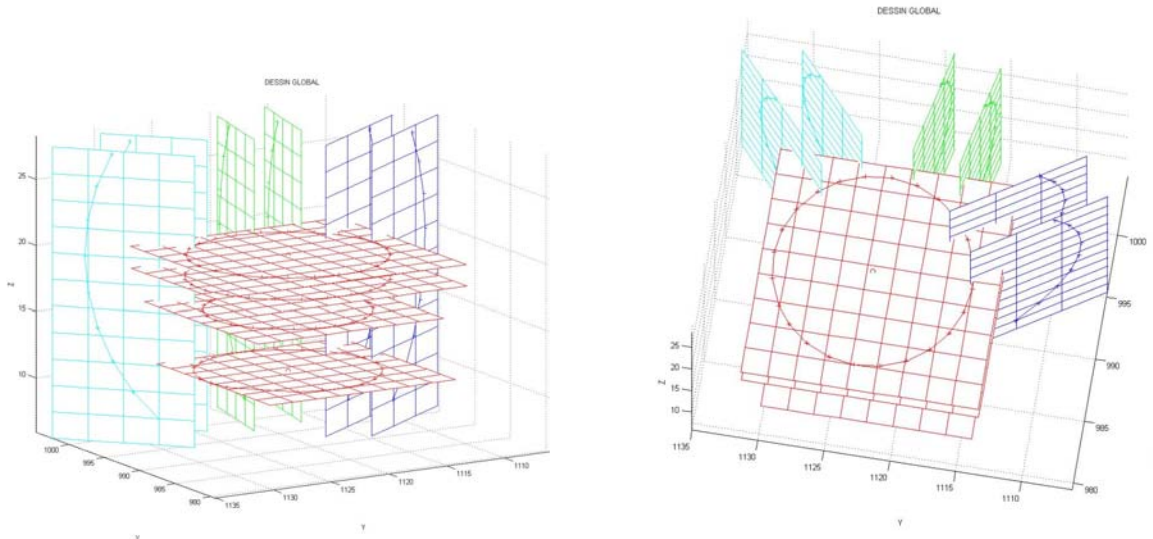
The first computations have been done in the local topocentric network that was defined by the polygon observations.

The 10 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 fit a circle. Then a more elaborate program taking into account the variances-covariances matrix of the polygon and the target positions has been used to compute the circle fittings.

Each target describes a circle, inscribed in a plane orthogonal to the vertical axis. Independent adjustments let check the parallelism of the four planes so that the alignment of the 4 centers, and the verticality of the primary axis. These results led to the adjustment with constraints and the vertical axis was then determined.

The processing of the coordinates of all the observation points is a least squares adjustment with constraints on the points of the polygon coming from the polygon observations. It has been led with the software COMP3D in a local topocentric reference system.

The precision of the 4x25 points goes from 0.2 mm to 2.2 mm.



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

Therefore, we have to determine if the axes intersect. The distance between the vertical axis and the horizontal axis in the 3 orientations have been processed. The mean of these distances is 0.17 mm. The axes are then assumed to intersect and the VLBI reference point is in the local system:

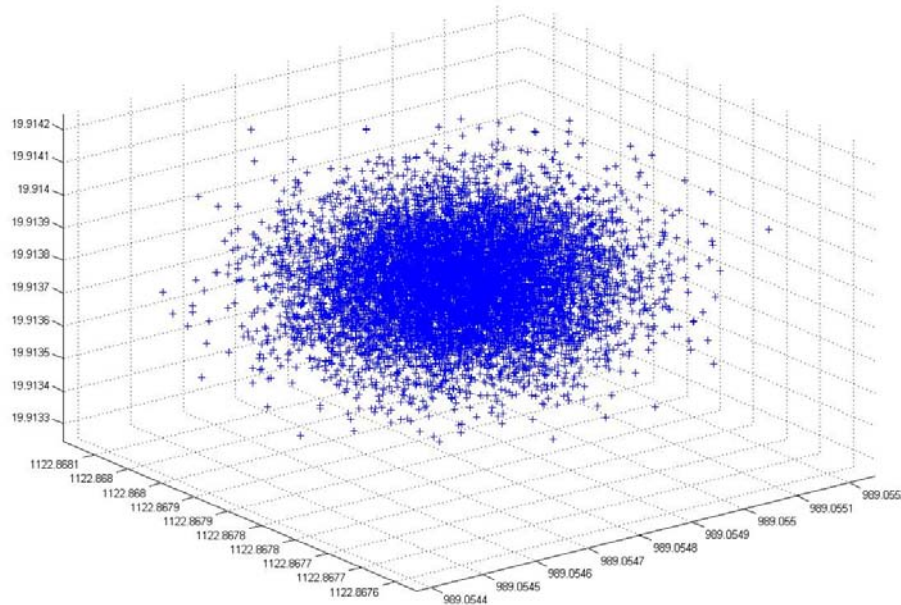
VLBI Reference point		
x (m)	y (m)	z (m)
989.0548	1122.8679	19.9138

One can find more information such as residuals on data analysis in annex 5.5.

3.3.1. Precision

The precision has been determined by using a Monte-Carlo method. Random sets of coordinates of the observed points have been performed depending on the precision of their determinations. Then the same processing as presented previously has been done to get a new set of coordinates for the VLBI reference point.

We obtain this points distribution :



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

The cloud is centered on the VLBI reference point and the size of the cloud is described by the following elements :

VLBI Reference point		
σ_x (m)	σ_y (m)	σ_z (m)
0.0002	0.0002	0.0002

3.3.2. Fictitious observations

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 points of the polygon to the VLBI reference point.

Therefore, this set of fictitious observation is equivalent to an intersection of the VLBI reference point from points 1, 2, 3, 4, 5 and 7.

They were introduced in the final computation of the co-location site.

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3.4. Survey control network

The analysis of the survey network observations has been carried out with the “Microsearch Geolab” software. The input files were developed from all the topometric observations (distances, horizontal and zenithal angles, direct levelling, planimetric and altimetric centerings). The coordinates of one point have been constrained and an azimuth computed from the GPS observations analysis has been introduced.

During the survey the antenna height has been checked by direct measurements using a calliper gauge. The difference with the value published in the sitelog and used to tie the station to the network with GPS is below 1 mm.

4. Results

The final results have been processed with the “Microsearch GeoLab” software. The input files were developed from :

- § all the topometric observations : distances, horizontal and zenithal angles, direct levelling, planimetric and altimetric centerings.
- § an extracted covariance matrix of the GPS baselines not including the IGS station
- § the GPS baseline between point 5 and the IGS station with its covariance matrix

The ITRF2000 coordinates of SHAO IGS GPS station at epoch 2003:332 have been constrained at 1mm (see ITRF2000 solution extracted coordinates in annex 5.9).

The following station name translation table has been used for the computation :

Point description	Used name or code	Computation name
SHAO IGS reference point	21605M002	21605M002 (GPS observations) 8 (topometry) <i>Rem : shao for GPS observations</i>
EGNOS station reference point :	9	9
SLR station : <ul style="list-style-type: none"> • System Reference Point (SRP) • Top and axis of the domed brass mark 	21605S001 30	21605S001 30 (GPS and topometry observations)
Future SLR site	21605M101	40 (GPS observations)
VLBI reference point	21605S009	21605S009 (fictitious observations)

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Point description	Used name or code	Computation name
Survey points :		
• 1	1	1
• 2	2	2
• 4	4	4
• 5	5	5
• 7	7	7
Telecommunication antenna (for conventional observations orientation)	50	50
Levelling benchmarks		
• residence building (SW corner)	1000	1000
• VLBI building : east side of the entrance door, between the 2 nd and the 3 rd window	2000	2000
• VLBI building : east side of the entrance door, before the first window	3000	3000
• VLBI building : east side of the entrance door, before the first window	4000	4000
• EGNOS concrete pier	5000	5000

The results of the adjustment are the coordinates of all the points of interest as well as their confidence ellipsoids in the ITRF2000 at the mean epoch of the observations (2003:332). Here is a table with the 3D coordinates and confidence region at 95% of the points of interest :

Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV	
XYZ		1	-2831656.7602 0.0065	4675722.7944 0.0065	3275351.5380 m 0.0065	0
XYZ		2	-2831688.2105 0.0065	4675699.9057 0.0065	3275352.0292 m 0.0065	0
XYZ		21605M002	-2831733.4794 0.0065	4675665.9616 0.0065	3275369.4295 m 0.0065	0
XYZ		21605M101	-2830750.7235 0.0065	4676573.2264 0.0065	3275076.8381 m 0.0065	0
XYZ		21605S001	-2831088.2992 0.0065	4676203.2595 0.0066	3275172.7324 m 0.0066	0
XYZ		21605S009	-2831687.1234 0.0065	4675733.5870 0.0065	3275327.6040 m 0.0065	0
XYZ		30	-2831090.9971 0.0065	4676203.2944 0.0065	3275169.0342 m 0.0065	0
XYZ		4	-2831761.2654 0.0065	4675644.5260 0.0065	3275371.0285 m 0.0065	0
XYZ		5	-2831764.2148 0.0065	4675670.1144 0.0065	3275329.9418 m 0.0065	0
XYZ		50	-2831606.1642 0.0025	4676084.7377 0.0027	3275034.3758 m 0.0026	0
XYZ		7	-2831648.7154 0.0065	4675742.5076 0.0065	3275316.1102 m 0.0065	0
XYZ		9	-2831750.8156 0.0065	4675661.3587 0.0065	3275352.1592 m 0.0065	0

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3D Station Confidence Regions (95.000 percent):

STATION	MAJ-SEMI (AZ, VANG)	MED-SEMI (AZ, VANG)	MIN-SEMI (AZ, VANG)
1	0.0183 (210, 88)	0.0182 (73, 1)	0.0182 (343, 1)
2	0.0183 (213, 88)	0.0182 (73, 1)	0.0182 (343, 1)
21605M002	0.0182 (203, 88)	0.0182 (81, 1)	0.0182 (351, 2)
21605M101	0.0184 (200, 88)	0.0182 (76, 1)	0.0182 (346, 2)
21605S001	0.0184 (170, 86)	0.0183 (328, 3)	0.0182 (58, 1)
21605S009	0.0184 (212, 88)	0.0182 (313, 0)	0.0182 (43, 1)
30	0.0184 (199, 88)	0.0182 (77, 1)	0.0182 (347, 2)
4	0.0183 (214, 89)	0.0182 (75, 1)	0.0182 (345, 1)
5	0.0183 (203, 88)	0.0182 (81, 1)	0.0182 (351, 2)
50	0.0085 (170, 89)	0.0069 (329, 1)	0.0063 (59, 0)
7	0.0183 (211, 88)	0.0182 (62, 1)	0.0182 (332, 1)
8	0.0184 (49, 90)	0.0182 (259, 0)	0.0182 (169, 0)
9	0.0184 (215, 89)	0.0182 (46, 1)	0.0182 (316, 0)

Adjusted Ellipsoid height coordinates:

CODE	FFF	STATION	Ellipsoid height	STD DEV
EHGT	1		20.4107	0.0008 m
EHGT	1000		13.5202	0.0008 m
EHGT	2		17.8503	0.0008 m
EHGT	2000		13.8777	0.0008 m
EHGT	3000		13.8830	0.0008 m
EHGT	4		19.5079	0.0008 m
EHGT	4000		13.8604	0.0008 m
EHGT	5		18.3353	0.0008 m
EHGT	5000		13.1702	0.0008 m
EHGT	7		12.9814	0.0008 m

Furthermore the whole covariance matrix is computed and it is possible to extract a covariance submatrix of reference points for :

- SHAO IGS GPS station 21605M002
- SLR station 21605S001
- VLBI station 21605S009

The results and the full covariance matrix are presented in annexes 5.11. and 5.12. The covariance matrix has finally been converted into the SINEX format using a special program from CATREF package. The resulted file is given in annexe 5.15.

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5.1. SHAO IGS station site log

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

0. Form

Prepared by (full name) : Oivind Ruud
Date Prepared : 2005-02-09
Report Type : UPDATE
If Update:
Previous Site Log : shao_20041018.log
Modified/Added Sections : 3.2-3.6

1. Site Identification of the GNSS Monument

Site Name : Shanghai Observatory, Sheshan station
Four Character ID : SHAO
Monument Inscription : 4027-S
IERS DOMES Number : 21605M002
CDP Number : (A4)
Monument Description : CONCRETE PILLAR
Height of the Monument : 6 m
Monument Foundation : CONCRETE BLOCK
Foundation Depth : 8 m
Marker Description : BRASS NAIL
Date Installed : 1994-05-01
Geologic Characteristic : BEDROCK
Bedrock Type : SEDIMENTARY
Bedrock Condition : (FRESH/JOINTED/WEATHERED)
Fracture Spacing : (1-10 cm/10-50 cm/50-200 cm/over 200 cm)
Fault zones nearby : NO
Distance/activity : (multiple lines)
Additional Information : (multiple lines)
: A 6 meter concrete pillar inside observatory
: dome serves as the monument. Pillar is tapered
: and almost 2 meters wide at the bottom.
: Geological Province: alluvial plain of the
: Yangtse Delta.
: Local Geology: So-Se is a small hill in the
: alluvium plains of the Yangtse Delta,
: interbedded with volcanic series of the Mesozoic
: era.
: Geological information from "NASA Space Geodesy
: Program: Catalogue of Site Information",
: Technical Memorandum 4482, March 1993, p537.

2. Site Location Information

City or Town : Sheshan
State or Province :
Country : China
Tectonic Plate : Eurasian
Approximate Position (ITRF)
X coordinate (m) : -2831733.5651
Y coordinate (m) : 4675666.0700
Z coordinate (m) : 3275369.4958
Latitude (N is +) : +310558.7128
Longitude (E is +) : +1211201.5990
Elevation (m,ellips.) : 22.2085
Additional Information : ITRF2000
: The station is located at the Shanghai
: Observatory in the Zi-Ka-Wei Section.
: Site information from "NASA Space Geodesy
: Program: Catalogue of Site Information",
: Technical Memorandum 4482, March 1993, p537.

3. GNSS Receiver Information

3.1 Receiver Type : ROGUE SNR-8100

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Satellite System : GPS
Serial Number : 140
Firmware Version : 3.0 -1994/10/10 17:01:54
Elevation Cutoff Setting : 4 deg
Date Installed : 1995-01-20T00:00Z
Date Removed : 1999-05-28T09:24Z
Temperature Stabiliz. : none
Additional Information : (multiple lines)

3.2 Receiver Type : ROGUE SNR-8100
Satellite System : GPS
Serial Number : 140
Firmware Version : 3.2.32.8
Elevation Cutoff Setting : 4 deg
Date Installed : 1999-05-28T09:24Z
Date Removed : 2002-07-01T23:59Z
Temperature Stabiliz. : none
Additional Information : (multiple lines)

3.3 Receiver Type : ROGUE SNR-8100
Satellite System : GPS
Serial Number : 140
Firmware Version : 3.2.32.10
Elevation Cutoff Setting : 4 deg
Date Installed : 2002-07-02T00:00Z
Date Removed : 2003-11-25T23:59Z
Temperature Stabiliz. : none
Additional Information : (multiple lines)

3.4 Receiver Type : ROGUE SNR-8100
Satellite System : GPS
Serial Number : 140
Firmware Version : 3.2.32.11
Elevation Cutoff Setting : 4 deg
Date Installed : 2004-10-01T01:00Z
Date Removed : 2004-10-04T23:59Z
Temperature Stabiliz. : none
Additional Information : Firmware upgrade.

3.5 Receiver Type : ROGUE SNR-8100
Satellite System : GPS
Serial Number : 140
Firmware Version : 3.2.32.10
Elevation Cutoff Setting : 4 deg
Date Installed : 2004-10-07T00:00Z
Date Removed : 2004-12-28T23:59Z
Temperature Stabiliz. : none
Additional Information : Firmware reverted to old version.

3.6 Receiver Type : ROGUE SNR-8100
Satellite System : GPS
Serial Number : 140
Firmware Version : 3.2.32.11
Elevation Cutoff Setting : 4 deg
Date Installed : 2004-12-29T02:00Z
Date Removed : (CCYY-MM-DDThh:mmZ)
Temperature Stabiliz. : none
Additional Information : Firmware upgrade.

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 JPLA
Serial Number : 429
Antenna Reference Point : BPA
Marker->ARP Up Ecc. (m) : 0.0814

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Marker->ARP North Ecc(m) : 0.0000
 Marker->ARP East Ecc(m) : 0.0000
 Alignment from True N :
 Antenna Radome Type : JPLA
 Radome Serial Number :
 Antenna Cable Type : (vendor & type number)
 Antenna Cable Length : 20 m
 Date Installed : 1995-01-20T00:00Z
 Date Removed : (CCYY-MM-DDThh:mmZ)
 Additional Information : (multiple lines)

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 : 7226
 Tied Marker Usage : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
 Tied Marker CDP Number : 7226
 Tied Marker DOMES Number : 21605S008
 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 : VLBI 6m radiotelescope ref. pt.

5.2 Tied Marker Name : 7233
 Tied Marker Usage : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
 Tied Marker CDP Number :
 Tied Marker DOMES Number :
 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 : Antenna reference point

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 : (if external)
 Effective Dates : 1995-01-20/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 : VLBI
Status : (PERMANENT/MOBILE)
Effective Dates : (CCYY-MM-DD/CCYY-MM-DD)
Notes : SLR station nearby (5 Km)

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

8.3.x Temp. Sensor Model :
Manufacturer :

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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 : Shanghai Astronomical Observatory
 Preferred Abbreviation : SHAO
 Mailing Address : Shanghai Astronomical Observatory
 : Chinese Academy Of Science
 : Nandan Road 80
 : Shanghai, 200030, China

Primary Contact
 Contact Name : Li Yan
 Telephone (primary) : 86-21-64386191-668
 Telephone (secondary) :
 Fax : 86-21-64384618
 E-mail : liyan@shao.ac.cn

Secondary Contact
 Contact Name : Shuanggen Jin
 Telephone (primary) : 86-21-64386191-668
 Telephone (secondary) :
 Fax : 86-21-4384618
 E-mail : sgjin@shao.ac.cn
 Additional Information : (multiple lines)

12. Responsible Agency (if different from 11.)

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Agency          : Jet Propulsion Laboratory
Preferred Abbreviation : JPL
Mailing Address  : 4800 Oak Grove Drive
                  : Pasadena, CA
                  : USA 91109

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     : Network Engineer/UNAVCO
Telephone (primary) : 303-381-7476
Telephone (secondary) : 303-381-7500
Fax              : 303-381-7451
E-mail           : ruud@unavco.org
Additional Information : Oivind Ruud (303-381-7476)

```

13. More Information

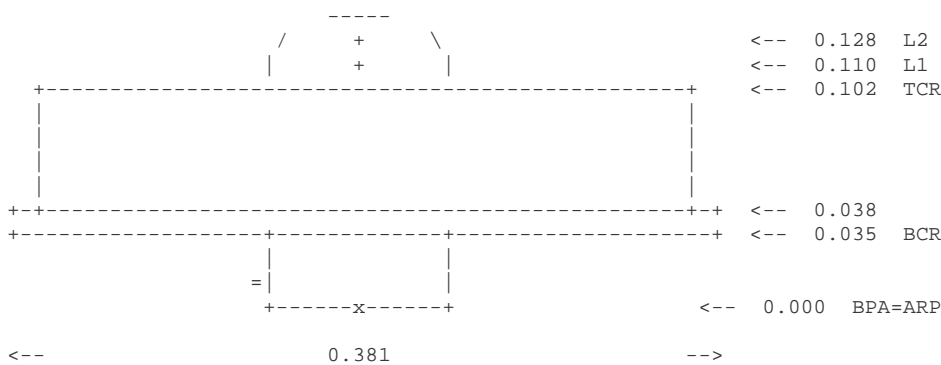
```

Primary Data Center : JPL (ODC-Operational Data Center)
Secondary Data Center : CDDIS (GDC-Global Data Center)
URL for More Information : http://www.unavco.net/public/logs/
                        : sitedetails.aspx

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

```

AOAD/M_T



```

ARP: Antenna Reference Point
L1 : L1 Phase Center
TCR: Top of Chokinging
TGP: Top of Ground Plane
TPA: Top of Preamplifier
TOP: Top of Pole

L2 : L2 Phase Center
BCR: Bottom of Chokinging
BGP: Bottom of Ground Plane
BPA: Bottom of Preamplifier

```

All dimensions are in meters.

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5.2. SLR site log

ILRS Site and System Information Form
International Laser Ranging Service

0. Form

Prepared by (Full Name) : Yang Fumin
Preparer E-mail : yangfm@center.shao.ac.cn
Date Prepared : 2002-05-09
Report Type : UPDATE
Format Version : 1.0

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

Site Name : Shanghai
IERS DOMES Number : 21605S001
CDP Pad ID : 7837
Subnetwork : WPLTN
Description : AZ EL INTERSECT
Monument Description : N.A.
Monument Inscription : N.A.
Mark Description : N.A.
Date Installed : 1983-03-19
Date Removed : (yyyy-mm-dd)
Geologic Characteristic : SANDSTONES
Additional Information : The site is located in southwest
Shanghai, 30 km away from town.
SRP is center of 45 deg bending
mirror.

2. Site Location Information

City or Town : Shanghai
State or Province : Shanghai
Country : P.R. Chinese
Tectonic Plate : Eurasian
Approximate Position
X coordinate [m]: -2831088.101
Y coordinate [m]: 4676203.354
Z coordinate [m]: 3275172.810
Latitude [deg]: 31.0975 N
Longitude [deg]: 121.1917 E
Elevation [m]: 29.023
Additional Information : The site is located by the
Sheshan hill

3. General System Information

3.01 System Name : Shanghai
4-Character Code : SHAL
CDP System Number : 28
CDP Occupation Number : 05
Eccentricity to SRP (if Not Identical With SRP)
North [m]: 0
East [m]: 0
Up [m]: 0
Date Measured : N.A.
Date Installed : 1983-03-19
Date Removed : (yyyy-mm-dd)
Additional Information : (multiple lines)

4. Telescope Information

4.01 Receiving Telescope Type : CASSEGRAIN
Aperture [m]: 0.6
Mount : AZ-EL
Xmitting Telescope Type : REFRACTOR
Aperture [m]: 0.15
Tracking Camera Type : ICCD

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Model :
 Manufacturer : China
 Field of View [deg]: 0.3
 Minimum Magnitude [mag]: 13
 Transmit/Receive Path : SEPARATE
 Transmit/Receive Switch : NONE
 Max Slew Rate Az [deg/s]: 5
 Max Slew Rate El [deg/s]: 1
 Max Used Tracking Rate Az : 5
 Max Used Tracking Rate El : 1
 Telescope Shelter : DOME
 Daylight Filter Type : Oven controlled spectral filter
 Dayl. Filt. Bandwidth [nm]: 0.3
 Adjustable Attenuation : NO
 Transmit Efficiency : 0.60
 Receive Efficiency : 0.51,0.1(3nm filter included)
 Date Installed : 1983-3-19
 Date Removed : (yyyy-mm-dd)
 Additional Information : The filter is used in daylight tracking only

5. Laser System Information

5.01 Laser Type : ND:YAG
 Number of Amplifiers : 1
 Primary Wavelength [nm]: 1064
 Primary Maximum Energy [mJ]: Not used for laser ranging
 Secondary Wavelength [nm]: 532
 Secondary Max. Energy [mJ]: 40
 Xmit Energy Adjustable : NO
 Pulse Width (FWHM) [ps]: 50~100
 Max. Repetition Rate [Hz]: 8
 Fullw. Beam Divergence ["]: 20
 Final Beam Diameter [m]: 0.12
 Eyesafe : NO
 Eyesafe Standard : N.A.
 Date Installed : 1995-10-01
 Date Removed : (yyyy-mm-dd)
 Additional Information : SFUR Passively Mode-locked laser

6. Receiver System

6.01.01 Primary Chain
 Wavelength [nm]: 532
 Detector Type : CSPAD
 Manufacturer : PESO Consulting
 Model : 0402
 Quantum Efficiency [%]: ~20
 Nominal Gain :
 Rise Time [ps]:
 Jitter (Single PE)[ps]: 30
 Field of View ["]: 80
 Date Installed : 1998-03-19
 Date Removed : (yyyy-mm-dd)
 Signal Processing : Time Walk Compensated
 Manufacturer : Graz
 Model : 1998-03-19
 Date Installed : (yyyy-mm-dd)
 Date Removed : (yyyy-mm-dd)
 Amplitude Measurement : NO
 Return-rate Controlled: NO
 Mode of Operation : Single to Multi Photon
 Time of Flight Observ. : INTERVAL

 Manufacturer : Hewlett-Packard
 Model : 5370B
 Resolution [ps]: 20
 Precision [ps]: 35
 Date Installed : 1990-04-01
 Date Removed : (yyyy-mm-dd)
 Additional Information : (multiple lines)

7. Tracking Capabilities

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7.01 Satellites

Very Low Alt (<400 km) : NIGHT
 Low Altitude (400-2000) : YES
 Lageos : YES
 GLONASS : YES
 Etalon : NIGHT
 GPS : NIGHT
 Moon : NO
 Avge Pass Switch Time [s]: ~20
 Average values for Lageos
 Single Shot RMS [mm]: 16
 # of Obs per NP : 40
 Use of Semi-trains : YES
 # of Semi-train Tracks : 3-4
 Range Gate Width [ns]: 100-30000
 Beam Pointing Accuracy ["]: 5
 Angle Encoder Resolution["]: 1
 Min. Tracking Elev. [deg]: 15
 Operation
 Months per Year : 12
 Days per Week : 7
 Hours per Day : 12~24
 Staff per Shift : 1
 System Shared With : NO
 Time Allocated to SLR [%]: 100
 Remotely Controllable : NO
 Date First Applicable : 1983-11-07
 Date Last Applicable : (yyyy-mm-dd)
 Additional Information : Minimum Tracking Elevation
 In north and west is 25 deg.

8. Calibration

8.01 Calibration Type : PRE+POST
 Target Location : EXTERNAL(short target within the dome)
 Target Type : see additional information
 Target Structure : Short CALIBR TARGET, see additional
 information
 Target Distance [m]: 2.0
 Date Measured : 2000-06-20
 Accuracy (mm) [mm]: 1
 Verification :
 Return-rate Controlled : (YES/NO)
 Mode of Operation : (MULTI/SINGLE/FEW PHOTON/DON'T KNOW)
 Average Cal Interval [min]: 120 or more
 Single Shot RMS [mm]: 8
 Edit Criterion 1st Chain : ITERATIVE 2.5 SIGMA
 Edit Criterion 2nd Chain : N.A.
 Application of Cal Data :
 Date Installed : 2000-06-20
 Date Removed : (yyyy-mm-dd)
 Additional Information : Target is made of a prism and a diffusor
 to direct the beam into receiver.

9. Time and Frequency Standards

9.01.01 Frequency Standard Type : Oven Controlled Crystal Oscillator
 Model : 58503A
 Manufacturer : HP
 Short Term Stab. [e-12]: 5
 Long Term Stab. [e-12]: 1
 Time Reference : GPS
 Synchronization : GPS
 Epoch Accuracy [ns]: 110
 Date Installed : 1997-10-01
 Date Removed : (yyyy-mm-dd)
 Additional Information :
 9.02.01 GPS Timing Rcvr Model : 58503A
 Manufacturer : HP
 Date Installed : 1997-10-01
 Date Removed : (yyyy-mm-dd)
 Additional Information : (multiple lines)

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10. Preprocessing Information

10.01 On-site NP Generation : YES
 Data Screening : Polyfit fit + orbit solve
 Edit Criterion 1st Chain : 2.5 SIGMA
 Edit Criterion 2nd Chain : N.A.
 Upload interval : No
 Date First Applicable : 1983-11-07
 Date Last Applicable : (yyyy-mm-dd)
 Additional Information : (multiple lines)

11. Aircraft Detection

11.01 Detection Type : NONE
 Date Installed : (yyyy-mm-dd)
 Date Removed : (yyyy-mm-dd)
 Additional Information : No limit to laser transmit in the area of the station, because there are few aircraft and the transmitted laser energy is low.

12. Meteorological Instrumentation

12.01.01 Pressure Sensor Model :
 Manufacturer : China
 Recording Interval : PER PASS
 Accuracy [mbar]: 0.3
 Height Diff to SRP [m]: 2
 Date Installed : 1999-09-01
 Calibration Interval : EVERY FEW YEARS
 Date Removed : (yyyy-mm-dd hh:mm UT)
 Additional Information : Pressures compared with local Met Office barometers

12.02.01 Temp Sensor Model :
 Manufacturer : China
 Recording Interval : PER PASS
 Accuracy [deg C]: 0.3
 Date Installed : 1990-04-01
 Calibration Interval : EVERY FEW YEARS
 Date Removed : (yyyy-mm-dd hh:mm UT)
 Additional Information : Temperatures compared with local Met office readings

12.03.01 Humidity Sensor Model :
 Manufacturer : China
 Recording Interval : PER PASS
 Accuracy [% rel h]: 3
 Date Installed : 1990-04-01
 Calibration Interval : EVERY FEW YEARS
 Date Removed : (yyyy-mm-dd hh:mm UT)
 Additional Information : Humidity compared with local Met office readings

13. Local Ties, Eccentricities, and Collocation Information

13.01 Collocated Permanent Geodetic Systems

GPS : IGS
 Date Installed : 1995-01-25
 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 : NO
 Date Installed : (yyyy-mm-dd)
 Date Removed : (yyyy-mm-dd)
 Additional Information : (multiple lines)
 PRARE : YES

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Date Installed : 1996-05-03
 Date Removed : 1998-12-01
 Additional Information : (multiple lines)
 VLBI : YES
 Date Installed : 1987-11-01
 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 : None
 Instrumentation Type : VLBI
 Instrumentation Status : PERMANENT
 DOMES Number : 21605S009
 CDP Number : 7227
 Differential Components (ITRS)
 dx [m]: -598.854 +- 0
 dy [m]: -469.637 +- 0
 dz [m]: 154.972 +- 0
 Date Measured : 1992
 Determined by : Shanghai Obs.
 Date Installed : (yyyy-mm-dd)
 Date Removed : (yyyy-mm-dd)
 Additional Information : (multiple lines)

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

Monument Name : JPL 4027-S
 Instrumentation Type : GPS
 Instrumentation Status : PERMANENT
 DOMES Number : 21605M002
 CDP Number : N.A.
 Differential Components (ITRS)
 dx [m]: -645.121 +- 0
 dy [m]: -537.348 +- 0
 dz [m]: 196.639 +- 0
 Date Measured : 1997-01-01
 Determined by : Shanghai Obs.
 Date Installed : 1994-10-01
 Date Removed : (yyyy-mm-dd)
 Additional Information : The previous site log had the wrong signs for Dx, Dy, Dz.

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 : Shanghai Astronomical Observatory,
 The Chinese Academy of Sciences
 Mailing Address : Shanghai Observatory
 80 Nandan Rd, Shanghai 200030
 China
 Primary Contact
 Contact Name : Yang Fumin
 Telephone (primary) : +86-021-64696290
 Telephone (secondary) :
 Fax : +86-021-64384618
 E-mail : yangfm@center.shao.ac.cn
 Secondary Contact
 Contact Name : Zhang Zhongping
 Telephone (primary) : +86 -021-64386191
 Telephone (secondary) :
 Fax : +86-021-64384618
 E-mail : zzp@center.shao.ac.cn
 Additional Information : (multiple lines)

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16. Responsible Agency (if different from 15.)

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

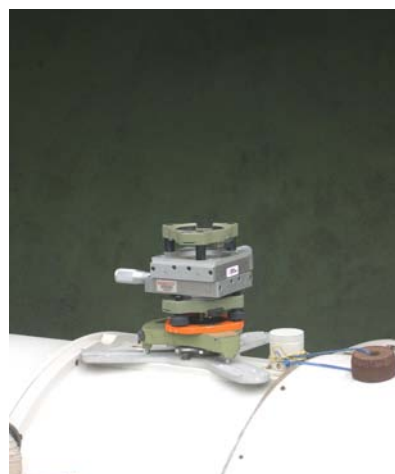
17. More Information

URL for More Information : <http://center.shao.ac.cn/>
Hardcopy on File
 Site Map : NO
 Site Diagram : NO
 Horizon Mask : NO
 Monument Description : NO
 Site Pictures : NO
Additional Information : (multiple lines)

5.3. SLR observations description



The platform ...



and the translation stage

The translation stage fixed on the platform has been put on top of the SLR and has been centered on the SLR vertical rotation axis. It could be used with target, prism or GPS antenna. This point has been included into the levelling observations.



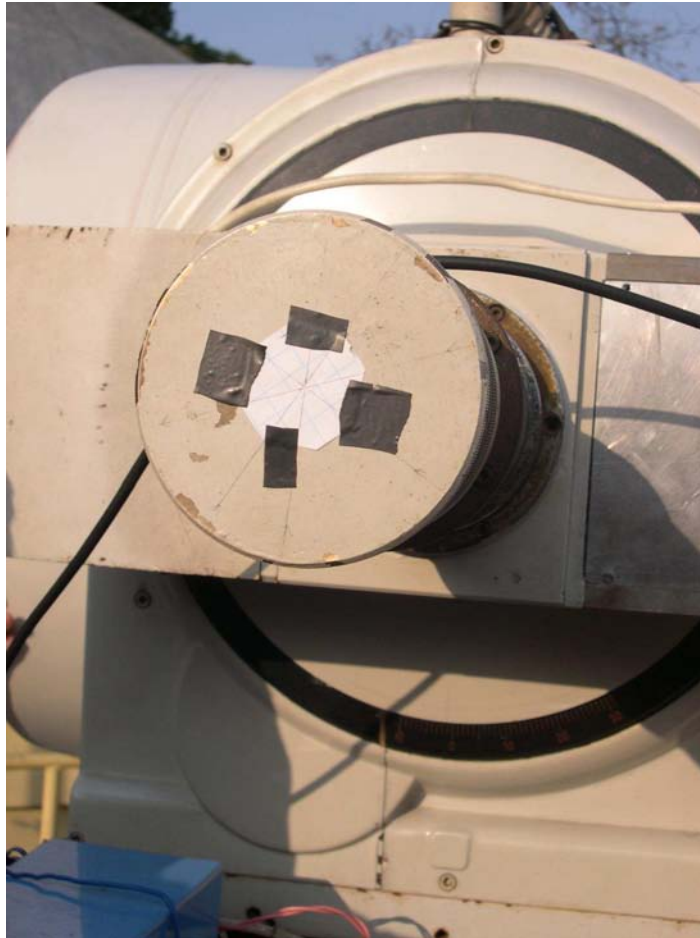
Choke ring antenna set up on the translation stage



Translation stage with target



Translation stage with prism



Percing point of the horizontal axis of the telescope

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5.4. VLBI site log

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) :
Date prepared : yyyy-mmm-dd
Report type : new/update

1. Site identification

Site name : Seshan VLBI station
Site 8-letter code : Shanghai
Site 2-letter code(s) : Sh

IERS DOMES number :
CDP occupation code : 21605
CDP monument number : 7227
Surveyed into national network? : (yes/no)
IGS station code : (4 letters, all upper case, blank if not an
IGS station)
ILRS station name : (blank if not an ILRS station)
Additional information : (multiple lines allowed)

2. Site information

2.1 Site location information

City or Town : Seshan
State or Province : Shanghai
Country : China
Tectonic plate : Eurasia
Approximate position
X coordinate (m) : -2831684.706
Y coordinate (m) : 4675732.890
Z coordinate (m) : 3275328.254
Latitude (deg) : 31.0992N
Longitude (deg) : +121.1996E
Elevation (m) : 5
Source of position : GPS
Additional information : (multiple lines allowed)

2.2 Site local survey network information

Number of reference markers :
Type of marker : (pillar, ground marker, etc.)
Frequency of surveying : (annual, biannual, etc.)
Surveying method : (directions, distances, levelling, GPS, etc.)
Survey instruments used : (theodolite, etc.)
Accuracy : (xx mm)
Survey performed by :
Survey documentation : (URL, publication, report, etc.)
Most recent survey date : (yyyy-mmm-dd)
Results provided to IERS: (yes/no)
Results provided to CDDIS: (yes/no)
Person responsible : (name and contact information)
Additional information : (multiple lines allowed)

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+AEA-ivscc.gsfc.nasa.gov telling the names.)

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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 : (multiple lines allowed)

3. Antenna information

Diameter (m) : 25
Axis type : AZEL
Axis offset (m) :
Slew rate first axis : 30/min
Slew rate second axis : 20/min
Limit stops first axis : 438, -81
Limit stops second axis : 87.6, 5
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 : (NASA/CDP prime-focus, dichroic, etc.)
X 1st-stage amplifier : cooled HEMT
X bandwidth (MHz) : 800
X Tsys at zenith (K) : 45
X SEFD (Jy) : 700
X aperture efficiency : (optional)
X LO frequencies (MHz) : 7600, 8000
S 1st-stage amplifier : cooled HEMT
S bandwidth (MHz) : 300
S Tsys at zenith (K) : 100
S SEFD (Jy) : 1700
S aperture efficiency : (optional)
S LO frequencies (MHz) : 1600
Phase calibrator type : NASA/CDP with 5 MHz
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 : flexible cable
X band freq. bandpass : 8200 - 9000 (MHz)
S band cable type : flexible cable
S band freq. bandpass : 2150 - 2450 (MHz)
LO ref signal cable type: flexible cable
LO ref signal freq. : 100 (MHz)
Phase cal ref signal cable type: flexible cable
Phase cal ref signal freq. : 5 (MHz)
Cable meas. system type : MarkIII cable
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 : VLBA
Number of mixers : VLBA type has 1 mixer per converter,

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Sidebands available : U, L
Number of mixers with
the following filters in
all sideband outputs:
2 MHz : yes
4 MHz : yes
8 MHz : yes
16 MHz : yes
32 MHz : yes
Additional information : (multiple lines allowed)

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

6.2 Formatter
Formatter type : MarkIV, VLBA S2
Serial number or rack ID: (e.g. formatter ID)
Additional information : (multiple lines allowed)

6.2.x (add sections for each additional formatter)

6.3 Decoder
Decode type : VLBA(DQA), S2
Additional information : (multiple lines allowed)

6.3.x (add sections for each additional decoder)

6.4 IF distribution
IF distributor type : VLBA
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.: 479.9 (MHz)
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 : (e.g. CresTech VIA interface box,
K4 DMS tape changer, etc.)
Additional information : (multiple lines allowed)

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

6.7 Recorders
Recorder type : VLBA4, S2
Number of recorders :
Tape type : thick, 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:
: 6.1.1 VLBA BBCs
: 6.2 VLBA, MK4, S2 formatter
: 6.3 VLBA DQA
: 6.4 VLBA IF distribution
: 6.5 UP converter
: 6.7 VLBA recorder S2 recorder

6.8.x (list additional configurations)

7 Meteorological instrumentation

7.1 Humidity sensor
Manufacturer : China
Model : HC
Accuracy : 3% RH

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Effective dates : (yyyy-mmm-dd to yyyy-mmm-dd)
Additional information : (multiple lines allowed)

7.2 Pressure sensor

Manufacturer : China
Model : GDJ-5
Accuracy : 0.3 mbar
Effective dates : (yyyy-mmm-dd to yyyy-mmm-dd)
Height relative to VLBI : (m)
Additional information : (multiple lines allowed)

7.3 Temperature sensor

Manufacturer : USA
Model : AD590
Accuracy : 0.2 degree
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/GPS
Installed dates : (yyyy-mmm-dd to yyyy-mmm-dd)
Manufacturer : H-maser Shanghai, GPS USA
Model number or ID : TAC
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 : (Doris/Glonass/Prare/SLR/GPS)
Instrument name :
Status : (Permanent/Mobile)
Effective dates : (yyyy-mmm-dd to yyyy-mmm-dd)
Included in local survey: (yes/no)
Additional information : (multiple lines allowed)

10.x (add sections for each type)

11. Field System computer information

System vendor : SWT
CPU : PII
CPU speed : 333 (MHz)
Memory : 64 (Mbytes)
Disk : 4.3 (Gbytes)
Linux release : Debian GNU/Linux 2.0
Internet connection : none
Antenna interface type : serial
Spare FS computer? : yes

12. Known RFI sources none

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 : Shanghai Astronomical Observatory
Chinese Academy of sciences

Shipping address : Shanghai Observatory
80 Nandan Road
Shanghai 200030
China

Postal address : Shanghai Observatory
80 Nandan Road
Shanghai 200030
China

URL of site web page :

On-site Friend of VLBI
Name : Huang Xinyong
Telephone (primary) : 86 21 34250656
Telephone (alternate) : 86 21 64386191-505
Fax : 86 21 64384618
E-mail : xhuang@center.shao.ac.cn

On-site VLBI operations room
Telephone (primary) : 86 21 57651763
Telephone (alternate) :
Fax :
E-mail :

Other on-site contact
Name :
Telephone (primary) :
Telephone (alternate) :
Fax :
E-mail :

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)

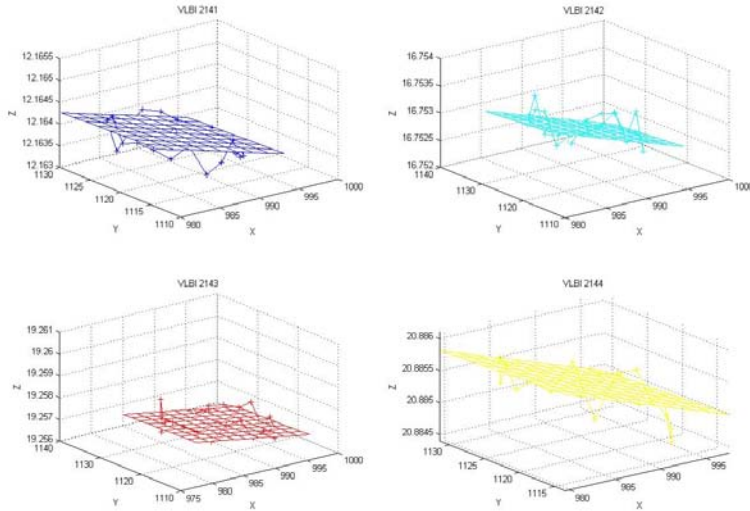
15. More information

Additional information : (multiple lines allowed)

5.5. VLBI reference point : data analysis

5.5.1. Vertical Axis

By a least squares adjustment, each of the 4 circles is determined independantly ; the radius, the centre and the plane elements are processed.



The four observed and computed planes and circles

The residuals (m) are presented here :

	Residuals wrt the plane	Residuals wrt the circle		Residuals wrt the plane	Residuals wrt the circle
1 st circle (23 points)	-4.155E-05	-4.117E-04	2nd circle (25 points)	-3.644E-04	-2.577E-04
	3.372E-04	-1.177E-03		9.879E-05	-7.861E-04
	3.191E-04	-4.926E-04		2.497E-04	-2.189E-04
	1.841E-04	-4.744E-04		2.771E-04	-1.911E-04
	-2.577E-04	-1.164E-05		-1.132E-04	1.143E-04
	1.848E-04	1.836E-04		3.756E-04	-3.333E-04
	-1.914E-04	1.475E-04		-1.558E-04	-8.331E-05
	-1.879E-04	1.725E-04		-3.052E-04	3.173E-04
	-4.814E-06	2.603E-05		-6.934E-05	-6.330E-05
	-4.112E-05	-1.388E-04		5.620E-05	-4.078E-04
	5.731E-06	1.358E-04		-1.234E-04	1.436E-04
	4.393E-04	-2.731E-05		3.971E-04	-4.649E-05
	-3.585E-05	2.287E-04		1.232E-04	-3.574E-04
	-3.145E-04	7.698E-04		-3.999E-05	6.911E-04
	3.085E-04	1.209E-04		-8.829E-05	-4.464E-04
	-6.153E-05	2.765E-05		-3.184E-04	2.714E-04
	8.031E-05	-2.055E-04		2.719E-04	-3.709E-05
	1.378E-04	4.227E-04		2.831E-04	1.092E-03
	1.401E-05	-5.562E-05		1.453E-05	-1.061E-03
	5.104E-04	-2.042E-04		-3.597E-05	-2.762E-04
	3.274E-04	1.222E-03		1.281E-04	2.937E-04
	-6.119E-04	3.059E-05		4.922E-04	3.925E-04
	-2.416E-04	-2.869E-04		-2.178E-04	2.642E-04
		-2.331E-04	7.778E-04		
		-6.441E-05	2.090E-04		

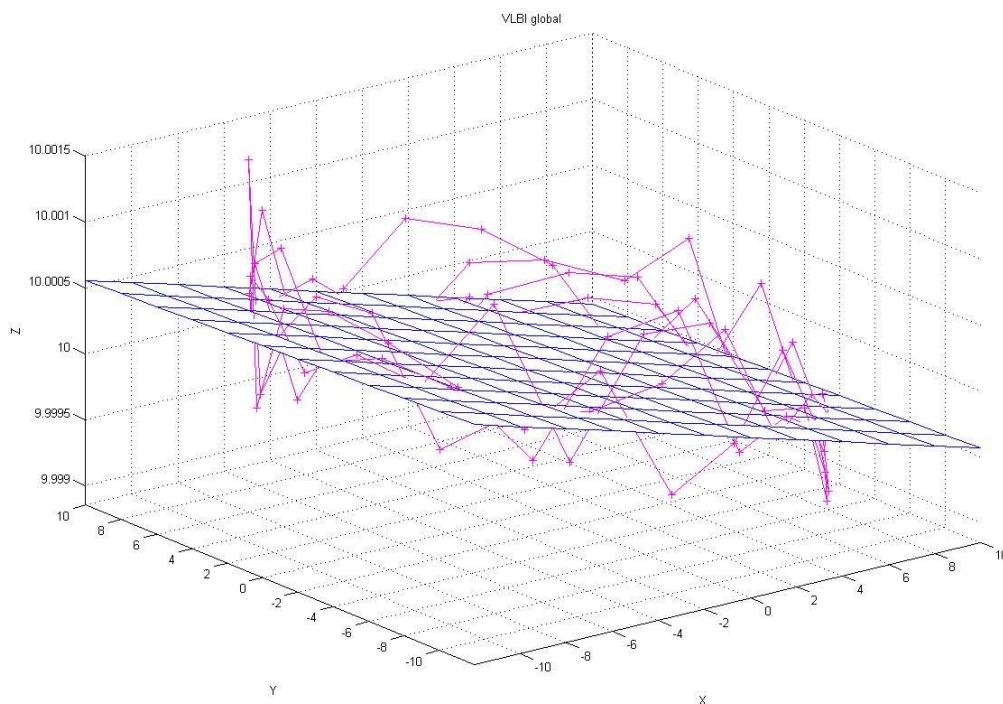
	Residuals wrt the plane	Residuals wrt the circle		Residuals wrt the plane	Residuals wrt the circle
3 rd circle (25 points)	-3.644E-04	-2.577E-04	4 th circle (25 points)	1.828E-04	-2.909E-04
	9.879E-05	-7.861E-04		2.520E-04	-7.313E-04
	2.497E-04	-2.189E-04		2.101E-04	-3.841E-04
	2.771E-04	-1.911E-04		5.440E-04	-5.830E-04
	-1.132E-04	1.143E-04		-4.395E-04	8.257E-06
	3.756E-04	-3.333E-04		1.553E-04	-4.420E-04
	-1.558E-04	-8.331E-05		-1.712E-04	-1.691E-04
	-3.052E-04	3.173E-04		-5.172E-04	8.878E-04
	-6.934E-05	-6.330E-05		-7.961E-05	-9.754E-05
	5.620E-05	-4.078E-04		4.586E-05	-1.893E-04
	-1.234E-04	1.436E-04		-1.356E-04	2.389E-04
	3.971E-04	-4.649E-05		6.813E-04	-1.581E-04
	1.232E-04	-3.574E-04		5.025E-04	-1.698E-04
	-3.999E-05	6.911E-04		-2.667E-04	2.154E-04
	-8.829E-05	-4.464E-04		7.823E-05	-4.568E-04
	-3.184E-04	2.714E-04		2.412E-04	3.324E-04
	2.719E-04	-3.709E-05		3.247E-04	-1.532E-04
	2.831E-04	1.092E-03		2.299E-04	1.003E-03
	1.453E-05	-1.061E-03		-4.435E-04	-6.648E-04
	-3.597E-05	-2.762E-04		9.025E-04	-5.280E-04
	1.281E-04	2.937E-04		-5.351E-04	3.459E-04
	4.922E-04	3.925E-04		-2.711E-04	6.374E-04
	-2.178E-04	2.642E-04		-4.791E-04	4.016E-04
	-2.331E-04	7.778E-04		-9.063E-05	7.799E-04
	-6.441E-05	2.090E-04		-1.724E-05	1.668E-04

The residuals represent the distance in meter from the point to the plane or the circle.

These 4 circles should have their planes parallel and their centres aligned. A first check is made at this level in order to validate that a global adjustment is possible.

	1 st circle	2 nd circle	3 rd circle	4 th circle
Normal vector (m)	x 4.3012E-05	x 4.626E-05	x 4.1683E-05	x 7.1383E-05
	y -3.9706E-06	y 1.5112E-05	y 1.7145E-06	y 9.0771E-06
	z 1	z 1	z 1	z 1
Centre (m)	x 989.0544	x 989.0549	x 989.0549	x 989.0551
	y 1122.8680	y 1122.8679	y 1122.8679	y 1122.8679
	z 12.1636	z 16.7529	z 19.2572	z 20.8853

By applying a translation (vector of the coordinates of the centre) and a scale factor (10 m / radius), it is possible to compute the final direction of the vertical axis.



The combined vertical axis orthogonal plane

The results are presented here :

Residuals wrt the plane (m)	Residuals wrt the circle (m)	Residuals wrt the plane (m)	Residuals wrt the circle (m)
2.693E-05	-5.973E-04	4.155E-04	-9.471E-04
5.869E-04	-1.686E-03	3.698E-04	-4.866E-04
5.726E-04	-6.995E-04	8.091E-04	-7.429E-04
3.821E-04	-6.677E-04	-4.826E-04	3.427E-05
-2.551E-04	-2.208E-07	2.859E-04	-5.539E-04
3.650E-04	2.834E-04	-1.574E-04	-1.968E-04
-1.931E-04	2.347E-04	-6.306E-04	1.185E-03
-2.135E-04	2.716E-04	-8.091E-05	-1.087E-04
1.908E-05	6.170E-05	5.860E-05	-2.337E-04
-6.405E-05	-1.763E-04	-2.036E-04	3.211E-04
-2.794E-05	2.129E-04	8.434E-04	-2.052E-04
5.638E-04	-2.546E-05	5.900E-04	-2.271E-04
-1.402E-04	3.347E-04	-4.316E-04	2.708E-04
-5.571E-04	1.102E-03	1.121E-05	-6.149E-04
3.231E-04	1.675E-04	2.221E-04	4.140E-04
-2.092E-04	2.781E-05	3.355E-04	-2.248E-04
-1.235E-06	-3.112E-04	2.216E-04	1.288E-03
9.394E-05	5.832E-04	-6.444E-04	-8.958E-04
-6.327E-05	-1.040E-04	1.138E-03	-7.147E-04
6.724E-04	-3.178E-04	-7.208E-04	4.331E-04
4.399E-04	1.722E-03	-3.537E-04	8.189E-04
-8.114E-04	2.974E-05	-5.981E-04	5.168E-04
-2.592E-04	-4.188E-04	-6.546E-05	1.019E-03
-6.649E-04	-4.089E-04	4.847E-05	2.224E-04

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8.714E-05	-1.239E-03	-2.961E-04	-8.451E-05
3.510E-04	-3.342E-04	-4.888E-05	-1.416E-03
4.191E-04	-2.854E-04	1.827E-04	-5.817E-04
-1.711E-04	2.023E-04	2.437E-04	-3.143E-04
6.293E-04	-5.036E-04	-2.518E-04	5.500E-05
-1.876E-04	-1.069E-04	-1.192E-04	-5.955E-04
-4.041E-04	5.265E-04	-2.859E-04	-2.013E-04
-1.640E-05	-7.834E-05	-7.493E-04	1.039E-03
1.902E-04	-6.275E-04	-4.455E-04	1.619E-04
-9.338E-05	2.401E-04	1.021E-04	6.525E-04
7.241E-04	-6.689E-05	1.067E-04	3.372E-04
2.775E-04	-5.655E-04	7.690E-04	-8.268E-04
4.094E-07	1.087E-03	6.410E-04	-6.087E-04
-9.948E-05	-7.191E-04	-4.009E-04	7.738E-04
-4.900E-04	4.116E-04	6.974E-04	-2.786E-04
4.168E-04	-8.080E-05	-3.125E-05	7.253E-05
4.077E-04	1.703E-03	6.683E-05	-6.100E-04
-4.149E-05	-1.706E-03	-1.983E-04	4.615E-04
-1.414E-04	-4.621E-04	2.333E-04	-5.446E-04
1.039E-04	4.423E-04	2.994E-04	-2.037E-04
6.729E-04	6.020E-04	-2.693E-04	3.614E-04
-4.522E-04	4.047E-04	-3.842E-05	8.617E-04
-4.695E-04	1.224E-03	1.058E-04	2.781E-04
-1.901E-04	3.298E-04	-1.504E-04	9.961E-04
3.103E-04	-3.769E-04	-1.636E-04	2.069E-04

Normal vector (m)	x	4.3012E-05
	y	-3.9706E-06
	z	1

The radius is estimated to be equal to 10.0000 m. The estimated centre is 0.017 mm from the theoretical value.

Final results on the vertical axis

Then the determination of the centres and the radius are computed by least squares with some added constraints on the plane that contains the circle.

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The residuals are presented here:

1 st circle (23 points)	2 nd circle (25 points)	3 rd circle (25 points)	4 th circle (25 points)
-4.117E-04	-2.577E-04	-2.909E-04	-6.438E-05
-1.177E-03	-7.861E-04	-7.313E-04	-1.074E-03
-4.926E-04	-2.189E-04	-3.841E-04	-4.495E-04
-4.744E-04	-1.911E-04	-5.830E-04	-2.511E-04
-1.165E-05	1.143E-04	8.260E-06	2.480E-05
1.836E-04	-3.333E-04	-4.420E-04	-4.680E-04
1.475E-04	-8.331E-05	-1.691E-04	-1.708E-04
1.725E-04	3.173E-04	8.878E-04	7.661E-04
2.602E-05	-6.330E-05	-9.754E-05	1.064E-04
-1.388E-04	-4.078E-04	-1.893E-04	4.800E-04
1.358E-04	1.436E-04	2.389E-04	2.460E-04
-2.732E-05	-4.649E-05	-1.581E-04	-6.280E-04
2.287E-04	-3.574E-04	-1.698E-04	-4.584E-04
7.698E-04	6.911E-04	2.154E-04	5.903E-04
1.209E-04	-4.464E-04	-4.568E-04	-1.997E-04
2.765E-05	2.714E-04	3.324E-04	6.922E-05
-2.055E-04	-3.709E-05	-1.532E-04	-4.432E-04
4.227E-04	1.092E-03	1.003E-03	3.674E-04
-5.563E-05	-1.061E-03	-6.648E-04	-3.917E-04
-2.042E-04	-2.762E-04	-5.280E-04	-1.352E-04
1.222E-03	2.937E-04	3.459E-04	2.893E-04
3.059E-05	3.925E-04	6.374E-04	6.643E-04
-2.869E-04	2.642E-04	4.016E-04	2.190E-04
	7.778E-04	7.799E-04	7.561E-04
	2.090E-04	1.668E-04	1.556E-04

The residuals represent the distance in metre from the point to the circle.

	1 st circle	2 nd circle	3 rd circle	4 th circle
Centre (m)	x 989.0544	x 989.0549	x 989.0549	x 989.0551
	y 1122.8680	y 1122.8679	y 1122.8679	y 1122.8679
	z 12.1638	z 16.7529	z 19.2571	z 20.8854

5.5.2. Horizontal Axis

Strategy

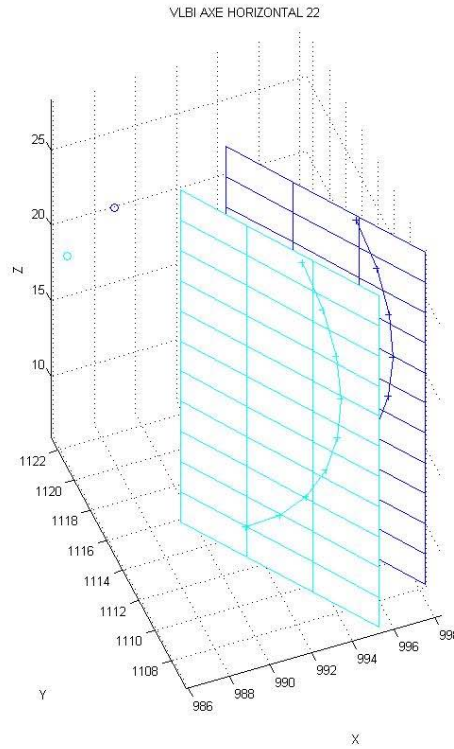
The horizontal axis has been observed through two targets set up on the antenna part linked to the secondary axis. The target could only describe an arc of the vertical circle and positions have been recorded with 10° step. In order to fulfill the lack of redundancy and the shortness of the arcs of circle, it has been decided to operate three times the same observation in three different orientations around the vertical axis. In this way, 9 positions have been determined for each vertical of the 2x3 circles by intersections from the points of the topometric network.

The processing of the coordinates of all the observation points is a least squares adjustment with constraints on the points of the polygon coming from the polygon observations. It has been led with the software COMP3D. The precision of the 3x2x9 points goes from 0.3 mm to 0.9 mm.

Each of the 3 couples of circle arcs have been processed like for the vertical axis and give the horizontal axis in its orientation.

Position 1

After having processed the 2 arcs independently and then determined the direction of the normal vector, we have the following results :



The 2 computed circle arcs and planes described by the 2 targets from position 1

Normal vector to the axis

Normal vector (m)	x	8.428E-01
	y	5.382E-01
	z	-2.797E-05

Centers of each arc of circle

	1 st circle		2 nd circle	
Centre (m)	x	988.9939	x	985.8774
	y	1122.8292	y	1120.8390
	z	19.9139	z	19.9138

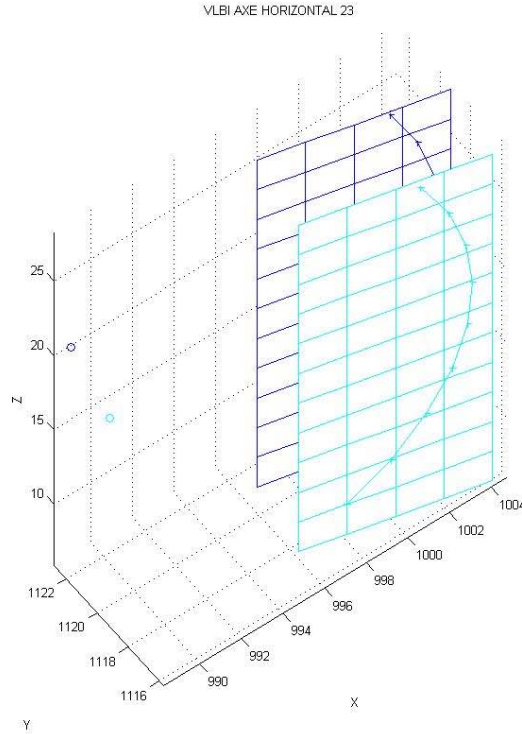
The residuals are presented here:

1 st circle (9 points)	2 nd circle (9 points)
-1.547E-05	3.634E-05
3.679E-05	-2.128E-05
1.647E-04	-3.654E-04
4.425E-05	-1.370E-04
-3.733E-05	-6.418E-05
-1.962E-04	1.775E-04
1.363E-04	3.707E-04
-1.485E-04	4.121E-05
1.539E-05	-3.789E-05

The residuals represent the distance in metre from the point to the circle.

Position 2

After having processed the 2 arcs independently and then determined the direction of the normal vector, we have the following results :



The 2 computed circle arcs and planes described by the 2 targets from position 2

Normal vector to the axis

Normal vector (m)	x	2.152E-01
	y	9.766E-01
	z	1.837E-05

Centers of each arc of circle

	1 st circle	2 nd circle
Centre (m)	x	989.0386
	y	1122.7954
	z	19.9137
	x	988.2414
	y	1119.1848
	z	19.9139

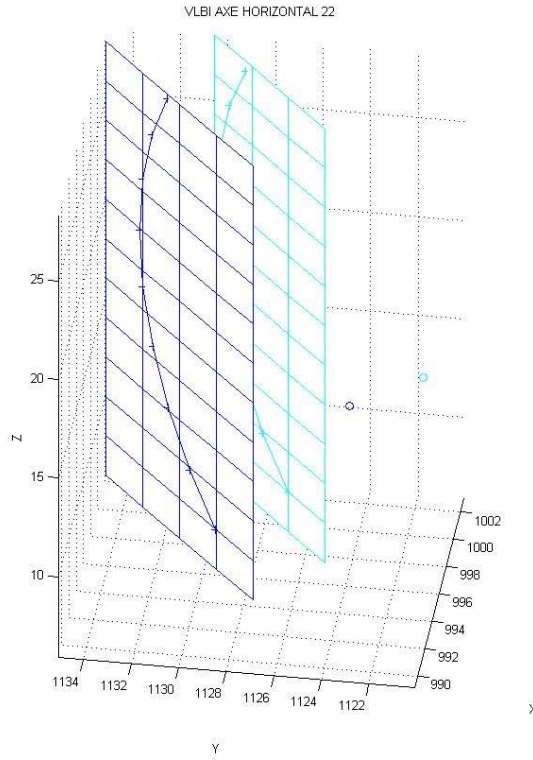
The residuals are presented here:

1 st circle (9 points)	2 nd circle (9 points)
1.588E-05	6.484E-06
-1.719E-04	-2.901E-04
-5.876E-06	1.765E-04
1.341E-04	1.146E-04
-1.713E-04	7.343E-05
9.655E-05	-1.056E-05
2.952E-05	3.481E-05
8.682E-05	-1.079E-04
-1.388E-05	2.681E-06

The residuals represent the distance in metre from the point to the circle.

Position 3

After having processed the 2 arcs independently and then determined the direction of the normal vector, we have the following results :



The 2 computed circle arcs and planes described by the 2 targets from position 3

Normal vector to the axis

Normal vector (m)	x	-6.765E-01
	y	7.365E-01
	z	9.354E-06

Centers of each arc of circle

	1 st circle	2 nd circle
Centre (m)	x	989.1049
	y	1122.8131
	z	19.9135
	x	991.6056
	y	1120.0893
	z	19.9138

The residuals are presented here:

1 st circle (9 points)	2 nd circle (9 points)
-8.883E-06	4.394E-06
1.563E-04	4.882E-05
-1.306E-04	-2.962E-04
1.205E-04	8.533E-05
-2.994E-05	1.882E-04
-1.411E-04	1.153E-04
-8.080E-06	8.078E-06
3.671E-05	-1.565E-04
5.143E-06	2.554E-06

The residuals represent the distance in metre from the point to the circle.

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5.6. GPS observations schedule

Point	Start (UT)	End (TU)	Ant. Height (m)	Ant. Type
Survey point 1 (Top and centre of the screw)	DOY 329 07:20	DOY 329 23:10	N,E 0.0000 UP 0.1743	LEIAT504
	DOY 331 09:43	DOY 332 02:25	N,E 0.0000 UP 0.1758	
	DOY 332 04:53	DOY 333 04:57	N,E 0.0000 UP 0.0651	ASH701945C_M
Survey point 2 (Top and centre of the screw)	DOY 332 09:15	DOY 333 13:32	N,E 0.0000 UP 0.0625	ASH701945C_M
Temporary station 3 (Top and centre of heavy tripod)	DOY 335 05:04	DOY 336 16:16	N,E 0.0000 UP -0.1622	LEIAT504
Survey point 4 (Top and centre of the screw)	DOY 335 08:25	DOY 336 14:27	N,E 0.0000 Up 0.0654	ASH701945C_M
Survey point 5 (Top and centre of the screw)	DOY 327 00:04	DOY 327 08:45	N,E 0.0000 Up 0.1675	LEIAT504
	DOY 329 07:02	DOY 329 22:57	N,E 0.0000 Up 0.1675	
	DOY 330 07:22	DOY 331 02:34	N,E 0.0000 Up 0.1676	
	DOY 331 09:10	DOY 332 13:05	N,E 0.0000 Up 0.1676	
	DOY 333 04:57	DOY 333 15:36	N,E 0.0000 Up 0.1676	
	DOY 334 00:08	DOY 334 06:42	N,E 0.0000 Up 0.1676	
	DOY 335 08:45	DOY 336 18:21	N,E 0.0000 Up 0.0567	ASH701945C_M
Cable car building roof (Top and centre of heavy tripod)	DOY 327 01:08	DOY 327 07:15	N,E 0.0000 Up 0.1883	LEIAT504
	DOY 334 00:42	DOY 334 06:03	N,E 0.0000 Up 0.1878	
Current SLR site (Top and centre of the domed brass mark)	DOY 327 01:25	DOY 327 07:34	N,E 0.0000 Up 1.5998	LEIAT504
	DOY 327 09:18	DOY 330 08:39	N,E 0.0000 Up 1.5998	
	DOY 330 08:42	DOY 335 01:18	N,E 0.0000 Up 1.5998	
	DOY 335 07:32	DOY 335 23:59	N,E 0.0000 Up 1.6005	
SLR telescope (Top and centre of heavy tripod) on the vertical axis)	DOY 335 03:51	DOY 335 05:22	N,E 0.0000 Up 0.1455	LEIAT504

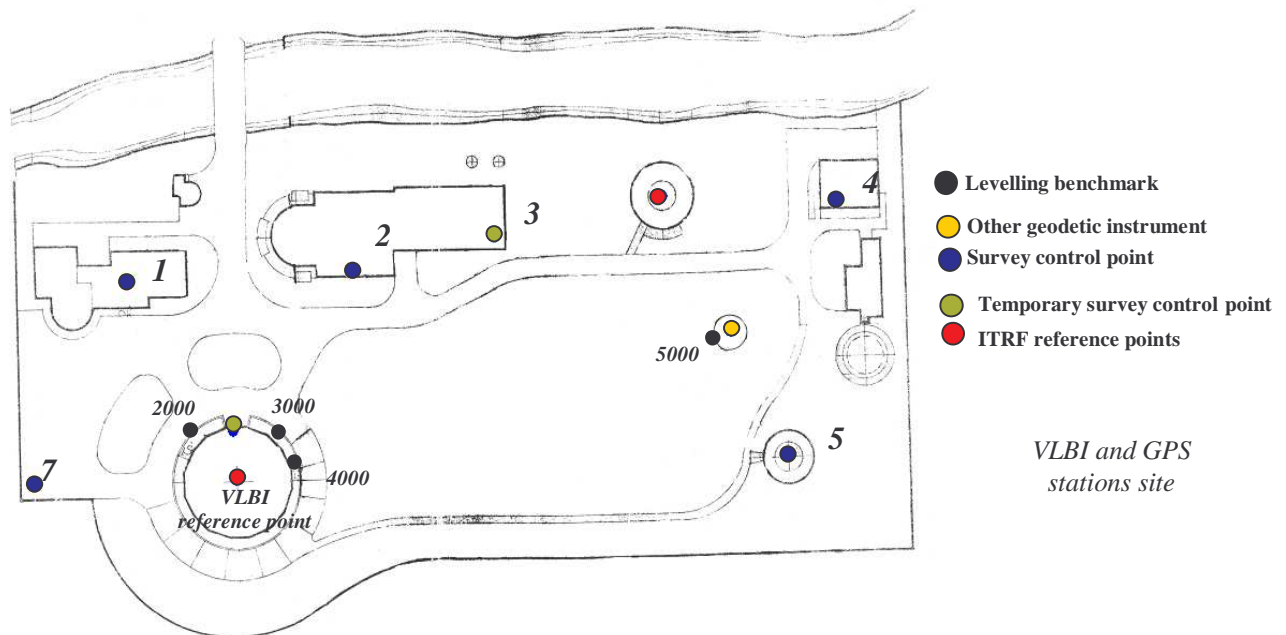
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Point	Start (UT)		End (TU)		Ant. Height (m)	Ant. Type
Future SLR site (Top and centre of screw)	DOY 327	02:14	DOY 327	06:17	N,E 0.0000	LEIAT504
					Up 0.1765	
	DOY 329	06:07	DOY 330	08:16	N,E 0.0000	
					Up 0.1750	
	DOY 330	08:24	DOY 332	01:23	N,E 0.0000	
					Up 0.1750	
	DOY 332	07:19	DOY 334	01:06	N,E 0.0000	
					Up 0.1750	
	DOY 334	01:16	DOY 336	02:11	N,E 0.0000	
					Up 0.1743	

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

5.7. Survey control points

5.7.1. The VLBI site



Point 1

- Residence building roof terrace
- Concrete block
- Top and centre of the 5/9 inch screw embedded on top
- Horizontal self-centering
- Direct levelling is possible



Point 2

- Workshop building roof terrace
- Concrete block
- Top and axis of the 5/9 inch screw embedded on top
- Horizontal self-centering
- Direct levelling is possible



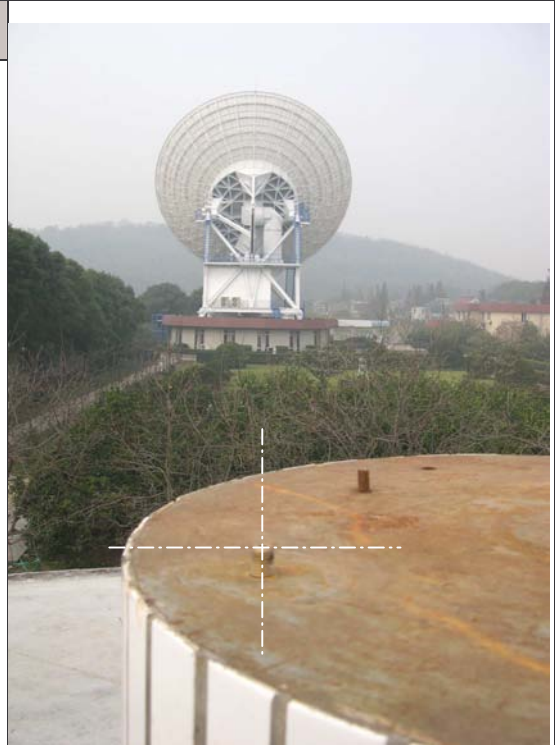
Point 4

- Power station building roof terrace
- Top and centre of the 5/9 inch screw embedded on a concrete wall
- Horizontal self centering
- Direct levelling is possible



Point 5

- Circular building roof terrace
- Concrete pillar
- Top and axis of the 5/9 inch screw embedded on top of a metallic plate



Point 7

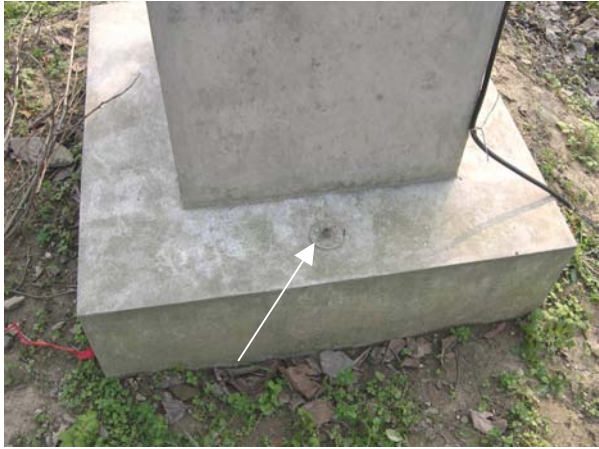
- Southwest corner of the Sheshan VLBI and GPS site
- Brass mark
- Top and centre
- Direct levelling is possible



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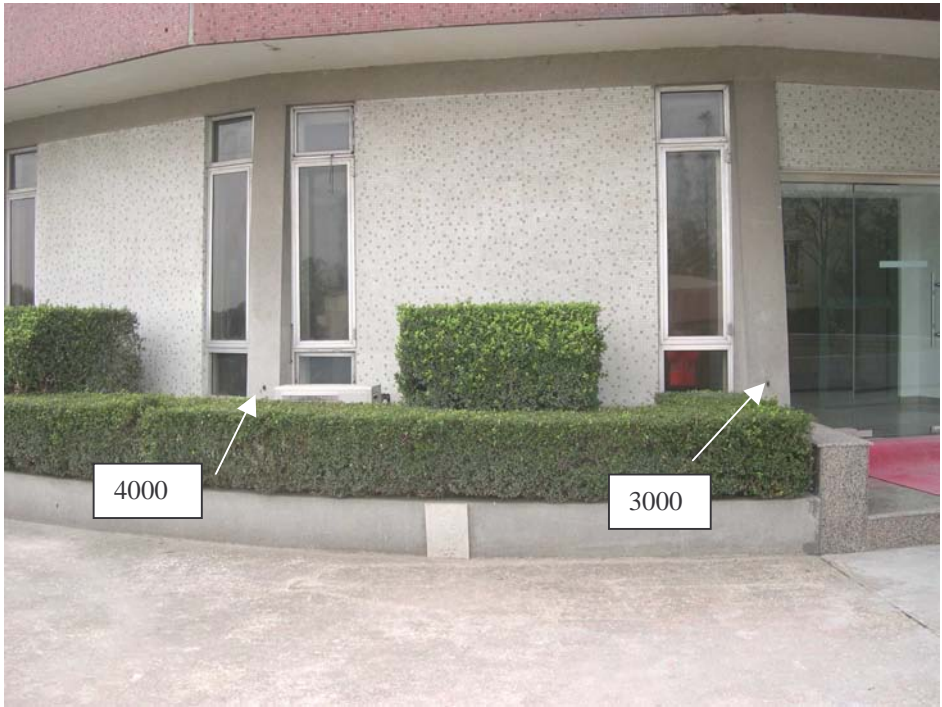
**Levelling benchmark
5000**

EGNOS concrete pier
base



**Levelling benchmark
4000**

VLBI building : east
side of the entrance
door, between the 2nd
and the 3rd window



**Levelling benchmark
3000**

VLBI building : east
side of the entrance
door, before the first
window

**Levelling benchmark
1000**

Residence building
Southwest corner



**Levelling benchmark
2000**

VLBI building : west
side of the entrance
door, between the 1st
and the 2nd window



5.7.2. Future Laser site

Point 40

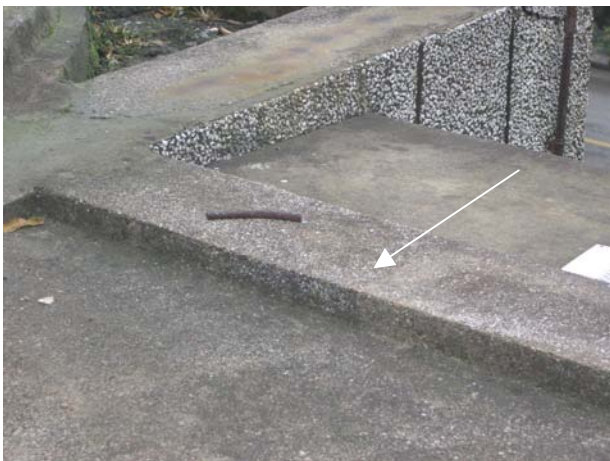
- Roof terrace
- Top and centre of the 5/9 inch screw embedded on a concrete wall
- Horizontal self centring device



5.7.3. Current Laser site

Point 30

- Roof terrace
- Top and centre of the domed brass mark



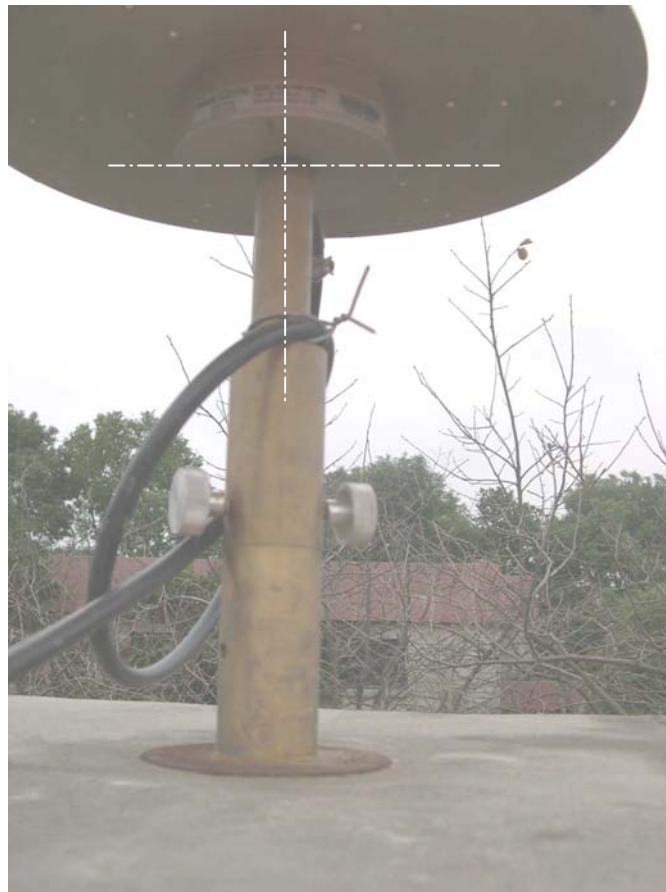
5.8. GPS stations antenna intersections

SHAO antenna intersections



References for horizontal and vertical determinations

EGNOS station antenna intersections



References for horizontal and vertical determinations

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5.9. SHAO ITRF00 solution extracted SINEX file (2003:332)

```

%=SNX 1.00 IGN 05:321:00000 IGN 03:332:00000 00:000:00000 C 6 2 X V
*-----
+FILE/REFERENCE
DESCRIPTION      IGN/ENSG/LAREG: IERS ITRS Product Center
OUTPUT          ITRF2000 station positions and velocities
CONTACT        Zuheir Altamimi (altamimi@ensg.ign.fr)
SOFTWARE       CATREF
INPUT          ITRF2000 solution

-FILE/REFERENCE
*-----
+FILE/COMMENT
*
*
*
-FILE/COMMENT
*-----
+SITE/ID
*CODE PT  _DOMES_  T  _STATION DESCRIPTION_  APPROX_LON_  APPROX_LAT_  _APP_H_
SHAO  A  21605M002  C  SHAO  21605M002          121 12  1.5  31  5  58.7   22.1
-SITE/ID
*-----
+SOLUTION/ESTIMATE
*INDEX TYPE  _CODE_  PT  SOLN  _REF_EPOCH_  UNIT  S  _ESTIMATED VALUE_  _STD_DEV_
  1  STAX  SHAO  A    1  03:332:00000  m    2  -.283173347973873E+07  .28099E-02
  2  STAY  SHAO  A    1  03:332:00000  m    2   .467566596147055E+07  .37934E-02
  3  STAZ  SHAO  A    1  03:332:00000  m    2   .327536942805999E+07  .41691E-02
  4  VELX  SHAO  A    1  03:332:00000  m/y   2  -.306849379564895E-01  .36973E-03
  5  VELY  SHAO  A    1  03:332:00000  m/y   2  -.112298145785553E-01  .47404E-03
  6  VELZ  SHAO  A    1  03:332:00000  m/y   2  -.134405028949834E-01  .50139E-03
-SOLUTION/ESTIMATE
*-----
+SOLUTION/MATRIX_ESTIMATE L COVA
*PARA1  PARA2  _PARA2+0_  _PARA2+1_  _PARA2+2_
  1      1      .789586586910286E-05
  2      1     -.675355859736665E-05  .143901087749258E-04
  3      1     -.366676857322245E-05  .710583822654907E-05  .173816038805136E-04
  4      1     .909518310360241E-06  -.697783727328794E-06  -.407114576292363E-06
  4      4     .136704294273500E-06
  5      1     -.700266444278191E-06  .153999620572736E-05  .768759497656955E-06
  5      4     -.100358887177672E-06  .224716413573800E-06
  6      1     -.405050988634622E-06  .763564394034003E-06  .187424035250533E-05
  6      4     -.634127591622395E-07  .114111700029834E-06  .251400982655323E-06
-SOLUTION/MATRIX_ESTIMATE L COVA
%ENDSNX

```

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5.10. GPS network covariance matrix

3DC				
XYZ	000 30	-2831090.9957	4676203.2927	3275169.0349 m
XYZ	000 21605M101	-2830750.7222	4676573.2249	3275076.8389 m
XYZ	000 5	-2831764.2137	4675670.1135	3275329.9428 m
XYZ	000 1	-2831656.7582	4675722.7915	3275351.5377 m
XYZ	000 2	-2831688.2092	4675699.9038	3275352.0305 m
XYZ	000 20	-2831329.3639	4676117.4997	3275186.2389 m
XYZ	000 35	-2831088.5498	4676203.6733	3275173.0261 m
XYZ	000 4	-2831761.2663	4675644.5288	3275371.0320 m
COV	CT UPPR	16		
ELEM	2.891744470469999e-06	-1.626026259449000e-09	-9.099042949519999e-10	
ELEM	2.891167744960000e-06	-1.061760804113000e-09	-5.993748729220000e-10	
ELEM	2.889973609098000e-06	-7.359131078819999e-11	-3.091820283120000e-11	
ELEM	2.890975921210000e-06	-9.759094503009999e-10	-5.264261509750000e-10	
ELEM	2.891089015580000e-06	-1.087418361388000e-09	-5.822672112929999e-10	
ELEM	2.890946801570000e-06	-9.090698247919998e-10	-5.042909670270000e-10	
ELEM	2.891198387630000e-06	-1.130632186900000e-09	-6.310814377549999e-10	
ELEM	2.890596556690000e-06	-6.554968629149999e-10	-3.200880065730000e-10	
ELEM	2.893530051190000e-06	1.534121823757000e-09	-1.156430017550000e-09	
ELEM	2.892473282230000e-06	1.096443434302000e-09	9.326423042889998e-11	
ELEM	2.890027816249999e-06	-3.482852444059999e-11	-8.320794352439999e-10	
ELEM	2.891993368830000e-06	8.189126654709999e-10	-9.336661419879999e-10	
ELEM	2.892196373990000e-06	9.006193382100000e-10	-8.530903950309999e-10	
ELEM	2.891903186380000e-06	8.283584556259999e-10	-1.114642979547000e-09	
ELEM	2.892470655220000e-06	1.061117880263000e-09	-4.889573729359999e-10	
ELEM	2.891177313750000e-06	4.575439549640000e-10		
ELEM	2.891852068060000e-06	-6.344591527100000e-10	1.043093016733000e-09	
ELEM	2.891275984130000e-06	3.618963164210000e-11	5.074540841649999e-11	
ELEM	2.889991012967000e-06	-4.752004703650000e-10	9.069036767340000e-10	
ELEM	2.891073617659999e-06	-5.234227970829999e-10	9.920190140159999e-10	
ELEM	2.891173672350000e-06	-4.758584733679999e-10	8.379290585229999e-10	
ELEM	2.890997255189999e-06	-6.219625311649999e-10	1.059360535710000e-09	
ELEM	2.891275599759999e-06	-2.584976737465000e-10	5.524970944279999e-10	
ELEM	2.890616728890000e-06			
ELEM	2.891856056260000e-06	-1.762414034651000e-09	-9.908773247179998e-10	
ELEM	2.889954498973000e-06	-1.124942020527000e-10	-4.567350624600000e-11	
ELEM	2.890921840640000e-06	-9.889171241289997e-10	-5.253090122269999e-10	
ELEM	2.891096867710000e-06	-1.154190802489000e-09	-6.119828348959999e-10	
ELEM	2.890926149630000e-06	-9.242163540959999e-10	-4.963574445120000e-10	
ELEM	2.891886693149999e-06	-1.831303370118000e-09	-1.022582829788000e-09	
ELEM	2.890628939140000e-06	-7.376333639089999e-10	-3.593196716069999e-10	
ELEM	2.893901572250000e-06	1.692272513337000e-09	1.487687494088000e-10	
ELEM	2.890035324470000e-06	-6.022710748619999e-11	-7.499904452720000e-10	
ELEM	2.891959558720000e-06	7.741952163089999e-10	-9.055680253749998e-10	
ELEM	2.892276091749999e-06	9.043528537809999e-10	-7.552191566749999e-10	
ELEM	2.891737889940000e-06	7.554507424900000e-10	-1.720610211239000e-09	
ELEM	2.893898962580000e-06	1.656936079604000e-09	-4.780466360009999e-10	
ELEM	2.891270345740000e-06	4.692014242600000e-10		
ELEM	2.892003986690000e-06	5.626365186849999e-11	7.890291054129999e-11	
ELEM	2.889982609714000e-06	-4.389019585219999e-10	9.156631927500000e-10	
ELEM	2.891036290420000e-06	-5.182222108710000e-10	1.049725243053000e-09	
ELEM	2.891198390519999e-06	-4.355336912659999e-10	8.253143455089999e-10	
ELEM	2.890944356629999e-06	-9.783719586110000e-10	1.708552018011000e-09	
ELEM	2.892003596540000e-06	-2.633528933696000e-10	6.175689323689999e-10	
ELEM	2.890659116520000e-06			
ELEM	2.889996555409000e-06	-7.543861341159999e-13	-7.792194466289999e-13	
ELEM	2.889992274163000e-06	1.099073985997000e-11	5.282254444560000e-12	
ELEM	2.889995158671999e-06	5.273405484199999e-12	7.367734163759999e-13	
ELEM	2.889977140100000e-06	6.595608840879999e-11	2.319360168479000e-11	
ELEM	2.889985147712000e-06	7.992883961769999e-11	2.455552246753000e-11	
ELEM	2.889996381431000e-06	-9.352117209239999e-13	2.757980122824000e-12	
ELEM	2.889996143873000e-06	1.844958002236000e-12	-1.098838779012000e-11	
ELEM	2.889998530435000e-06	2.875458128345000e-12	-7.666665362649999e-12	

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ELEM	2.889997253633000e-06	5.899249344609999e-13	-5.093172171679999e-11
ELEM	2.890012739120000e-06	4.108605474659999e-11	-7.073571571799999e-11
ELEM	2.890032668560000e-06	4.359582189720000e-11	-5.551451728169999e-13
ELEM	2.889996125377000e-06	-7.907364029689999e-13	
ELEM	2.889994714190000e-06	-7.119148455519999e-12	1.528794672885000e-12
ELEM	2.889994702341000e-06	-4.902288241010000e-12	3.435509726989999e-12
ELEM	2.889993934179000e-06	-1.563226886597000e-11	-3.655558792040000e-11
ELEM	2.889982893223000e-06	-3.319217002659999e-11	-4.397987000899999e-11
ELEM	2.889982231702000e-06	-2.433355960691000e-12	7.455072570540000e-12
ELEM	2.889995944174000e-06		
ELEM	2.892950941430000e-06	-2.682553170678000e-09	-1.578611233423000e-09
ELEM	2.891432492080000e-06	-1.326625093383000e-09	-7.440310271359999e-10
ELEM	2.890608197610000e-06	-5.105102051219999e-10	-2.911747663270000e-10
ELEM	2.890952483310000e-06	-8.188553550370000e-10	-4.706096553679999e-10
ELEM	2.890404267650000e-06	-3.913647525439999e-10	-1.941921289870000e-10
ELEM	2.895901044760000e-06	2.705445735481000e-09	-1.316563089625000e-09
ELEM	2.892775775639999e-06	1.243751784288000e-09	-5.952205982050000e-10
ELEM	2.891168611960000e-06	5.575897073499999e-10	-9.471365134859999e-10
ELEM	2.891956928820000e-06	8.803421008709999e-10	-3.691458213089999e-10
ELEM	2.890761751980000e-06	3.263944637119999e-10	
ELEM	2.893463468480000e-06	-7.364420353930000e-10	1.246641807408000e-09
ELEM	2.891594170240000e-06	-3.153263914200000e-10	4.819733084789999e-10
ELEM	2.890644556699999e-06	-5.128161540400000e-10	7.904590349299999e-10
ELEM	2.891035908939999e-06	-1.848100159649000e-10	3.341815880750000e-10
ELEM	2.890422864800000e-06		
ELEM	2.895040966310000e-06	-4.666223504010000e-09	-2.666383556520000e-09
ELEM	2.890699249949999e-06	-5.865434552809999e-10	-3.273926740470000e-10
ELEM	2.891127513270000e-06	-9.744374071259999e-10	-5.499299169649999e-10
ELEM	2.890467255199999e-06	-4.441709669290000e-10	-2.175506707719000e-10
ELEM	2.899674439729999e-06	4.402206646549999e-09	-6.790703877249999e-10
ELEM	2.891309600610000e-06	6.207175674279999e-10	-1.112406791761000e-09
ELEM	2.892273464739999e-06	1.014402079622000e-09	-4.316047631430000e-10
ELEM	2.890864456800000e-06	3.700712258970000e-10	
ELEM	2.895724835680000e-06	-3.591165950640000e-10	5.423245637759999e-10
ELEM	2.890720641730000e-06	-5.994883152479999e-10	9.206195285889999e-10
ELEM	2.891198006149999e-06	-2.155064212377000e-10	3.742686509149999e-10
ELEM	2.890475615970000e-06		
ELEM	2.914211928700000e-06	-2.375101612520000e-08	-1.038421490683000e-08
ELEM	2.890956792300000e-06	-8.240841453369999e-10	-4.672413719279999e-10
ELEM	2.890390930299999e-06	-4.216018110440000e-10	-1.989435761374000e-10
ELEM	2.935746119230000e-06	1.894331718537000e-08	-8.824386505039999e-10
ELEM	2.891735257149999e-06	7.899952639139998e-10	-3.090853748630000e-10
ELEM	2.890711379280000e-06	2.728766419971000e-10	
ELEM	2.911915716769999e-06	-4.838649472859999e-10	7.717133718759999e-10
ELEM	2.890943975149999e-06	-1.651113618568000e-10	3.568022576320000e-10
ELEM	2.890381748770000e-06		
ELEM	3.028944070370000e-06	-1.301289858097000e-07	-5.361701969329999e-08
ELEM	2.890659584700000e-06	-6.958613348319999e-10	-3.468310894640000e-10
ELEM	3.099842694809999e-06	8.583650057029999e-08	-5.469038314890000e-10
ELEM	2.891267707170000e-06	4.854594490089999e-10	
ELEM	2.992339208990000e-06	-2.950607221730000e-10	5.822535430380000e-10
ELEM	2.890658735039999e-06		
ELEM	2.895214337410000e-06	-4.675576275180000e-09	-2.622666697030000e-09
ELEM	2.900435012590000e-06	4.517919801610000e-09	
ELEM	2.895490670539999e-06		

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5.11. Global results listing

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=====
shao_juillet.iob
Microsearch GeoLab, V2001.9.20.0      GRS80      UNITS: m,GRAD Page 0001
=====
Fri Jan 13 08:40:49 2006

```

```

Input file: D:\itrf\surveys\shanghai\calculs\global2-1mm\shao_juillet.iob
Output file: D:\itrf\surveys\shanghai\calculs\global2-1mm\shao_juillet.lst
Options file: C:\Program Files\Microsearch\GeoLab\default.gpj

```

PARAMETERS		OBSERVATIONS	
Description	Number	Description	Number
No. of Stations	151	Directions	326
Coord Parameters	415	Distances	134
Free Latitudes	132	Azimuths	0
Free Longitudes	132	Vertical Angles	0
Free Heights	151	Zenithal Angles	249
Fixed Coordinates	38	Angles	0
Astro. Latitudes	0	Heights	0
Astro. Longitudes	0	Height Differences	170
Geoid Records	0	Auxiliary Params.	0
All Aux. Pars.	126	2-D Coords.	0
Direction Pars.	126	2-D Coord. Diffs.	174
Scale Parameters	0	3-D Coords.	33
Constant Pars.	0	3-D Coord. Diffs.	0
Rotation Pars.	0		
Translation Pars.	0		
	-----		-----
Total Parameters	541	Total Observations	1086
Degrees of Freedom =		545	

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 Relative
Relative Confidence Regions	All
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	No
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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shao_juillet.iob
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=====

Adjusted PLH Coordinates:

CODE	FFF	STATION	LATITUDE		LONGITUDE		ELIP-HEIGHT		
			STD DEV		STD DEV		STD DEV		
PLH	000	1	N 31 5	58.067032	E121 11	58.011190	20.4107	m	0
				0.0012		0.0012	0.0012		
PLH	110	1000	N 31 5	58.066967	E121 11	58.011239	13.5202	m	0
				0.0000		0.0000	0.0012		
PLH	000	2	N 31 5	58.135801	E121 11	59.473688	17.8503	m	0
				0.0012		0.0012	0.0012		
PLH	000	20	N 31 5	50.652884	E121 11	39.729417	78.9294	m	0
				0.0013		0.0013	0.0017		
PLH	110	2000	N 31 5	58.135755	E121 11	59.473740	13.8777	m	0
				0.0000		0.0000	0.0012		
PLH	000	21605M002	N 31 5	58.713196	E121 12	1.598328	22.0572	m	0
				0.0012		0.0012	0.0012		
PLH	000	21605M101	N 31 5	46.098824	E121 11	12.146630	99.6422	m	0
				0.0012		0.0012	0.0013		
PLH	000	21605S001	N 31 5	51.140938	E121 11	30.272414	27.8560	m	0
				0.0014		0.0013	0.0014		
PLH	000	21605S009	N 31 5	56.982969	E121 11	58.780239	29.4210	m	0
				0.0012		0.0012	0.0013		
PLH	000	3	N 31 5	58.402656	E121 12	0.523506	19.0166	m	0
				0.0012		0.0012	0.0013		
PLH	000	30	N 31 5	51.014181	E121 11	30.358816	27.1679	m	0
				0.0012		0.0012	0.0013		
PLH	110	3000	N 31 5	58.402616	E121 12	0.523569	13.8830	m	0
				0.0000		0.0000	0.0012		
PLH	000	35	N 31 5	51.140938	E121 11	30.272414	28.4224	m	0
				0.0014		0.0013	0.0013		
PLH	000	4	N 31 5	58.823789	E121 12	2.914136	19.5079	m	0
				0.0012		0.0012	0.0012		
PLH	110	4000	N 31 5	58.823726	E121 12	2.914171	13.8604	m	0
				0.0000		0.0000	0.0012		
PLH	000	5	N 31 5	57.288755	E121 12	2.509137	18.3353	m	0
				0.0012		0.0012	0.0012		
PLH	000	50	N 31 5	44.496162	E121 11	49.303772	99.2615	m	0
				0.0024		0.0023	0.0030		
PLH	110	5000	N 31 5	57.288763	E121 12	2.509111	13.1702	m	0
				0.0000		0.0000	0.0012		
PLH	000	7	N 31 5	56.869114	E121 11	57.366202	12.9814	m	0
				0.0012		0.0012	0.0012		
PLH	000	8	N 31 5	58.713209	E121 12	1.598324	22.1370	m	0
				0.0012		0.0012	0.0013		
PLH	000	9	N 31 5	58.148476	E121 12	2.247827	17.4547	m	0
				0.0012		0.0012	0.0013		

Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE		Y-COORDINATE		Z-COORDINATE			
			STD DEV		STD DEV		STD DEV			
XYZ		1	-2831656.	7597	4675722.	7942	3275351.	5384	m	0
				0.0012		0.0012	0.0012			
XYZ		1000	-2831653.	7050	4675717.	7476	3275347.	9776	m	0
				0.0006		0.0009	0.0006			
XYZ		2	-2831688.	2100	4675699.	9055	3275352.	0295	m	0
				0.0012		0.0012	0.0012			
XYZ		20	-2831329.	3668	4676117.	5036	3275186.	2413	m	0
				0.0014		0.0016	0.0014			
XYZ		2000	-2831686.	4494	4675696.	9958	3275349.	9763	m	0
				0.0005		0.0009	0.0006			
XYZ		21605M002	-2831733.	4800	4675665.	9620	3275369.	4290	m	0
				0.0012		0.0012	0.0012			
XYZ		21605M101	-2830750.	7229	4676573.	2261	3275076.	8386	m	0
				0.0012		0.0013	0.0012			
XYZ		21605S001	-2831088.	2986	4676203.	2592	3275172.	7329	m	0
				0.0014		0.0013	0.0014			
XYZ		21605S009	-2831687.	1229	4675733.	5867	3275327.	6044	m	0
				0.0012		0.0012	0.0012			

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Adjusted XYZ Coordinates:

CODE	FFF	STATION	X-COORDINATE STD DEV	Y-COORDINATE STD DEV	Z-COORDINATE STD DEV		
XYZ		3	-2831710.3259 0.0012	4675682.7163 0.0012	3275359.6692 m 0.0012		0
XYZ		30	-2831090.9966 0.0012	4676203.2941 0.0013	3275169.0348 m 0.0012		0
XYZ		3000	-2831708.0506 0.0005	4675678.9560 0.0009	3275357.0165 m 0.0006		0
XYZ		35	-2831088.5498 0.0013	4676203.6741 0.0013	3275173.0255 m 0.0014		0
XYZ		4	-2831761.2648 0.0012	4675644.5256 0.0012	3275371.0286 m 0.0012		0
XYZ		4000	-2831758.7610 0.0005	4675640.3897 0.0009	3275368.1099 m 0.0006		0
XYZ		5	-2831764.2140 0.0012	4675670.1139 0.0012	3275329.9424 m 0.0012		0
XYZ		50	-2831606.1642 0.0025	4676084.7377 0.0027	3275034.3758 m 0.0026		0
XYZ		5000	-2831761.9222 0.0005	4675666.3311 0.0009	3275327.2747 m 0.0006		0
XYZ		7	-2831648.7148 0.0012	4675742.5073 0.0012	3275316.1106 m 0.0012		0
XYZ		8	-2831733.5152 0.0012	4675666.0203 0.0012	3275369.4705 m 0.0012		0
XYZ		9	-2831750.8152 0.0012	4675661.3584 0.0012	3275352.1594 m 0.0012		0

Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
XCT	21605M002			-2831733.48000 0.0008	0.0000 0.0005	0.0091
YCT	21605M002			4675665.96200 0.0012	-0.0000 0.0008	-0.0020
ZCT	21605M002			3275369.42900 0.0009	-0.0000 0.0006	-0.0036
XCT	21605M002			-2831733.48000 0.0010	0.0000 0.0008	0.0063
YCT	21605M002			4675665.96200 0.0014	-0.0000 0.0011	-0.0014
ZCT	21605M002			3275369.42900 0.0011	-0.0000 0.0008	-0.0025
XCT	5			-2831764.21380 0.0010	-0.0003 0.0008	-0.4378
YCT	5			4675670.11370 0.0014	0.0001 0.0011	0.0807
ZCT	5			3275329.94260 0.0011	0.0002 0.0008	0.1888
XCT	30			-2831090.99570 0.0070	-0.0010 0.0070	-0.1373
YCT	30			4676203.29270 0.0100	0.0000 0.0099	0.0026
ZCT	30			3275169.03490 0.0076	0.0013 0.0076	0.1735
XCT	21605M101			-2830750.72220 0.0070	-0.0010 0.0070	-0.1361
YCT	21605M101			4676573.22490 0.0100	0.0000 0.0099	0.0018
ZCT	21605M101			3275076.83890 0.0076	0.0010 0.0076	0.1350
XCT	5			-2831764.21370 0.0070	-0.0006 0.0070	-0.0888
YCT	5			4675670.11350 0.0100	0.0001 0.0099	0.0070
ZCT	5			3275329.94280 0.0076	0.0002 0.0076	0.0322

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	RESIDUAL	STD RES	
				STD DEV	STD DEV	PPM	
XCT	1			-2831656.75820	-0.0010	-0.1386	
				0.0070	0.0070		
YCT	1			4675722.79150	-0.0001	-0.0069	
				0.0100	0.0099		
ZCT	1			3275351.53770	0.0030	0.3986	
				0.0076	0.0076		
XCT	2			-2831688.20920	-0.0019	-0.2645	
				0.0070	0.0070		
YCT	2			4675699.90380	-0.0002	-0.0207	
				0.0100	0.0099		
ZCT	2			3275352.03050	0.0011	0.1409	
				0.0076	0.0076		
XCT	20			-2831329.36390	-0.0004	-0.0633	
				0.0070	0.0070		
YCT	20			4676117.49970	0.0004	0.0448	
				0.0100	0.0100		
ZCT	20			3275186.23890	0.0053	0.6969	
				0.0077	0.0076		
XCT	35			-2831088.54980	-0.0009	-0.1262	
				0.0071	0.0070		
YCT	35			4676203.67330	-0.0004	-0.0383	
				0.0102	0.0102		
ZCT	35			3275173.02610	0.0003	0.0371	
				0.0079	0.0078		
XCT	4			-2831761.26630	-0.0011	-0.1530	
				0.0070	0.0070		
YCT	4			4675644.52880	0.0004	0.0365	
				0.0100	0.0099		
ZCT	4			3275371.03200	-0.0047	-0.6211	
				0.0076	0.0076		
DIR		111504	112020	0 0	0.0	1.9	0.5
					4.0	3.6	
DIR		111504	112001	13 44	61.0	1.5	0.4
					4.0	3.7	
DIR		111504	112002	10 20	86.0	0.7	0.2
					4.0	3.6	
DIR		111504	112003	11 89	9.0	-3.9	-1.1
					4.0	3.5	
DIR		111504	112050	368 37	25.0	0.0	0.0
					4.0	3.5	
DIR		111504	112006	399 14	10.0	1.9	0.5
					4.0	3.7	
DIR		111504	112007	0 0	51.0	-2.1	-0.6
					4.0	3.7	
DIR		111504	112020	0 0	0.0	1.7	0.7
					4.0	2.6	
DIR		111504	112005	338 95	74.0	-1.7	-0.7
					4.0	2.6	
DIR		111502	112020	0 0	0.0	-2.1	-0.6
					4.0	3.6	
DIR		111502	112001	22 93	43.0	-2.3	-0.7
					4.0	3.2	
DIR		111502	112003	208 12	11.0	6.5	2.2
					4.0	2.9	
DIR		111502	112005	246 37	31.0	-5.7	-1.7
					4.0	3.5	
DIR		111502	112050	362 72	69.0	-2.3	-0.7
					4.0	3.4	
DIR		111502	112006	368 77	0.0	4.4	1.4
					4.0	3.2	
DIR		111502	112007	387 59	42.0	1.7	0.5
					4.0	3.5	
DIR		111502	112020	0 0	0.0	-1.7	-0.6
					4.0	2.8	
DIR		111502	112004	211 87	24.0	1.7	0.6
					4.0	2.8	


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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	RESIDUAL	STD RES	
				STD DEV	STD DEV	PPM	
ZANG		111504	112003	100 70	40.0	-6.0	-1.1
					6.0	5.5	
ZANG		111504	112050	91 17	45.0	-20.6	-2.1
					10.0	9.8	
ZANG		111504	112006	100 88	24.0	-4.6	-0.8
					6.0	5.8	
ZANG		111504	112007	102 10	3.0	-2.4	-0.4
					6.0	5.9	
ZANG		111504	112020	94 31	95.0	-3.0	-0.3
					12.0	12.0	
ZANG		111504	112020	94 31	96.0	-2.0	-0.2
					12.0	12.0	
ZANG		111504	112005	101 55	13.0	-3.8	-0.8
					6.0	4.7	
ZANG		111502	112001	95 80	71.0	-2.6	-0.5
					6.0	5.2	
ZANG		111502	112003	97 92	97.0	0.1	0.0
					6.0	4.9	
ZANG		111502	112005	99 64	12.0	3.2	0.6
					6.0	5.6	
ZANG		111502	112050	89 73	62.0	-7.0	-0.7
					10.0	9.7	
ZANG		111502	112006	100 4	98.0	0.4	0.1
					6.0	4.8	
ZANG		111502	112007	103 34	52.0	-0.4	-0.1
					6.0	5.6	
ZANG		111502	112020	93 22	54.0	-7.1	-0.6
					12.0	11.9	
ZANG		111502	112020	93 22	52.0	-9.1	-0.8
					12.0	11.9	
ZANG		111502	112020	93 22	53.0	-8.1	-0.7
					12.0	11.9	
ZANG		111502	112004	98 87	31.0	5.1	0.9
					6.0	5.8	
ZANG		111502	112020	93 22	56.0	-5.1	-0.4
					12.0	11.9	
ZANG		111502	112003	97 92	96.0	-0.9	-0.2
					6.0	4.9	
ZANG		111502	112020	93 22	58.0	-3.1	-0.3
					12.0	11.9	
ZANG		111502	112007	103 34	51.0	-1.4	-0.3
					6.0	5.6	
ZANG		111502	112020	93 22	54.0	-7.1	-0.6
					12.0	11.9	
ZANG		111502	112020	93 22	53.0	-8.1	-0.7
					12.0	11.9	
ZANG		111502	112001	95 80	73.0	-0.6	-0.1
					6.0	5.2	
ZANG		111502	112004	98 87	24.0	-1.9	-0.3
					6.0	5.8	
ZANG		111502	112005	99 64	17.0	8.2	1.5
					6.0	5.6	
ZANG		111502	112006	100 4	97.0	-0.6	-0.1
					6.0	4.8	
ZANG		111502	112020	93 22	53.0	-8.1	-0.7
					12.0	11.9	
ZANG		111502	112020	93 22	52.0	-9.1	-0.8
					12.0	11.9	
ZANG		111502	112004	98 87	28.0	2.1	0.4
					6.0	5.8	
ZANG		111502	112020	93 22	55.0	-6.1	-0.5
					12.0	11.9	
ZANG		111505	112020	93 96	58.0	-8.4	-0.7
					12.0	12.0	
ZANG		111505	112004	98 44	89.0	1.0	0.2
					6.0	4.9	

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION	RESIDUAL	STD RES
				STD DEV	STD DEV	PPM
ZANG		111505	112003	99 52	67.0	-4.2
					6.0	5.4
ZANG		111505	112002	100 35	99.0	2.9
					6.0	5.6
ZANG		111505	112020	93 96	60.0	-6.4
					12.0	12.0
ZANG		111505	112020	93 96	62.0	-4.4
					12.0	12.0
ZANG		111505	112020	93 96	57.0	-9.4
					12.0	12.0
ZANG		111505	112006	100 31	65.0	-5.4
					6.0	5.7
ZANG		111505	112001	98 91	7.0	7.6
					6.0	5.8
ZANG		111506	112020	92 85	82.0	-5.8
					12.0	11.9
ZANG		111506	112007	106 5	9.0	5.1
					6.0	4.5
ZANG		111506	112020	92 85	78.0	-9.8
					12.0	11.9
ZANG		111506	112001	94 57	16.0	0.8
					6.0	4.4
ZANG		111506	112002	99 95	14.0	-0.4
					6.0	4.3
ZANG		111506	112003	98 96	50.0	-1.7
					6.0	5.5
ZANG		111506	112004	99 11	86.0	-2.3
					6.0	5.8
ZANG		111506	112005	99 68	39.0	2.5
					6.0	5.7
ZANG		111506	112020	92 85	79.0	-8.8
					12.0	11.9
ZANG		111506	112020	92 85	78.0	-9.8
					12.0	11.9
ZANG		111506	112020	92 85	77.0	-10.8
					12.0	11.9
DIST		111504	113207	158.96160	0.0000	0.0512
					0.0010	0.31
DIST		111504	113206	121.62180	-0.0005	-0.4728
					0.0010	3.80
DIST		111504	113101	132.01280	-0.0009	-0.8883
					0.0010	6.59
DIST		111504	113102	93.62180	-0.0006	-0.6547
					0.0010	6.83
DIST		111504	113205	48.49390	-0.0010	-1.0573
					0.0010	21.38
DIST		111504	113103	64.67400	-0.0010	-0.9883
					0.0010	14.70
DIST		111502	113103	29.02600	-0.0004	-0.4239
					0.0010	14.11
DIST		111502	113201	38.90110	-0.0006	-0.6492
					0.0010	16.42
DIST		111502	113207	68.22080	-0.0000	-0.0386
					0.0010	0.55
DIST		111502	113105	84.57040	-0.0010	-0.9808
					0.0010	11.40
DIST		111502	113206	33.57650	-0.0004	-0.4210
					0.0010	12.34
DIST		111502	113104	93.62190	-0.0007	-0.7197
					0.0010	7.52
DIST		111502	113103	29.02630	-0.0007	-0.7344
					0.0010	24.44
DIST		111502	113207	68.22110	-0.0003	-0.3469
					0.0010	4.95
DIST		111502	113206	33.57630	-0.0002	-0.2177
					0.0010	6.38


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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIST		111502	113201	38.90100 0.0010	-0.0005 0.0010	-0.5476 13.85
DIST		111502	113205	84.57050 0.0010	-0.0011 0.0010	-1.0926 12.70
DIST		111502	113104	93.62240 0.0010	-0.0012 0.0010	-1.2309 12.86
DIST		111505	113102	84.57040 0.0010	-0.0009 0.0010	-0.9418 10.93
DIST		111505	113103	62.81970 0.0010	-0.0010 0.0010	-0.9830 15.13
DIST		111505	113201	121.60710 0.0010	-0.0009 0.0010	-0.9022 7.29
DIST		111505	113204	48.49450 0.0010	-0.0016 0.0010	-1.5840 32.01
DIST		111505	113206	101.17580 0.0010	-0.0006 0.0010	-0.6611 6.42
DIST		111506	113207	37.48340 0.0010	-0.0010 0.0010	-0.9916 25.85
DIST		111506	113102	33.57590 0.0010	0.0002 0.0010	0.1731 5.06
DIST		111506	113103	59.64610 0.0010	-0.0014 0.0010	-1.4410 23.35
DIST		111506	113201	30.36470 0.0010	-0.0004 0.0010	-0.4305 13.95
DIST		111506	113104	121.62230 0.0010	-0.0010 0.0010	-1.0172 8.18
DIST		111506	113105	101.17600 0.0010	-0.0009 0.0010	-0.8904 8.64
DIR		111205	112020	0 0 4.0	0.0 2.6	-9.1 -3.5
DIR		111205	112004	134 98 4.0	88.0 2.6	9.1 3.5
DIR		111205	112020	0 0 4.0	0.0 3.5	0.6 0.2
DIR		111205	112006	20 57 4.0	33.0 3.5	2.9 0.8
DIR		111205	112001	33 41 4.0	15.0 3.5	-0.2 -0.1
DIR		111205	112002	40 74 4.0	25.0 3.5	-1.6 -0.5
DIR		111205	112003	57 55 4.0	85.0 3.2	-1.7 -0.5
DIR		111204	112020	0 0 4.0	0.0 2.8	-0.0 -0.0
DIR		111204	112002	10 20 4.0	85.0 2.8	0.0 0.0
DIR		111204	112020	0 0 4.0	0.0 3.4	1.9 0.6
DIR		111204	112001	13 44 4.0	63.0 3.4	-0.3 -0.1
DIR		111204	112003	11 89 4.0	11.0 3.3	-5.6 -1.7
DIR		111204	112006	399 14 4.0	8.0 3.4	4.0 1.2
DIR		111204	112020	0 0 4.0	0.0 3.2	0.9 0.3
DIR		111204	112007	0 0 4.0	48.0 3.2	-0.0 -0.0
DIR		111204	112005	338 95 4.0	72.0 2.9	-0.9 -0.3
DIR		111204	112020	0 0 4.0	0.0 2.7	3.4 1.3
DIR		111204	112050	368 37 4.0	30.0 2.7	-3.4 -1.3
DIR		101207	112004	0 0 4.0	0.0 2.5	1.7 0.7

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES PPM
				STD DEV	STD DEV	STD DEV	STD DEV	
DIR		101207	112001	352 36	21.0	-1.7		-0.7
					4.0	2.5		
ZANG		111205	112020	93 96	57.0	-9.9		-0.8
					12.0	12.0		
ZANG		111205	112004	98 44	96.0	1.4		0.3
					6.0	4.9		
ZANG		111205	112020	93 96	58.0	-8.9		-0.4
					20.0	20.0		
ZANG		111205	112006	100 31	75.0	1.3		0.2
					6.0	5.7		
ZANG		111205	112001	98 91	7.0	4.9		0.8
					6.0	5.8		
ZANG		111205	112002	100 36	1.0	1.1		0.2
					6.0	5.6		
ZANG		111205	112003	99 52	85.0	8.6		1.6
					6.0	5.4		
ZANG		111205	112020	93 96	53.0	-13.9		-1.2
					12.0	12.0		
ZANG		111205	112020	93 96	58.0	-8.9		-0.7
					12.0	12.0		
ZANG		111205	112020	93 96	53.0	-13.9		-1.2
					12.0	12.0		
ZANG		111205	112020	93 96	55.0	-11.9		-1.0
					12.0	12.0		
ZANG		111204	112020	94 31	90.0	-8.5		-0.7
					12.0	12.0		
ZANG		111204	112002	101 12	91.0	-2.4		-0.4
					6.0	5.7		
ZANG		111204	112020	94 31	91.0	-7.5		-0.6
					12.0	12.0		
ZANG		111204	112020	94 31	95.0	-3.5		-0.3
					12.0	12.0		
ZANG		111204	112001	99 56	66.0	1.5		0.3
					6.0	5.9		
ZANG		111204	112003	100 70	52.0	1.0		0.2
					6.0	5.5		
ZANG		111204	112006	100 88	33.0	1.7		0.3
					6.0	5.8		
ZANG		111204	112020	94 31	88.0	-10.5		-0.9
					12.0	12.0		
ZANG		111204	112007	102 10	6.0	-1.5		-0.3
					6.0	5.9		
ZANG		111204	112005	101 55	17.0	-6.6		-1.4
					6.0	4.8		
ZANG		111204	112020	94 31	90.0	-8.5		-0.7
					12.0	12.0		
ZANG		111204	112020	94 31	92.0	-6.5		-0.5
					12.0	12.0		
ZANG		111204	112020	94 31	89.0	-9.5		-0.8
					12.0	12.0		
ZANG		111204	112020	94 31	89.0	-9.5		-0.8
					12.0	12.0		
ZANG		111204	112050	91 17	62.0	-4.2		-0.4
					10.0	9.8		
ZANG		101207	112004	97 93	59.0	5.2		0.9
					6.0	5.8		
ZANG		101207	112001	90 58	44.0	-2.4		-0.7
					6.0	3.7		
ZANG		101207	112004	97 93	52.0	-1.8		-0.3
					6.0	5.8		
DIST		111205	113204		48.49300	-0.0001		-0.0671
					0.0010	0.0010		1.36
DIST		111205	113103		62.82030	-0.0015		-1.5787
					0.0010	0.0010		24.30
DIST		111205	113102		84.56980	-0.0003		-0.2971
					0.0010	0.0010		3.45

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Residuals (critical value = 4.205, N,E,Up for 3D):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIST		111205	113101	121.60620 0.0010	0.0000 0.0010	0.0258 0.21
DIST		111205	113206	101.17430 0.0010	0.0009 0.0010	0.8996 8.73
DIST		111204	113202	93.62110 0.0010	0.0000 0.0010	0.0159 0.17
DIST		111204	113201	132.01160 0.0010	0.0003 0.0010	0.3098 2.30
DIST		111204	113203	64.67300 0.0010	0.0000 0.0010	0.0358 0.53
DIST		111204	113207	158.96080 0.0010	0.0008 0.0010	0.8534 5.21
DIST		111204	113206	121.62090 0.0010	0.0004 0.0010	0.4154 3.34
DIST		111204	113105	48.49370 0.0010	-0.0009 0.0010	-0.8875 17.95
DIST		101207	113101	41.10920 0.0010	-0.0000 0.0010	-0.0483 1.14
DIR		111207	112004	0 0 4.0	0.0 3.5	-2.5 -0.7
DIR		111207	112006	2 81 4.0	51.0 3.1	6.6 2.1
DIR		111207	112050	157 27 4.0	58.0 3.2	-4.8 -1.5
DIR		111207	112020	199 99 4.0	31.0 3.4	4.3 1.3
DIR		111207	112002	385 92 4.0	58.0 3.4	-3.7 -1.1
DIR		111206	112004	0 0 4.0	0.0 2.8	1.4 0.5
DIR		111206	112005	25 39 4.0	90.0 2.8	-1.4 -0.5
DIR		111206	112004	0 0 4.0	0.0 3.5	-6.8 -2.0
DIR		111206	112020	201 5 4.0	8.0 3.5	0.5 0.1
DIR		111206	112007	203 67 4.0	72.0 2.9	12.3 4.2
DIR		111206	112001	284 96 4.0	9.0 2.9	-2.8 -1.0
DIR		111206	112002	367 96 4.0	52.0 3.0	-1.1 -0.4
DIR		111206	112003	386 15 4.0	81.0 3.3	-2.0 -0.6
ZANG		111207	112004	97 90 6.0	15.0 5.8	1.0 0.2
ZANG		111207	112006	93 95 6.0	10.0 3.7	3.3 0.9
ZANG		111207	112050	87 79 10.0	91.0 9.6	-22.0 -2.3
ZANG		111207	112020	91 89 12.0	41.0 11.9	-7.1 -0.6
ZANG		111207	112002	96 65 6.0	55.0 5.2	-3.5 -0.7
ZANG		111207	112020	91 89 12.0	39.0 11.9	-9.1 -0.8
ZANG		111207	112020	91 89 12.0	39.0 11.9	-9.1 -0.8
ZANG		111206	112004	99 11 6.0	91.0 5.9	1.8 0.3
ZANG		111206	112005	99 68 6.0	44.0 5.7	6.4 1.1
ZANG		111206	112004	99 11 6.0	93.0 5.9	3.8 0.6
ZANG		111206	112004	99 11 6.0	93.0 5.9	3.8 0.6

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Residuals (critical value = 4.205, N,E,Up for 3D):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ZANG		111206	112020	92 85 74.0	-14.0	-1.2
				12.0	11.9	
ZANG		111206	112007	106 5 5.0	-2.0	-0.4
				6.0	4.5	
ZANG		111206	112001	94 57 16.0	-2.6	-0.6
				6.0	4.4	
ZANG		111206	112002	99 95 20.0	2.3	0.5
				6.0	4.4	
ZANG		111206	112003	98 96 53.0	-0.5	-0.1
				6.0	5.5	
ZANG		111206	112020	92 85 81.0	-7.0	-0.6
				12.0	11.9	
ZANG		111206	112004	99 11 86.0	-3.2	-0.6
				6.0	5.9	
ZANG		111206	112004	99 11 90.0	0.8	0.1
				6.0	5.9	
ZANG		111206	112004	99 11 88.0	-1.2	-0.2
				6.0	5.9	
DIST		111207	113104	158.96260	-0.0009	-0.9485
				0.0010	0.0010	5.78
DIST		111207	113206	37.48250	-0.0001	-0.1230
				0.0010	0.0010	3.20
DIST		111207	113102	68.22120	-0.0004	-0.3872
				0.0010	0.0010	5.51
DIST		111206	113105	101.17550	-0.0003	-0.2732
				0.0010	0.0010	2.65
DIST		111206	113204	121.62120	0.0002	0.1604
				0.0010	0.0010	1.29
DIST		111206	113103	59.64550	-0.0007	-0.7547
				0.0010	0.0010	12.22
DIST		111206	113201	30.36370	0.0005	0.4766
				0.0010	0.0010	15.46
DIST		111206	113102	33.57540	0.0007	0.7205
				0.0010	0.0010	21.08
DIST		111206	113207	37.48240	-0.0000	-0.0416
				0.0010	0.0010	1.08
ELAT		112001	1	0 00 0.000000	0.0000	0.8669
				0.0001	0.0000	142.21
ELON		112001	1	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	108.76
EHDF		112001	1	-0.22520	-0.0005	-1.0797
				0.0005	0.0005	2156.11
ELAT		113101	1	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	5.16
ELON		113101	1	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	36.03
EHDF		113101	1	-0.22520	0.0000	0.0000
				0.0005	0.0000	0.00*
ELAT		113201	1	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	5.67
ELON		113201	1	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	76.23
EHDF		113201	1	-0.22520	0.0000	0.0000
				0.0005	0.0000	0.00*
ELAT		112002	2	0 00 0.000000	0.0001	4.0859
				0.0001	0.0000	268.50
ELON		112002	2	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	201.53
EHDF		112002	2	-0.22550	-0.0001	-0.2637
				0.0005	0.0004	519.26
ELAT		113102	2	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	10.88
ELON		113102	2	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	89.33
EHDF		113102	2	-0.22550	0.0000	0.0000
				0.0005	0.0000	0.00*

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Residuals (critical value = 4.205, N,E,Up for 3D):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ELAT		113202	2	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	0.16
ELON		113202	2	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	0.67
EHDF		113202	2	-0.22550	-0.0000	-0.0000
				0.0005	0.0000	0.00*
ELAT		111502	2	0 00 0.000000	0.0001	1.0607
				0.0001	0.0001	396.52
ELON		111502	2	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	146.87
EHDF		111502	2	-0.22550	-0.0004	-0.7819
				0.0005	0.0005	1604.10
ELAT		112003	3	0 00 0.000000	-0.0007	-0.0007
				0.0002	-0.0000	201560.6
ELON		112003	3	0 00 0.000000	0.0000	0.0000
				0.0002	-0.0000	4261.08
EHDF		112003	3	-0.00310	-0.0003	-0.7034
				0.0005	0.0004	88956.26
ELAT		113103	3	0 00 0.000000	-0.0001	-0.0001
				0.0002	-0.0000	34951.25
ELON		113103	3	0 00 0.000000	0.0000	0.0000
				0.0002	-0.0000	2667.00
EHDF		113103	3	-0.00310	-0.0000	-0.0000
				0.0005	0.0000	0.00*
ELAT		113203	3	0 00 0.000000	-0.0000	-0.0000
				0.0002	-0.0000	88.48
ELON		113203	3	0 00 0.000000	-0.0000	-0.0000
				0.0002	-0.0000	432.20
EHDF		113203	3	-0.00310	-0.0000	-0.0000
				0.0005	0.0000	0.00*
ELAT		111204	4	0 00 0.000000	0.0001	0.0001
				0.0001	-0.0000	363.51
ELON		111204	4	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	60.70
EHDF		111204	4	-0.22760	-0.0005	-1.1699
				0.0005	0.0004	2244.83
ELAT		112004	4	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	77.09
ELON		112004	4	0 00 0.000000	0.0001	0.0001
				0.0001	-0.0000	392.22
EHDF		112004	4	-0.22760	0.0007	1.6407
				0.0005	0.0004	3127.00
ELAT		113104	4	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	51.38
ELON		113104	4	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	159.22
EHDF		113104	4	-0.22760	-0.0000	-0.0000
				0.0005	0.0000	0.00*
ELAT		113204	4	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	66.61
ELON		113204	4	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	9.40
EHDF		113204	4	-0.22760	0.0000	0.0000
				0.0005	0.0000	0.00*
ELAT		111504	4	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	202.32
ELON		111504	4	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	174.64
EHDF		111504	4	-0.22760	0.0000	0.0021
				0.0005	0.0004	4.05
ELAT		111505	5	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	165.09
ELON		111505	5	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	182.06
EHDF		111505	5	-0.21850	0.0008	1.7258
				0.0005	0.0004	3451.83

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Residuals (critical value = 4.205, N,E,Up for 3D):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ELAT		111205	5	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	191.02
ELON		111205	5	0 00 0.000000	-0.0001	-0.0001
				0.0001	-0.0000	317.83
EHDF		111205	5	-0.21850	0.0002	0.5538
				0.0005	0.0004	1105.07
ELAT		112005	5	0 00 0.000000	0.0001	0.0001
				0.0001	-0.0000	260.36
ELON		112005	5	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	162.04
EHDF		112005	5	-0.21850	0.0000	0.0883
				0.0005	0.0004	170.35
ELAT		113105	5	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	52.29
ELON		113105	5	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	85.46
EHDF		113105	5	-0.21850	-0.0000	-0.0000
				0.0005	0.0000	0.00*
ELAT		113205	5	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	61.43
ELON		113205	5	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	36.25
EHDF		113205	5	-0.21850	-0.0000	-0.0000
				0.0005	0.0000	0.00*
ELAT		111506	6	0 00 0.000000	-0.0001	-3.1223
				0.0001	0.0000	585022.0
ELON		111506	6	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	33483.25
EHDF		111506	6	0.00000	-0.0001	-0.3288
				0.0005	0.0004	810316.4
ELAT		111206	6	0 00 0.000000	-0.0001	-4.0136
				0.0001	0.0000	391484.2
ELON		111206	6	0 00 0.000000	0.0001	0.0001
				0.0001	-0.0000	277167.4
EHDF		111206	6	0.00000	-0.0003	-0.7074
				0.0005	0.0005	877447.6
ELAT		112006	6	0 00 0.000000	0.0000	0.1993
				0.0001	0.0000	40041.72
ELON		112006	6	0 00 0.000000	-0.0001	-0.0001
				0.0001	-0.0000	672079.5
EHDF		112006	6	0.00000	0.0001	0.1491
				0.0005	0.0004	739382.5
ELAT		113206	6	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	981564.7
ELON		113206	6	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	192291.3
EHDF		113206	6	0.00000	-0.0000	-0.0000
				0.0005	0.0000	0.01*
ELAT		111207	7	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	31.75
ELON		111207	7	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	0.66
EHDF		111207	7	-1.51210	-0.0001	-0.1457
				0.0005	0.0004	38.47
ELAT		112007	7	0 00 0.000000	0.0002	0.0002
				0.0001	-0.0000	116.00
ELON		112007	7	0 00 0.000000	-0.0001	-0.0001
				0.0001	-0.0000	44.19
EHDF		112007	7	-1.51210	0.0001	0.3090
				0.0005	0.0004	88.35
ELAT		113207	7	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	1.46
ELON		113207	7	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	2.91
EHDF		113207	7	-1.51210	0.0000	0.0000
				0.0005	0.0000	0.00*


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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ELAT		101207	7	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	1.60
ELON		101207	7	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	8.37
EHDF		101207	7	-1.59720	0.0002	0.4263
				0.0005	0.0004	101.44
ELAT		112020	20	0 00 0.000000	-0.0006	-1.2959
				0.0010	0.0005	2500.00
ELON		112020	20	0 00 0.000000	0.0002	0.0002
				0.0010	-0.0000	938.44
EHDF		112020	20	-0.23870	-0.0024	-5.3547
				0.0010	0.0004	9959.97
^						
ELAT		112050	50	0 00 0.000000	-0.0006	-0.0006
				0.0010	-0.0000	453455.5
ELON		112050	50	0 00 0.000000	0.0009	0.0009
				0.0010	-0.0000	705054.9
EHDF		112050	50	0.000000	-0.0007	-3.1327
				0.0010	0.0002	545230.2
DIR		121503	122020	0 0 0.0	0.1	0.0
				4.0	3.2	
DIR		121503	122001	16 21 32.0	-1.1	-0.4
				4.0	3.0	
DIR		121503	122005	262 79 67.0	1.0	0.3
				4.0	2.9	
DIR		121503	122020	0 0 0.0	-1.9	-0.6
				4.0	3.3	
DIR		121503	122002	7 73 24.0	-1.1	-0.4
				4.0	2.9	
DIR		121503	122004	213 16 25.0	-1.2	-0.4
				4.0	2.9	
DIR		121503	122006	386 57 24.0	4.1	1.3
				4.0	3.2	
DIR		121503	122020	0 0 0.0	2.3	0.8
				4.0	2.8	
DIR		121503	122007	393 30 47.0	-2.3	-0.8
				4.0	2.8	
DIR		121507	122020	0 0 0.0	1.1	0.3
				4.0	3.5	
DIR		121507	122002	185 93 22.0	-0.9	-0.3
				4.0	3.5	
DIR		121507	122003	192 3 28.0	0.7	0.2
				4.0	3.6	
DIR		121507	122004	200 0 69.0	-4.2	-1.2
				4.0	3.6	
DIR		121507	122050	357 28 8.0	8.4	2.5
				4.0	3.3	
DIR		121507	122006	202 82 33.0	-4.9	-1.5
				4.0	3.2	
DIR		121507	122020	0 0 0.0	0.5	0.2
				4.0	2.5	
DIR		121507	122001	152 36 83.0	-0.5	-0.2
				4.0	2.5	
DIR		121501	122020	0 0 0.0	3.0	0.8
				4.0	3.6	
DIR		121501	122002	224 56 8.0	1.9	0.6
				4.0	3.2	
DIR		121501	122003	218 23 16.0	-4.6	-1.3
				4.0	3.5	
DIR		121501	122004	216 73 74.0	-1.3	-0.4
				4.0	3.6	
DIR		121501	122005	240 66 87.0	0.6	0.2
				4.0	3.6	
DIR		121501	122050	360 15 28.0	3.3	1.0
				4.0	3.4	

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Residuals (critical value = 4.205, N,E,Up for 3D):

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		121501	122007	355 65	81.0	-2.9	-1.0
					4.0	3.0	
DIR		121501	122020	0 0	0.0	0.3	0.1
					4.0	2.7	
DIR		121501	122050	360 15	29.0	-0.3	-0.1
					4.0	2.7	
DIR		121501	122020	0 0	0.0	-1.2	-0.5
					4.0	2.4	
DIR		121501	122006	287 39	31.0	1.2	0.5
					4.0	2.4	
DIR		121506	122020	0 0	0.0	-0.5	-0.1
					4.0	3.5	
DIR		121506	122007	2 62	87.0	-2.8	-0.9
					4.0	3.0	
DIR		121506	122002	166 91	36.0	0.6	0.2
					4.0	3.1	
DIR		121506	122004	198 94	80.0	3.5	1.0
					4.0	3.5	
DIR		121506	122005	224 34	67.0	2.8	0.8
					4.0	3.4	
DIR		121506	122001	83 91	5.0	-3.5	-1.2
					4.0	2.9	
DIR		121506	122020	0 0	0.0	0.5	0.2
					4.0	2.7	
DIR		121506	122050	360 43	47.0	-0.5	-0.2
					4.0	2.7	
DIR		121506	122020	0 0	0.0	1.3	0.5
					4.0	2.7	
DIR		121506	122003	185 10	77.0	-1.3	-0.5
					4.0	2.7	
ZANG		121503	122020	93 64	61.0	-14.2	-1.2
					12.0	11.9	
ZANG		121503	122001	98 47	6.0	2.0	0.4
					6.0	5.6	
ZANG		121503	122005	100 47	1.0	3.2	0.6
					6.0	5.1	
ZANG		121503	122020	93 64	64.0	-11.2	-0.9
					12.0	11.9	
ZANG		121503	122002	102 6	46.0	9.6	2.2
					6.0	4.4	
ZANG		121503	122004	99 29	34.0	-0.6	-0.1
					6.0	5.2	
ZANG		121503	122006	101 3	14.0	-5.3	-1.0
					6.0	5.5	
ZANG		121503	122020	93 64	69.0	-6.2	-0.5
					12.0	11.9	
ZANG		121503	122007	102 93	87.0	-9.8	-1.7
					6.0	5.8	
ZANG		121507	122020	91 90	43.0	-9.8	-0.8
					12.0	11.9	
ZANG		121507	122002	96 73	46.0	3.6	0.7
					6.0	5.5	
ZANG		121507	122003	97 6	15.0	-1.3	-0.2
					6.0	5.6	
ZANG		121507	122004	97 93	52.0	0.9	0.2
					6.0	5.8	
ZANG		121507	122050	87 81	15.0	-16.4	-1.7
					10.0	9.6	
ZANG		121507	122006	94 9	23.0	-5.0	-1.1
					6.0	4.4	
ZANG		121507	122020	91 90	44.0	-8.8	-0.7
					12.0	11.9	
ZANG		121507	122020	91 90	43.0	-9.8	-0.8
					12.0	11.9	
ZANG		121507	122001	90 58	40.0	1.6	0.3
					6.0	4.7	

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Residuals (critical value = 4.205, N,E,Up for 3D):
 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		121501	122020	93 7	15.0	-14.1	-1.2	
					12.0	11.9		
ZANG		121501	122002	104 19	25.0	-5.1	-1.0	
					6.0	5.0		
ZANG		121501	122003	101 53	3.0	-1.7	-0.3	
					6.0	5.3		
ZANG		121501	122004	100 43	53.0	-0.8	-0.1	
					6.0	5.8		
ZANG		121501	122005	101 9	13.0	3.0	0.5	
					6.0	5.7		
ZANG		121501	122050	89 61	12.0	-2.1	-0.2	
					10.0	9.7		
ZANG		121501	122007	109 41	69.0	-1.0	-0.2	
					6.0	4.9		
ZANG		121501	122020	93 7	19.0	-10.1	-0.8	
					12.0	11.9		
ZANG		121501	122020	93 7	18.0	-11.1	-0.9	
					12.0	11.9		
ZANG		121501	122050	89 61	0.0	-14.1	-1.5	
					10.0	9.7		
ZANG		121501	122020	93 7	20.0	-9.1	-0.8	
					12.0	11.9		
ZANG		121501	122006	105 42	92.0	6.7	1.6	
					6.0	4.3		
ZANG		121506	122020	92 85	80.0	-7.9	-0.7	
					12.0	11.9		
ZANG		121506	122007	105 90	75.0	-3.3	-0.7	
					6.0	4.7		
ZANG		121506	122002	99 95	5.0	-4.0	-0.8	
					6.0	4.8		
ZANG		121506	122004	99 11	90.0	2.7	0.5	
					6.0	5.8		
ZANG		121506	122005	99 68	40.0	2.4	0.4	
					6.0	5.6		
ZANG		121506	122001	94 57	22.0	7.7	1.8	
					6.0	4.3		
ZANG		121506	122020	92 85	76.0	-11.9	-1.0	
					12.0	11.9		
ZANG		121506	122050	89 0	98.0	-9.6	-1.0	
					10.0	9.7		
ZANG		121506	122020	92 85	76.0	-11.9	-1.0	
					12.0	11.9		
ZANG		121506	122003	98 96	82.0	-5.6	-1.1	
					6.0	5.2		
DIST		121503	123205		62.81950	-0.0009	-0.9291	
					0.0010	0.0010	14.47	
DIST		121503	123204		64.67400	-0.0009	-0.9328	
					0.0010	0.0010	13.98	
DIST		121503	123101		67.39690	0.0001	0.1530	
					0.0010	0.0010	2.21	
DIST		121503	123202		29.02570	-0.0003	-0.2942	
					0.0010	0.0010	9.86	
DIST		121503	123107		96.18400	0.0008	0.8608	
					0.0010	0.0010	8.63	
DIST		121507	123202		68.21570	0.0007	0.7203	
					0.0010	0.0010	10.25	
DIST		121507	123203		96.18440	0.0005	0.4928	
					0.0010	0.0010	4.94	
DIST		121507	123206		37.47410	0.0003	0.3542	
					0.0010	0.0010	9.22	
DIST		121507	123104		158.95930	-0.0004	-0.4188	
					0.0010	0.0010	2.56	
DIST		121507	123201		41.10920	0.0000	0.0120	
					0.0010	0.0010	0.28	
DIST		121501	123202		38.90060	-0.0001	-0.0860	
					0.0010	0.0010	2.17	

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIST		121501	123203	67.39740 0.0010	-0.0003 0.0010	-0.3345 4.83
DIST		121501	123107	41.10890 0.0010	0.0003 0.0010	0.3112 7.40
DIST		121501	123104	132.01260 0.0010	-0.0007 0.0010	-0.6759 5.02
DIST		121501	123205	121.60680 0.0010	-0.0006 0.0010	-0.6544 5.29
DIST		121501	123106	30.36460 0.0010	-0.0002 0.0010	-0.2193 7.11
DIST		121506	123105	101.17560 0.0010	-0.0005 0.0010	-0.4638 4.50
DIST		121506	123104	121.62210 0.0010	-0.0007 0.0010	-0.7133 5.74
DIST		121506	123202	33.57610 0.0010	0.0001 0.0010	0.1414 4.14
DIST		121506	123207	37.47470 0.0010	-0.0003 0.0010	-0.3269 8.51
DIST		121506	123101	30.36490 0.0010	-0.0005 0.0010	-0.4594 14.91
DIST		121506	123103	59.64490 0.0010	-0.0002 0.0010	-0.1591 2.60
DIR		121207	122020	0 0 0.0 4.0	3.6 3.4	1.0
DIR		121207	122001	152 36 84.0 4.0	1.2 3.1	0.4
DIR		121207	122002	185 93 25.0 4.0	-1.5 3.5	-0.4
DIR		121207	122004	200 0 67.0 4.0	0.3 3.6	0.1
DIR		121207	122006	202 82 37.0 4.0	-6.5 3.2	-2.0
DIR		121207	122050	357 28 16.0 4.0	2.9 3.3	0.9
DIR		121201	122004	0 0 0.0 4.0	-1.4 2.5	-0.6
DIR		121201	122007	138 92 2.0 4.0	1.4 2.5	0.6
DIR		121201	122004	0 0 0.0 4.0	-1.3 3.6	-0.4
DIR		121201	122005	23 93 12.0 4.0	1.6 3.6	0.4
DIR		121201	122006	70 65 63.0 4.0	-0.1 2.9	-0.0
DIR		121201	122050	143 41 59.0 4.0	-2.0 3.4	-0.6
DIR		121201	122020	183 26 25.0 4.0	3.6 3.5	1.0
DIR		121201	122003	1 49 36.0 4.0	1.6 3.5	0.5
DIR		121201	122002	7 82 40.0 4.0	-3.4 3.3	-1.0
ZANG		121207	122020	91 90 38.0 12.0	-14.7 11.9	-1.2
ZANG		121207	122001	90 58 33.0 6.0	-4.0 4.6	-0.9
ZANG		121207	122002	96 73 42.0 6.0	0.5 5.5	0.1
ZANG		121207	122004	97 93 55.0 6.0	4.3 5.8	0.7
ZANG		121207	122006	94 9 25.0 6.0	-1.4 4.4	-0.3
ZANG		121207	122050	87 81 33.0 10.0	1.7 9.6	0.2
ZANG		121207	122004	97 93 53.0 6.0	2.3 5.8	0.4

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Residuals (critical value = 4.205, N,E,Up for 3D):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ZANG		121207	122020	91 90 40.0 12.0	-12.7 11.9	-1.1
ZANG		121201	122004	100 43 53.0 6.0	0.8 5.8	0.1
ZANG		121201	122007	109 41 72.0 6.0	7.2 4.9	1.5
ZANG		121201	122004	100 43 52.0 6.0	-0.2 5.8	-0.0
ZANG		121201	122005	101 9 4.0 6.0	-4.3 5.7	-0.8
ZANG		121201	122006	105 42 70.0 6.0	-8.3 4.2	-2.0
ZANG		121201	122050	89 61 10.0 10.0	-3.6 9.7	-0.4
ZANG		121201	122020	93 7 15.0 12.0	-13.7 11.9	-1.1
ZANG		121201	122003	101 53 9.0 6.0	7.5 5.3	1.4
ZANG		121201	122002	104 19 25.0 6.0	0.3 5.0	0.1
ZANG		121201	122020	93 7 12.0 12.0	-16.7 11.9	-1.4
DIST		121207	123102	68.21560 0.0010	0.0008 0.0010	0.8224 11.70
DIST		121207	123106	37.47410 0.0010	0.0003 0.0010	0.3406 8.87
DIST		121207	123101	41.10890 0.0010	0.0003 0.0010	0.3184 7.57
DIST		121207	123204	158.95820 0.0010	0.0006 0.0010	0.6651 4.06
DIST		121201	123107	41.10860 0.0010	0.0006 0.0010	0.6214 14.77
DIST		121201	123206	30.36390 0.0010	0.0005 0.0010	0.4991 16.18
DIST		121201	123104	132.01240 0.0010	-0.0005 0.0010	-0.4879 3.62
DIST		121201	123202	38.89970 0.0010	0.0008 0.0010	0.8005 20.23
DIST		121201	123203	67.39630 0.0010	0.0008 0.0010	0.7744 11.19
DIST		121201	123105	121.60630 0.0010	-0.0001 0.0010	-0.1446 1.17
DIR		121206	122020	0 0 0.0 4.0	1.6 2.4	0.7
DIR		121206	122001	83 91 4.0 4.0	-1.6 2.4	-0.7
DIR		121206	122020	0 0 0.0 4.0	1.5 3.4	0.4
DIR		121206	122002	166 91 40.0 4.0	-1.0 3.1	-0.3
DIR		121206	122003	185 10 73.0 4.0	3.4 3.4	1.0
DIR		121206	122004	198 94 87.0 4.0	-1.2 3.5	-0.3
DIR		121206	122005	224 34 75.0 4.0	-2.7 3.4	-0.8
DIR		121206	122020	0 0 0.0 4.0	0.6 2.5	0.2
DIR		121206	122007	2 62 85.0 4.0	-0.6 2.5	-0.2
DIR		121206	122020	0 0 0.0 4.0	-2.0 2.7	-0.7
DIR		121206	122050	360 43 42.0 4.0	2.0 2.7	0.7
DIR		121203	122020	0 0 0.0 4.0	2.1 2.7	0.8

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Residuals (critical value = 4.205, N,E,Up for 3D):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES PPM
				STD	DEV	STD	DEV	
DIR		121203	122006	386	57	35.0	-2.1	-0.8
						4.0	2.7	
DIR		121203	122020	0	0	0.0	1.1	0.4
						4.0	2.8	
DIR		121203	122007	393	30	45.0	-1.1	-0.4
						4.0	2.8	
DIR		121203	122020	0	0	0.0	3.2	0.9
						4.0	3.5	
DIR		121203	122002	7	73	32.0	-2.5	-0.9
						4.0	2.8	
DIR		121203	122005	262	79	74.0	-3.2	-1.0
						4.0	3.2	
DIR		121203	122004	213	16	25.0	3.1	1.0
						4.0	3.2	
DIR		121203	122050	364	65	34.0	-0.6	-0.2
						4.0	3.4	
DIR		121203	122020	0	0	0.0	1.3	0.5
						4.0	2.7	
DIR		121203	122001	16	21	34.0	-1.3	-0.5
						4.0	2.7	
ZANG		121206	122020	92	85	84.0	-3.4	-0.3
						12.0	11.9	
ZANG		121206	122001	94	56	96.0	-10.3	-2.4
						6.0	4.3	
ZANG		121206	122020	92	85	80.0	-7.4	-0.6
						12.0	11.9	
ZANG		121206	122020	92	85	81.0	-6.4	-0.5
						12.0	11.9	
ZANG		121206	122002	99	95	4.0	2.2	0.5
						6.0	4.8	
ZANG		121206	122003	98	96	87.0	3.4	0.7
						6.0	5.2	
ZANG		121206	122004	99	11	81.0	-4.3	-0.7
						6.0	5.8	
ZANG		121206	122005	99	68	33.0	-2.2	-0.4
						6.0	5.6	
ZANG		121206	122020	92	85	79.0	-8.4	-0.7
						12.0	11.9	
ZANG		121206	122007	105	90	79.0	7.2	1.5
						6.0	4.7	
ZANG		121206	122020	92	85	80.0	-7.4	-0.6
						12.0	11.9	
ZANG		121206	122020	92	85	75.0	-12.4	-1.0
						12.0	11.9	
ZANG		121203	122020	93	64	75.0	-0.2	-0.0
						12.0	11.9	
ZANG		121203	122006	101	3	34.0	14.6	2.7
						6.0	5.5	
ZANG		121203	122020	93	64	72.0	-3.2	-0.3
						12.0	11.9	
ZANG		121203	122020	93	64	75.0	-0.2	-0.0
						12.0	11.9	
ZANG		121203	122007	102	93	96.0	-0.8	-0.1
						6.0	5.8	
ZANG		121203	122020	93	64	68.0	-7.2	-0.6
						12.0	11.9	
ZANG		121203	122002	102	6	29.0	-7.6	-1.7
						6.0	4.4	
ZANG		121203	122005	100	47	1.0	3.1	0.6
						6.0	5.1	
ZANG		121203	122004	99	29	42.0	7.3	1.4
						6.0	5.2	
ZANG		121203	122020	93	64	65.0	-10.2	-0.9
						12.0	11.9	
ZANG		121203	122020	93	64	65.0	-10.2	-0.9
						12.0	11.9	


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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES
				STD DEV		STD DEV	PPM	
ZANG		121203	122001	98 47	8.0	3.9		0.7
					6.0	5.6		
DIST		121206	123101		30.36480	-0.0004		-0.3640
					0.0010	0.0010		11.80
DIST		121206	123203		59.64410	0.0006		0.5897
					0.0010	0.0010		9.63
DIST		121206	123202		33.57530	0.0009		0.8858
					0.0010	0.0010		25.91
DIST		121206	123104		121.62180	-0.0004		-0.4536
					0.0010	0.0010		3.65
DIST		121206	123205		101.17490	0.0002		0.2235
					0.0010	0.0010		2.17
DIST		121206	123107		37.47440	-0.0000		-0.0188
					0.0010	0.0010		0.49
DIST		121203	123106		59.64470	-0.0001		-0.0641
					0.0010	0.0010		1.05
DIST		121203	123105		62.81920	-0.0007		-0.7020
					0.0010	0.0010		10.93
DIST		121203	123202		29.02530	0.0001		0.1535
					0.0010	0.0010		5.14
DIST		121203	123104		64.67350	-0.0004		-0.4300
					0.0010	0.0010		6.45
DIST		121203	123207		96.18430	0.0006		0.5827
					0.0010	0.0010		5.84
DIST		121203	123101		67.39720	-0.0001		-0.1100
					0.0010	0.0010		1.59
ELAT		121201	1	0 00	0.000000	-0.0000		-0.9944
					0.0001	0.0000		106.76
ELON		121201	1	0 00	0.000000	0.0000		0.0000
					0.0001	-0.0000		16.69
EHDF		121201	1		-0.22530	0.0001		0.2384
					0.0005	0.0004		471.97
ELAT		122001	1	0 00	0.000000	-0.0001		-2.1791
					0.0001	0.0000		256.53
ELON		122001	1	0 00	0.000000	-0.0000		-0.0000
					0.0001	-0.0000		205.34
EHDF		122001	1		-0.22530	-0.0002		-0.5424
					0.0005	0.0005		1083.68
ELAT		123101	1	0 00	0.000000	-0.0000		-0.0000
					0.0001	-0.0000		16.69
ELON		123101	1	0 00	0.000000	0.0000		0.0000
					0.0001	-0.0000		25.28
EHDF		123101	1		-0.22530	0.0000		0.0000
					0.0005	0.0000		0.00*
ELAT		123201	1	0 00	0.000000	0.0000		0.0000
					0.0001	-0.0000		0.47
ELON		123201	1	0 00	0.000000	0.0000		0.0000
					0.0001	-0.0000		0.22
EHDF		123201	1		-0.22530	-0.0000		-0.0000
					0.0005	0.0000		0.00*
ELAT		121501	1	0 00	0.000000	0.0000		1.0821
					0.0001	0.0000		140.81
ELON		121501	1	0 00	0.000000	0.0000		0.0000
					0.0001	-0.0000		33.65
EHDF		121501	1		-0.22530	-0.0002		-0.5008
					0.0005	0.0004		991.67
ELAT		122002	2	0 00	0.000000	-0.0000		-0.2156
					0.0001	0.0001		78.34
ELON		122002	2	0 00	0.000000	0.0000		0.0000
					0.0001	-0.0000		4.63
EHDF		122002	2		-0.22550	-0.0002		-0.4436
					0.0005	0.0005		912.89
ELAT		123102	2	0 00	0.000000	0.0000		0.0000
					0.0001	-0.0000		20.23
ELON		123102	2	0 00	0.000000	0.0000		0.0000
					0.0001	-0.0000		28.97

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
EHDF		123102	2	-0.22550 0.0005	-0.0000 0.0000	-0.0000 0.00*
ELAT		123202	2	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 56.34
ELON		123202	2	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 89.86
EHDF		123202	2	-0.22550 0.0005	-0.0000 0.0000	-0.0000 0.00*
ELAT		121203	3	0 00 0.000000 0.0001	0.0001 0.0000	3.8965 821423.3
ELON		121203	3	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 256184.7
EHDF		121203	3	0.00000 0.0005	-0.0001 0.0004	-0.1762 509551.0
ELAT		122003	3	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 24455.23
ELON		122003	3	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 42349.67
EHDF		122003	3	0.00000 0.0005	0.0002 0.0004	0.3927 998801.4
ELAT		123103	3	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 580245.5
ELON		123103	3	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 813462.2
EHDF		123103	3	0.00000 0.0005	0.0000 0.0000	0.0000 0.00*
ELAT		123203	3	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 436461.2
ELON		123203	3	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 899789.6
EHDF		123203	3	0.00000 0.0005	-0.0000 0.0000	-0.0000 0.00*
ELAT		121503	3	0 00 0.000000 0.0001	0.0001 0.0000	2.1085 694699.7
ELON		121503	3	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 149238.4
EHDF		121503	3	0.00000 0.0005	-0.0001 0.0004	-0.1550 703647.1
ELAT		122004	4	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 66.40
ELON		122004	4	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 12.06
EHDF		122004	4	-0.22750 0.0005	0.0006 0.0004	1.5151 2680.68
ELAT		123104	4	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 38.94
ELON		123104	4	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 130.01
EHDF		123104	4	-0.22750 0.0005	-0.0000 0.0000	-0.0000 0.00*
ELAT		123204	4	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 2.77
ELON		123204	4	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 12.71
EHDF		123204	4	-0.22750 0.0005	-0.0000 0.0000	-0.0000 0.00*
ELAT		122005	5	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 21.88
ELON		122005	5	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 28.99
EHDF		122005	5	-0.21850 0.0005	0.0004 0.0004	1.0255 1868.84
ELAT		123105	5	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 18.38
ELON		123105	5	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 53.55

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Residuals (critical value = 4.205, N,E,Up for 3D):
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
EHDF	123105	5	-0.21850	-0.0000	-0.0000
			0.0005	0.0000	0.00*
ELAT	123205	5	0 00 0.000000	0.0000	0.0000
			0.0001	-0.0000	28.55
ELON	123205	5	0 00 0.000000	-0.0000	-0.0000
			0.0001	-0.0000	53.67
EHDF	123205	5	-0.21850	-0.0000	-0.0000
			0.0005	0.0000	0.00*
ELAT	121206	6	0 00 0.000000	0.0000	1.2745
			0.0001	0.0000	74654.44
ELON	121206	6	0 00 0.000000	-0.0000	-0.0000
			0.0001	-0.0000	20316.73
EHDF	121206	6	0.00020	0.0002	0.5107
			0.0005	0.0005	533653.3
ELAT	121506	6	0 00 0.000000	0.0001	2.7648
			0.0001	0.0000	877348.0
ELON	121506	6	0 00 0.000000	0.0000	0.0000
			0.0001	-0.0000	159092.8
EHDF	121506	6	0.00020	-0.0001	-0.3297
			0.0005	0.0005	1312580
ELAT	122006	6	0 00 0.000000	0.0001	3.0903
			0.0001	0.0000	727013.6
ELON	122006	6	0 00 0.000000	-0.0001	-0.0001
			0.0001	-0.0000	382971.6
EHDF	122006	6	0.00020	-0.0003	-0.6422
			0.0005	0.0005	1817557
ELAT	123106	6	0 00 0.000000	0.0000	0.0000
			0.0001	-0.0000	16035.00
ELON	123106	6	0 00 0.000000	0.0000	0.0000
			0.0001	-0.0000	11695.32
EHDF	123106	6	0.00020	-0.0000	-0.0000
			0.0005	0.0000	0.00*
ELAT	123206	6	0 00 0.000000	-0.0000	-0.0000
			0.0001	-0.0000	13837.12
ELON	123206	6	0 00 0.000000	0.0000	0.0000
			0.0001	-0.0000	30756.16
EHDF	123206	6	0.00020	0.0000	0.0000
			0.0005	0.0000	0.00*
ELAT	121207	7	0 00 0.000000	-0.0001	-0.0001
			0.0001	-0.0000	50.87
ELON	121207	7	0 00 0.000000	0.0000	0.0000
			0.0001	-0.0000	2.23
EHDF	121207	7	-1.59670	0.0004	1.0015
			0.0005	0.0004	267.63
ELAT	121507	7	0 00 0.000000	-0.0001	-0.0001
			0.0001	-0.0000	46.74
ELON	121507	7	0 00 0.000000	0.0000	0.0000
			0.0001	-0.0000	16.29
EHDF	121507	7	-1.59670	0.0003	0.7838
			0.0005	0.0004	210.30
ELAT	122007	7	0 00 0.000000	-0.0001	-4.2860
			0.0001	0.0000	32.85
			^^		
ELON	122007	7	0 00 0.000000	0.0000	0.0000
			0.0001	-0.0000	20.07
EHDF	122007	7	-1.59670	0.0006	1.4128
			0.0005	0.0004	392.49
ELAT	123107	7	0 00 0.000000	-0.0000	-0.0000
			0.0001	-0.0000	7.64
ELON	123107	7	0 00 0.000000	-0.0000	-0.0000
			0.0001	-0.0000	6.79
EHDF	123107	7	-1.59670	0.0000	0.0000
			0.0005	0.0000	0.00*
ELAT	123207	7	0 00 0.000000	-0.0000	-0.0000
			0.0001	-0.0000	1.06

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Residuals (critical value = 4.205, N,E,Up for 3D):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
ELON		123207	7	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 1.19
EHDF		123207	7	-1.59670 0.0005	0.0000 0.0000	0.0000 0.00*
ELAT		122020	20	0 00 0.000000 0.0010	-0.0001 0.0004	-0.2940 535.77
ELON		122020	20	0 00 0.000000 0.0010	0.0000 -0.0000	0.0000 201.35
EHDF		122020	20	-0.23870 0.0010	-0.0022 0.0004	-5.1193 9007.39
ELAT		122050	50	0 00 0.000000 0.0010	0.0006 -0.0000	0.0006 438981.4
ELON		122050	50	0 00 0.000000 0.0010	-0.0010 -0.0000	-0.0010 780337.3
EHDF		122050	50	0.00000 0.0010	-0.0006 0.0003	-2.3030 445386.8
DIR		311231	312050	0 0 0.0 4.0	-0.2 2.7	-0.1
DIR		311231	312020	378 92 60.0 4.0	0.7 2.7	0.2
DIR		311231	312035	304 38 84.0 4.0	-0.0 0.1	-0.0
DIR		311231	312030	396 43 49.0 4.0	-0.5 0.5	-1.0
ZANG		311231	312050	91 80 13.0 12.0	35.7 11.8	3.0
ZANG		311231	312020	87 43 30.0 12.0	48.3 11.6	4.1
ZANG		311231	312035	101 54 62.0 6.0	0.1 0.4	0.2
ZANG		311231	312030	97 86 73.0 6.0	-0.2 0.4	-0.5
ZANG		311231	312050	91 80 12.0 12.0	34.7 11.8	2.9
DIST		311231	313230	3.78840 0.0010	0.0003 0.0009	0.3048 72.06
DIST		311231	313235	2.99610 0.0010	0.0001 0.0009	0.1204 37.52
DIST		311231	313235	2.99620 0.0010	0.0000 0.0009	0.0133 4.14
DIR		311530	312050	0 0 0.0 4.0	4.7 2.7	1.7
DIR		311530	312020	378 63 88.0 4.0	-5.2 2.7	-1.9
DIR		311530	312031	196 40 70.0 4.0	0.5 0.5	1.0
DIR		311530	312035	242 1 61.0 4.0	0.0 0.2	0.2
DIR		311530	312050	0 0 0.0 4.0	3.5 2.7	1.3
DIR		311530	312020	378 63 85.0 4.0	-3.5 2.7	-1.3
ZANG		311530	312050	91 75 74.0 8.0	17.2 7.7	2.2
ZANG		311530	312020	87 28 38.0 12.0	37.8 11.6	3.3
ZANG		311530	312031	102 13 59.0 6.0	-0.0 0.4	-0.1
ZANG		311530	312035	102 80 69.0 6.0	-0.3 0.6	-0.5
ZANG		311530	312050	91 75 86.0 8.0	29.2 7.7	3.8
ZANG		311530	312020	87 28 41.0 12.0	40.8 11.6	3.5

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIST		311530	313235	4.53040	-0.0002	-0.2359
				0.0010	0.0009	44.60
DIST		311530	313231	3.78900	-0.0003	-0.3360
				0.0010	0.0009	79.32
EHDF		30N	35	-0.15613	0.0005	0.9400
				0.0005	0.0005	101.97
EHDF		35	31	0.03137	-0.0004	-0.8032
				0.0005	0.0005	130.70
EHDF		31	30N	0.12469	-0.0000	-0.0000
				0.0001	0.0000	0.13*
EHDF		30N	31	-0.12472	0.0000	0.0000
				0.0001	0.0000	8.05*
EHDF		31	35	-0.03107	0.0001	0.1877
				0.0005	0.0005	30.55
EHDF		35	30N	0.15584	-0.0002	-0.3500
				0.0005	0.0005	37.97
EHDF		30N	36	-0.67711	0.0000	0.0000
				0.0001	0.0000	5.10*
EHDF		36	37	-0.00428	0.0000	0.0000
				0.0001	0.0000	5481.53*
EHDF		37	30N	0.68132	0.0000	0.0000
				0.0001	0.0000	0.0000
EHDF		30N	360	-0.68100	-0.0000	-0.0000
				0.0001	0.0000	5.24*
EHDF		360	35	0.52538	-0.0000	-0.0000
				0.0001	0.0000	45.66*
EHDF		35	370	-0.52566	0.0000	0.0000
				0.0001	0.0000	26.61*
EHDF		370	30N	0.68130	0.0000	0.0000
				0.0001	0.0000	0.0000
EHDF		30N	361	-0.68099	0.0000	0.0000
				0.0001	0.0000	0.73*
EHDF		361	371	0.00028	0.0000	0.0000
				0.0001	0.0000	11517.88*
EHDF		371	30N	0.68070	0.0000	0.0000
				0.0001	0.0000	0.73*
EHDF		21605S001	36	0.04500	0.0000	0.0000
				0.0002	0.0000	0.00*
ELAT		30	312030	0 00 0.000000	-0.0000	-2.1053
				0.0001	0.0000	27.20
ELON		30	312030	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	9.13
EHDF		30	312030	1.65060	0.0002	0.5023
				0.0005	0.0004	131.37
ELAT		30	311530	0 00 0.000000	0.0001	2.3486
				0.0001	0.0000	31.67
ELON		30	311530	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	12.00
EHDF		30	311530	1.65060	0.0002	0.5329
				0.0005	0.0004	139.56
ELAT		30	313230	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	0.53
ELON		30	313230	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	1.57
EHDF		30	313230	1.65060	-0.0000	-0.0000
				0.0005	0.0000	0.00*
ELAT		31	312031	0 00 0.000000	-0.0000	-1.9407
				0.0001	0.0000	190.05
ELON		31	312031	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	63.80
EHDF		31	312031	0.23820	0.0001	0.1323
				0.0005	0.0004	242.96
ELAT		31	311231	0 00 0.000000	0.0000	1.8527
				0.0001	0.0000	185.90
ELON		31	311231	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	75.70

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Residuals (critical value = 4.205, N,E,Up for 3D):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE AT	FROM	TO		OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
EHDF	31	311231		0.23820 0.0005	0.0002 0.0004	0.5340 982.40
ELAT	31	313231	0 00	0.000000 0.0001	0.0000 -0.0000	0.0000 4.01
ELON	31	313231	0 00	0.000000 0.0001	-0.0000 -0.0000	-0.0000 11.95
EHDF	31	313231		0.23820 0.0005	-0.0000 0.0000	-0.0000 0.00*
ELAT	35	312035	0 00	0.000000 0.0001	-0.0000 -0.0000	-0.0000 7.44
ELON	35	312035	0 00	0.000000 0.0001	-0.0000 -0.0000	-0.0000 11.15
EHDF	35	312035		0.19650 0.0005	0.0002 0.0004	0.3455 763.27
ELAT	35	313235	0 00	0.000000 0.0001	0.0000 -0.0000	0.0000 3.14
ELON	35	313235	0 00	0.000000 0.0001	-0.0000 -0.0000	-0.0000 7.95
EHDF	35	313235		0.19650 0.0005	-0.0000 0.0000	-0.0000 0.00*
ELAT	35	21605S001	0 00	0.000000 0.0001	0.0000 -0.0000	0.0000 0.00
ELON	35	21605S001	0 00	0.000000 0.0001	-0.0000 -0.0000	-0.0000 0.00
ELAT	50	312050	0 00	0.000000 0.0001	0.0000 0.0000	0.0000 359687.3*
ELON	50	312050	0 00	0.000000 0.0001	0.0000 0.0000	0.0000 143822.0*
EHDF	50	312050		0.000000 0.0001	-0.0000 0.0000	-0.0000 921926.9*
ELAT	20	312020	0 00	0.000000 0.0001	-0.0000 -0.0000	-0.0000 54.57
ELON	20	312020	0 00	0.000000 0.0001	-0.0000 -0.0000	-0.0000 2.43
EHDF	20	312020		0.23780 0.0010	-0.0022 0.0003	-6.7557 9153.03
EHDF	30	30N		1.41010 0.0002	0.0001 0.0000	0.0001 52.16*
DIR	411220	412030	0 0	0.0 4.0	-1.8 3.3	-0.5 3.3
DIR	411220	412001	169 10	91.0 4.0	3.2 3.4	1.0 -0.8
DIR	411220	412003	171 12	76.0 4.0	-2.8 3.4	-0.8 0.5
DIR	411220	412050	238 0	26.0 4.0	1.3 2.9	0.5 1.0
DIR	411220	412030	0 0	0.0 4.0	2.8 2.7	1.0 -1.0
DIR	411220	413202	170 73	67.0 4.0	-2.8 2.7	-1.0 -1.3
DIR	421220	422030	0 0	0.0 4.0	-3.7 2.7	-1.3 1.3
DIR	421220	423202	170 73	54.0 4.0	3.7 2.7	1.3 -0.5
DIR	421220	422030	0 0	0.0 4.0	-1.5 3.3	-0.5 1.0
DIR	421220	422001	169 10	91.0 4.0	3.5 3.4	1.0 0.1
DIR	421220	422003	171 12	73.0 4.0	0.4 3.4	0.1 -0.8
DIR	421220	422050	238 0	30.0 4.0	-2.4 2.9	-0.8 -0.7
DIR	421220	422030	0 0	0.0 4.0	-2.3 3.3	-0.7 0.8
DIR	421220	422001	169 10	91.0 4.0	2.7 2.7	0.8 0.8


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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
				4.0	3.4	
DIR		421220	422003	171 12 69.0	3.7	1.1
				4.0	3.4	
DIR		421220	422050	238 0 31.0	-4.1	-1.4
				4.0	2.9	
ZANG		411220	412030	112 71 76.0	-5.7	-1.3
				6.0	4.5	
ZANG		411220	412001	106 93 26.0	9.9	1.7
				6.0	5.8	
ZANG		411220	412003	106 35 92.0	12.4	2.1
				6.0	5.8	
ZANG		411220	412050	95 96 78.0	-2.6	-0.6
				6.0	4.5	
ZANG		411220	412030	112 71 77.0	-4.7	-1.0
				6.0	4.5	
ZANG		411220	413202	106 78 0.0	8.7	1.5
				6.0	5.8	
ZANG		421220	422030	112 71 78.0	-6.8	-1.4
				6.0	5.0	
ZANG		421220	423202	106 78 6.0	14.8	2.5
				6.0	5.9	
ZANG		421220	422030	112 71 84.0	-0.8	-0.2
				6.0	5.0	
ZANG		421220	422001	106 93 23.0	7.0	1.2
				6.0	5.8	
ZANG		421220	422003	106 35 87.0	7.4	1.3
				6.0	5.8	
ZANG		421220	422030	112 71 83.0	-1.8	-0.4
				6.0	5.0	
ZANG		421220	422001	106 93 31.0	15.0	2.6
				6.0	5.8	
ZANG		421220	422003	106 35 91.0	11.4	2.0
				6.0	5.8	
DIST		411220	413202	575.01460	0.0016	1.7776
				0.0010	0.0009	2.83
DIST		421220	423202	575.01570	0.0005	0.5728
				0.0010	0.0009	0.91
ELAT	1		412001	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	9.59
ELON	1		412001	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	4.52
EHDF	1		412001	0.22730	-0.0001	-0.0001
				0.0005	0.0000	353.92*
ELAT	1		422001	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	18.42
ELON	1		422001	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	8.68
EHDF	1		422001	0.22730	-0.0002	-0.0002
				0.0005	0.0000	786.55*
ELAT	2		413202	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	37.08
ELON	2		413202	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	62.29
EHDF	2		413202	0.22460	-0.0001	-0.0001
				0.0005	0.0000	295.52*
ELAT	2		423202	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	1.01
ELON	2		423202	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	25.79
EHDF	2		423202	0.22460	-0.0001	-0.0001
				0.0005	0.0000	504.80*
ELAT	3		412003	0 00 0.000000	-0.0000	-0.0000
				0.0001	-0.0000	4744.27
ELON	3		412003	0 00 0.000000	0.0000	0.0000
				0.0001	-0.0000	2054.61

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
EHDF		3	412003	0.00000 0.0010	-0.0004 0.0002	-2.1390 999987.8
ELAT		3	422003	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 4549.90
ELON		3	422003	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 1970.44
EHDF		3	422003	0.00000 0.0010	-0.0005 0.0002	-2.3648 999988.4
ELAT		20	411220	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 79.69
ELON		20	411220	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 53.98
EHDF		20	411220	0.23570 0.0010	-0.0001 0.0004	-0.3730 632.18
ELAT		20	421220	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 79.68
ELON		20	421220	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 46.89
EHDF		20	421220	0.23470 0.0010	0.0007 0.0004	1.5912 2867.90
ELAT		30	412030	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 5.65
ELON		30	412030	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 0.25
EHDF		30	412030	1.65060 0.0050	0.0176 0.0046	3.8129 10549.46
ELAT		30	422030	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 6.50
ELON		30	422030	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 0.29
EHDF		30	422030	1.65060 0.0050	0.0161 0.0047	3.4331 9681.51
ELAT		50	412050	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 9468.56
ELON		50	412050	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 7075.69
EHDF		50	412050	0.00000 0.0010	0.0001 0.0002	0.5742 999928.1
ELAT		50	422050	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 801155.5
ELON		50	422050	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 598689.9
EHDF		50	422050	0.00000 0.0010	-0.0000 0.0000	-0.0000 0.01*
ELAT		4	4ANT	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 19.63
ELON		4	4ANT	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 8.04
EHDF		4	4ANT	0.06540 0.0010	0.0001 0.0001	0.7409 1324.65
ELAT		5	5ANT	0 00 0.000000 0.0001	-0.0000 -0.0000	-0.0000 112.90
ELON		5	5ANT	0 00 0.000000 0.0001	0.0000 -0.0000	0.0000 38.21
EHDF		5	5ANT	0.05670 0.0010	0.0005 0.0002	2.1953 7894.58
DIR		411220	412030	0 0 0.0 5.0	7.5 3.5	2.2
DIR		411220	5ANT	176 36 81.0 5.0	-7.5 3.5	-2.2
DIR		421220	422030	0 0 0.0 5.0	3.6 3.5	1.0
DIR		421220	4ANT	172 40 12.0 5.0	-3.6 3.5	-1.0
DIR		421220	422030	0 0 0.0 5.0	3.5 3.5	1.0

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIR		421220	5ANT	176 36 73.0	-3.5	-1.0
				5.0	3.5	
DIR		421220	422030	0 0 0.0	9.1	2.6
				5.0	3.5	
DIR		421220	8	171 38 61.0	-9.1	-2.6
				5.0	3.5	
DIR		421220	422030	0 0 0.0	6.0	1.7
				5.0	3.5	
DIR		421220	5ANT	176 36 78.0	-6.0	-1.7
				5.0	3.5	
DIST		4112205	5ANT	0.20210	0.0000	0.0000
				0.0001	0.0000	0.00*
EHDF		5ANT	4112205	0.10200	0.0000	0.0000
				0.0001	0.0000	12.38*
DIR		5ANT	411220	0 0 0.0	0.0	0.0
				1.0	0.0	*
DIR		5ANT	4112205	0 0 0.0	-0.0	-0.0
				8.0	0.0	
ZANG		411220	4112205	106 4 50.0	-16.2	-2.1
				8.0	7.9	
DIST		4212204	4ANT	0.20210	0.0000	0.0000
				0.0001	0.0000	0.00*
EHDF		4ANT	4212204	0.10200	0.0000	0.0000
				0.0001	0.0000	4.29*
DIR		4ANT	421220	0 0 0.0	0.0	0.0
				1.0	0.0	*
DIR		4ANT	4212204	0 0 0.0	-0.0	-0.0
				8.0	0.0	
ZANG		421220	4212204	105 69 29.0	-5.8	-0.7
				8.0	7.9	
DIST		4212205	5ANT	0.20210	0.0000	0.0000
				0.0001	0.0000	0.00*
EHDF		5ANT	4212205	0.10200	0.0000	0.0000
				0.0001	0.0000	4.97*
DIR		5ANT	421220	0 0 0.0	0.0	0.0
				1.0	0.1	
DIR		5ANT	4212205	0 0 0.0	-0.0	-0.0
				8.0	5.6	
ZANG		421220	4212205	106 4 51.0	-15.0	-1.9
				8.0	7.9	
DIST		4212208	8	0.20210	0.0000	0.0000
				0.0001	0.0000	0.00*
EHDF		8	4212208	0.10200	0.0000	0.0000
				0.0001	0.0000	5.29*
DIR		8	421220	0 0 0.0	0.0	0.0
				1.0	0.0	*
DIR		8	4212208	0 0 0.0	-0.0	-0.0
				8.0	0.0	
ZANG		421220	4212208	105 73 64.0	-6.8	-0.9
				8.0	7.9	
DIST		4212205	5ANT	0.20210	0.0000	0.0000
				0.0001	0.0000	0.00*
EHDF		5ANT	4212205	0.10200	0.0000	0.0000
				0.0001	0.0000	4.97*
DIR		5ANT	421220	0 0 0.0	0.0	0.0
				1.0	0.1	
DIR		5ANT	4212205	0 0 0.0	-0.0	-0.0
				8.0	5.6	
ZANG		421220	4212205	106 4 68.0	2.0	0.3
				8.0	7.9	
DIR		111205	112020	0 0 0.0	4.1	1.2
				5.0	3.4	
DIR		111205	8	88 75 67.0	-4.1	-1.2
				5.0	3.4	
DIR		111205	112020	0 0 0.0	-1.7	-0.6
				5.0	2.6	

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES PPM
				STD DEV	STD DEV	STD DEV	STD DEV	
DIR		111205	9	104 49	21.0	1.7	0.6	
					5.0	2.6		
DIR		111204	112020	0 0	0.0	1.9	0.7	
					5.0	2.8		
DIR		111204	9	369 55	87.0	-1.9	-0.7	
					5.0	2.8		
DIR		111204	112020	0 0	0.0	7.7	2.4	
					5.0	3.2		
DIR		111204	8	18 54	85.0	-7.7	-2.4	
					5.0	3.2		
DIST		1112058	8		0.20210	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		8	1112058		0.10200	0.0000	0.0000	
					0.0001	0.0000	15.24*	
DIR		8	111205	0 0	0.0	-0.0	-0.0	
					1.0	0.0	*	
DIR		8	1112058	0 0	0.0	-0.0	-0.0	
					8.0	0.0		
ZANG		111205	1112058	95 30	66.0	-1.6	-0.2	
					8.0	7.2		
DIST		1112059	9		0.20150	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		9	1112059		0.10080	0.0000	0.0000	
					0.0001	0.0000	214.62*	
DIR		9	111205	0 0	0.0	-0.0	-0.0	
					1.0	0.0	*	
DIR		9	1112059	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		111205	1112059	102 33	43.0	-11.8	-2.1	
					8.0	5.8		
DIST		1112049	9		0.20150	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		9	1112049		0.10080	-0.0001	-0.0001	
					0.0001	0.0000	340.93*	
DIR		9	111204	0 0	0.0	0.0	0.0	
					1.0	0.0	*	
DIR		9	1112049	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		111204	1112049	105 11	17.0	18.8	3.2	
					8.0	5.9		
DIST		1112048	8		0.20210	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		8	1112048		0.10200	0.0000	0.0000	
					0.0001	0.0000	101.67*	
DIR		8	111204	0 0	0.0	0.0	0.0	
					1.0	0.0	*	
DIR		8	1112048	0 0	0.0	-0.0	-0.0	
					8.0	0.0		
ZANG		111204	1112048	95 43	65.0	-7.2	-1.1	
					8.0	6.5		
DIR		111206	112004	0 0	0.0	-3.0	-0.9	
					5.0	3.5		
DIR		111206	9	7 96	40.0	3.0	0.9	
					5.0	3.5		
DIR		111206	112004	0 0	0.0	-6.1	-1.7	
					5.0	3.5		
DIR		111206	8	392 44	35.0	6.1	1.7	
					5.0	3.5		
DIST		1112069	9		0.20150	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		9	1112069		0.10080	0.0000	0.0000	
					0.0001	0.0000	8.86*	
DIR		9	111206	0 0	0.0	-0.0	-0.0	
					1.0	0.0	*	
DIR		9	1112069	0 0	0.0	-0.0	-0.0	
					8.0	0.0		

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Residuals (critical value = 4.205, N,E,Up for 3D):
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		111206	1112069	100 32	24.0	-1.8	-0.2	
					8.0	7.8		
DIST		1112068	8		0.20210	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		8	1112068		0.10200	-0.0000	-0.0000	
					0.0001	0.0000	51.82*	
DIR		8	111206	0 0	0.0	-0.0	-0.0	
					1.0	0.0	*	
DIR		8	1112068	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		111206	1112068	96 99	53.0	9.4	1.2	
					8.0	7.8		
DIR		121201	122004	0 0	0.0	-6.8	-2.0	
					5.0	3.5		
DIR		121201	8	398 16	3.0	6.8	2.0	
					5.0	3.5		
DIST		1212018	8		0.20210	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		8	1212018		0.10200	-0.0000	-0.0000	
					0.0001	0.0000	5.13*	
DIR		8	121201	0 0	0.0	-0.0	-0.0	
					1.0	0.0	*	
DIR		8	1212018	0 0	0.0	-0.0	-0.0	
					8.0	0.0		
ZANG		121201	1212018	98 94	80.0	1.0	0.1	
					8.0	7.8		
DIR		121206	122020	0 0	0.0	-7.9	-2.3	
					5.0	3.5		
DIR		121206	8	191 39	15.0	7.9	2.3	
					5.0	3.5		
DIR		121206	122020	0 0	0.0	-0.4	-0.1	
					5.0	3.4		
DIR		121206	9	206 91	29.0	0.4	0.1	
					5.0	3.4		
DIR		121203	122020	0 0	0.0	-28.6	-3.4	
					10.0	8.5		
DIR		121203	8	205 39	9.0	7.1	3.4	
					5.0	2.1		
DIR		121203	122020	0 0	0.0	-2.0	-0.6	
					5.0	3.1		
DIR		121203	9	236 81	80.0	2.0	0.6	
					5.0	3.1		
DIST		1212068	8		0.20210	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		8	1212068		0.10200	-0.0000	-0.0000	
					0.0001	0.0000	42.88*	
DIR		8	121206	0 0	0.0	-0.0	-0.0	
					1.0	0.0	*	
DIR		8	1212068	0 0	0.0	-0.0	-0.0	
					8.0	0.0		
ZANG		121206	1212068	96 99	46.0	7.7	1.0	
					8.0	7.8		
DIST		1212069	9		0.20150	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		9	1212069		0.10080	-0.0000	-0.0000	
					0.0001	0.0000	0.55*	
DIR		9	121206	0 0	0.0	-0.0	-0.0	
					1.0	0.0	*	
DIR		9	1212069	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		121206	1212069	100 32	21.0	0.1	0.0	
					8.0	7.8		
DIST		1212038	8		0.20210	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		8	1212038		0.10200	0.0000	0.0000	
					0.0001	0.0000	76.59*	

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES
						STD DEV	STD DEV	PPM
DIR		8	121203	0 0	0.0	-0.0	-0.0	
					1.0	0.0		*
DIR		8	1212038	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		121203	1212038	93 15	90.0	-4.7	-0.7	
					8.0	6.3		
DIST		1212039	9		0.20150	0.0000	0.0000	
					0.00001	0.0000	0.00*	
EHDF		9	1212039		0.10080	0.0000	0.0000	
					0.00001	0.0000	69.18*	
DIR		9	121203	0 0	0.0	-0.0	-0.0	
					1.0	0.0		*
DIR		9	1212039	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		121203	1212039	102 1	28.0	-6.5	-0.9	
					8.0	7.2		
DIR		111504	112020	0 0	0.0	8.0	2.5	
					5.0	3.2		
DIR		111504	8	18 54	85.0	-8.0	-2.5	
					5.0	3.2		
DIR		111504	112020	0 0	0.0	-1.6	-0.6	
					5.0	2.8		
DIR		111504	9	369 55	80.0	1.6	0.6	
					5.0	2.8		
DIR		111502	112020	0 0	0.0	-7.2	-2.1	
					5.0	3.4		
DIR		111502	8	206 93	28.0	7.2	2.1	
					5.0	3.4		
DIR		111502	112020	0 0	0.0	-1.8	-0.5	
					5.0	3.4		
DIR		111502	9	226 7	7.0	1.8	0.5	
					5.0	3.4		
DIR		111502	112020	0 0	0.0	-8.7	-2.5	
					5.0	3.4		
DIR		111502	8	206 93	25.0	8.7	2.5	
					5.0	3.4		
DIR		111502	112020	0 0	0.0	7.7	2.3	
					5.0	3.4		
DIR		111502	9	226 7	26.0	-7.7	-2.3	
					5.0	3.4		
DIR		111505	112020	0 0	0.0	-2.5	-0.8	
					5.0	3.4		
DIR		111505	8	88 75	54.0	2.5	0.8	
					5.0	3.4		
DIR		111505	112020	0 0	0.0	2.0	0.7	
					5.0	2.6		
DIR		111505	9	104 49	29.0	-2.0	-0.7	
					5.0	2.6		
DIR		111506	112020	0 0	0.0	-4.6	-1.3	
					5.0	3.4		
DIR		111506	8	191 39	22.0	4.6	1.3	
					5.0	3.4		
DIR		111506	112020	0 0	0.0	0.8	0.2	
					5.0	3.4		
DIR		111506	9	206 91	32.0	-0.8	-0.2	
					5.0	3.4		
DIST		1115048	8		0.20210	0.0000	0.0000	
					0.00001	0.0000	0.00*	
EHDF		8	1115048		0.10200	0.0000	0.0000	
					0.00001	0.0000	44.37*	
DIR		8	111504	0 0	0.0	0.0	0.0	
					1.0	0.0		*
DIR		8	1115048	0 0	0.0	-0.0	-0.0	
					8.0	0.0		
ZANG		111504	1115048	95 43	60.0	-3.2	-0.5	
					8.0	6.5		

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION STD DEV	RESIDUAL STD DEV	STD RES PPM
DIST		1115049	9	0.20150 0.0001	-0.0000 0.0000	-0.0000 0.00*
EHDF		9	1115049	0.10080 0.0001	-0.0001 0.0000	-0.0001 325.21*
DIR		9	111504	0 0 0.0 1.0	0.0 0.0	0.0 *
DIR		9	1115049	0 0 0.0 8.0	-0.0 0.0	-0.0
ZANG		111504	1115049	105 11 4.0 8.0	18.0 5.8	3.1
DIST		1115028	8	0.20210 0.0001	0.0000 0.0000	0.0000 0.00*
EHDF		8	1115028	0.10200 0.0001	-0.0000 0.0000	-0.0000 45.21*
DIR		8	111502	0 0 0.0 1.0	-0.0 0.1	-0.0
DIR		8	1115028	0 0 0.0 8.0	-0.0 5.6	-0.0
ZANG		111502	1115028	95 50 67.0 8.0	3.4 7.6	0.5
DIST		1115029	9	0.20150 0.0001	0.0000 0.0000	0.0000 0.00*
EHDF		9	1115029	0.10080 0.0001	0.0000 0.0000	0.0000 13.88*
DIR		9	111502	0 0 0.0 1.0	0.0 0.1	0.0
DIR		9	1115029	0 0 0.0 8.0	0.0 5.6	0.0
ZANG		111502	1115029	100 45 20.0 8.0	-2.6 7.8	-0.3
DIST		1115028	8	0.20210 0.0001	0.0000 0.0000	0.0000 0.00*
EHDF		8	1115028	0.10200 0.0001	-0.0000 0.0000	-0.0000 45.21*
DIR		8	111502	0 0 0.0 1.0	-0.0 0.1	-0.0
DIR		8	1115028	0 0 0.0 8.0	-0.0 5.6	-0.0
ZANG		111502	1115028	95 50 71.0 8.0	7.4 7.6	1.0
DIST		1115029	9	0.20150 0.0001	0.0000 0.0000	0.0000 0.00*
EHDF		9	1115029	0.10080 0.0001	0.0000 0.0000	0.0000 13.88*
DIR		9	111502	0 0 0.0 1.0	0.0 0.1	0.0
DIR		9	1115029	0 0 0.0 8.0	0.0 5.6	0.0
ZANG		111502	1115029	100 45 21.0 8.0	-1.6 7.8	-0.2
DIST		1115058	8	0.20210 0.0001	0.0000 0.0000	0.0000 0.00*
EHDF		8	1115058	0.10200 0.0001	-0.0000 0.0000	-0.0000 94.88*
DIR		8	111505	0 0 0.0 1.0	-0.0 0.0	-0.0 *
DIR		8	1115058	0 0 0.0 8.0	-0.0 0.0	-0.0
ZANG		111505	1115058	95 30 71.0 8.0	9.7 7.2	1.3
DIST		1115059	9	0.20150 0.0001	0.0000 0.0000	0.0000 0.00*
EHDF		9	1115059	0.10080 0.0001	0.0000 0.0000	0.0000 232.59*
DIR		9	111505	0 0 0.0 1.0	-0.0 0.0	-0.0 *


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Residuals (critical value = 4.205, N,E,Up for 3D):
 NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES
					STD DEV	STD DEV	PPM	
DIR		9	1115059	0 0	0.0	-0.0	-0.0	
					8.0	0.0		
ZANG		111505	1115059	102 33	30.0	-12.8	-2.2	
					8.0	5.8		
DIST		1115068	8		0.20210	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		8	1115068		0.10200	-0.0000	-0.0000	
					0.0001	0.0000	9.24*	
DIR		8	111506	0 0	0.0	-0.0	-0.0	
					1.0	0.0		*
DIR		8	1115068	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		111506	1115068	96 99	44.0	1.7	0.2	
					8.0	7.8		
DIST		1115069	9		0.20150	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		9	1115069		0.10080	0.0000	0.0000	
					0.0001	0.0000	73.46*	
DIR		9	111506	0 0	0.0	-0.0	-0.0	
					1.0	0.0		*
DIR		9	1115069	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		111506	1115069	100 32	10.0	-14.6	-1.9	
					8.0	7.8		
DIR		121503	122020	0 0	0.0	-27.4	-3.2	
					10.0	8.5		
DIR		121503	8	205 39	12.0	6.9	3.2	
					5.0	2.1		
DIR		121503	122020	0 0	0.0	-0.9	-0.3	
					5.0	3.1		
DIR		121503	9	236 81	83.0	0.9	0.3	
					5.0	3.1		
DIR		121501	122020	0 0	0.0	-3.6	-1.0	
					5.0	3.5		
DIR		121501	8	214 89	79.0	3.6	1.0	
					5.0	3.5		
DIR		121501	122020	0 0	0.0	3.2	0.9	
					5.0	3.5		
DIR		121501	9	226 61	45.0	-3.2	-0.9	
					5.0	3.5		
DIR		121501	122020	0 0	0.0	-6.1	-1.8	
					5.0	3.5		
DIR		121501	8	214 89	74.0	6.1	1.8	
					5.0	3.5		
DIR		121506	122020	0 0	0.0	-5.7	-1.6	
					5.0	3.5		
DIR		121506	8	191 39	19.0	5.7	1.6	
					5.0	3.5		
DIR		121506	122020	0 0	0.0	-1.2	-0.4	
					5.0	3.4		
DIR		121506	9	206 91	27.0	1.2	0.4	
					5.0	3.4		
DIST		1215038	8		0.20210	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		8	1215038		0.10200	0.0000	0.0000	
					0.0001	0.0000	166.45*	
DIR		8	121503	0 0	0.0	-0.0	-0.0	
					1.0	0.0		*
DIR		8	1215038	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		121503	1215038	93 15	84.0	-10.2	-1.6	
					8.0	6.3		
DIST		1215039	9		0.20150	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		9	1215039		0.10080	-0.0000	-0.0000	
					0.0001	0.0000	5.00*	

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES
						STD DEV	STD DEV	PPM
DIR		9	121503	0 0	0.0	0.0	0.0	
					1.0	0.0		*
DIR		9	1215039	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		121503	1215039	102 1	35.0	0.5	0.1	
					8.0	7.2		
DIST		1215018	8		0.20210	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		8	1215018		0.10200	-0.0000	-0.0000	
					0.0001	0.0000	24.45*	
DIR		8	121501	0 0	0.0	-0.0	-0.0	
					1.0	0.1		
DIR		8	1215018	0 0	0.0	-0.0	-0.0	
					8.0	5.6		
ZANG		121501	1215018	98 94	89.0	7.8	1.0	
					8.0	7.8		
DIST		1215019	9		0.20150	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		9	1215019		0.10080	0.0000	0.0000	
					0.0001	0.0000	28.40*	
DIR		9	121501	0 0	0.0	-0.0	-0.0	
					1.0	0.0		*
DIR		9	1215019	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		121501	1215019	101 74	85.0	-6.5	-0.8	
					8.0	7.8		
DIST		1215018	8		0.20210	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		8	1215018		0.10200	-0.0000	-0.0000	
					0.0001	0.0000	24.45*	
DIR		8	121501	0 0	0.0	-0.0	-0.0	
					1.0	0.1		
DIR		8	1215018	0 0	0.0	-0.0	-0.0	
					8.0	5.6		
ZANG		121501	1215018	98 94	83.0	1.8	0.2	
					8.0	7.8		
DIST		1215068	8		0.20210	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		8	1215068		0.10200	-0.0000	-0.0000	
					0.0001	0.0000	66.33*	
DIR		8	121506	0 0	0.0	-0.0	-0.0	
					1.0	0.0		*
DIR		8	1215068	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		121506	1215068	96 99	53.0	12.0	1.5	
					8.0	7.8		
DIST		1215069	9		0.20150	0.0000	0.0000	
					0.0001	0.0000	0.00*	
EHDF		9	1215069		0.10080	0.0000	0.0000	
					0.0001	0.0000	16.82*	
DIR		9	121506	0 0	0.0	-0.0	-0.0	
					1.0	0.0		*
DIR		9	1215069	0 0	0.0	0.0	0.0	
					8.0	0.0		
ZANG		121506	1215069	100 32	20.0	-3.3	-0.4	
					8.0	7.8		
ELAT		8	21605M002	0 00	0.000000	-0.0004	-0.0004	
					0.0001	-0.0000	4948.79	
ELON		8	21605M002	0 00	0.000000	0.0001	0.0001	
					0.0001	-0.0000	1311.44	
DIR		1	5	0 0	0.0	0.0	0.2	
					1.0	0.2		
DIR		1	21605S009	52 47	64.0	-0.0	-0.2	
					1.0	0.2		
DIR		2	6	0 0	0.0	-0.0	-0.2	
					1.0	0.2		

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Residuals (critical value = 4.205, N,E,Up for 3D):
NOTE: Observation values shown are reduced to mark-to-mark.

TYPE	AT	FROM	TO	OBSERVATION		RESIDUAL		STD RES
				STD	DEV	STD	DEV	PPM
DIR		2	21605S009	388	4	59.0	0.3	0.2
						3.0	2.0	
DIR		3	6	0	0	0.0	-0.0	-0.2
						1.0	0.3	
DIR		3	21605S009	391	19	75.0	0.4	0.2
						3.0	2.5	
DIR		4	7	0	0	0.0	0.1	0.2
						1.0	0.2	
DIR		4	21605S009	394	33	91.0	-0.9	-0.2
						4.0	3.8	
DIR		5	20	0	0	0.0	0.2	0.7
						1.0	0.2	
DIR		5	21605S009	14	73	5.0	-2.7	-0.7
						4.0	3.7	
DIR		7	4	0	0	0.0	0.0	0.1
						1.0	0.2	
DIR		7	21605S009	18	80	10.0	-0.4	-0.1
						4.0	2.9	
ZANG		1	21605S009	85	58	74.0	3.7	0.9
						5.0	4.0	
ZANG		2	21605S009	82	6	52.0	0.8	0.2
						5.0	4.1	
ZANG		3	21605S009	89	67	86.0	0.2	0.0
						5.0	4.5	
ZANG		4	21605S009	94	89	51.0	-3.9	-0.8
						5.0	4.9	
ZANG		5	21605S009	92	92	2.0	-3.1	-0.6
						5.0	4.8	
ZANG		7	21605S009	73	78	34.0	-2.3	-0.6
						5.0	4.0	
EHDF		1000	7			-0.53867	-0.0001	-0.4396
						0.0002	0.0002	1.67
EHDF		7	2000			0.89629	0.0000	0.0000
						0.0001	0.0000	0.16*
EHDF		2000	3000			0.00526	0.0000	0.0000
						0.0001	0.0000	0.60*
EHDF		3000	4000			-0.02269	0.0000	0.0000
						0.0001	0.0000	0.48*
EHDF		4000	5000			-0.69030	0.0002	1.1965
						0.0002	0.0002	3.78
EHDF		5000	4000			0.69026	-0.0001	-0.9355
						0.0002	0.0002	2.96
EHDF		4000	3000			0.02271	-0.0001	-0.0001
						0.0001	0.0000	0.79*
EHDF		3000	2000			-0.00502	-0.0003	-1.4262
						0.0002	0.0002	8.87
EHDF		2000	7			-0.89623	-0.0001	-0.0001
						0.0001	0.0000	1.04*
EHDF		7	1000			0.53882	-0.0001	-0.5326
						0.0002	0.0002	2.02
EHDF		8005	8001			-0.50393	-0.0000	-0.0000
						0.0001	0.0000	19.84*
EHDF		8001	8002			0.50271	0.0000	0.0000
						0.0001	0.0000	19.89*
EHDF		8002	8001			-0.50273	0.0000	0.0000
						0.0001	0.0000	19.89*
EHDF		8001	8005			0.50395	-0.0000	-0.0000
						0.0001	0.0000	19.84*
EHDF		8005	5000			-3.54012	0.0001	0.4243
						0.0002	0.0001	1.20
EHDF		5000	8005			3.54000	0.0001	0.4243
						0.0002	0.0001	1.20
EHDF		5000	4001			4.09617	-0.0000	-0.0000
						0.0001	0.0000	0.09*
EHDF		4001	5000			-4.09608	-0.0001	-0.0001
						0.0001	0.0000	1.76*

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Residuals (critical value = 4.205, N,E,Up for 3D):

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

TYPE	AT	FROM	TO	OBSERVATION	RESIDUAL	STD RES
				STD DEV	STD DEV	PPM
EHDF		4002	4	2.22324	0.0000	0.0000
				0.0001	0.0000	13.07*
EHDF		4	4002	-2.22319	-0.0001	-0.0001
				0.0001	0.0000	35.56*
EHDF		1000	6N	4.31180	-0.0001	-0.4187
				0.0003	0.0003	3.47
EHDF		6N	1000	-4.31162	-0.0001	-0.2914
				0.0003	0.0003	2.42
EHDF		6N	1	2.57897	-0.0002	-1.0763
				0.0002	0.0002	5.68
EHDF		1	6N	-2.57894	0.0001	0.8890
				0.0002	0.0002	4.69
EHDF		2	6N	-0.01846	0.0000	0.0000
				0.0001	0.0000	0.19*
EHDF		6N	2	0.01850	-0.0000	-0.0000
				0.0001	0.0000	1.38*
EHDF		2	6N	-0.01835	-0.0001	-0.0001
				0.0001	0.0000	3.08*
EHDF		3N	2	-0.98991	0.0000	0.0000
				0.0001	0.0000	1.49*
EHDF		2	3N	0.98982	0.0000	0.0000
				0.0001	0.0000	1.61*
EHDF		5	4002	-1.05083	0.0001	0.0001
				0.0001	0.0000	1.61*
EHDF		4002	5	1.05070	0.0001	0.0001
				0.0001	0.0000	1.07*
EHDF		4001	4002	0.01810	0.0001	0.0001
				0.0001	0.0000	4492.95*
EHDF		6N	6	0.21820	0.0000	0.0000
				0.0001	0.0000	111.94*
EHDF		3N	3	0.17640	0.0000	0.1201
				0.0002	0.0001	79.15

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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	4.2045
Number of Flagged Residuals	4
Convergence Criterion	0.0001
Final Iteration Counter Value	3
Confidence Level Used	95.0000
Estimated Variance Factor	2.3337
Number of Degrees of Freedom	545

Chi-Square Test on the Variance Factor:

2.0796e+00 < 1.0000 < 2.6376e+00 ?

***** THE TEST FAILS *****

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

Variance factor used	=	2.3337
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
1	0.0029	9	0.0029	0.0024
1000	0.0000	0	0.0000	0.0024
2	0.0029	60	0.0029	0.0024
20	0.0033	123	0.0032	0.0034
2000	0.0000	0	0.0000	0.0024
21605M002	0.0029	180	0.0029	0.0023
21605M101	0.0029	179	0.0029	0.0026
21605S001	0.0035	149	0.0030	0.0027
21605S009	0.0030	150	0.0029	0.0025
3	0.0030	79	0.0029	0.0025
30	0.0029	178	0.0029	0.0026
3000	0.0000	0	0.0000	0.0024
35	0.0035	149	0.0030	0.0026
4	0.0029	44	0.0029	0.0024
4000	0.0000	0	0.0000	0.0024
5	0.0029	164	0.0029	0.0024
50	0.0060	149	0.0055	0.0060
5000	0.0000	0	0.0000	0.0024
7	0.0030	28	0.0030	0.0024
8	0.0029	82	0.0029	0.0025
9	0.0030	13	0.0030	0.0025

3D Station Confidence Regions (95.000 percent):

STATION	MAJ-SEMI (AZ, VANG)	MED-SEMI (AZ, VANG)	MIN-SEMI (AZ, VANG)
1	0.0035 (189, 86)	0.0033 (9, 4)	0.0033 (99, 0)
1000	0.0035 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
2	0.0035 (192, 86)	0.0033 (61, 3)	0.0033 (331, 3)
20	0.0049 (174, 86)	0.0037 (302, 2)	0.0036 (32, 3)
2000	0.0035 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
21605M002	0.0033 (184, 84)	0.0033 (340, 5)	0.0033 (71, 2)
21605M101	0.0037 (183, 86)	0.0033 (359, 4)	0.0033 (89, 0)
21605S001	0.0040 (150, 7)	0.0038 (316, 83)	0.0034 (59, 2)
21605S009	0.0035 (177, 86)	0.0034 (330, 3)	0.0033 (60, 2)
3	0.0035 (201, 87)	0.0034 (79, 1)	0.0033 (349, 2)
30	0.0036 (180, 86)	0.0033 (358, 4)	0.0033 (88, 0)
3000	0.0035 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
35	0.0040 (149, 5)	0.0037 (309, 85)	0.0034 (59, 2)
4	0.0034 (190, 84)	0.0033 (48, 5)	0.0033 (317, 4)
4000	0.0035 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
5	0.0034 (183, 84)	0.0033 (341, 5)	0.0033 (71, 2)
50	0.0085 (170, 89)	0.0069 (329, 1)	0.0063 (59, 0)
5000	0.0034 (0, 90)	0.0000 (90, 0)	0.0000 (0, 0)
7	0.0035 (194, 82)	0.0034 (29, 8)	0.0034 (299, 2)
8	0.0035 (175, 90)	0.0033 (82, 0)	0.0033 (352, 0)
9	0.0035 (191, 85)	0.0034 (13, 5)	0.0034 (283, 0)

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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
1	1000	0.0029	9	0.0029	0.0006	6.8905	425.35
1	2	0.0005	73	0.0005	0.0004	38.9005	13.62
1	20	0.0016	106	0.0014	0.0024	538.7994	2.88
1	2000	0.0029	9	0.0029	0.0006	39.3634	74.46
1	21605M002	0.0006	9	0.0006	0.0008	97.1389	6.56
1	21605M101	0.0007	2	0.0006	0.0011	1272.6339	0.51
1	21605S001	0.0020	149	0.0009	0.0013	765.4842	2.68
1	21605S009	0.0008	152	0.0004	0.0006	40.1402	18.79
1	3	0.0007	80	0.0005	0.0006	67.3920	10.96
1	30	0.0006	1	0.0006	0.0010	764.3793	0.81
1	3000	0.0029	9	0.0029	0.0006	67.6945	43.30
1	35	0.0020	149	0.0008	0.0012	765.4900	2.63
1	4	0.0007	176	0.0006	0.0006	132.0119	5.61
1	4000	0.0029	9	0.0029	0.0006	132.1717	22.17
1	5	0.0006	8	0.0005	0.0006	121.6060	4.80
1	50	0.0051	146	0.0048	0.0055	483.8957	10.64
1	5000	0.0029	9	0.0029	0.0006	121.8029	24.06
1	7	0.0007	40	0.0005	0.0005	41.3336	16.38
1	8	0.0007	46	0.0006	0.0007	97.1403	7.08
1	9	0.0010	17	0.0008	0.0007	112.3440	8.62
1000	2	0.0029	60	0.0029	0.0005	39.0557	75.04
1000	20	0.0033	123	0.0032	0.0025	539.5913	6.06
1000	2000	0.0000	0	0.0000	0.0004	38.8179	0.00
1000	21605M002	0.0029	180	0.0029	0.0009	97.4985	29.34
1000	21605M101	0.0029	179	0.0029	0.0011	1273.0815	2.30
1000	21605S001	0.0035	149	0.0030	0.0014	765.5825	4.60
1000	21605S009	0.0030	150	0.0029	0.0007	42.2220	70.66
1000	3	0.0030	79	0.0029	0.0007	67.6004	43.90
1000	30	0.0029	178	0.0029	0.0011	764.4716	3.83
1000	3000	0.0000	0	0.0000	0.0005	67.3790	0.00
1000	35	0.0035	149	0.0030	0.0012	765.5934	4.57
1000	4	0.0029	44	0.0029	0.0006	132.1435	22.14
1000	4000	0.0000	0	0.0000	0.0005	132.0087	0.00
1000	5	0.0029	164	0.0029	0.0006	121.6819	23.66
1000	50	0.0060	149	0.0055	0.0055	485.0649	12.37
1000	5000	0.0000	0	0.0000	0.0006	121.5863	0.00
1000	7	0.0030	28	0.0030	0.0004	40.6627	73.32
1000	8	0.0029	82	0.0029	0.0007	97.5055	29.58
1000	9	0.0030	13	0.0030	0.0007	112.3727	26.73
2	20	0.0016	111	0.0014	0.0024	575.0151	2.70
2	2000	0.0029	60	0.0029	0.0005	3.9726	737.73
2	21605M002	0.0006	60	0.0006	0.0008	59.1969	10.76
2	21605M101	0.0006	32	0.0006	0.0011	1310.4582	0.49
2	21605S001	0.0020	149	0.0009	0.0013	803.3715	2.55
2	21605S009	0.0007	161	0.0006	0.0006	41.6195	17.54
2	3	0.0008	75	0.0005	0.0005	29.0336	26.47
2	30	0.0006	38	0.0006	0.0010	802.2163	0.78
2	3000	0.0029	60	0.0029	0.0005	29.2814	100.09
2	35	0.0020	149	0.0008	0.0012	803.3788	2.51
2	4	0.0007	37	0.0006	0.0006	93.6211	7.33
2	4000	0.0029	60	0.0029	0.0006	93.6918	31.28
2	5	0.0006	58	0.0005	0.0006	84.5694	6.84
2	50	0.0052	147	0.0048	0.0055	505.6986	10.28
2	5000	0.0029	60	0.0029	0.0006	84.6967	34.60
2	7	0.0008	54	0.0006	0.0005	68.3005	11.51
2	8	0.0007	68	0.0006	0.0007	59.2027	12.17
2	9	0.0009	36	0.0008	0.0007	73.5208	12.90
20	2000	0.0033	123	0.0032	0.0025	575.4511	5.68
20	21605M002	0.0016	123	0.0014	0.0025	633.0522	2.49
20	21605M101	0.0016	116	0.0014	0.0025	744.6346	2.08
20	21605S001	0.0024	145	0.0016	0.0026	256.2232	9.56
20	21605S009	0.0016	119	0.0014	0.0025	543.4751	2.94
20	3	0.0017	106	0.0014	0.0025	603.5289	2.77
20	30	0.0015	113	0.0013	0.0025	253.9221	6.05
20	3000	0.0033	123	0.0032	0.0025	604.0609	5.41
20	35	0.0024	145	0.0015	0.0026	256.1109	9.45
20	4	0.0017	130	0.0015	0.0024	666.6261	2.50
20	4000	0.0033	123	0.0032	0.0025	667.1531	4.90

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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
-----
20 5 0.0016 123 0.0014 0.0024 640.2341 2.42
20 50 0.0052 133 0.0045 0.0057 317.4170 16.24
20 5000 0.0033 123 0.0032 0.0025 640.7427 5.10
20 7 0.0016 86 0.0014 0.0025 509.3833 3.14
20 8 0.0016 120 0.0014 0.0025 633.0451 2.55
20 9 0.0017 135 0.0016 0.0025 642.8188 2.70
2000 21605M002 0.0029 180 0.0029 0.0008 59.6102 47.99
2000 21605M101 0.0029 179 0.0029 0.0011 1310.7127 2.24
2000 21605S001 0.0035 149 0.0030 0.0013 803.4315 4.38
2000 21605S009 0.0030 150 0.0029 0.0006 42.8934 69.55
2000 3 0.0030 79 0.0029 0.0007 29.4609 100.74
2000 30 0.0029 178 0.0029 0.0010 802.2730 3.65
2000 3000 0.0000 0 0.0000 0.0003 29.0105 0.00
2000 35 0.0035 149 0.0030 0.0012 803.4416 4.36
2000 4 0.0029 44 0.0029 0.0005 93.7745 31.19
2000 4000 0.0000 0 0.0000 0.0003 93.6058 0.00
2000 5 0.0029 164 0.0029 0.0005 84.6837 34.00
2000 50 0.0060 149 0.0055 0.0055 506.3528 11.85
2000 5000 0.0000 0 0.0000 0.0005 84.5685 0.00
2000 7 0.0030 28 0.0030 0.0002 68.1329 43.76
2000 8 0.0029 82 0.0029 0.0007 59.6212 48.37
2000 9 0.0030 13 0.0030 0.0007 73.6053 40.81
21605M002 21605M101 0.0006 179 0.0006 0.0012 1369.1416 0.47
21605M002 21605S001 0.0020 149 0.0009 0.0014 862.3437 2.38
21605M002 21605S009 0.0008 150 0.0006 0.0009 92.0400 9.20
21605M002 3 0.0008 79 0.0006 0.0009 30.2005 26.18
21605M002 30 0.0006 178 0.0006 0.0011 861.2018 0.72
21605M002 3000 0.0029 180 0.0029 0.0008 31.1379 91.88
21605M002 35 0.0020 149 0.0008 0.0013 862.3477 2.34
21605M002 4 0.0006 44 0.0006 0.0007 35.1294 17.39
21605M002 4000 0.0029 180 0.0029 0.0008 35.9835 79.51
21605M002 4001 0.0029 180 0.0029 0.0007 35.3635 80.90
21605M002 4002 0.0029 180 0.0029 0.0006 35.3610 80.91
21605M002 411220 0.0016 123 0.0014 0.0034 633.0734 2.55
21605M002 5 0.0003 164 0.0003 0.0006 50.2097 6.44
21605M002 50 0.0053 149 0.0047 0.0055 551.2195 9.57
21605M002 5000 0.0029 180 0.0029 0.0007 50.8535 56.26
21605M002 7 0.0008 28 0.0007 0.0008 126.0444 6.66
21605M002 8 0.0004 82 0.0003 0.0009 0.0798 4555.54
21605M002 9 0.0009 13 0.0008 0.0009 24.8986 36.76
21605M101 21605S001 0.0020 149 0.0008 0.0012 509.9300 3.93
21605M101 21605S009 0.0009 154 0.0006 0.0012 1282.4675 0.69
21605M101 3 0.0008 78 0.0007 0.0011 1339.3427 0.62
21605M101 30 0.0005 1 0.0004 0.0009 511.0146 0.95
21605M101 3000 0.0029 179 0.0029 0.0011 1339.6622 2.19
21605M101 35 0.0020 149 0.0007 0.0011 509.8505 3.86
21605M101 4 0.0007 2 0.0007 0.0010 1403.6478 0.53
21605M101 4000 0.0029 179 0.0029 0.0011 1403.9813 2.09
21605M101 5 0.0006 2 0.0005 0.0010 1380.8828 0.42
21605M101 50 0.0052 148 0.0048 0.0055 986.0040 5.32
21605M101 5000 0.0029 179 0.0029 0.0011 1381.1954 2.12
21605M101 7 0.0009 29 0.0008 0.0011 1246.4887 0.69
21605M101 8 0.0007 28 0.0007 0.0012 1369.1371 0.51
21605M101 9 0.0010 14 0.0009 0.0012 1381.1187 0.73
21605S001 21605S009 0.0021 149 0.0009 0.0014 776.6389 2.76
21605S001 3 0.0021 148 0.0010 0.0014 832.3629 2.49
21605S001 30 0.0020 149 0.0006 0.0008 4.5778 429.23
21605S001 3000 0.0035 149 0.0030 0.0013 832.4342 4.23
21605S001 35 0.0004 0 0.0004 0.0007 0.5664 660.16
21605S001 4 0.0021 150 0.0009 0.0013 896.8767 2.32
21605S001 4000 0.0035 149 0.0030 0.0013 896.9470 3.92
21605S001 5 0.0020 149 0.0008 0.0013 875.1116 2.32
21605S001 50 0.0056 150 0.0048 0.0056 548.9762 10.21
21605S001 5000 0.0035 149 0.0030 0.0013 875.1821 4.02
21605S001 7 0.0021 150 0.0010 0.0013 739.5375 2.84
21605S001 8 0.0021 149 0.0009 0.0014 862.3432 2.40
21605S001 9 0.0022 151 0.0011 0.0014 874.5162 2.48
21605S009 3 0.0008 120 0.0007 0.0007 64.4540 12.85
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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
21605S009	30	0.0009	153	0.0006	0.0011	775.3296	1.12
21605S009	3000	0.0030	150	0.0029	0.0007	65.4794	45.56
21605S009	35	0.0021	149	0.0008	0.0012	776.6380	2.71
21605S009	4	0.0009	153	0.0007	0.0007	123.7520	7.40
21605S009	4000	0.0030	150	0.0029	0.0007	124.3317	24.00
21605S009	5	0.0008	150	0.0005	0.0007	99.8864	8.10
21605S009	50	0.0052	150	0.0048	0.0055	464.5905	11.12
21605S009	5000	0.0030	150	0.0029	0.0007	100.5900	29.66
21605S009	7	0.0007	91	0.0006	0.0006	41.0715	17.76
21605S009	8	0.0009	146	0.0007	0.0008	92.0338	9.46
21605S009	9	0.0011	168	0.0009	0.0008	99.3810	10.87
3	30	0.0008	79	0.0007	0.0011	831.2109	0.99
3	3000	0.0030	79	0.0029	0.0007	5.1336	578.15
3	35	0.0020	148	0.0010	0.0012	832.3692	2.45
3	4	0.0008	72	0.0006	0.0007	64.6709	12.58
3	4000	0.0030	79	0.0029	0.0007	64.8748	45.75
3	5	0.0007	80	0.0005	0.0007	62.8206	11.86
3	50	0.0053	144	0.0048	0.0055	527.5288	9.98
3	5000	0.0030	79	0.0029	0.0007	63.0876	47.05
3	7	0.0009	70	0.0007	0.0006	96.2718	9.41
3	8	0.0009	77	0.0006	0.0007	30.2087	28.49
3	9	0.0010	66	0.0008	0.0008	46.3890	21.51
30	3000	0.0029	178	0.0029	0.0010	831.2781	3.52
30	35	0.0019	149	0.0005	0.0006	4.6965	410.74
30	4	0.0007	180	0.0006	0.0010	895.7026	0.81
30	4000	0.0029	178	0.0029	0.0010	895.7687	3.27
30	5	0.0006	1	0.0005	0.0010	873.7243	0.63
30	50	0.0052	148	0.0048	0.0055	545.5148	9.60
30	5000	0.0029	178	0.0029	0.0010	873.7908	3.35
30	7	0.0008	31	0.0007	0.0010	738.2448	1.14
30	8	0.0007	26	0.0007	0.0011	861.2014	0.78
30	9	0.0010	14	0.0008	0.0011	873.2637	1.14
3000	35	0.0035	149	0.0030	0.0012	832.4440	4.20
3000	4	0.0029	44	0.0029	0.0005	64.9118	45.06
3000	4000	0.0000	0	0.0000	0.0002	64.6681	0.00
3000	5	0.0029	164	0.0029	0.0005	62.9724	45.72
3000	50	0.0060	149	0.0055	0.0055	528.3338	11.36
3000	5000	0.0000	0	0.0000	0.0004	62.8181	0.00
3000	7	0.0030	28	0.0030	0.0003	96.0875	31.03
3000	8	0.0029	82	0.0029	0.0007	31.1590	92.55
3000	9	0.0030	13	0.0030	0.0007	46.4982	64.59
35	4	0.0020	150	0.0008	0.0011	896.8822	2.28
35	4000	0.0035	149	0.0030	0.0012	896.9561	3.90
35	5	0.0020	149	0.0007	0.0011	875.1180	2.28
35	50	0.0056	150	0.0048	0.0055	548.9028	10.19
35	5000	0.0035	149	0.0030	0.0012	875.1918	4.00
35	7	0.0021	150	0.0010	0.0012	739.5492	2.79
35	8	0.0020	149	0.0008	0.0013	862.3471	2.36
35	9	0.0021	151	0.0011	0.0013	874.5231	2.44
4	4000	0.0029	44	0.0029	0.0005	5.6475	517.97
4	5	0.0006	24	0.0005	0.0003	48.4927	11.67
4	50	0.0054	148	0.0048	0.0055	575.4806	9.32
4	5000	0.0029	44	0.0029	0.0004	48.8909	59.83
4	7	0.0009	175	0.0008	0.0005	159.0091	5.74
4	8	0.0007	73	0.0006	0.0007	35.1353	19.73
4	9	0.0010	33	0.0007	0.0007	27.3603	35.28
4000	5	0.0029	164	0.0029	0.0005	48.6829	59.13
4000	50	0.0060	149	0.0055	0.0055	576.2892	10.41
4000	5000	0.0000	0	0.0000	0.0004	48.4816	0.00
4000	7	0.0030	28	0.0030	0.0004	158.8776	18.76
4000	8	0.0029	82	0.0029	0.0007	36.0018	80.10
4000	9	0.0030	13	0.0030	0.0007	27.5180	109.15
5	50	0.0053	149	0.0047	0.0055	533.1530	9.88
5	5000	0.0029	164	0.0029	0.0004	5.1651	557.37
5	7	0.0008	27	0.0007	0.0005	137.0117	5.84
5	8	0.0004	96	0.0004	0.0007	50.2160	8.89
5	9	0.0009	11	0.0007	0.0007	27.3822	32.35
50	5000	0.0060	149	0.0055	0.0055	533.9610	11.24
50	7	0.0051	155	0.0048	0.0055	445.3163	11.36

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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
-----
50         8             0.0053 149  0.0048    0.0055   551.2086   9.59
50         9             0.0054 148  0.0048    0.0055   548.7807   9.75
5000      7             0.0030 28   0.0030    0.0005   136.9064   21.78
5000      8             0.0029 82   0.0029    0.0007    50.8679   56.69
5000      9             0.0030 13   0.0030    0.0007    27.7009  108.43
7         8             0.0009 44   0.0008    0.0007   126.0502    7.02
7         9             0.0011 23   0.0010    0.0007   135.3113    8.17
8         9             0.0009 23   0.0008    0.0007    24.9138   37.67

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Fri Jan 13 08:40:59 2006

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5.12. Global results covariance matrix of selected points (extracted from Microsearch Geolab)

* Extracted coordinates follow: (extracted on Thu Feb 16 13:59:01 2006)
 * Source (GeoLab adjustment): shao_juillet
 * Variance factor of adjustment = 2.333654
 * Variance factor used in computing covariance matrix = 1.000000
 * Number of degrees of freedom of adjustment = 545
 * Number of stations in adjusted network = 151
 * Number of stations extracted = 8
 *

3DC					
XYZ	21605M002	-2831733.4800	4675665.9620	3275369.4290 m	0
XYZ	1	-2831656.7597	4675722.7942	3275351.5384 m	0
XYZ	2	-2831688.2100	4675699.9055	3275352.0295 m	0
XYZ	4	-2831761.2648	4675644.5256	3275371.0286 m	0
XYZ	5	-2831764.2140	4675670.1139	3275329.9424 m	0
XYZ	50	-2831606.1642	4676084.7377	3275034.3758 m	0
XYZ	7	-2831648.7148	4675742.5073	3275316.1106 m	0
XYZ	9	-2831750.8152	4675661.3584	3275352.1594 m	0
COV	CT	UPPR			
ELEM	5.85384317448479e-07	1.41104792193693e-13	1.05803601061658e-12		
ELEM	5.85134321271144e-07	-1.96362008898018e-11	-1.32208246061886e-10		
ELEM	5.85134536906489e-07	-1.92266070121915e-11	-1.32468634204932e-10		
ELEM	5.85135361250819e-07	-1.74219301822409e-11	-1.30520909236125e-10		
ELEM	5.85136464316289e-07	-1.4448636598879e-11	-1.24996520421604e-10		
ELEM	5.85148493201455e-07	-4.34993080546534e-11	-1.1963837224795e-10		
ELEM	5.85134040825255e-07	-2.07341680502413e-11	-1.31050583548807e-10		
ELEM	5.85135967406851e-07	-1.81986543055728e-11	-1.3246638289865e-10		
ELEM	5.85382723726469e-07	1.67731235843002e-13	-1.84643132969886e-11		
ELEM	5.85337246010179e-07	-2.1628100672361e-11	-1.93979104017078e-11		
ELEM	5.85337615267927e-07	-1.90194632366219e-11	-1.84514754786999e-11		
ELEM	5.85342081076638e-07	-7.39619193975391e-12	-2.03068689825962e-11		
ELEM	5.85331432120253e-07	-2.07526245359652e-11	-4.71507582849652e-12		
ELEM	5.8533698236904e-07	9.09695119649777e-12	-1.78469604027174e-11		
ELEM	5.85337986200496e-07	-2.11868212917439e-11	-1.76801576230203e-11		
ELEM	5.85339936412229e-07	-1.33370388171546e-11			
ELEM	5.85383435188236e-07	-1.28170236262463e-10	-8.96938705203152e-12		
ELEM	5.85252710694737e-07	-1.29162165441213e-10	-1.00925504392593e-11		
ELEM	5.85253860473777e-07	-1.32457476052657e-10	-1.52387739129534e-11		
ELEM	5.85253313091813e-07	-1.34568711020659e-10	-2.04264001626336e-11		
ELEM	5.85244388045889e-07	-1.36529632242663e-10	-5.44288468455015e-11		
ELEM	5.85233353840885e-07	-1.29371287724947e-10	-8.36243195658092e-12		
ELEM	5.85252317220179e-07	-1.31733621924e-10	-1.10771119498156e-11		
ELEM	5.85253528496446e-07				
ELEM	6.49020703995023e-07	1.93364308548669e-09	2.52213844485653e-08		
ELEM	6.3917319656345e-07	1.78291501233989e-09	2.43269326324261e-08		
ELEM	6.19301613593168e-07	4.19016214436548e-09	1.63908453563671e-08		
ELEM	6.15488439696276e-07	2.05371495156135e-09	1.59064797282e-08		
ELEM	6.38042826632626e-07	-8.51774289805314e-10	1.00822160710431e-08		
ELEM	6.33396803928547e-07	-4.4817476205805e-10	1.71927902027528e-08		
ELEM	6.2891648925854e-07	6.67449428096777e-10	2.22073606862614e-08		
ELEM	6.13540722619126e-07	3.47576994001324e-09	2.70050023496114e-09		
ELEM	6.0435088218048e-07	1.87100610461688e-09	2.5726794714163e-09		
ELEM	5.95180696660459e-07	5.12818888172711e-10	2.46978192227634e-09		
ELEM	5.90876942795902e-07	1.8966468489455e-09	-2.17882640760512e-08		
ELEM	6.08811124273516e-07	4.37599542685696e-08	3.50923741745832e-09		
ELEM	6.08351721286282e-07	4.42002981069808e-10	2.57627675529039e-09		
ELEM	5.95444012557709e-07	1.62458231982156e-09			
ELEM	6.2556739678023e-07	2.44294249291441e-08	3.1687528817271e-09		
ELEM	6.16454509212748e-07	1.62287821395148e-08	-1.59844451477726e-09		
ELEM	6.04556421155176e-07	1.63325041861449e-08	1.78089029007614e-09		
ELEM	6.01542776002354e-07	8.09575244052651e-09	8.59427112619569e-09		
ELEM	6.34745023100527e-07	1.74583347444174e-08	6.68558650312673e-09		
ELEM	6.18328026750633e-07	2.24291440533576e-08	4.1298190064461e-09		

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ELEM	6.08014651841436e-07		
ELEM	6.45951104693414e-07	3.99259407499211e-09	2.32307754998916e-08
ELEM	6.19693596873907e-07	3.62581230262212e-09	1.58978670196663e-08
ELEM	6.154796156658e-07	2.06094640878367e-09	1.59214271490984e-08
ELEM	6.34051190537074e-07	1.59176051077572e-09	1.60668517918713e-08
ELEM	6.33239859953062e-07	7.85976595708914e-10	1.89112541555904e-08
ELEM	6.29684581025772e-07	4.55332582477698e-10	2.21406256243678e-08
ELEM	6.12902976624903e-07	-5.80067081561846e-10	2.15791725457327e-09
ELEM	5.95575556567128e-07	1.17798952550661e-09	2.52983389688372e-09
ELEM	5.90828143914433e-07	1.80104667970422e-09	-1.16448453166728e-08
ELEM	6.07504165441883e-07	2.63752777870829e-08	1.5463232527555e-09
ELEM	6.03731938627295e-07	3.48493727467063e-09	2.10022601604831e-09
ELEM	5.96045807426769e-07	2.17424373683788e-09	
ELEM	6.24374891353293e-07	1.58398235944431e-08	-7.54108469104739e-10
ELEM	6.05363019464553e-07	1.6431918942966e-08	1.69960973578185e-09
ELEM	6.01381853532443e-07	1.4142226316061e-08	4.37776255600671e-09
ELEM	6.23617911501983e-07	1.92248930890504e-08	4.38838547837262e-09
ELEM	6.16190233848276e-07	2.22636903959286e-08	4.44484921007222e-09
ELEM	6.08815729696143e-07		
ELEM	6.27312548841621e-07	2.40099363141121e-09	1.17492063245476e-08
ELEM	6.15469475727913e-07	2.52711181706635e-09	1.64564515958106e-08
ELEM	6.11956443908458e-07	5.68718038846856e-09	2.81687166562759e-08
ELEM	6.19065890405332e-07	4.75310695580904e-09	1.73576112870453e-08
ELEM	6.21661835721502e-07	3.4345934017405e-10	1.30677255313412e-08
ELEM	6.11882207863816e-07	8.19096730607393e-10	2.05335803310477e-09
ELEM	5.90316949236663e-07	1.07279879082828e-09	9.6070247442249e-09
ELEM	5.91717056688307e-07	-1.12966935708948e-08	3.41418002945047e-09
ELEM	5.96695092102751e-07	-9.52607586770036e-10	8.62813330537591e-10
ELEM	5.94347500949296e-07	3.26811410460187e-09	
ELEM	6.17420699597625e-07	1.59400915072552e-08	1.84392258206496e-09
ELEM	6.01386106831021e-07	2.72917846277118e-08	-3.97839839014023e-09
ELEM	5.85429911486664e-07	1.72478362443205e-08	-2.68063346643376e-09
ELEM	6.03317112129047e-07	1.30680401621673e-08	4.34234726666206e-09
ELEM	6.102533530831e-07		
ELEM	6.15487238900811e-07	2.1340772079333e-09	1.59119658709851e-08
ELEM	6.15679976467109e-07	1.93495934028051e-09	1.5605403298828e-08
ELEM	6.15501313208753e-07	2.04833761603934e-09	1.58861025151361e-08
ELEM	6.15470089618604e-07	2.0569132409024e-09	1.59380224042705e-08
ELEM	5.91614357188403e-07	2.52449651813984e-09	2.23719867410786e-09
ELEM	5.90935165177675e-07	2.29999727215714e-09	2.4929234454107e-09
ELEM	5.90755397142936e-07	1.88438452739912e-09	2.57417279491573e-09
ELEM	5.90574086484684e-07	1.75252722776996e-09	
ELEM	6.02322393232884e-07	1.55582056571102e-08	2.05617929981406e-09
ELEM	6.02810156184485e-07	1.63311340362156e-08	1.63994404960074e-09
ELEM	6.0157476198572e-07	1.65159044798534e-08	1.39298179059603e-09
ELEM	6.0127192843381e-07		
ELEM	3.5696303753473e-06	-7.09543730136773e-08	6.58174384631091e-07
ELEM	6.46805476931584e-07	-4.84089556085582e-09	-1.32611180673354e-08
ELEM	6.23156570936152e-07	4.13820066511544e-09	2.98833385639956e-08
ELEM	2.27839520818696e-06	1.4050394802661e-07	-2.38086295543755e-08
ELEM	6.09548157247565e-07	4.69877298970995e-08	1.31778952257861e-09
ELEM	5.94602639971172e-07	3.15175820457071e-09	
ELEM	2.894843393599e-06	-1.36759843193301e-08	1.44803632895251e-08
ELEM	6.66703275200048e-07	2.80963956145459e-08	-2.92278730424936e-10
ELEM	5.96643082446665e-07		
ELEM	6.46754099304683e-07	2.23612714105338e-09	1.48286639405051e-08
ELEM	6.26152499617807e-07	4.92180716709065e-10	2.10890351255973e-08
ELEM	6.35619384316264e-07	1.98354286137052e-09	2.60287410171011e-09
ELEM	5.96022889233826e-07	1.34063586197524e-09	
ELEM	6.3420170100325e-07	2.1399052209316e-08	4.24233333457196e-09
ELEM	6.06460460775774e-07		
ELEM	6.61967789098423e-07	-5.96658993887831e-10	2.11986648209788e-08
ELEM	6.43404744752679e-07	6.0295049871393e-09	
ELEM	6.41963660538069e-07		

*

* End of extracted coordinates

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**5.13. Ellipsoid height of the levelling benchmarks and levelled survey points
(extracted from Microsearch Geolab)**

```

*
* Extracted coordinates follow: (extracted on Thu Feb 16 13:55:53 2006)
* Source (GeoLab adjustment): shao_juillet
* Variance factor of adjustment = 2.333654
* Variance factor used in computing covariance matrix = 1.000000
* Number of degrees of freedom of adjustment = 545
* Number of stations in adjusted network = 151
* Number of stations extracted = 10
*
EHGT      1                20.4107      0.0008 m
EHGT     1000              13.5202      0.0008 m
EHGT      2                17.8503      0.0008 m
EHGT     2000              13.8777      0.0008 m
EHGT     3000              13.8830      0.0008 m
EHGT      4                19.5079      0.0008 m
EHGT     4000              13.8604      0.0008 m
EHGT      5                18.3353      0.0008 m
EHGT     5000              13.1702      0.0008 m
EHGT      7                12.9814      0.0008 m
*
* End of extracted coordinates
*

```


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5.15. SINEX file : 21605_IGN_2003-332.SNX

```

%=SNX 1.00 IGN 06:013:00000 IGN 03:332:00000 03:332:00000 C 00009
*-----
+FILE/COMMENT
* File created by geotosnx software (Z.Altamimi)
* Original input file: shao_juillet2.cov
* Matrix Scaling Factor used:          1.0000000000
-FILE/COMMENT
*-----
+SITE/ID
*CODE PT  __DOMES__ T  _STATION DESCRIPTION__ APPROX_LON_ APPROX_LAT_  _APP_H_
SHAO  A  21605M002   21605M002          121 12 01.5   31 05 58.7   22.1
7837  A  21605S001   21605S001          121 11 30.2   31 05 51.1   27.9
7227  A  21605S009   21605S009          121 11 58.7   31 05 56.9   29.4
-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  SHAO  A    1 03:332:00000 m    2 -.283173348000000E+07 0.11688E-02
  2 STAY  SHAO  A    1 03:332:00000 m    2  0.467566596200000E+07 0.11688E-02
  3 STAZ  SHAO  A    1 03:332:00000 m    2  0.327536942900000E+07 0.11688E-02
  4 STAX  7837  A    1 03:332:00000 m    2 -.283108829860000E+07 0.13739E-02
  5 STAY  7837  A    1 03:332:00000 m    2  0.467620325920000E+07 0.12720E-02
  6 STAZ  7837  A    1 03:332:00000 m    2  0.327517273290000E+07 0.13915E-02
  7 STAX  7227  A    1 03:332:00000 m    2 -.283168712290000E+07 0.12460E-02
  8 STAY  7227  A    1 03:332:00000 m    2  0.467573358670000E+07 0.11992E-02
  9 STAZ  7227  A    1 03:332:00000 m    2  0.327532760440000E+07 0.12265E-02
-SOLUTION/ESTIMATE
*-----
+SOLUTION/MATRIX_ESTIMATE L COVA
*PARA1 PARA2  _PARA2+0_____ _PARA2+1_____ _PARA2+2_____
  1    1  0.136608451550408E-05
  2    1  0.329299509227381E-12  0.136608079629085E-05
  3    1  0.246907957154911E-11  0.391431918175545E-12  0.136608245653616E-05
  4    1  0.136551283355459E-05  0.488889432660378E-10  -.455191422138606E-09
  4    4  0.188759926177756E-05
  5    1  -.117906983707973E-09  0.136597124534316E-05  -.215699798509621E-09
  5    4  -.107397450989922E-06  0.161793926655169E-05
  6    1  -.152434778085041E-09  0.134528079837136E-09  0.136575892427090E-05
  6    4  -.165381400509625E-07  0.216342710643521E-06  0.193632749376858E-05
  7    1  0.136550327785402E-05  -.461884316601965E-10  -.300567753305019E-09
  7    4  0.145817695926904E-05  0.718833690486268E-08  0.430456220944338E-07
  7    7  0.155251759916955E-05
  8    1  -.472937574136496E-10  0.136597069288473E-05  -.201157005240766E-10
  8    4  0.484015451463556E-08  0.139236258155494E-05  0.637671155013970E-08
  8    7  -.709278168352204E-08  0.143814883836310E-05
  9    1  -.308397613328774E-09  -.528694378786543E-10  0.136578193892274E-05
  9    4  0.432230022487151E-07  0.358688594276535E-08  0.142097894933250E-05
  9    7  0.518361608160984E-07  0.259924913729066E-07  0.150436138466331E-05
-SOLUTION/MATRIX_ESTIMATE L COVA
%ENDSNX

```