

Damien Pesce

ITRF local tie survey at Puerto Ayora, Santa Cruz, Galapagos – Ecuador



DIFFUSION EXTERNE

DT • 600 82 8724

version 1

Date de création 22/08/2023

Résumé / Abstract

The ITRF2020 realization (most recent frame of the International Terrestrial Reference System) computed by the ITRS product Centre (IGN Geodesy research team from IPGP) is the result of the reference frames combination from four space geodesy techniques (i.e. GNSS, DORIS, SLR and VLBI). One way to achieve one common frame consists in adding to the combination results from co-located sites local tie surveys. The Foundation Charles Darwin research centre at the Puerto Ayora, Santa Cruz Island, Galapagos, Ecuador hosts a DORIS and a GNSS station. This report describes the local tie survey carried out in June 2023 during the DORIS station renovation on site and presents the associated results.

Remerciements / Acknowledgements

On behalf of CNES and IGN, we would like to acknowledge the staff from the Charles Darwin research station for their essential logistic assistance, their welcome and help especially Mikel Goñi and the IT team.

I thank also Jacob Sklar from NASA Global Geodetic Network and David Stowers from NASA Jet Propulsion Laboratory for their prompt email assistances when I was on the field.

1	Introduction	4
1.1	Context	4
1.2	Glossary.....	4
2	Co-location site description	5
2.1	Site information	5
2.2	Co-located points.....	6
3	Local tie survey description.....	7
3.1	Organization	7
3.2	Equipment – Instruments characteristics	7
3.3	Co-located points.....	8
3.3.1	DORIS antenna – SCRC.....	8
3.3.2	DORIS antenna – SCSC	8
3.3.3	DORIS station – marker.....	9
3.3.4	GNSS station – GLPS.....	10
3.4	Observation polygon.....	11
3.4.1	Total station figure.....	11
3.4.2	Orientation	13
3.5	Survey method.....	14
3.5.1	GNSS antenna reference points	15
3.5.2	DORIS antenna reference point	15
3.5.3	Geodetic marker.....	16
3.5.4	Orientations.....	16
4	Computation and data analysis.....	17
4.1	On site validation.....	17
4.2	IGS alignment.....	17
4.2.1	GLPS IGS Coordinates.....	17
4.2.2	Orientation points.....	17
4.3	Final adjustment	17
5	Results	19
5.1	Adjusted coordinates and confidence intervals	19
5.2	Vectors.....	20
6	Annexes	21
6.1	GLPS Diagrams.....	21
6.2	Adjustment input files	22
6.2.1	Approximate coordinates file.....	22
6.2.2	Observations file	24
6.3	Adjustment output files	38
6.3.1	COMP3D computation report.....	38
6.3.2	Sinex file : 42005_IGN_2023-166_v10.SNX.....	74

1 Introduction

1.1 Context

The International Terrestrial Reference Frame (ITRF) is the result of a combination of different terrestrial reference frames provided by the four space geodetic techniques (i.e. GNSS, DORIS, SLR and VLBI). To perform this combination between independent reference frames, local tie surveys between co-located space geodetic instruments, precisely measured and expressed in three dimensions are necessary.

One way to improve the ITRS realization consists in adding to the combination tie vectors from new co-located sites or to improve the local tie accuracy on former sites.

To this end, missing or old local ties have to be surveyed. In charge of the DORIS network maintenance, IGN carries out local tie surveys as soon as a DORIS station is co-located with other techniques.

This document presents the local tie survey performed in Puerto Ayora, on Santa-Cruz Island, Galápagos, which took place on June 2023 during DORIS renovation operation.

The goals were the following:

- Assign coordinates to the reference point of the new DORIS antenna ;
- Provide tie vectors between instrument reference points (i.e. DORIS, GNSS) ;
- Produce a survey result file in SINEX format.

1.2 Glossary

ARP: Antenna Reference Point

CNES: Centre National d'Études Spatiales (France)

DOMES: Directory Of MERit Sites, ITRF product center site numbering

DORIS: Doppler Orbitography and Radiopositioning Integrated by Satellite

FCD: Foundation Charles Darwin

GGOS: Global Geodetic Observing System

GNSS: Global Navigation Satellite System

IDS: International DORIS Service

IERS: International Earth Rotation and Reference Systems Service

IGN: Institut National de l'Information Géographique et Forestière (France)

IGS: International GNSS Service

ITRF: International Terrestrial Reference Frame

SINEX: Solution INdependent Exchange

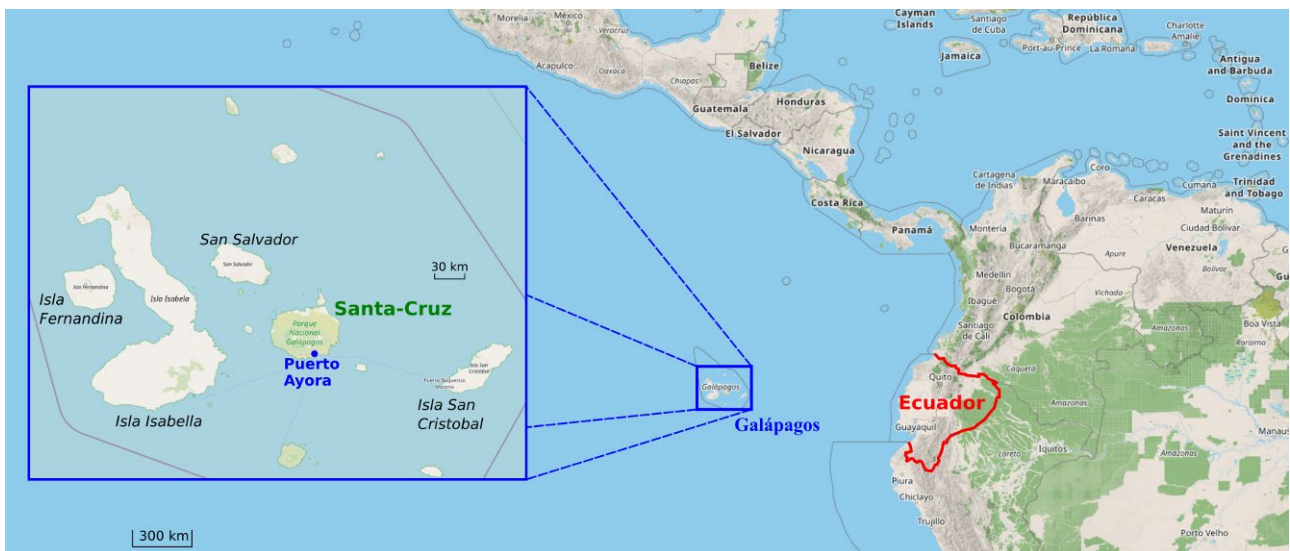
SLR: Satellite Laser Ranging

VLBI: Very Long Baseline Interferometry

2 Co-location site description

2.1 Site information

The Galápagos Islands are located in the Eastern Pacific, around the Equator, 900 km west of Ecuador's coast. They form the Galápagos Province of the Republic of Ecuador.



Location map (extract OpenStreetMap)

The site is located to the west of Puerto Aroya city in Santa Cruz Island, at the Charles Darwin Research Station owned by the Foundation Charles Darwin.



Puerto Ayora map (extract OpenStreetMap)

2.2 Co-located points

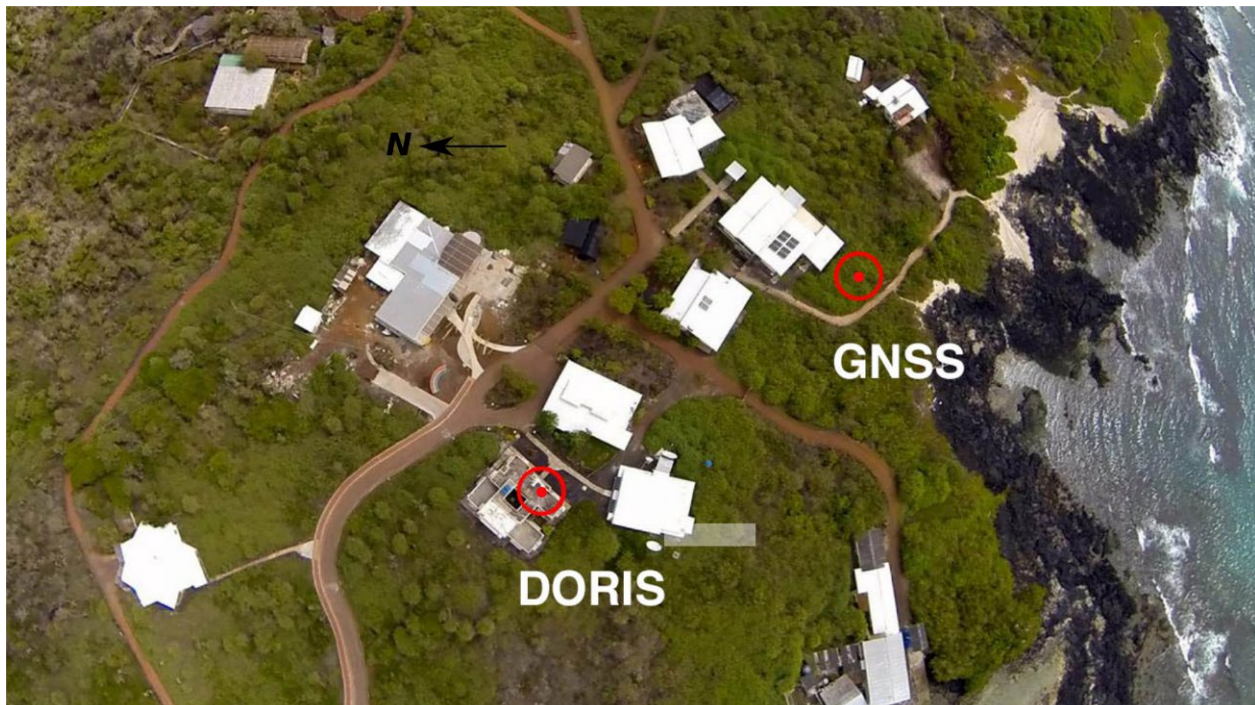
The research station is equipped with a GNSS station (GLPS) part of IGS network and operated by NASA -, a DORIS station (former acronym: SCRC; new acronym: SCSC after renovation). The GNSS antenna is mounted on a deep drilled braced monument (stainless steel tripod) anchored in bed rock. The DORIS antenna is mounted on 1 m high rigid metal tower fixed on rooftop. A witness mark is embedded in concrete roof underneath the DORIS antenna.

The following table sums up the geodetic techniques co-located on site.

Technique Name	DOMES n°	Description	Acronym / N°
GNSS	42005M002	Antenna mount reference point / tripod	GLPS
DORIS	42005S002	DORIS antenna reference point	SCRC
DORIS	42005S003	DORIS antenna reference point	SCSC
DORIS	42005M003	DORIS mark	-

For further information about the DORIS station:

<https://ids-doris.org/doris-system/tracking-network/site-logs.html>



Point's location

3 Local tie survey description

3.1 Organization

The local tie was performed by Damien Pesce (IGN) from June 15th to 16th 2023.

3.2 Equipment – Instruments characteristics

The following section provides the characteristics of the surveying equipment that was used. The surveying instruments belong to IGN. The equipment is regularly checked and calibrated at IGN.



Equipment	Trademark, Serial ref. n°	Specifications, accuracy
Total station	Leica TM50 s/n 09856	EDM st. dev. 0.6 mm + 1 ppm Angular st. dev. 0.15 mgon (0.5")
Prism set Reflector & tribrach	Leica GPF121	Dist. Corr. 0.0 mm
Reflector mini pole	Leica GLS14	H = 0.200 m
Mini-reflector	Leica GMP101	Dist. Corr. 17.5 mm
Pocket weather tracker (meteorological station)	Kestrel 4500NV s/n 672710	Temp. st. dev. 0.5°C Pressure st. dev. 1 hPa
GNSS unit Leica	Receiver: Leica GX 1230+ GNSS Antenna: Leica AX1203+ GNSS	Theoretical static post-processing accuracies: Horiz. 5 mm + 0.5 ppm Vert. 6 mm + 0.5 ppm

NB.: All these survey instruments allowed the observations to be recorded electronically on memory cards or storage devices and then downloaded to a laptop PC for on-site checking.

3.3 Co-located points

3.3.1 DORIS antenna – SCRC

The SCRC DORIS antenna was installed on September 2019 and was removed during the local tie survey right before the installation of the new SCSC DORIS antenna.

Acronym : SCRC	DOMES number : 42005S002
 <p data-bbox="424 1442 539 1469">Overview</p>	 <p data-bbox="1042 1442 1214 1469">Close-up view</p>
<p>Description: the reference point is located 0.390 m above the antenna base-mounting surface on the antenna vertical axis.</p>	

3.3.2 DORIS antenna – SCSC

The new DORIS antenna was installed during the local tie survey work. The antenna was installed on the same mounting plate and mast as the former SCRC antenna.

This means that the reference point of the new antenna is very close to the reference point of the previous one.

Acronym : SCSC

DOMES number : 42005S003



Overview



Close-up view

Description: the reference point is located 0.390 m above the antenna base-mounting surface on the antenna vertical axis.

3.3.3 DORIS station – marker

A domed brass mark embedded vertically down the DORIS reference point on the concrete roof is used as a witness mark for both antennas.

Acronym : DORIS marker

DOMES number : 42005M003



Overview



Close-up view

Description : the marker is located + 1.430 m underneath the antenna reference point (SCSC)

3.3.4 GNSS station – GLPS

GLPS that is managed by NASA-JPL is part of IGS network and was installed in 2003

Acronym : GLPS

DOMES number : 22901M003



Overview with protection dome



Close-up view without dome

Description: the reference point is represented by a divot in a SCIGN antenna mount, 0.0083 m under the ARP. See diagram of the antenna mount in annexe 6.1

3.4 Observation polygon

All surveying operations have been carried out in such a way to provide the highest accuracy for the 3D vectors determination between reference points.

3.4.1 Total station figure

Observations were done using a total station from:

- 5 stations (numbers 10 to 12 and SLN and SLE) around the DORIS antennas on the roof top,
- 2 stations located on path between DORIS and GNSS stations (numbers 13 and 14),
- 4 stations around GNSS antenna (numbers 15 to 18)
- A total station was installed on the new DORIS antenna plate before the antenna installation (point number 105).

The SLN and SLE tripod stations were initially installed to verticalize the new antenna, but were finally used also for the survey. The SLE station may have moved a little bit during the few days of work. In the second part of the survey, it was replaced by station SLE-2.

In order to obtain a solution with minimal constraints, all the survey points were non-monumented temporary points except the point 105. There were very few centring errors or height difference errors.



Overview of the stations around the Doris antenna



Total station on point 16 with GLPS and point 17 in background

3.4.2 Orientation

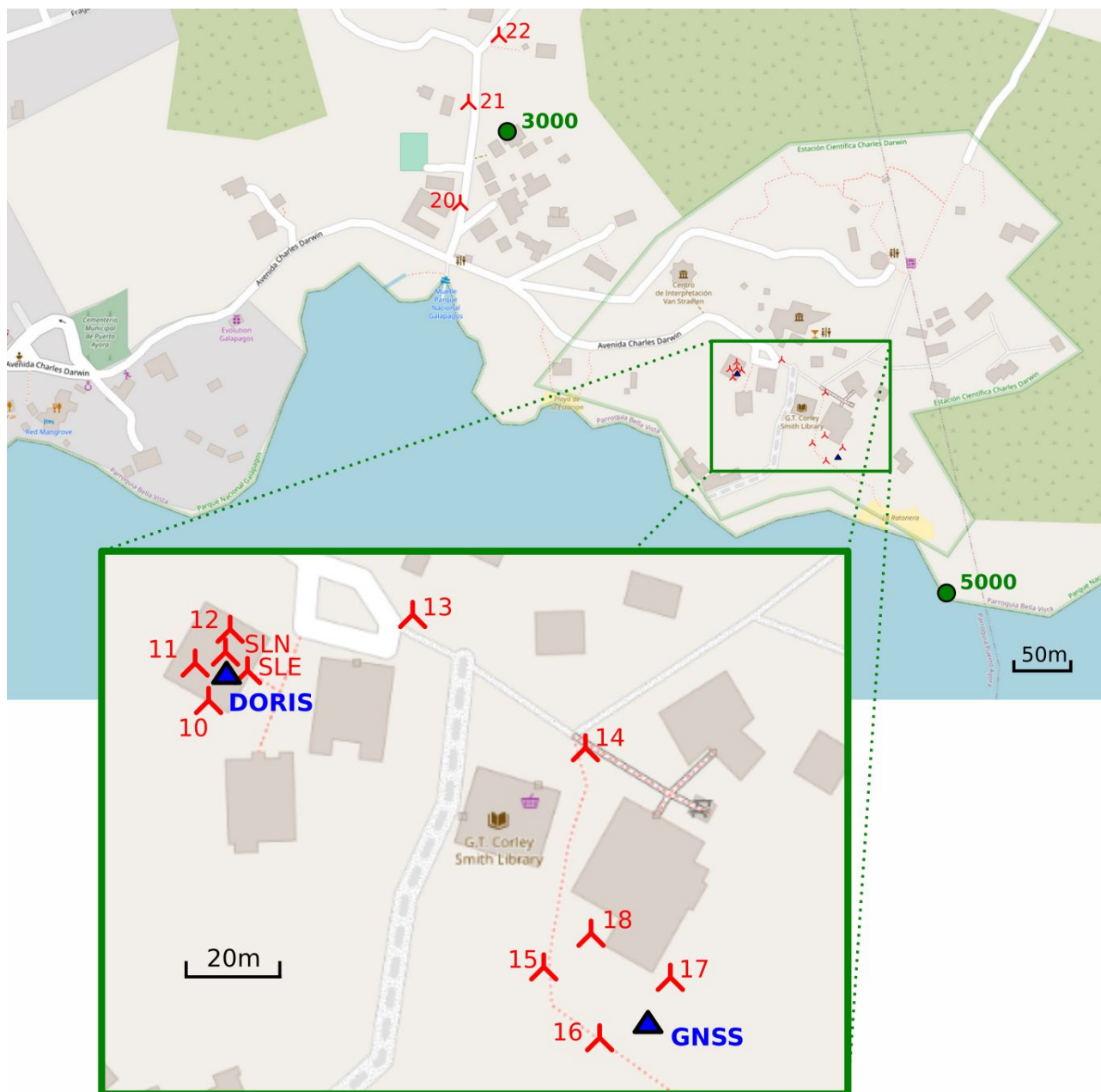
To constrain the orientation with north direction of the survey, two points away from the survey were observed. The temporary point 5000 was a GNSS antenna setup on the beach to the south-east of GLPS. The point was visible from the stations 10 and 11 (approximately 250m from 10). The second orientation point 3000 is a radio antenna mast located on the National Park facilities and facing north-west (about 290m from 10 to 3000). It was visible from almost all the stations.



Point 3000



Point 5000



Survey network

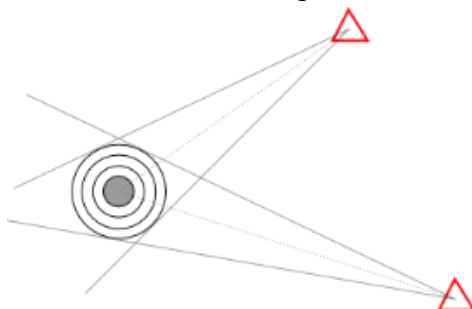
3.5 Survey method

All the visible lines of sight were observed with total station. Horizontal directions and zenith angles were observed in data sets, each set consisting in one reading in both direct and reverse theodolite positions. Distance measurements were observed at least once over each line. Meteorological data (atmospheric pressure and temperature) were recorded at each station and used to correct distances measurements.

For a small figure like this one, conventional terrestrial observations are more accurate than GNSS measurements. The GNSS observations are only used to get the polygon orientation.

3.5.1 GNSS antenna reference points

The reference points have been determined indirectly for GNSS antennas. From each surveying station aiming at the antenna, right and left tangents on the bottom or on the top of choke-ring were observed. In the adjustment, horizontal and vertical angle observations were averaged.



Top view

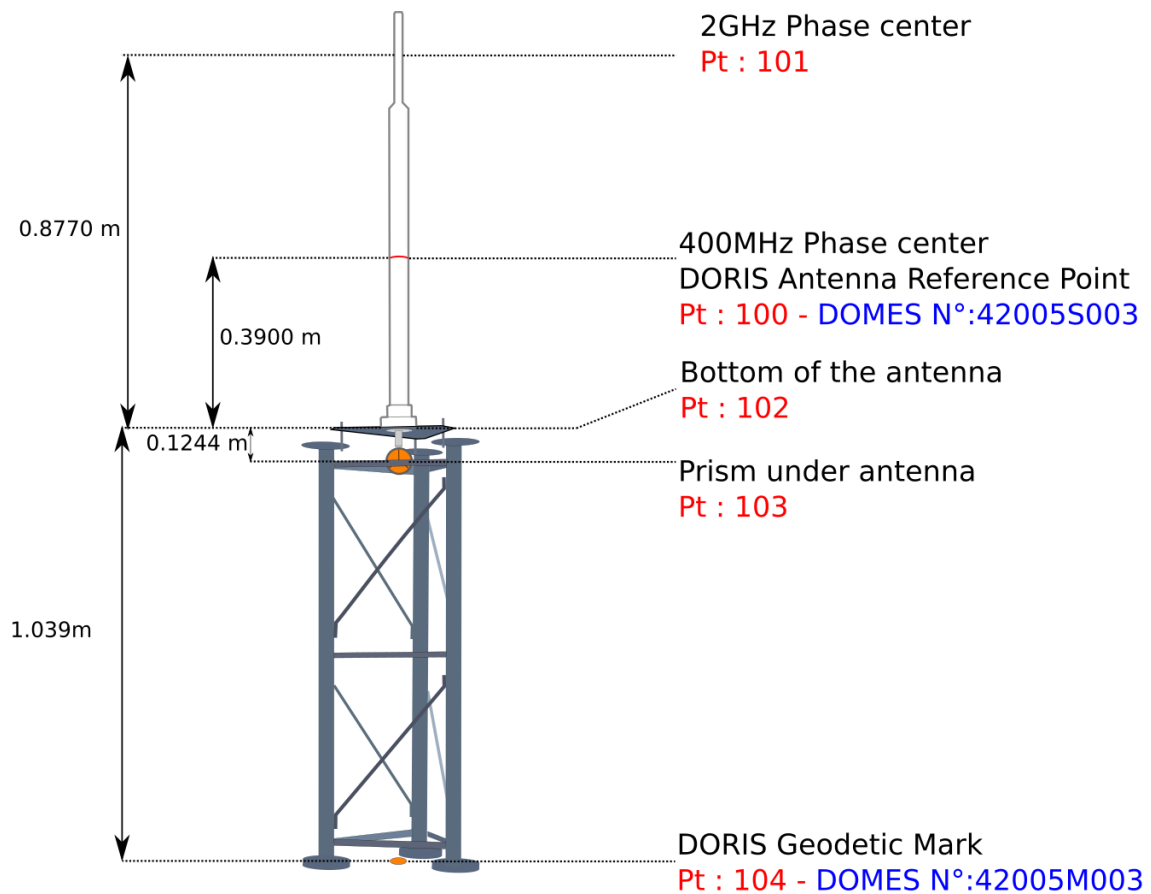
To improve the accuracy of the height component, mini-prisms were placed at the top of the antenna rings. Horizontal and vertical angles and distances were observed from the surveying stations but in the adjustment these points are levelling points and they are linked to the other points using the height between the top of the ring antenna and the ARP provided by the manufacturer.

3.5.2 DORIS antenna reference point

An indirect approach was used to determine the DORIS antenna reference point. From each surveying station aiming at the antenna, right and left tangents to the DORIS antenna close to the ARP (red circle n°100 and 150), close to 2 GHz phase centre (point 101 and 151) and close to antenna base (n°102 and 152) were observed. In the adjustment, horizontal and vertical angle observations were averaged to get the position for the ARP point. For the two other points, only horizontal angle observations were averaged because vertical positions of those points are not precisely defined.

A prism on mini-pole placed on the top the support plate was observed from each station to determine a more accurate height of the bottom of antenna (points 106 to 109). And a prism fixed underneath the antenna was also observed from surveying station. It was located on antenna vertical axis and 0.5144m under the reference point.

The height between DORIS mark (n°104) and the top of the support plate was measured. And the heights between antenna bottom and phase centres come from the antenna manufacturer.



SCSC antenna heights sketch

3.5.3 Geodetic marker

The DORIS witness mark was observed thanks to prisms on mini-pole (height 0.200m).

3.5.4 Orientations

GNSS observations were carried out in order to align the terrestrial survey network to IGS20 reference frame.

The point 5000 was observed for 3 and half hours. GPS and Glonass constellations were recorded with a sampling rate of 30s.

It was not possible to install a GNSS antenna directly on the mast 3000. 3 points around the point 3000 were observed with a GNSS then a total station was setup on the 3 points and observed the two other points and the antenna 3000 to obtain its coordinates.

The 3 points named 20, 21 and 22 were observed during respectively 1h, 1h30 and 0h30 with the same observation parameters as point 5000

4 Computation and data analysis

4.1 On site validation

Total station observations were checked on site and converted into the adjustment format. GNSS data were validated after a quick baselines calculation.

4.2 IGS alignment

4.2.1 GLPS IGS Coordinates

GLPS coordinates proceed from the IGS00PSSNX_20231660000_01D_01D_CRD.SNX file (i.e. IGS20 daily combined solution for the day 166 of the year 2023 – IGS20 epoch 2023.45).

4.2.2 Orientation points

The GNSS baselines were processed with Leica Infinity software version 3.3.1. The IGS precise ephemerides were used as well as the IGS antenna phase offset files.

We obtained 6 baselines:

- 4 from GLPS to 5000, 20, 21 and 22;
- 2 from 21 to 20 and 22.

Those baselines and there covariance matrices will be used for the final adjustment.

4.3 Final adjustment

The data was processed using 3D least-square adjustment with IGN Comp3D version 5.21 software. A first adjustment was processed with the two orientations observations. The input file comes from:

- Total station observations : horizontal and zenith angles, distances;
- Height differences between points of the same stations;
- Centring equations : relative position between points;
- GNSS baselines and total station observations from point 20, 21 and 22;
- GPLS reference point coordinates, constrained at 0.1 mm to its IGS20 epoch 2023.45 values.

The computation was done in UTM 15S projection.

The terrestrial adjustment was processed taking into account for each point the vertical deflection from the geoid model EGM08.

The a priori standard deviations used for most of the observations with total station are:

- 0.9 mgon + 0.1 mm (*SD relative*) for horizontal angles

- 1.2 mgon + 0.2 mm (*SD relative*) for vertical angles,
- 0.5 mm for distances on prism.

The final precision of an observation takes into account the absolute precision and the one relative to the computed distance between the two points coordinates at current iteration. For angular measurements:

$$\sigma_{abs} + \frac{\sigma_{rel}}{distance}$$

The results show that the residuals on both orientations are consistent with a priori standard deviation values. This first adjustment provides an azimuth and its standard deviation from GLPS to point 3000.

A second adjustment with minimal constraints was processed with the same parameters and almost the same observations. The GLPS azimuth at 3000 was added but the GNSS baselines, the total station observations at points 20, 21 and 22 and all the observations to the 5000 orientation point were removed.

This adjustment provides coordinates and a covariance matrix of our survey work.

5 Results

5.1 Adjusted coordinates and confidence intervals

The results of the adjustment are the coordinates of all points and their confidence ellipsoids in the IGS20 reference frame at epoch of the observations (i.e. epoch 2023.45).

The table below provides the 3D coordinates.

Cartesian Coordinates IGS20 epoch 2023.45			
Point – <i>process nb</i>	X (m)	Y (m)	Z (m)
SCRC – 150 42005S002	-33878.7513	-6377521.9417	-82085.3324
SCSC – 100 42005S003	-33878.7521	-6377521.9440	-82085.3324
DORIS mark – 104 42005M003	-33878.7446	-6377520.5146	-82085.3137
GLPS – 200 42005M002	-33800.7271	-6377516.5174	-82154.1978

The table below provides confidence ellipsoid (3D) at 2.5σ (that means the results have a probability of 90% to be inside the ellipsoid).

3D confidence regions 2.5σ (90 percent)			
Point – <i>process nb</i>	$\frac{1}{2}$ axis (mm)	Azimuth (gr)	Tilt (gr)
SCRC – 150 42005S002	1.73	44.8951	1.6019
	1.60	182.3281	97.1134
	0.70	144.8347	2.4008
SCSC – 100 42005S003	1.70	46.4271	2.5016
	1.65	0.2019	96.6559
	0.70	146.3399	2.218
DORIS mark – 104 42005M003	1.80	44.8426	198.9001
	1.55	168.0943	96.9227
	0.85	144.7929	197.1262
GLPS – 200 42005M002	0.25	-	-
	0.25	-	-
	0.25	-	-

The whole covariance matrix was computed. Covariance submatrix for the main points of interest was extracted from it for the next ITRF solution computation. Finally, this covariance submatrix was converted into SINEX format. The resulting SINEX file (42005_IGN_2023-166_v10.SNX) is provided in appendix 6.2.2.

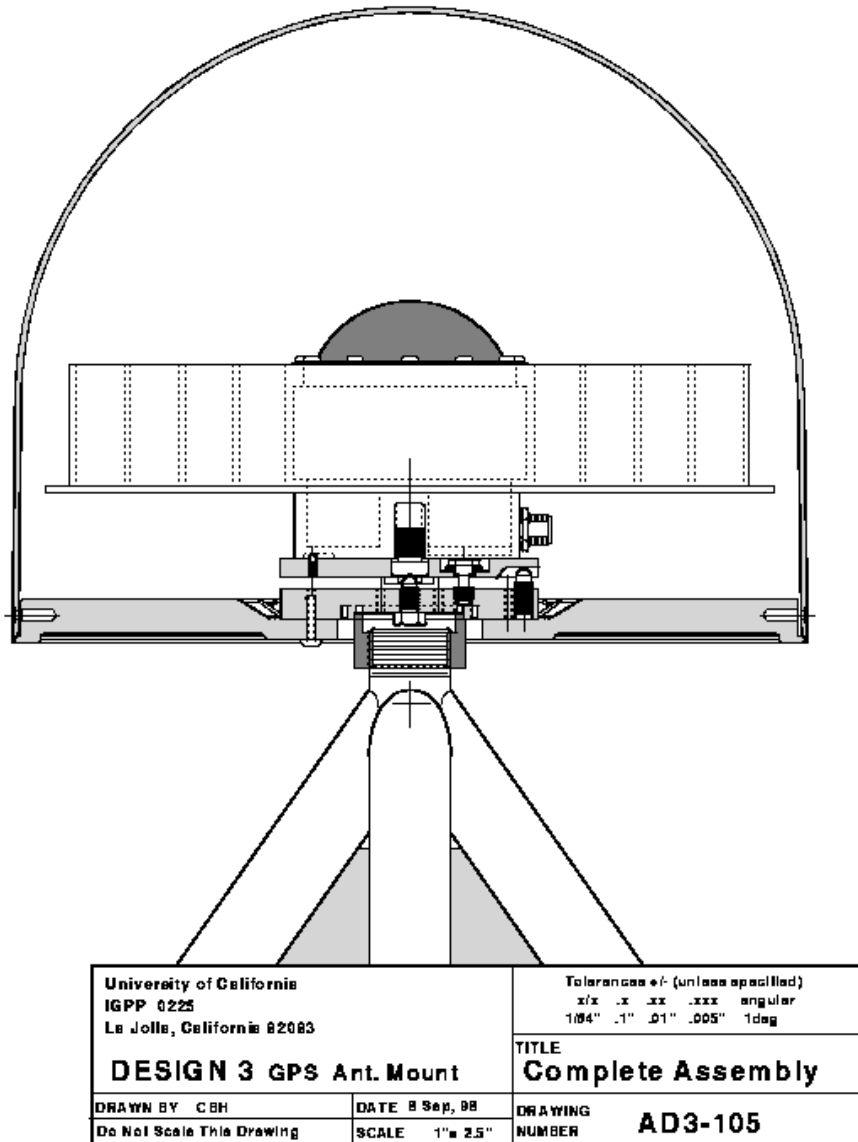
5.2 Vectors

The following table shows vectors in Cartesian coordinate system (IGS20 ep.2023.45):

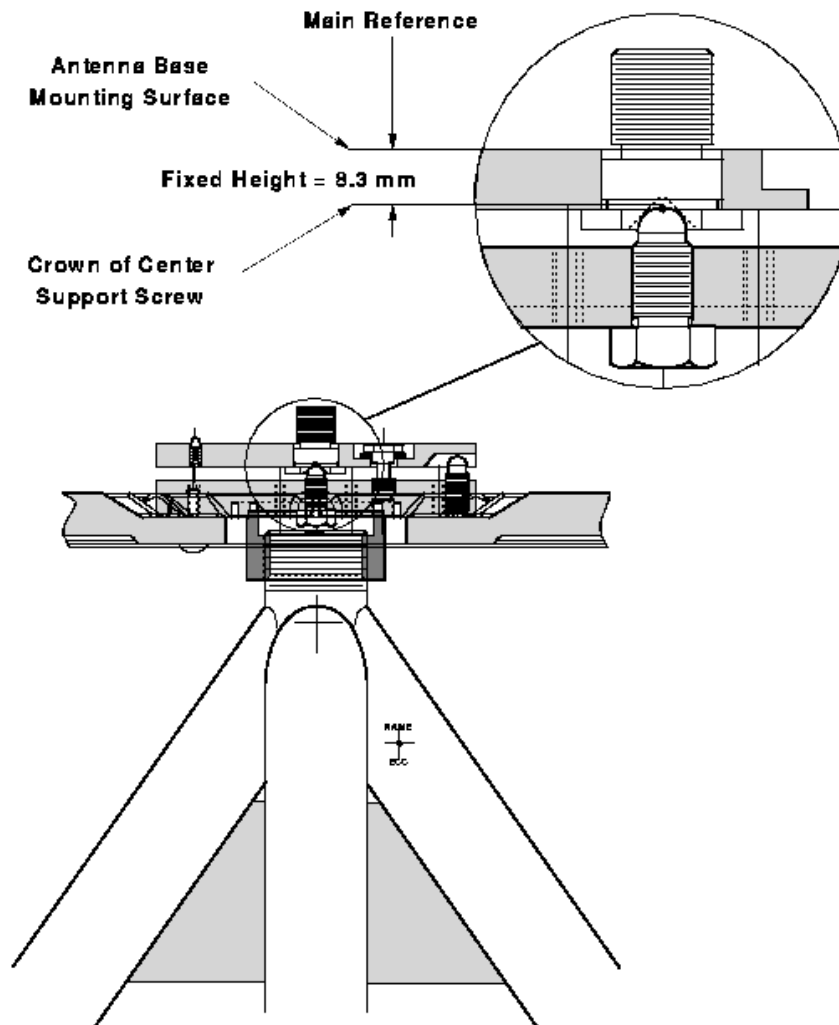
	ΔX (m)	ΔY (m)	ΔZ (m)
SCRC → SCSC	-0.0008	-0.0023	0.0000
SCSC → DORIS mark	0.0074	1.4293	0.0187
SCSC → GLPS	78.0250	5.4266	-68.8654
SCRC → GLPS	78.0242	5.4243	-68.8654

6 Annexes

6.1 GLPS Diagrams



Antenna mount complete assembly



University of California IGPP 0225 La Jolla, California 92093		Tolerances +/- (unless specified) x/x .x .xx .xxx angular 1/64" .1" .01" .005" 1deg	
DESIGN 3 GPS Ant. Mount		TITLE Main Reference	
DRAWN BY CBH	DATE 24 Jun, 99	DRAWING NUMBER	AD3-103
Do Not Scale This Drawing		SCALE 1" = 2.5"	

Antenna mount reference point height

6.2 Adjustment input files

6.2.1 Approximate coordinates file

**Station GNSS GLPS ITRF2020 ep2023-166 (2023.45)- UTM15s
 **200 : reference point ; 201 : ARP h=0.0083m ; 202 : BCR ; 203 : TCR ; 205 : bottom of the coupling tube this point is outside the dome
 **206=>212 prisms on antenna plate (only for altitude of the plate) h=0.0847m

1	200	800121.1600	9917784.7600	1.7738	0.0001	0.0001	0.0001	1.27	-6.50
0	201	800121.1600	9917784.7600	1.7821	0.0000	0.0000	0.0000	1.27	-6.50
0	202	800121.1600	9917784.7600	1.8166	0.0000	0.0000	0.0000	1.27	-6.50

0 203	800121.1600	9917784.7600	1.8828	0.0000	0.0000	0.0000	1.27	-6.50
0 205	800121.1607	9917784.7603	1.7246	0.0000	0.0000	0.0000	1.27	-6.50
0 206	800121.1930	9917784.9208	1.9674	0.0000	0.0000	0.0000	1.27	-6.50
0 207	800121.1099	9917784.6058	1.9675	0.0000	0.0000	0.0000	1.27	-6.50
0 208	800121.0229	9917784.8502	1.9673	0.0000	0.0000	0.0000	1.27	-6.50
0 209	800121.3140	9917784.7128	1.9675	0.0000	0.0000	0.0000	1.27	-6.50
0 210	800121.3179	9917784.7344	1.9675	0.0000	0.0000	0.0000	1.27	-6.50
0 211	800120.9964	9917784.7531	1.9675	0.0000	0.0000	0.0000	1.27	-6.50
0 212	800120.9992	9917784.7931	1.9675	0.0000	0.0000	0.0000	1.27	-6.50
**former DORIS - SCRC								
**150:ARP 400MHz phase centre ; 151: 2Ghz Phase centre ; 152 : bottom of antenna ; 153 : prism fixed under the antenna, height from 152 = -0.1244m								
0 150	800043.1519	9917853.7922	6.7163	0.0000	0.0000	0.0000	1.26	-6.54
0 151	800043.1523	9917853.7925	7.2040	0.0000	0.0000	0.0000	1.26	-6.54
0 152	800043.1516	9917853.7920	6.3270	0.0000	0.0000	0.0000	1.26	-6.54
0 153	800043.1517	9917853.7919	6.2028	0.0000	0.0000	0.0000	1.26	-6.54
**DORIS witness mark 104:prism with minipole h=0.2m; 104r: marker								
0 104	800043.1510	9917853.7923	5.4891	0.0000	0.0000	0.0000	1.26	-6.54
0 104r	800043.1510	9917853.7923	5.2891	0.0000	0.0000	0.0000	1.26	-6.54
**new DORIS - SCRC								
**100:ARP 400MHz phase centre ; 101: 2Ghz Phase centre ; 102 : bottom of antenna ; 103 : prism fixed under the antenna, height from 102 = -0.1244m ; 105:prim/TS centred on antenna plate height from 102 = 0.2521m								
0 100	800043.1512	9917853.7922	6.7185	0.0000	0.0000	0.0000	1.26	-6.54
0 101	800043.1512	9917853.7922	7.2045	0.0000	0.0000	0.0000	1.26	-6.54
0 102	800043.1512	9917853.7922	6.3275	0.0000	0.0000	0.0000	1.26	-6.54
0 103	800043.1514	9917853.7921	6.2031	0.0000	0.0000	0.0000	1.26	-6.54
0 105	800043.1512	9917853.7921	6.5785	0.0000	0.0000	0.0000	1.26	-6.54
**106=>109 prisms on antenna plate (only for altitude of the plate) h=0.0847m								
0 106	800043.1104	9917853.7314	6.4123	0.0000	0.0000	0.0000	1.26	-6.54
0 107	800043.1803	9917853.8571	6.4122	0.0000	0.0000	0.0000	1.26	-6.54
0 108	800043.2171	9917853.7931	6.4122	0.0000	0.0000	0.0000	1.26	-6.54
0 109	800043.0781	9917853.7968	6.4122	0.0000	0.0000	0.0000	1.26	-6.54
*Stations								
0 10	800038.4130	9917849.8936	6.8370	0.0000	0.0000	0.0000	1.26	-6.54
0 11	800034.3283	9917857.1869	7.4632	0.0000	0.0000	0.0000	1.26	-6.54
0 12	800043.6112	9917861.6914	6.8767	0.0000	0.0000	0.0000	1.26	-6.54
0 13	800080.2581	9917864.5200	3.2017	0.0000	0.0000	0.0000	1.28	-6.53
0 14	800115.0276	9917837.7739	2.4555	0.0000	0.0000	0.0000	1.29	-6.51
0 15	800107.3123	9917795.7057	2.1341	0.0000	0.0000	0.0000	1.27	-6.51
0 16	800116.5518	9917779.4179	0.9759	0.0000	0.0000	0.0000	1.27	-6.50
0 17	800131.5191	9917798.7623	3.3861	0.0000	0.0000	0.0000	1.28	-6.49
0 18	800118.1795	9917805.5208	1.1357	0.0000	0.0000	0.0000	1.28	-6.50
0 SLN	800041.5143	9917857.2422	6.6979	0.0000	0.0000	0.0000	1.26	-6.54
0 SLE	800045.7786	9917855.7685	6.7624	0.0000	0.0000	0.0000	1.26	-6.54
0 SLE-2	800045.7814	9917855.7703	6.7616	0.0000	0.0000	0.0000	1.26	-6.54
* 0 20	799796.3778	9918000.9690	2.3412	0.0000	0.0000	0.0000	1.19	-6.67
* 0 22	799832.2123	9918144.8510	7.5159	0.0000	0.0000	0.0000	1.27	-6.68
* 0 21	799805.9883	9918080.9136	3.0257	0.0000	0.0000	0.0000	1.23	-6.68
* Orientations								
* 0 5000	800210.2852	9917678.8732	-1.4106	0.0000	0.0000	0.0000	1.27	-6.44
8 3000	799850.8846	9918067.3734	39.4376	0.0000	0.0000	0.0000	1.24	-6.63

6.2.2 Observations file

```
*Azimuth
8 200 3000 -48.6184 0.00024
**terrestrial obs
@obs/231306.obs
@obs/231406.obs
@obs/231506.obs
@obs/SC_VERT_OLD.obs

**DORIS witness mark 104:prism with minipole h=0.2m; 104r: marker
9 104 104r 0 0.0002 0 0 0
4 104r 104 0.2 0.0001 0 0 0

**centring and height former DORIS - SCRC
**150:ARP 400MHz phase centre ; 151: 2Ghz Pase centre ; 152 : bottom of antenna ; 153 :
prism fixed under the antenna, height from 152 = -0.1244m
4 150 152 -0.390 0.0005 0 0 0
4 152 151 0.8770 0.0005 0 0 0
4 152 153 -0.1244 0.0002 0 0 0
9 150 151 0 0.0002 0 0 0
9 150 152 0 0.0002 0 0 0
9 150 153 0 0.0002 0 0 0

**centring and height new DORIS - SCSC
**100:ARP 400MHz phase centre ; 101: 2Ghz Pase centre ; 102 : bottom of antenna ; 103 :
prism fixed under the antenna, height from 102 = -0.1244m ; 105:prim/TS centred on
antenna plate height from 102 = 0.2521m
9 100 101 0 0.0002 0 0 0
9 100 102 0 0.0002 0 0 0
9 100 105 0 0.0002 0 0 0
9 100 103 0 0.0002 0 0 0
**106=>109 prisms on antenna plate (only for altitude of the plate) h=0.0847m
4 100 102 -0.390 0.0005 0 0 0
4 102 101 0.8770 0.0005 0 0 0
4 102 103 -0.1244 0.0002 0 0 0
4 102 106 0.0847 0.0002 0 0 0
4 102 107 0.0847 0.0002 0 0 0
4 102 108 0.0847 0.0002 0 0 0
4 102 109 0.08470 0.0002 0 0 0
4 102 105 0.2521 0.0005 0 0 0

**centring and height GNSS - GLPS
**200 : reference point ; 201 : ARP h=0.0083m ; 202 : BCR ; 203 : TCR
9 200 201 0 0.0001 0 0 0
9 200 202 0 0.0001 0 0 0
9 200 203 0 0.0001 0 0 0

4 200 201 0.0083 0.0002 0 0 0
4 201 202 0.0346 0.0002 0 0 0
4 201 203 0.1006 0.0002 0 0 0

4 203 206 0.0847 0.0002 0 0 0
4 203 207 0.0847 0.0002 0 0 0
4 203 208 0.0847 0.0002 0 0 0
4 203 209 0.0847 0.0002 0 0 0
4 203 210 0.0847 0.0002 0 0 0
4 203 211 0.0847 0.0002 0 0 0
4 203 212 0.0847 0.0002 0 0 0
```

*Données reduites

* D:\DORIS\santa-cruz\topo\brutes\231306.obs

* fichier créé le 14/06/2023 à 01:15:41

*Tours d'horizon

* Station n°1 10

* Temperature : 27.7 °C - Pression : 757.7 mmHg - Correction meteo : 15.5 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

*7 10	1000	0.0000	0.0009	0.0001	0.0000	0.0000
*5 10	2000	163.6004	0.0009	0.0001	0.0000	0.0000
*5 10	150G	391.0153	0.0009	0.0001	0.0000	0.0000
*5 10	151G	391.1821	0.0009	0.0001	0.0000	0.0000
*5 10	152G	390.9791	0.0009	0.0001	0.0000	0.0000
*5 10	150D	391.5783	0.0009	0.0001	0.0000	0.0000
*5 10	151D	391.4096	0.0009	0.0001	0.0000	0.0000
*5 10	152D	391.6147	0.0009	0.0001	0.0000	0.0000
7 10	150	391.2968	0.0009	0.0001	0.0000	0.0000
5 10	151	391.29585	0.0009	0.0001	0.0000	0.0000
5 10	152	391.2969	0.0009	0.0001	0.0000	0.0000
5 10	104	391.2938	0.0009	0.0001	0.0000	0.0000
5 10	11	302.6222	0.0009	0.0001	0.0000	0.0000
5 10	12	361.5430	0.0009	0.0001	0.0000	0.0000
5 10	SLN	360.5465	0.0009	0.0001	0.0000	0.0000
5 10	SLE	392.2608	0.0009	0.0001	0.0000	0.0000
*6 10	1000	97.2086	0.0012	0.0002	0.0000	0.0000
*6 10	2000	101.8592	0.0012	0.0002	0.0000	0.0000
*6 10	150G	101.2534	0.0012	0.0002	0.0000	0.0000
*6 10	151G	96.3998	0.0012	0.0002	0.0000	0.0000
*6 10	152G	105.0406	0.0012	0.0002	0.0000	0.0000
*6 10	150D	101.2535	0.0012	0.0002	0.0000	0.0000
*6 10	151D	96.3767	0.0012	0.0002	0.0000	0.0000
*6 10	152D	105.0205	0.0012	0.0002	0.0000	0.0000
6 10	150	101.2535	0.0012	0.0005	0.0000	0.0000
*6 10	151	96.38825	0.0012	0.0002	0.0000	0.0000
*6 10	152	105.03055	0.0012	0.0002	0.0000	0.0000
6 10	104	113.7838	0.0012	0.0002	0.0000	0.0000
6 10	11	95.2334	0.0012	0.0002	0.0000	0.0000
6 10	12	99.8020	0.0012	0.0002	0.0000	0.0000
6 10	SLN	101.1075	0.0012	0.0002	0.0000	0.0000
6 10	SLE	100.5025	0.0012	0.0002	0.0000	0.0000
3 10	104	6.2796	0.0005	0.0000	0.0000	0.0000
3 10	11	8.3771	0.0005	0.0000	0.0000	0.0000
3 10	12	12.8832	0.0005	0.0000	0.0000	0.0000
3 10	SLN	7.9721	0.0005	0.0000	0.0000	0.0000
3 10	SLE	9.4151	0.0005	0.0000	0.0000	0.0000

* Station n°2 11

* Temperature : 26.6 °C - Pression : 757.4 mmHg - Correction meteo : 14.7 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

*7 11	1000	0.0000	0.0009	0.0001	0.0000	0.0000
*5 11	2000	150.0641	0.0009	0.0001	0.0000	0.0000
7 11	10	93.5833	0.0009	0.0001	0.0000	0.0000
5 11	12	397.3263	0.0009	0.0001	0.0000	0.0000
5 11	SLN	25.5972	0.0009	0.0001	0.0000	0.0000
*5 11	150G	49.2847	0.0009	0.0001	0.0000	0.0000
*5 11	151G	49.3893	0.0009	0.0001	0.0000	0.0000
*5 11	152G	49.2642	0.0009	0.0001	0.0000	0.0000
*5 11	150D	49.6493	0.0009	0.0001	0.0000	0.0000

*5 11	151D	49.5381	0.0009	0.0001	0.0000	0.0000
*5 11	152D	49.6762	0.0009	0.0001	0.0000	0.0000
5 11	150	49.6467	-0.0009	0.0001	0.0000	0.0000
5 11	151	49.4637	0.0009	0.0001	0.0000	0.0000
5 11	152	49.4702	0.0009	0.0001	0.0000	0.0000
5 11	153	49.4727	0.0009	0.0001	0.0000	0.0000
5 11	104	49.4690	0.0009	0.0001	0.0000	0.0000
5 11	SLE	33.9322	0.0009	0.0001	0.0000	0.0000
*6 11	1000	97.8947	0.0012	0.0002	0.0000	0.0000
*6 11	2000	102.1745	0.0012	0.0002	0.0000	0.0000
6 11	10	104.7623	0.0012	0.0002	0.0000	0.0000
6 11	12	103.6150	0.0012	0.0002	0.0000	0.0000
6 11	SLN	106.7556	0.0012	0.0002	0.0000	0.0000
*6 11	150G	105.0278	0.0012	0.0002	0.0000	0.0000
*6 11	151G	101.8785	0.0012	0.0002	0.0000	0.0000
*6 11	152G	107.4414	0.0012	0.0002	0.0000	0.0000
*6 11	150D	105.0254	0.0012	0.0002	0.0000	0.0000
*6 11	151D	101.8762	0.0012	0.0002	0.0000	0.0000
*6 11	152D	107.4416	0.0012	0.0002	0.0000	0.0000
6 11	150	105.0266	0.0012	0.0005	0.0000	0.0000
*6 11	151	101.87735	0.0012	0.0002	0.0000	0.0000
*6 11	152	107.4415	0.0012	0.0002	0.0000	0.0000
6 11	153	108.4430	0.0012	0.0002	0.0000	0.0000
6 11	104	113.1138	0.0012	0.0002	0.0000	0.0000
6 11	SLE	103.8625	0.0012	0.0002	0.0000	0.0000
3 11	10	8.3771	0.0005	0.0000	0.0000	0.0000
3 11	12	10.3272	0.0005	0.0000	0.0000	0.0000
3 11	SLN	7.2216	0.0005	0.0000	0.0000	0.0000
3 11	153	9.5311	0.0005	0.0000	0.0000	0.0000
3 11	104	9.6501	0.0005	0.0000	0.0000	0.0000
3 11	SLE	11.5507	0.0005	0.0000	0.0000	0.0000

* Station n°3 12

* Temperature : 27.3 °C - Pression : 756.5 mmHg - Correction meteo : 15.6 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

*7 12	2000	0.0000	0.0009	0.0001	0.0000	0.0000
7 12	10	398.1955	0.0009	0.0001	0.0000	0.0000
5 12	11	43.0133	0.0009	0.0001	0.0000	0.0000
5 12	SLN	399.8118	0.0009	0.0001	0.0000	0.0000
*5 12	150G	375.2541	0.0009	0.0001	0.0000	0.0000
*5 12	151G	375.3782	0.0009	0.0001	0.0000	0.0000
*5 12	152G	375.2290	0.0009	0.0001	0.0000	0.0000
*5 12	150D	375.6899	0.0009	0.0001	0.0000	0.0000
*5 12	151D	375.5556	0.0009	0.0001	0.0000	0.0000
*5 12	152D	375.7197	0.0009	0.0001	0.0000	0.0000
5 12	150	375.4720	0.0009	0.0005	0.0000	0.0000
5 12	151	375.4669	0.0009	0.0001	0.0000	0.0000
5 12	152	375.47435	0.0009	0.0001	0.0000	0.0000
5 12	153	375.4733	0.0009	0.0001	0.0000	0.0000
5 12	104	375.4792	0.0009	0.0001	0.0000	0.0000
5 12	SLE	349.4430	0.0009	0.0001	0.0000	0.0000
*6 12	2000	101.6545	0.0012	0.0002	0.0000	0.0000
6 12	10	100.1956	0.0012	0.0002	0.0000	0.0000
6 12	11	96.3814	0.0012	0.0002	0.0000	0.0000
6 12	SLN	102.3089	0.0012	0.0002	0.0000	0.0000
*6 12	150G	101.2945	0.0012	0.0002	0.0000	0.0000
*6 12	151G	97.5136	0.0012	0.0002	0.0000	0.0000
*6 12	152G	104.2108	0.0012	0.0002	0.0000	0.0000
*6 12	150D	101.2891	0.0012	0.0002	0.0000	0.0000
*6 12	151D	97.5138	0.0012	0.0002	0.0000	0.0000

*6 12	152D	104.1993	0.0012	0.0002	0.0000	0.0000
6 12	150	101.2918	0.0012	0.0005	0.0000	0.0000
*6 12	151	97.5137	0.0012	0.0002	0.0000	0.0000
*6 12	152	104.20505	0.0012	0.0002	0.0000	0.0000
6 12	153	105.4116	0.0012	0.0002	0.0000	0.0000
6 12	104	111.0575	0.0012	0.0002	0.0000	0.0000
6 12	SLE	101.1493	0.0012	0.0002	0.0000	0.0000
3 12	10	12.8832	0.0005	0.0000	0.0000	0.0000
3 12	11	10.3272	0.0005	0.0000	0.0000	0.0000
3 12	SLN	4.9181	0.0005	0.0000	0.0000	0.0000
3 12	153	7.9361	0.0005	0.0000	0.0000	0.0000
3 12	104	8.0266	0.0005	0.0000	0.0000	0.0000
3 12	SLE	6.3041	0.0005	0.0000	0.0000	0.0000

*Données reduites

* D:\DORIS\santa-cruz\topo\brutes\231406.obs

* fichier créé le 15/06/2023 à 01:19:31

*Tours d'horizon

* Station n°1 105

* Temperature : 27.9 °C - Pression : 758.0 mmHg - Correction meteo : 15.6 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

7 105	3000	0.0000	0.0009	0.0001	0.0000	0.0000
*5 105	1000	112.5483	0.0009	0.0001	0.0000	0.0000
*5 105	2000	276.8303	0.0009	0.0001	0.0000	0.0000
5 105	10	302.8314	0.0009	0.0001	0.0000	0.0000
5 105	11	370.0419	0.0009	0.0001	0.0000	0.0000
5 105	12	50.3621	0.0009	0.0001	0.0000	0.0000
5 105	SLE	105.6053	0.0009	0.0001	0.0000	0.0000
*6 105	3000	92.7320	0.0012	0.0002	0.0000	0.0000
*6 105	1000	96.5754	0.0012	0.0002	0.0000	0.0000
*6 105	2000	101.5833	0.0012	0.0002	0.0000	0.0000
6 105	10	97.3157	0.0012	0.0002	0.0000	0.0000
6 105	11	94.0541	0.0012	0.0002	0.0000	0.0000
6 105	12	97.5964	0.0012	0.0002	0.0000	0.0000
6 105	SLE-2	96.4567	0.0012	0.0002	0.0000	0.0000
3 105	10	6.1371	0.0005	0.0000	0.0000	0.0000
3 105	11	9.4881	0.0005	0.0000	0.0000	0.0000
3 105	12	7.9131	0.0005	0.0000	0.0000	0.0000
3 105	SLE-2	3.2941	0.0005	0.0000	0.0000	0.0000

* Station n°2 10

* Temperature : 27.3 °C - Pression : 757.8 mmHg - Correction meteo : 15.1 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

7 10	3000	0.0000	0.0009	0.0001	0.0000	0.0000
*5 10	2000	273.7795	0.0009	0.0001	0.0000	0.0000
*5 10	1000	110.1787	0.0009	0.0001	0.0000	0.0000
5 10	11	12.7992	0.0009	0.0001	0.0000	0.0000
5 10	12	71.7213	0.0009	0.0001	0.0000	0.0000
5 10	105	101.4705	0.0009	0.0001	0.0000	0.0000
5 10	SLN	70.7240	0.0009	0.0001	0.0000	0.0000
5 10	SLE-2	102.4393	0.0009	0.0001	0.0000	0.0000
*6 10	3000	92.7845	0.0012	0.0002	0.0000	0.0000
*6 10	2000	101.8605	0.0012	0.0002	0.0000	0.0000

*6 10	1000	97.2080	0.0012	0.0002	0.0000	0.0000
6 10	11	95.2345	0.0012	0.0002	0.0000	0.0000
6 10	12	99.8017	0.0012	0.0002	0.0000	0.0000
6 10	105	102.6813	0.0012	0.0002	0.0000	0.0000
6 10	SLN	101.1078	0.0012	0.0002	0.0000	0.0000
6 10	SLE-2	100.5108	0.0012	0.0002	0.0000	0.0000
3 10	11	8.3761	0.0005	0.0000	0.0000	0.0000
3 10	12	12.8832	0.0005	0.0000	0.0000	0.0000
3 10	105	6.1371	0.0005	0.0000	0.0000	0.0000
3 10	SLN	7.9721	0.0005	0.0000	0.0000	0.0000
3 10	SLE-2	9.4186	0.0005	0.0000	0.0000	0.0000

* Station n°3 SLN

* Temperature : 27.8 °C - Pression : 757.7 mmHg - Correction meteo : 15.6 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

7 SLN	3000	0.0000	0.0009	0.0001	0.0000	0.0000
*5 SLN	1000	117.4077	0.0009	0.0001	0.0000	0.0000
*5 SLN	2000	275.1402	0.0009	0.0001	0.0000	0.0000
5 SLN	10	272.3293	0.0009	0.0001	0.0000	0.0000
5 SLN	SLE-2	168.0508	0.0009	0.0002	0.0000	0.0000
5 SLN	12	74.9438	0.0009	0.0001	0.0000	0.0000
5 SLN	105	218.7021	0.0009	0.0001	0.0000	0.0000
5 SLN	11	346.4152	0.0009	0.0001	0.0000	0.0000

*6 SLN	3000	92.6665	0.0012	0.0002	0.0000	0.0000
*6 SLN	1000	96.7070	0.0012	0.0002	0.0000	0.0000
*6 SLN	2000	101.6220	0.0012	0.0002	0.0000	0.0000
6 SLN	10	98.8870	0.0012	0.0002	0.0000	0.0000
6 SLN	SLE-2	99.1009	0.0012	0.0002	0.0000	0.0000
6 SLN	12	97.6784	0.0012	0.0002	0.0000	0.0000
6 SLN	105	101.9884	0.0012	0.0002	0.0000	0.0000
6 SLN	11	93.2372	0.0012	0.0002	0.0000	0.0000

3 SLN	10	7.9721	0.0005	0.0000	0.0000	0.0000
3 SLN	SLE-2	4.5111	0.0005	0.0000	0.0000	0.0000
3 SLN	12	4.9191	0.0005	0.0000	0.0000	0.0000
3 SLN	105	3.8181	0.0005	0.0000	0.0000	0.0000
3 SLN	11	7.2211	0.0005	0.0000	0.0000	0.0000

* Station n°4 12

* Temperature : 27.9 °C - Pression : 757.5 mmHg - Correction meteo : 15.8 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

7 12	3000	0.0000	0.0009	0.0002	0.0000	0.0000
*5 12	2000	276.1576	0.0009	0.0002	0.0000	0.0000
5 12	10	274.3533	0.0009	0.0002	0.0000	0.0000
5 12	11	319.1710	0.0009	0.0002	0.0000	0.0000
5 12	SLE-2	225.5642	0.0009	0.0002	0.0000	0.0000
5 12	SLN	275.9700	0.0009	0.0002	0.0000	0.0000
5 12	105	251.6347	0.0009	0.0002	0.0000	0.0000

*6 12	3000	92.6592	0.0012	0.0002	0.0000	0.0000
*6 12	2000	101.6547	0.0012	0.0002	0.0000	0.0000
6 12	10	100.1948	0.0012	0.0002	0.0000	0.0000
6 12	11	96.3815	0.0012	0.0002	0.0000	0.0000
6 12	SLE-2	101.1618	0.0012	0.0002	0.0000	0.0000
6 12	SLN	102.3097	0.0012	0.0002	0.0000	0.0000
6 12	105	102.3978	0.0012	0.0002	0.0000	0.0000

3 12	10	12.8832	0.0005	0.0000	0.0000	0.0000
------	----	---------	--------	--------	--------	--------

3 12	11	10.3272	0.0005	0.0000	0.0000	0.0000
3 12	SLE-2	6.3031	0.0005	0.0000	0.0000	0.0000
3 12	SLN	4.9186	0.0005	0.0000	0.0000	0.0000
3 12	105	7.9131	0.0005	0.0000	0.0000	0.0000

* Station n°5 11

* Temperature : 28.6 °C - Pression : 757.1 mmHg - Correction meteo : 16.5 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

7 11	3000	0.0000	0.0009	0.0002	0.0000	0.0000
*5 11	1000	119.5962	0.0009	0.0002	0.0000	0.0000
5 11	10	213.1830	0.0009	0.0002	0.0000	0.0000
5 11	105	169.0647	0.0009	0.0002	0.0000	0.0000
5 11	SLE-2	153.5160	0.0009	0.0002	0.0000	0.0000
5 11	SLN	145.1936	0.0009	0.0002	0.0000	0.0000
5 11	12	116.9210	0.0009	0.0002	0.0000	0.0000
5 11	205	189.9368	0.0009	0.0002	0.0000	0.0000

*6 11	3000	92.7159	0.0012	0.0002	0.0000	0.0000
*6 11	1000	97.8953	0.0012	0.0002	0.0000	0.0000
6 11	10	104.7607	0.0012	0.0002	0.0000	0.0000
6 11	105	105.9429	0.0012	0.0002	0.0000	0.0000
6 11	SLE-2	103.8690	0.0012	0.0002	0.0000	0.0000
6 11	SLN	106.7576	0.0012	0.0002	0.0000	0.0000
6 11	12	103.6155	0.0012	0.0002	0.0000	0.0000
6 11	205	103.2377	-0.0012	0.0002	0.0000	0.0000

3 11	10	8.3771	0.0005	0.0000	0.0000	0.0000
3 11	105	9.4882	0.0005	0.0000	0.0000	0.0000
3 11	SLE-2	11.5532	0.0005	0.0000	0.0000	0.0000
3 11	SLN	7.2211	0.0005	0.0000	0.0000	0.0000
3 11	12	10.3272	0.0005	0.0000	0.0000	0.0000

*Données reduites

* D:\DORIS\santa-cruz\topo\brutes\231506.obs

* fichier créé le 15/06/2023 à 22:40:46

*Tours d'horizon

* Station n°1 10

* Temperature : 28.3 °C - Pression : 757.7 mmHg - Correction meteo : 16.1 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

*7 10	5000	0.0000	0.0009	0.0001	0.0000	0.0000
7 10	3000	204.8530	-0.0009	0.0001	0.0000	0.0000
5 10	11	217.6528	0.0009	0.0001	0.0000	0.0000
5 10	15	392.5857	0.0009	0.0001	0.0000	0.0000
5 10	16	396.8793	0.0009	0.0001	0.0000	0.0000
5 10	205	392.6105	0.0009	0.0001	0.0000	0.0000
*5 10	202G	392.5030	0.0009	0.0001	0.0000	0.0000
*5 10	202D	392.7202	0.0009	0.0001	0.0000	0.0000
5 10	202	392.6116	0.0009	0.0001	0.0000	0.0000
*5 10	100G	306.0430	0.0009	0.0001	0.0000	0.0000
*5 10	100D	306.6067	0.0009	0.0001	0.0000	0.0000
5 10	100	306.32485	0.0009	0.0001	0.0000	0.0000
5 10	103	306.3317	0.0009	0.0001	0.0000	0.0000
5 10	12	276.5761	0.0009	0.0001	0.0000	0.0000
5 10	13	328.7503	0.0009	0.0001	0.0000	0.0000
*6 10	5000	102.1727	0.0012	0.0002	0.0000	0.0000
*6 10	3000	92.7846	0.0012	0.0002	0.0000	0.0000

6 10	11	95.2356	0.0012	0.0002	0.0000	0.0000
6 10	15	103.4161	0.0012	0.0002	0.0000	0.0000
6 10	16	103.5473	0.0012	0.0002	0.0000	0.0000
6 10	205	103.0981	-0.0012	0.0005	0.0000	0.0000
*6 10	202G	103.0364	0.0012	0.0002	0.0000	0.0000
*6 10	202D	103.0353	0.0012	0.0002	0.0000	0.0000
6 10	202	103.03585	0.0012	0.0002	0.0000	0.0000
*6 10	100G	101.2259	0.0012	0.0002	0.0000	0.0000
*6 10	100D	101.2239	0.0012	0.0002	0.0000	0.0000
6 10	100	101.2249	0.0012	0.0005	0.0000	0.0000
6 10	103	106.5588	0.0012	0.0002	0.0000	0.0000
6 10	12	99.8019	0.0012	0.0002	0.0000	0.0000
6 10	13	105.2177	-0.0012	0.0002	0.0000	0.0000

3 10	11	8.3771	0.0005	0.0000	0.0000	0.0000
3 10	15	87.7194	0.0005	0.0000	0.0000	0.0000
3 10	16	105.3137	0.0005	0.0000	0.0000	0.0000
3 10	103	6.1641	0.0005	0.0000	0.0000	0.0000
3 10	12	12.8832	0.0005	0.0000	0.0000	0.0000
3 10	13	44.4447	0.0005	0.0000	0.0000	0.0000

* Station n°2 11

* Temperature : 27.7 °C - Pression : 757.5 mmHg - Correction meteo : 15.6 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

*7 11	5000	0.0000	0.0009	0.0001	0.0000	0.0000
7 11	3000	203.8945	0.0009	0.0001	0.0000	0.0000
5 11	13	339.4986	0.0009	0.0001	0.0000	0.0000
5 11	15	394.1440	0.0009	0.0001	0.0000	0.0000
5 11	16	397.8038	0.0009	0.0001	0.0000	0.0000
5 11	205	393.8317	0.0009	0.0001	0.0000	0.0000
*5 11	202G	393.7321	0.0009	0.0001	0.0000	0.0000
*5 11	202D	393.9353	0.0009	0.0001	0.0000	0.0000
5 11	202	393.8337	0.0009	0.0001	0.0000	0.0000
5 11	12	320.8157	0.0009	0.0001	0.0000	0.0000
*5 11	100G	372.7765	0.0009	0.0001	0.0000	0.0000
*5 11	100D	373.1432	0.0009	0.0001	0.0000	0.0000
5 11	100	372.95985	0.0009	0.0001	0.0000	0.0000
5 11	106	373.4407	0.0009	0.0001	0.0000	0.0000
5 11	107	372.4813	0.0009	0.0001	0.0000	0.0000
5 11	10	17.0717	0.0009	0.0001	0.0000	0.0000

*6 11	5000	102.2612	0.0012	0.0002	0.0000	0.0000
*6 11	3000	92.7165	0.0012	0.0002	0.0000	0.0000
6 11	13	105.8217	0.0012	0.0002	0.0000	0.0000
6 11	15	103.5550	0.0012	0.0002	0.0000	0.0000
6 11	16	103.6490	0.0012	0.0002	0.0000	0.0000
6 11	205	103.2375	-0.0012	0.0005	0.0000	0.0000
*6 11	202G	103.1793	0.0012	0.0002	0.0000	0.0000
*6 11	202D	103.1793	0.0012	0.0002	0.0000	0.0000
6 11	202	103.1793	0.0012	0.0002	0.0000	0.0000
6 11	12	103.6147	0.0012	0.0002	0.0000	0.0000
*6 11	100G	105.0049	0.0012	0.0002	0.0000	0.0000
*6 11	100D	105.0073	0.0012	0.0002	0.0000	0.0000
6 11	100	105.0061	0.0012	0.0005	0.0000	0.0000
6 11	106	107.0633	0.0012	0.0002	0.0000	0.0000
6 11	107	107.0502	0.0012	0.0002	0.0000	0.0000
6 11	10	104.7587	0.0012	0.0002	0.0000	0.0000

3 11	13	46.6727	0.0005	0.0000	0.0000	0.0000
3 11	15	95.5095	0.0005	0.0000	0.0000	0.0000
3 11	16	113.2803	0.0005	0.0000	0.0000	0.0000
3 11	12	10.3272	0.0005	0.0000	0.0000	0.0000
3 11	106	9.4891	0.0005	0.0000	0.0000	0.0000

3 11	107	9.5091	0.0005	0.0000	0.0000	0.0000
3 11	10	8.3766	0.0005	0.0000	0.0000	0.0000

* Station n°3 12

* Temperature : 27.7 °C - Pression : 757.5 mmHg - Correction meteo : 15.6 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

7 12	3000	0.0000	0.0009	0.0001	0.0000	0.0000
5 12	10	274.3542	0.0009	0.0001	0.0000	0.0000
*5 12	100G	251.4160	0.0009	0.0001	0.0000	0.0000
*5 12	100D	251.8533	0.0009	0.0001	0.0000	0.0000
5 12	100	251.63465	0.0009	0.0001	0.0000	0.0000
5 12	108	251.1051	0.0009	0.0001	0.0000	0.0000
5 12	109	252.2231	0.0009	0.0001	0.0000	0.0000
5 12	11	319.1695	0.0009	0.0001	0.0000	0.0000
5 12	13	143.0267	0.0009	0.0001	0.0000	0.0000

*6 12	3000	92.6602	0.0012	0.0002	0.0000	0.0000
6 12	10	100.1933	0.0012	0.0002	0.0000	0.0000
*6 12	100G	101.2655	0.0012	0.0002	0.0000	0.0000
*6 12	100D	101.2717	0.0012	0.0002	0.0000	0.0000
6 12	100	101.2686	0.0012	0.0005	0.0000	0.0000
6 12	108	103.7377	0.0012	0.0002	0.0000	0.0000
6 12	109	103.7362	0.0012	0.0002	0.0000	0.0000
6 12	11	96.3799	0.0012	0.0002	0.0000	0.0000
6 12	13	106.3483	0.0012	0.0002	0.0000	0.0000

3 12	10	12.8832	0.0005	0.0000	0.0000	0.0000
3 12	108	7.9161	0.0005	0.0000	0.0000	0.0000
3 12	109	7.9206	0.0005	0.0000	0.0000	0.0000
3 12	11	10.3272	0.0005	0.0000	0.0000	0.0000
3 12	13	36.9136	0.0005	0.0000	0.0000	0.0000

* Station n°4 13

* Temperature : 30.4 °C - Pression : 757.8 mmHg - Correction meteo : 17.9 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

7 13	3000	0.0000	0.0009	0.0001	0.0000	0.0000
5 13	11	343.8211	0.0009	0.0001	0.0000	0.0000
5 13	10	332.4918	0.0009	0.0001	0.0000	0.0000
*5 13	100G	335.9420	0.0009	0.0001	0.0000	0.0000
*5 13	100D	336.0311	0.0009	0.0001	0.0000	0.0000
5 13	100	335.98655	0.0009	0.0001	0.0000	0.0000
5 13	103	335.9848	0.0009	0.0001	0.0000	0.0000
5 13	14	195.6458	0.0009	0.0001	0.0000	0.0000
5 13	12	348.9892	-0.0009	0.0001	0.0000	0.0000

*6 13	3000	92.4830	0.0012	0.0002	0.0000	0.0000
6 13	11	94.1790	0.0012	0.0002	0.0000	0.0000
6 13	10	94.7964	-0.0012	0.0002	0.0000	0.0000
*6 13	100G	94.2131	0.0012	0.0002	0.0000	0.0000
*6 13	100D	94.2134	0.0012	0.0002	0.0000	0.0000
6 13	100	94.2133	0.0012	0.0005	0.0000	0.0000
6 13	103	95.0599	0.0012	0.0002	0.0000	0.0000
6 13	14	101.0836	0.0012	0.0002	0.0000	0.0000
6 13	12	93.6541	0.0012	0.0002	0.0000	0.0000

3 13	11	46.6728	0.0005	0.0000	0.0000	0.0000
3 13	10	44.4458	0.0005	0.0000	0.0000	0.0000
3 13	103	38.7147	0.0005	0.0000	0.0000	0.0000
3 13	14	43.8418	0.0005	0.0000	0.0000	0.0000
3 13	12	36.9132	0.0005	0.0000	0.0000	0.0000

```
** Station n°5 14
** Temperature : 28.5 °C - Pression : 757.8 mmHg - Correction meteo : 16.2 ppm
** Date/heure debut :
** Date/heure fin :
** Numero de cycle : 0
*
*7 14          3000          0.0000          0.0009 0.0001          0.0000          0.0000
*5 14          13          396.1902          0.0009 0.0001          0.0000          0.0000
*5 14          15          265.9933          0.0009 0.0001          0.0000          0.0000
*5 14          3000          0.0007          0.0009 0.0001          0.0000          0.0000
*
*6 14          3000          93.2840          0.0012 0.0002          0.0000          0.0000
*6 14          13          98.9170          0.0012 0.0002          0.0000          0.0000
*6 14          15          100.4795          0.0012 0.0002          0.0000          0.0000
*6 14          3000          93.2832          0.0012 0.0002          0.0000          0.0000
*
*3 14          13          43.8407          0.0005 0.0000          0.0000          0.0000
*3 14          15          42.7407          0.0005 0.0000          0.0000          0.0000
```

*Données reduites

* D:\DORIS\santa-cruz\topo\brutes\st14-v2.obs
* fichier créé le 20/06/2023 à 21:27:20

*Tours d'horizon

```
* Station n°1 14
* Temperature : 28.5 °C - Pression : 757.8 mmHg - Correction meteo : 16.2 ppm
* Date/heure debut :
* Date/heure fin :
* Numero de cycle : 0
```

```
7 14          3000          0.0000          0.0009 0.0001          0.0000          0.0000
5 14          13          396.1898          0.0009 0.0001          0.0000          0.0000
5 14          15          265.9929          0.0009 0.0001          0.0000          0.0000
*6 14          3000          93.2836          0.0012 0.0002          0.0000          0.0000
6 14          13          98.9170          0.0012 0.0002          0.0000          0.0000
6 14          15          100.4795          0.0012 0.0002          0.0000          0.0000
3 14          13          43.8407          0.0005 0.0000          0.0000          0.0000
3 14          15          42.7407          0.0005 0.0000          0.0000          0.0000
```

* Station n°6 15

```
* Temperature : 28.2 °C - Pression : 757.8 mmHg - Correction meteo : 15.9 ppm
* Date/heure debut :
* Date/heure fin :
* Numero de cycle : 0
```

```
7 15          3000          0.0000          0.0009 0.0001          0.0000          0.0000
5 15          10          390.5904          0.0009 0.0001          0.0000          0.0000
5 15          11          392.7299          0.0009 0.0001          0.0000          0.0000
5 15          16          215.3147          0.0009 0.0001          0.0000          0.0000
5 15          205          190.7455          0.0009 0.0001          0.0000          0.0000
*5 15          202D          191.4320          0.0009 0.0001          0.0000          0.0000
*5 15          202G          190.0611          0.0009 0.0001          0.0000          0.0000
5 15          202          190.74655          0.0009 0.0001          0.0000          0.0000
5 15          206          190.2153          0.0009 0.0001          0.0000          0.0000
5 15          207          191.2928          0.0009 0.0001          0.0000          0.0000
5 15          18          101.3993          0.0009 0.0001          0.0000          0.0000
5 15          14          59.7127          0.0009 0.0001          0.0000          0.0000
*6 15          3000          93.6602          0.0012 0.0002          0.0000          0.0000
6 15          10          96.5856          0.0012 0.0002          0.0000          0.0000
6 15          11          96.4466          0.0012 0.0002          0.0000          0.0000
6 15          16          103.9353          0.0012 0.0002          0.0000          0.0000
6 15          205          101.4740          0.0012 0.0005          0.0000          0.0000
```

*6 15	202D	101.1461	0.0012	0.0002	0.0000	0.0000
*6 15	202G	101.1476	0.0012	0.0002	0.0000	0.0000
6 15	202	101.14685	0.0012	0.0002	0.0000	0.0000
6 15	206	100.6054	0.0012	0.0002	0.0000	0.0000
6 15	207	100.5989	0.0012	0.0002	0.0000	0.0000
6 15	18	104.3367	0.0012	0.0002	0.0000	0.0000
6 15	14	99.5222	0.0012	0.0002	0.0000	0.0000
3 15	10	87.7194	0.0005	0.0000	0.0000	0.0000
3 15	11	95.5095	0.0005	0.0000	0.0000	0.0000
3 15	16	18.7483	0.0005	0.0000	0.0000	0.0000
3 15	206	17.5663	0.0005	0.0000	0.0000	0.0000
3 15	207	17.6963	0.0005	0.0000	0.0000	0.0000
3 15	18	14.6672	0.0005	0.0000	0.0000	0.0000
3 15	14	42.7407	0.0005	0.0000	0.0000	0.0000

* Station n°7 15

* Temperature : 28.9 °C - Pression : 757.7 mmHg - Correction meteo : 16.6 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

7 15	3000	0.0000	0.0009	0.0001	0.0000	0.0000
5 15	17	140.1664	0.0009	0.0001	0.0000	0.0000
5 15	18	101.3987	0.0009	0.0001	0.0000	0.0000
5 15	11	392.7304	0.0009	0.0001	0.0000	0.0000
5 15	10	390.5896	0.0009	0.0001	0.0000	0.0000
5 15	14	59.7116	0.0009	0.0001	0.0000	0.0000
*5 15	202G	190.0579	0.0009	0.0001	0.0000	0.0000
*5 15	202D	191.4295	0.0009	0.0001	0.0000	0.0000
5 15	202	190.7437	0.0009	0.0001	0.0000	0.0000
*6 15	3000	93.6579	0.0012	0.0002	0.0000	0.0000
6 15	17	96.7375	0.0012	0.0002	0.0000	0.0000
6 15	18	104.3360	0.0012	0.0002	0.0000	0.0000
6 15	11	96.4479	0.0012	0.0002	0.0000	0.0000
6 15	10	96.5856	0.0012	0.0002	0.0000	0.0000
6 15	14	99.5216	0.0012	0.0002	0.0000	0.0000
*6 15	202G	101.1461	0.0012	0.0002	0.0000	0.0000
*6 15	202D	101.1457	0.0012	0.0002	0.0000	0.0000
6 15	202	101.1459	0.0012	0.0002	0.0000	0.0000
3 15	17	24.4134	0.0005	0.0000	0.0000	0.0000
3 15	18	14.6672	0.0005	0.0000	0.0000	0.0000
3 15	11	95.5091	0.0005	0.0000	0.0000	0.0000
3 15	10	87.7190	0.0005	0.0000	0.0000	0.0000
3 15	14	42.7402	0.0005	0.0000	0.0000	0.0000

* Station n°8 16

* Temperature : 28.5 °C - Pression : 757.7 mmHg - Correction meteo : 16.3 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

7 16	3000	0.0000	0.0009	0.0001	0.0000	0.0000
5 16	10	394.1563	0.0009	0.0001	0.0000	0.0000
5 16	11	395.6647	0.0009	0.0001	0.0000	0.0000
5 16	15	14.5883	0.0009	0.0001	0.0000	0.0000
5 16	17	89.3611	0.0009	0.0001	0.0000	0.0000
*5 16	205G	92.4914	0.0009	0.0001	0.0000	0.0000
*5 16	205D	93.0162	0.0009	0.0001	0.0000	0.0000
5 16	205	92.7538	0.0009	0.0001	0.0000	0.0000
*5 16	202G	91.0382	0.0009	0.0001	0.0000	0.0000
*5 16	202D	94.4643	0.0009	0.0001	0.0000	0.0000
5 16	202	92.75125	0.0009	0.0001	0.0000	0.0000
5 16	208	91.2781	0.0009	0.0001	0.0000	0.0000

5 16	209	94.0687	0.0009	0.0001	0.0000	0.0000
*6 16	3000	93.7588	0.0012	0.0002	0.0000	0.0000
6 16	10	96.4569	0.0012	0.0002	0.0000	0.0000
6 16	11	96.3537	0.0012	0.0002	0.0000	0.0000
6 16	15	96.0658	0.0012	0.0002	0.0000	0.0000
6 16	17	93.7439	0.0012	0.0002	0.0000	0.0000
*6 16	205G	93.2692	0.0012	0.0002	0.0000	0.0000
*6 16	205D	93.2755	0.0012	0.0002	0.0000	0.0000
6 16	205	93.27235	0.0012	0.0005	0.0000	0.0000
*6 16	202G	92.4433	0.0012	0.0002	0.0000	0.0000
*6 16	202D	92.4377	0.0012	0.0002	0.0000	0.0000
6 16	202	92.4405	0.0012	0.0002	0.0000	0.0000
6 16	208	91.0846	0.0012	0.0002	0.0000	0.0000
6 16	209	91.1859	0.0012	0.0002	0.0000	0.0000
3 16	10	105.3137	0.0005	0.0000	0.0000	0.0000
3 16	11	113.2808	0.0005	0.0000	0.0000	0.0000
3 16	15	18.7483	0.0005	0.0000	0.0000	0.0000
3 16	17	24.5604	0.0005	0.0000	0.0000	0.0000
3 16	208	7.1001	0.0005	0.0000	0.0000	0.0000
3 16	209	7.1851	0.0005	0.0000	0.0000	0.0000

* Station n°9 18

* Temperature : 30.1 °C - Pression : 756.5 mmHg - Correction meteo : 18.0 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

*7 18	1	0.0000	0.0009	0.0001	0.0000	0.0000
7 18	15	384.7531	0.0009	0.0001	0.0000	0.0000
5 18	17	261.3747	0.0009	0.0001	0.0000	0.0000
*5 18	205G	322.3494	0.0009	0.0001	0.0000	0.0000
*5 18	205D	322.5248	0.0009	0.0001	0.0000	0.0000
5 18	205	322.4371	0.0009	0.0001	0.0000	0.0000
*5 18	202G	321.8638	0.0009	0.0001	0.0000	0.0000
*5 18	202D	323.0171	0.0009	0.0001	0.0000	0.0000
5 18	202	322.44045	0.0009	0.0001	0.0000	0.0000
5 18	210	321.9782	0.0009	0.0001	0.0000	0.0000
5 18	211	322.9353	0.0009	0.0001	0.0000	0.0000
*5 18	203G	321.8942	0.0009	0.0001	0.0000	0.0000
*5 18	203D	322.9861	0.0009	0.0001	0.0000	0.0000
5 18	203	322.44015	0.0009	0.0001	0.0000	0.0000
*6 18	1	96.2521	0.0012	0.0002	0.0000	0.0000
6 18	15	95.6630	0.0012	0.0002	0.0000	0.0000
6 18	17	90.4838	0.0012	0.0002	0.0000	0.0000
*6 18	205G	98.2075	0.0012	0.0002	0.0000	0.0000
*6 18	205D	98.2120	0.0012	0.0002	0.0000	0.0000
6 18	205	98.20975	0.0012	0.0005	0.0000	0.0000
*6 18	202G	97.9325	0.0012	0.0002	0.0000	0.0000
*6 18	202D	97.9326	0.0012	0.0002	0.0000	0.0000
6 18	202	97.93255	0.0012	0.0002	0.0000	0.0000
6 18	210	97.4815	0.0012	0.0002	0.0000	0.0000
6 18	211	97.4737	0.0012	0.0002	0.0000	0.0000
*6 18	203G	97.7304	0.0012	0.0002	0.0000	0.0000
*6 18	203D	97.7296	0.0012	0.0002	0.0000	0.0000
6 18	203	97.7300	0.0012	0.0002	0.0000	0.0000
3 18	15	14.6673	0.0005	0.0000	0.0000	0.0000
3 18	17	15.1123	0.0005	0.0000	0.0000	0.0000
3 18	210	21.0234	0.0005	0.0000	0.0000	0.0000
3 18	211	20.9594	0.0005	0.0000	0.0000	0.0000

* Station n°10 17

* Temperature : 30.1 °C - Pression : 756.5 mmHg - Correction meteo : 18.0 ppm

* Date/heure debut :
* Date/heure fin :
* Numero de cycle : 0

*7 17	2	0.0000	0.0009	0.0001	0.0000	0.0000
7 17	15	87.7350	0.0009	0.0001	0.0000	0.0000
5 17	16	37.6515	0.0009	0.0001	0.0000	0.0000
5 17	18	125.5832	0.0009	0.0001	0.0000	0.0000
*5 17	202G	35.5830	0.0009	0.0001	0.0000	0.0000
*5 17	203G	35.6210	0.0009	0.0001	0.0000	0.0000
*5 17	202D	36.9738	0.0009	0.0001	0.0000	0.0000
5 17	202	36.2784	0.0009	0.0001	0.0000	0.0000
5 17	212	36.8213	0.0009	0.0001	0.0000	0.0000

*6 17	2	99.8206	0.0012	0.0002	0.0000	0.0000
6 17	15	103.2670	0.0012	0.0002	0.0000	0.0000
6 17	16	106.2580	0.0012	0.0002	0.0000	0.0000
6 17	18	109.5143	0.0012	0.0002	0.0000	0.0000
*6 17	202G	105.7290	0.0012	0.0002	0.0000	0.0000
*6 17	203G	105.4851	0.0012	0.0002	0.0000	0.0000
*6 17	202D	105.7285	0.0012	0.0002	0.0000	0.0000
6 17	202	105.72875	0.0012	0.0002	0.0000	0.0000
6 17	212	105.1578	0.0012	0.0002	0.0000	0.0000

3 17	15	24.4134	0.0005	0.0000	0.0000	0.0000
3 17	16	24.5594	0.0005	0.0000	0.0000	0.0000
3 17	18	15.1123	0.0005	0.0000	0.0000	0.0000
3 17	212	17.5323	0.0005	0.0000	0.0000	0.0000

* Station n°11 15
* Temperature : 30.7 °C - Pression : 756.5 mmHg - Correction meteo : 18.6 ppm
* Date/heure debut :
* Date/heure fin :
* Numero de cycle : 0

7 15	3000	0.0000	0.0009	0.0001	0.0000	0.0000
5 15	16	215.3126	0.0009	0.0001	0.0000	0.0000
5 15	17	140.1639	0.0009	0.0001	0.0000	0.0000
5 15	18	101.4024	0.0009	0.0001	0.0000	0.0000
*5 15	203G	190.0980	0.0009	0.0001	0.0000	0.0000
*5 15	203D	191.3940	0.0009	0.0001	0.0000	0.0000
5 15	203	190.7460	0.0009	0.0001	0.0000	0.0000

*6 15	3000	93.6636	0.0012	0.0002	0.0000	0.0000
6 15	16	103.9339	0.0012	0.0002	0.0000	0.0000
6 15	17	96.7339	0.0012	0.0002	0.0000	0.0000
6 15	18	104.3367	0.0012	0.0002	0.0000	0.0000
*6 15	203G	100.9076	0.0012	0.0002	0.0000	0.0000
*6 15	203D	100.9055	0.0012	0.0002	0.0000	0.0000
6 15	203	100.90655	0.0012	0.0002	0.0000	0.0000

3 15	16	18.7483	0.0005	0.0000	0.0000	0.0000
3 15	17	24.4140	0.0005	0.0000	0.0000	0.0000
3 15	18	14.6668	0.0005	0.0000	0.0000	0.0000

* Station n°12 16
* Temperature : 29.6 °C - Pression : 756.5 mmHg - Correction meteo : 17.6 ppm
* Date/heure debut :
* Date/heure fin :
* Numero de cycle : 0

7 16	3000	0.0000	0.0009	0.0001	0.0000	0.0000
5 16	15	14.5881	0.0009	0.0001	0.0000	0.0000
5 16	17	89.3591	0.0009	0.0001	0.0000	0.0000
*5 16	203G	91.1262	0.0009	0.0001	0.0000	0.0000
*5 16	203D	94.3740	0.0009	0.0001	0.0000	0.0000

5 16	203	92.7501	0.0009	0.0001	0.0000	0.0000
*6 16	3000	93.7561	0.0012	0.0002	0.0000	0.0000
6 16	15	96.0651	0.0012	0.0002	0.0000	0.0000
6 16	17	93.7425	0.0012	0.0002	0.0000	0.0000
*6 16	203G	91.8504	0.0012	0.0002	0.0000	0.0000
*6 16	203D	91.8457	0.0012	0.0002	0.0000	0.0000
6 16	203	91.84805	0.0012	0.0002	0.0000	0.0000
3 16	15	18.7483	0.0005	0.0000	0.0000	0.0000
3 16	17	24.5594	0.0005	0.0000	0.0000	0.0000

*Données reduites

* D:\DORIS\santa-cruz\topo\brutes\SC_VERT_OLD.obs

* fichier créé le 13/06/2023 à 19:03:18

*Tours d'horizon

* Station n°1 SLN

* Temperature : 27.9 °C - Pression : 758.0 mmHg - Correction meteo : 15.6 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

*7 SLN	1000	0.0000	0.0009	0.0001	0.0000	0.0000
*5 SLN	2000	157.7334	0.0009	0.0001	0.0000	0.0000
*5 SLN	100G	100.8302	0.0009	0.0001	0.0000	0.0000
*5 SLN	101G	101.0880	0.0009	0.0001	0.0000	0.0000
*5 SLN	102G	100.4604	0.0009	0.0001	0.0000	0.0000
*5 SLN	100D	101.7310	0.0009	0.0001	0.0000	0.0000
*5 SLN	101D	101.4568	0.0009	0.0001	0.0000	0.0000
*5 SLN	102D	102.1217	0.0009	0.0001	0.0000	0.0000
7 SLN	150	101.2806	0.0009	0.0001	0.0000	0.0000
5 SLN	151	101.2724	0.0009	0.0001	0.0000	0.0000
5 SLN	152	101.29105	0.0009	0.0001	0.0000	0.0000
5 SLN	153	101.2923	0.0009	0.0001	0.0000	0.0000
5 SLN	10	154.9226	0.0009	0.0001	0.0000	0.0000
5 SLN	11	229.0077	0.0009	0.0001	0.0000	0.0000
5 SLN	12	357.5384	0.0009	0.0001	0.0000	0.0000
5 SLN	SLE	50.6744	0.0009	0.0001	0.0000	0.0000
5 SLN	104	101.2993	0.0009	0.0001	0.0000	0.0000
*6 SLN	1000	96.7605	-0.0012	0.0002	0.0000	0.0000
*6 SLN	2000	101.6232	0.0012	0.0002	0.0000	0.0000
*6 SLN	100G	99.7019	0.0012	0.0002	0.0000	0.0000
*6 SLN	101G	91.8974	0.0012	0.0002	0.0000	0.0000
*6 SLN	102G	106.1083	0.0012	0.0002	0.0000	0.0000
*6 SLN	100D	99.6939	0.0012	0.0002	0.0000	0.0000
*6 SLN	101D	91.8973	0.0012	0.0002	0.0000	0.0000
*6 SLN	102D	106.0785	0.0012	0.0002	0.0000	0.0000
6 SLN	150	99.6979	0.0012	0.0005	0.0000	0.0000
6 SLN	151	91.89735	-0.0012	0.0002	0.0000	0.0000
6 SLN	152	106.00934	-0.0012	0.0002	0.0000	0.0000
6 SLN	153	108.2113	0.0012	0.0002	0.0000	0.0000
6 SLN	10	98.8865	0.0012	0.0002	0.0000	0.0000
6 SLN	11	93.2372	0.0012	0.0002	0.0000	0.0000
6 SLN	12	97.6825	0.0012	0.0002	0.0000	0.0000
6 SLN	SLE	99.0775	-0.0012	0.0002	0.0000	0.0000
6 SLN	104	119.5312	0.0012	0.0002	0.0000	0.0000
3 SLN	153	3.8481	0.0005	0.0000	0.0000	0.0000
3 SLN	10	7.9721	0.0005	0.0000	0.0000	0.0000
3 SLN	11	7.2211	0.0005	0.0000	0.0000	0.0000
3 SLN	12	4.9181	0.0005	0.0000	0.0000	0.0000
3 SLN	SLE	4.5091	0.0005	0.0000	0.0000	0.0000

3 SLN 104 4.0018 0.0005 0.0000 0.0000 0.0000

* Station n°2 SLE

* Temperature : 28.7 °C - Pression : 758.0 mmHg - Correction meteo : 16.3 ppm

* Date/heure debut :

* Date/heure fin :

* Numero de cycle : 0

*7 SLE 1000 0.0000 0.0009 0.0001 0.0000 0.0000

*5 SLE 2000 164.7317 0.0009 0.0001 0.0000 0.0000

*5 SLE 100G 192.0654 0.0009 0.0001 0.0000 0.0000

*5 SLE 101G 192.3755 0.0009 0.0001 0.0000 0.0000

*5 SLE 102G 191.6254 0.0009 0.0001 0.0000 0.0000

*5 SLE 100D 193.1151 0.0009 0.0001 0.0000 0.0000

*5 SLE 101D 192.8039 0.0009 0.0001 0.0000 0.0000

*5 SLE 102D 193.5576 0.0009 0.0001 0.0000 0.0000

7 SLE 150 192.59025 0.0009 0.0001 0.0000 0.0000

5 SLE 151 192.5897 0.0009 0.0001 0.0000 0.0000

5 SLE 152 192.5915 0.0009 0.0001 0.0000 0.0000

5 SLE 104 192.6031 0.0009 0.0001 0.0000 0.0000

5 SLE SLN 254.8413 0.0009 0.0001 0.0000 0.0000

5 SLE 10 190.7926 0.0009 0.0001 0.0000 0.0000

5 SLE 11 241.5000 0.0009 0.0001 0.0000 0.0000

5 SLE 12 311.3233 0.0009 0.0001 0.0000 0.0000

*6 SLE 1000 96.5861 0.0012 0.0002 0.0000 0.0000

*6 SLE 2000 101.6546 0.0012 0.0002 0.0000 0.0000

*6 SLE 100G 100.9014 0.0012 0.0002 0.0000 0.0000

*6 SLE 101G 91.8341 0.0012 0.0002 0.0000 0.0000

*6 SLE 102G 108.2831 0.0012 0.0002 0.0000 0.0000

*6 SLE 100D 100.8974 0.0012 0.0002 0.0000 0.0000

*6 SLE 101D 91.8372 0.0012 0.0002 0.0000 0.0000

*6 SLE 102D 108.2825 0.0012 0.0002 0.0000 0.0000

6 SLE 150 100.8994 0.0012 0.0005 0.0000 0.0000

*6 SLE 151 91.83565 0.0012 0.0002 0.0000 0.0000

*6 SLE 152 108.2828 0.0012 0.0002 0.0000 0.0000

6 SLE 104 123.5359 0.0012 0.0002 0.0000 0.0000

6 SLE SLN 100.9071 0.0012 0.0002 0.0000 0.0000

6 SLE 10 99.4940 0.0012 0.0002 0.0000 0.0000

6 SLE 11 96.1331 0.0012 0.0002 0.0000 0.0000

6 SLE 12 98.8433 0.0012 0.0002 0.0000 0.0000

3 SLE 104 3.5231 0.0005 0.0000 0.0000 0.0000

3 SLE SLN 4.5091 0.0005 0.0000 0.0000 0.0000

3 SLE 10 9.4152 0.0005 0.0000 0.0000 0.0000

3 SLE 11 11.5502 0.0005 0.0000 0.0000 0.0000

3 SLE 12 6.3041 0.0005 0.0000 0.0000 0.0000

6.3 Adjustment output files

6.3.1 COMP3D computation report



Sant-Cruz1

Version: COMP3D v5.21rc4-win
Commit:
Copyright 1992-2022 IGN France - Licensed to IGN/ENSG only
comp3d@ign.fr

Project configuration

Name : Sant-Cruz1

Description : Local tie survey, GNSS station GLPS coordinates constrained (0.1mm) from IGS daily combined SINEX solution for week 2266, day 4. Orientation to point 3000. Vertical deflection from EGM08.

Root COR file : StaCrz.cor

Root OBS file : StaCrz.obs

Unit : Grad

Decimal places number : 4

Computation nature : Compensation

Normal matrix inversion : Yes

Internal constraints : No

Refraction coefficient : 0.1200

Georeferencing : Yes

Projection definition : EPSG:32715

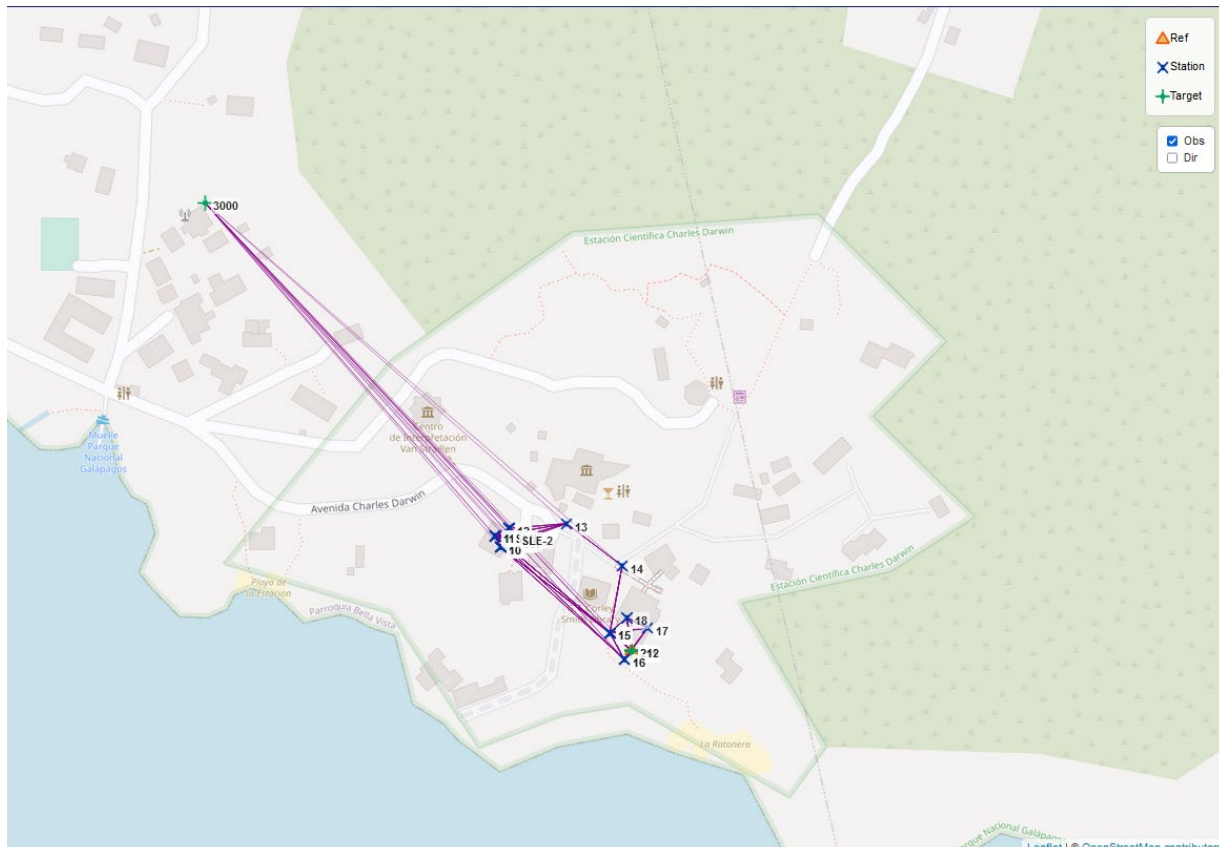
Projection center : E=800121 N=9917784

Convergence criterion : 0.001000

Maximum iterations : 100

Ellipsoidal heights : Yes

Additional iterations : 0

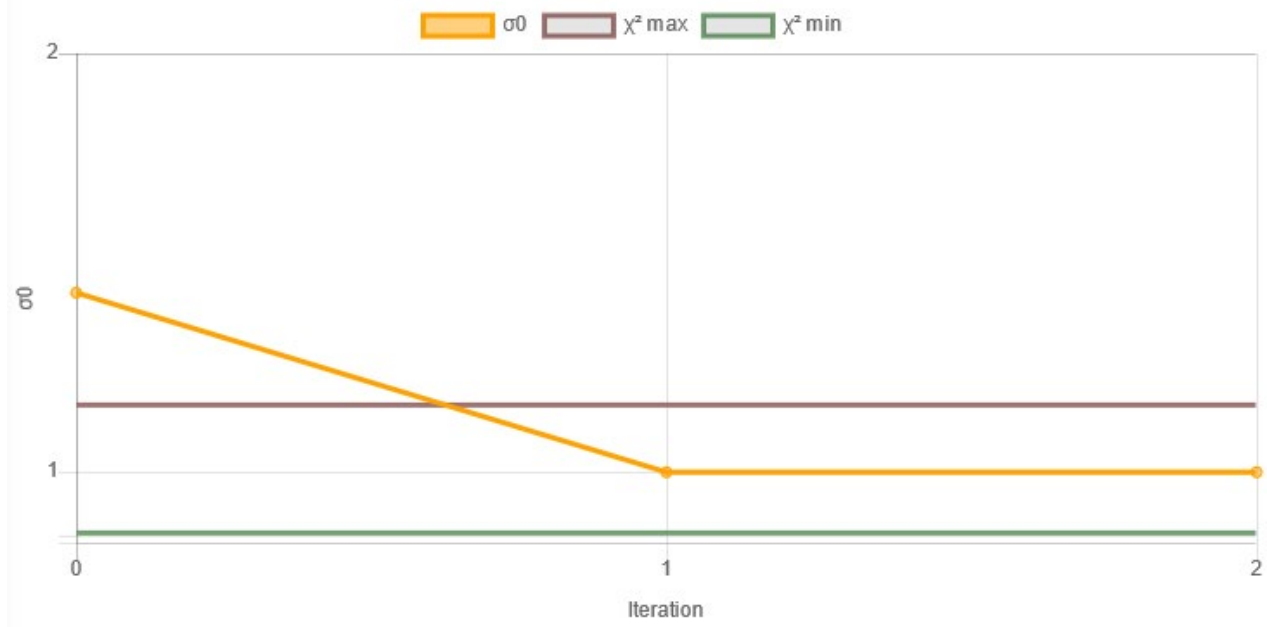


Computation information

Compensation done : Yes
 σ_0 initial : 1.3453
 σ_0 final : 0.9994
Iterations : 2
Computation interruption : No
Rank default : 0
Computation start : 2023-Sep-01 15:51:44.916777
Computation duration : 00:00:00.015621
Sphere radius : 6356759.47 m
Total observations number : 449
Active observations number : 438
Parameters : 141
Normal matrix inversion : Yes
Monte-Carlo simulation done : No
Internal constraints : No
Using vertical deflection : Yes
User proj def : EPSG:32715
Stereo def : +proj=sterea +lat_0=-0.743004555731716 +lon_0=-90.3036652278973 +k_0=1 +x_0=0 +y_0=0
LatLong def : +proj=latlong
Geocent def : +proj=geocent

Cartesian global to Geocentric:					
	0.999985955255	-0.000068726950	-0.005299487611		-33800.877036961436
Geocentr =	-0.005299933238	-0.012967330274	-0.999901874712	* Global +	-6377514.7330658715
	0	0.999915918276	-0.012967512399		-82154.9342708962

σ_0 evolution



χ^2 test

Confidence: 99%
Degrees of freedom: 297
Test: $0.9039 < 0.9994 < 1.1171$?
Test passed: Yes!
Biggest ellipsoid: 0.0377m

Initial coordinates

Name	E init	N init	Eh init	σ_x init	σ_y init	σ_z init	η	ξ	Active obs
200	800121.1600	9917784.7600	1.7738	0.0001	0.0001	0.0001	1.27	-6.50	11
201	800121.1600	9917784.7600	1.7821	-	-	-	1.27	-6.50	5
202	800121.1600	9917784.7600	1.8166	-	-	-	1.27	-6.50	17
203	800121.1600	9917784.7600	1.8828	-	-	-	1.27	-6.50	16
205	800121.1607	9917784.7603	1.7246	-	-	-	1.27	-6.50	9
206	800121.1930	9917784.9208	1.9674	-	-	-	1.27	-6.50	4
207	800121.1099	9917784.6058	1.9675	-	-	-	1.27	-6.50	4
208	800121.0229	9917784.8502	1.9673	-	-	-	1.27	-6.50	4
209	800121.3140	9917784.7128	1.9675	-	-	-	1.27	-6.50	4
210	800121.3179	9917784.7344	1.9675	-	-	-	1.27	-6.50	4
211	800120.9964	9917784.7531	1.9675	-	-	-	1.27	-6.50	4
212	800120.9992	9917784.7931	1.9675	-	-	-	1.27	-6.50	4
150	800043.1519	9917853.7922	6.7163	-	-	-	1.26	-6.54	16
151	800043.1523	9917853.7925	7.2040	-	-	-	1.26	-6.54	8
152	800043.1516	9917853.7920	6.3270	-	-	-	1.26	-6.54	10
153	800043.1517	9917853.7919	6.2028	-	-	-	1.26	-6.54	12
104	800043.1510	9917853.7923	5.4891	-	-	-	1.26	-6.54	18
104r	800043.1510	9917853.7923	5.2891	-	-	-	1.26	-6.54	3
100	800043.1512	9917853.7922	6.7185	-	-	-	1.26	-6.54	17
101	800043.1512	9917853.7922	7.2045	-	-	-	1.26	-6.54	3
102	800043.1512	9917853.7922	6.3275	-	-	-	1.26	-6.54	10
103	800043.1514	9917853.7921	6.2031	-	-	-	1.26	-6.54	9
105	800043.1512	9917853.7921	6.5785	-	-	-	1.26	-6.54	28
106	800043.1104	9917853.7314	6.4123	-	-	-	1.26	-6.54	4
107	800043.1803	9917853.8571	6.4122	-	-	-	1.26	-6.54	4
108	800043.2171	9917853.7931	6.4122	-	-	-	1.26	-6.54	4
109	800043.0781	9917853.7968	6.4122	-	-	-	1.26	-6.54	4
10	800038.4130	9917849.8936	6.8370	-	-	-	1.26	-6.54	98
11	800034.3283	9917857.1869	7.4632	-	-	-	1.26	-6.54	107

Name	E init	N init	Eh init	σ_x init	σ_y init	σ_z init	η	ξ	Active obs
12	800043.6112	9917861.6914	6.8767	-	-	-	1.26	-6.54	88
13	800080.2581	9917864.5200	3.2017	-	-	-	1.28	-6.53	27
14	800115.0276	9917837.7739	2.4555	-	-	-	1.29	-6.51	16
15	800107.3123	9917795.7057	2.1341	-	-	-	1.27	-6.51	77
16	800116.5518	9917779.4179	0.9759	-	-	-	1.27	-6.50	47
17	800131.5191	9917798.7623	3.3861	-	-	-	1.28	-6.49	29
18	800118.1795	9917805.5208	1.1357	-	-	-	1.28	-6.50	30
SLN	800041.5143	9917857.2422	6.6979	-	-	-	1.26	-6.54	58
SLE	800045.7786	9917855.7685	6.7624	-	-	-	1.26	-6.54	31
SLE-2	800045.7814	9917855.7703	6.7616	-	-	-	1.26	-6.54	14
3000	799850.8846	9918067.3734	39.4376	-	-	-	1.24	-6.63	15

Observations

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
StaCrz.cor														
crd_x	200	200	0.1594	0.0000	0.0001	0.0	0.0000	0.0	0.0001	0.0		0		
crd_y	200	200	0.7596	0.0000	0.0001	0.0	0.0000	0.0	0.0001	0.0		0		
crd_z	200	200	1.7738	0.0000	0.0001	-0.0	-0.0000	-0.0	0.0001	-0.0		0		
StaCrz.obs														
azim	200	3000	-48.6184	392.5879	0.0002	0.0	0.0000	0.0	0.0002	0.0		0		
obs\231306.obs														
tour	10	150	391.2968	6.1333	0.0019	0.4	0.0008	0.1	0.0011	0.7	0.5	70	0.0095	
hz	10	151	391.2958	6.1436	0.0019	0.9	0.0018	0.2	0.0011	1.6	1.1	66	0.0098	
hz	10	152	391.2969	6.1530	0.0019	-0.0	-0.0000	-0.0	0.0011	-0.0	-0.0	66	0.0098	
hz	10	104	391.2938	6.2780	0.0019	-1.8	-0.0034	-0.3	0.0012	-2.9	-2.2	64	0.0100	
hz	10	11	302.6222	8.3767	0.0017	-0.3	-0.0004	-0.1	0.0009	-0.5	-0.3	70	0.0082	
hz	10	12	361.5430	12.8831	0.0014	0.7	0.0010	0.2	0.0008	1.3	0.8	71	0.0068	
hz	10	SLN	360.5465	7.9717	0.0017	0.1	0.0001	0.0	0.0008	0.1	0.1	77	0.0079	
hz	10	SLE	392.2608	9.4152	0.0016	-0.2	-0.0003	-0.1	0.0008	-0.5	-0.3	77	0.0074	
zen	10	150	101.2535	6.1333	0.0064	0.0	0.0003	0.0	0.0027	0.1	0.0	83	0.0288	
zen	10	104	113.7838	6.2780	0.0032	-2.3	-0.0073	-0.7	0.0016	-4.6	-2.6	75	0.0152	0.0097
zen	10	11	95.2334	8.3767	0.0027	1.4	0.0038	0.5	0.0007	5.3	1.4	93	0.0116	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
zen	10	12	99.8020	12.8831	0.0022	1.0	0.0023	0.5	0.0005	4.7	1.1	95	0.0092	
zen	10	SLN	101.1075	7.9717	0.0028	1.4	0.0039	0.5	0.0008	4.9	1.4	92	0.0120	
zen	10	SLE	100.5025	9.4152	0.0026	1.0	0.0025	0.4	0.0009	2.7	1.0	87	0.0112	
dist	10	104	6.2796	6.2780	0.0005	-3.3	-0.0016	-1.6	0.0001	-11.2	-3.4	92	0.0021	0.0018
dist	10	11	8.3771	8.3767	0.0005	-0.8	-0.0004	-0.4	0.0001	-4.1	-0.8	96	0.0021	
dist	10	12	12.8832	12.8831	0.0005	-0.1	-0.0001	-0.1	0.0001	-0.6	-0.1	95	0.0021	
dist	10	SLN	7.9721	7.9717	0.0005	-0.7	-0.0004	-0.4	0.0001	-3.7	-0.8	96	0.0021	
dist	10	SLE	9.4151	9.4152	0.0005	0.2	0.0001	0.1	0.0001	0.8	0.2	93	0.0021	
tour	11	10	93.5833	8.3767	0.0017	1.2	0.0019	0.3	0.0009	2.3	1.3	74	0.0079	
hz	11	12	397.3263	10.3274	0.0015	-0.5	-0.0008	-0.1	0.0008	-0.9	-0.6	72	0.0073	
hz	11	SLN	25.5972	7.2217	0.0018	-0.1	-0.0002	-0.0	0.0008	-0.3	-0.2	81	0.0081	
hz	11	150	49.6467	9.4769	0.0016	-113.6	-0.1788	-26.6	-	-	-	-	-	-
hz	11	151	49.4637	9.4512	0.0016	0.8	0.0013	0.2	0.0009	1.4	1.0	67	0.0079	
hz	11	152	49.4702	9.5152	0.0016	-0.4	-0.0006	-0.1	0.0009	-0.7	-0.5	67	0.0079	
hz	11	153	49.4727	9.5310	0.0016	-1.3	-0.0021	-0.3	0.0010	-2.1	-1.7	62	0.0082	
hz	11	104	49.4690	9.6506	0.0016	0.1	0.0002	0.0	0.0009	0.2	0.2	66	0.0079	
hz	11	SLE	33.9322	11.5508	0.0015	0.3	0.0004	0.1	0.0007	0.6	0.4	74	0.0069	
zen	11	10	104.7623	8.3767	0.0027	0.2	0.0006	0.1	0.0007	0.8	0.2	93	0.0116	
zen	11	12	103.6150	10.3274	0.0024	1.0	0.0024	0.4	0.0006	4.1	1.0	94	0.0103	
zen	11	SLN	106.7556	7.2217	0.0030	1.1	0.0032	0.4	0.0009	3.8	1.1	92	0.0127	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
zen	11	150	105.0266	9.4769	0.0046	-0.9	-0.0040	-0.6	0.0017	-2.3	-0.9	86	0.0202	
zen	11	153	108.4430	9.5310	0.0025	0.2	0.0005	0.1	0.0013	0.4	0.2	75	0.0120	
zen	11	104	113.1138	9.6506	0.0025	0.5	0.0014	0.2	0.0010	1.3	0.6	83	0.0113	
zen	11	SLE	103.8625	11.5508	0.0023	1.0	0.0023	0.4	0.0007	3.1	1.1	90	0.0100	
dist	11	10	8.3771	8.3767	0.0005	-0.8	-0.0004	-0.4	0.0001	-4.1	-0.8	96	0.0021	
dist	11	12	10.3272	10.3274	0.0005	0.4	0.0002	0.2	0.0001	1.9	0.4	96	0.0021	
dist	11	SLN	7.2216	7.2217	0.0005	0.2	0.0001	0.1	0.0001	1.2	0.2	96	0.0021	
dist	11	153	9.5311	9.5310	0.0005	-0.3	-0.0001	-0.1	0.0002	-0.9	-0.3	90	0.0022	
dist	11	104	9.6501	9.6506	0.0005	0.9	0.0005	0.5	0.0001	3.3	0.9	93	0.0021	
dist	11	SLE	11.5507	11.5508	0.0005	0.3	0.0001	0.1	0.0001	1.1	0.3	94	0.0021	
tour	12	10	398.1955	12.8831	0.0014	-0.2	-0.0003	-0.1	0.0007	-0.4	-0.3	72	0.0067	
hz	12	11	43.0133	10.3274	0.0015	-0.0	-0.0000	-0.0	0.0008	-0.0	-0.0	69	0.0075	
hz	12	SLN	399.8118	4.9184	0.0022	0.4	0.0009	0.1	0.0010	0.9	0.4	81	0.0100	
hz	12	150	375.4720	7.9085	0.0049	-0.1	-0.0005	-0.1	0.0009	-0.6	-0.1	96	0.0206	
hz	12	151	375.4669	7.9134	0.0017	0.9	0.0015	0.2	0.0009	1.6	1.1	69	0.0084	
hz	12	152	375.4744	7.9262	0.0017	-0.3	-0.0006	-0.1	0.0009	-0.6	-0.4	69	0.0084	
hz	12	153	375.4733	7.9359	0.0017	0.1	0.0002	0.0	0.0010	0.2	0.2	62	0.0089	
hz	12	104	375.4792	8.0277	0.0017	-0.2	-0.0003	-0.0	0.0010	-0.3	-0.2	68	0.0085	
hz	12	SLE	349.4430	6.3035	0.0019	-0.5	-0.0010	-0.1	0.0011	-0.9	-0.7	67	0.0095	
zen	12	10	100.1956	12.8831	0.0022	0.1	0.0002	0.0	0.0005	0.5	0.1	95	0.0092	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
zen	12	11	96.3814	10.3274	0.0024	0.5	0.0013	0.2	0.0006	2.3	0.6	94	0.0103	
zen	12	SLN	102.3089	4.9184	0.0038	1.5	0.0056	0.4	0.0012	4.7	1.6	90	0.0164	
zen	12	150	101.2918	7.9085	0.0052	-0.1	-0.0005	-0.1	0.0020	-0.2	-0.1	85	0.0233	
zen	12	153	105.4116	7.9359	0.0028	0.3	0.0009	0.1	0.0015	0.6	0.4	71	0.0136	
zen	12	104	111.0575	8.0277	0.0028	0.8	0.0022	0.3	0.0012	1.8	0.9	80	0.0127	
zen	12	SLE	101.1493	6.3035	0.0032	1.6	0.0051	0.5	0.0013	3.9	1.7	83	0.0145	
dist	12	10	12.8832	12.8831	0.0005	-0.1	-0.0001	-0.1	0.0001	-0.6	-0.1	95	0.0021	
dist	12	11	10.3272	10.3274	0.0005	0.4	0.0002	0.2	0.0001	1.9	0.4	96	0.0021	
dist	12	SLN	4.9181	4.9184	0.0005	0.5	0.0003	0.3	0.0001	2.8	0.6	96	0.0021	
dist	12	153	7.9361	7.9359	0.0005	-0.3	-0.0002	-0.2	0.0002	-1.0	-0.4	88	0.0022	
dist	12	104	8.0266	8.0277	0.0005	2.1	0.0011	1.1	0.0001	7.1	2.2	91	0.0021	
dist	12	SLE	6.3041	6.3035	0.0005	-1.1	-0.0006	-0.6	0.0001	-4.7	-1.1	94	0.0021	
obs\231406.obs														
tour	105	3000	0.0000	289.0490	0.0009	0.1	0.0001	0.5	0.0007	0.2	0.2	40	0.0060	
hz	105	10	302.8314	6.1370	0.0019	-0.9	-0.0017	-0.2	0.0011	-1.5	-1.1	65	0.0099	
hz	105	11	370.0419	9.4881	0.0016	0.7	0.0011	0.2	0.0009	1.3	0.9	68	0.0079	
hz	105	12	50.3621	7.9126	0.0017	0.3	0.0006	0.1	0.0010	0.6	0.4	69	0.0084	
hz	105	SLE	105.6053	3.2905	0.0028	-1.0	-0.0028	-0.1	0.0021	-1.3	-1.4	45	0.0173	
zen	105	10	97.3157	6.1370	0.0033	0.6	0.0018	0.2	0.0013	1.4	0.6	84	0.0147	
zen	105	11	94.0541	9.4881	0.0025	0.7	0.0017	0.3	0.0009	2.0	0.7	89	0.0111	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
zen	105	12	97.5964	7.9126	0.0028	1.6	0.0044	0.5	0.0010	4.3	1.7	87	0.0124	
zen	105	SLE-2	96.4567	3.2938	0.0051	0.5	0.0027	0.1	0.0032	0.8	0.7	61	0.0266	
dist	105	10	6.1371	6.1370	0.0005	-0.2	-0.0001	-0.1	0.0001	-0.7	-0.2	94	0.0021	
dist	105	11	9.4881	9.4881	0.0005	-0.1	-0.0000	-0.0	0.0001	-0.4	-0.1	95	0.0021	
dist	105	12	7.9131	7.9126	0.0005	-0.9	-0.0005	-0.5	0.0001	-3.7	-1.0	94	0.0021	
dist	105	SLE-2	3.2941	3.2938	0.0005	-0.5	-0.0003	-0.3	0.0002	-1.4	-0.6	85	0.0022	
tour	10	3000	0.0000	288.8140	0.0009	-0.2	-0.0001	-0.6	0.0007	-0.2	-0.2	45	0.0057	
hz	10	11	12.7992	8.3767	0.0017	-0.1	-0.0002	-0.0	0.0008	-0.2	-0.1	76	0.0078	
hz	10	12	71.7213	12.8831	0.0014	-0.0	-0.0000	-0.0	0.0007	-0.0	-0.0	77	0.0065	
hz	10	105	101.4705	6.1370	0.0019	-0.1	-0.0001	-0.0	0.0010	-0.1	-0.1	72	0.0094	
hz	10	SLN	70.7240	7.9717	0.0017	-0.1	-0.0001	-0.0	0.0008	-0.1	-0.1	79	0.0078	
hz	10	SLE-2	102.4393	9.4186	0.0016	0.5	0.0007	0.1	0.0012	0.6	0.7	43	0.0099	
zen	10	11	95.2345	8.3767	0.0027	1.0	0.0027	0.4	0.0007	3.7	1.0	93	0.0116	
zen	10	12	99.8017	12.8831	0.0022	1.2	0.0026	0.5	0.0005	5.4	1.2	95	0.0092	
zen	10	105	102.6813	6.1370	0.0033	0.4	0.0012	0.1	0.0013	0.9	0.4	84	0.0147	
zen	10	SLN	101.1078	7.9717	0.0028	1.3	0.0036	0.4	0.0008	4.5	1.3	92	0.0120	
zen	10	SLE-2	100.5108	9.4186	0.0026	-0.4	-0.0010	-0.1	0.0011	-0.9	-0.4	82	0.0115	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
dist	10	11	8.3761	8.3767	0.0005	1.2	0.0006	0.6	0.0001	6.4	1.2	96	0.0021	
dist	10	12	12.8832	12.8831	0.0005	-0.1	-0.0001	-0.1	0.0001	-0.6	-0.1	95	0.0021	
dist	10	105	6.1371	6.1370	0.0005	-0.2	-0.0001	-0.1	0.0001	-0.7	-0.2	94	0.0021	
dist	10	SLN	7.9721	7.9717	0.0005	-0.7	-0.0004	-0.4	0.0001	-3.7	-0.8	96	0.0021	
dist	10	SLE- 2	9.4186	9.4186	0.0005	-0.1	-0.0000	-0.0	0.0002	-0.2	-0.1	86	0.0022	
tour	SLN	3000	0.0000	285.4046	0.0009	0.5	0.0004	2.0	0.0007	0.6	0.7	41	0.0059	
hz	SLN	10	272.3293	7.9717	0.0017	-0.5	-0.0009	-0.1	0.0009	-1.0	-0.6	72	0.0082	
hz	SLN	SLE- 2	168.0508	4.5111	0.0037	-0.3	-0.0009	-0.1	0.0024	-0.4	-0.3	58	0.0201	
hz	SLN	12	74.9438	4.9184	0.0022	-0.2	-0.0005	-0.0	0.0012	-0.4	-0.3	71	0.0107	
hz	SLN	105	218.7021	3.8178	0.0026	-0.2	-0.0005	-0.0	0.0018	-0.3	-0.3	50	0.0149	
hz	SLN	11	346.4152	7.2217	0.0018	0.1	0.0001	0.0	0.0010	0.1	0.1	69	0.0088	
zen	SLN	10	98.8870	7.9717	0.0028	0.6	0.0017	0.2	0.0008	2.2	0.6	92	0.0120	
zen	SLN	SLE- 2	99.1009	4.5111	0.0040	-0.1	-0.0004	-0.0	0.0022	-0.2	-0.1	70	0.0197	
zen	SLN	12	97.6784	4.9184	0.0038	1.9	0.0071	0.6	0.0012	5.9	2.0	90	0.0164	
zen	SLN	105	101.9884	3.8178	0.0045	0.5	0.0023	0.1	0.0022	1.1	0.6	77	0.0211	
zen	SLN	11	93.2372	7.2217	0.0030	1.4	0.0040	0.5	0.0009	4.7	1.4	92	0.0127	
dist	SLN	10	7.9721	7.9717	0.0005	-0.7	-0.0004	-0.4	0.0001	-3.7	-0.8	96	0.0021	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
dist	SLN	SLE-2	4.5111	4.5111	0.0005	-0.1	-0.0000	-0.0	0.0002	-0.2	-0.1	86	0.0022	
dist	SLN	12	4.9191	4.9184	0.0005	-1.5	-0.0007	-0.7	0.0001	-7.3	-1.5	96	0.0021	
dist	SLN	105	3.8181	3.8178	0.0005	-0.6	-0.0003	-0.3	0.0001	-2.7	-0.6	95	0.0021	
dist	SLN	11	7.2211	7.2217	0.0005	1.2	0.0006	0.6	0.0001	6.4	1.3	96	0.0021	
tour	12	3000	0.0000	283.5479	0.0009	0.6	0.0006	2.5	0.0008	0.7	1.0	36	0.0064	
hz	12	10	274.3533	12.8831	0.0019	-0.7	-0.0014	-0.3	0.0008	-1.8	-0.8	82	0.0086	
hz	12	11	319.1710	10.3274	0.0021	-0.5	-0.0010	-0.2	0.0009	-1.1	-0.5	83	0.0096	
hz	12	SLE-2	225.5642	6.3028	0.0029	0.4	0.0013	0.1	0.0019	0.7	0.6	59	0.0156	
hz	12	SLN	275.9700	4.9184	0.0035	-0.2	-0.0006	-0.0	0.0011	-0.6	-0.2	90	0.0151	
hz	12	105	251.6347	7.9126	0.0025	-0.3	-0.0006	-0.1	0.0010	-0.6	-0.3	84	0.0113	
zen	12	10	100.1948	12.8831	0.0022	0.5	0.0010	0.2	0.0005	2.2	0.5	95	0.0092	
zen	12	11	96.3815	10.3274	0.0024	0.5	0.0012	0.2	0.0006	2.1	0.5	94	0.0103	
zen	12	SLE-2	101.1618	6.3028	0.0032	0.1	0.0002	0.0	0.0016	0.2	0.1	76	0.0151	
zen	12	SLN	102.3097	4.9184	0.0038	1.3	0.0048	0.4	0.0012	4.0	1.3	90	0.0164	
zen	12	105	102.3978	7.9126	0.0028	0.5	0.0015	0.2	0.0010	1.5	0.6	87	0.0124	
dist	12	10	12.8832	12.8831	0.0005	-0.1	-0.0001	-0.1	0.0001	-0.6	-0.1	95	0.0021	
dist	12	11	10.3272	10.3274	0.0005	0.4	0.0002	0.2	0.0001	1.9	0.4	96	0.0021	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
dist	12	SLE-2	6.3031	6.3028	0.0005	-0.6	-0.0003	-0.3	0.0002	-1.5	-0.6	87	0.0022	
dist	12	SLN	4.9186	4.9184	0.0005	-0.5	-0.0002	-0.2	0.0001	-2.3	-0.5	96	0.0021	
dist	12	105	7.9131	7.9126	0.0005	-0.9	-0.0005	-0.5	0.0001	-3.7	-1.0	94	0.0021	
tour	11	3000	0.0000	280.6157	0.0009	-0.3	-0.0003	-1.2	0.0007	-0.4	-0.4	52	0.0054	
hz	11	10	213.1830	8.3767	0.0024	-1.3	-0.0032	-0.4	0.0008	-3.8	-1.4	88	0.0106	
hz	11	105	169.0647	9.4881	0.0022	-0.1	-0.0001	-0.0	0.0009	-0.1	-0.1	84	0.0101	
hz	11	SLE-2	153.5160	11.5535	0.0020	-0.3	-0.0007	-0.1	0.0010	-0.6	-0.4	73	0.0096	
hz	11	SLN	145.1936	7.2217	0.0027	-0.8	-0.0020	-0.2	0.0009	-2.2	-0.8	88	0.0117	
hz	11	12	116.9210	10.3274	0.0021	-0.4	-0.0008	-0.1	0.0008	-1.1	-0.4	86	0.0094	
hz	11	205	189.9368	113.1379	0.0010	1.5	0.0015	2.7	0.0007	2.3	2.0	57	0.0055	
zen	11	10	104.7607	8.3767	0.0027	0.8	0.0022	0.3	0.0007	3.1	0.8	93	0.0116	
zen	11	105	105.9429	9.4881	0.0025	0.5	0.0014	0.2	0.0009	1.6	0.6	89	0.0111	
zen	11	SLE-2	103.8690	11.5535	0.0023	-0.4	-0.0010	-0.2	0.0009	-1.1	-0.5	85	0.0102	
zen	11	SLN	106.7576	7.2217	0.0030	0.4	0.0012	0.1	0.0009	1.5	0.4	92	0.0127	
zen	11	12	103.6155	10.3274	0.0024	0.8	0.0019	0.3	0.0006	3.2	0.8	94	0.0103	
zen	11	205	103.2377	113.1379	0.0013	-5.2	-0.0068	-12.1	-	-	-	-	-	-
dist	11	10	8.3771	8.3767	0.0005	-0.8	-0.0004	-0.4	0.0001	-4.1	-0.8	96	0.0021	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
dist	11	105	9.4882	9.4881	0.0005	-0.3	-0.0001	-0.1	0.0001	-1.3	-0.3	95	0.0021	
dist	11	SLE- 2	11.5532	11.5535	0.0005	0.5	0.0003	0.3	0.0002	1.4	0.6	85	0.0022	
dist	11	SLN	7.2211	7.2217	0.0005	1.2	0.0006	0.6	0.0001	6.4	1.3	96	0.0021	
dist	11	12	10.3272	10.3274	0.0005	0.4	0.0002	0.2	0.0001	1.9	0.4	96	0.0021	
obs\231506.obs														
tour	10	3000	204.8530	288.8140	0.0009	4.6	0.0042	19.1	-	-	-	-	-	-
hz	10	11	217.6528	8.3767	0.0017	2.2	0.0036	0.5	0.0008	4.6	2.5	78	0.0077	
hz	10	15	392.5857	87.7189	0.0010	-0.9	-0.0009	-1.2	0.0004	-2.0	-1.0	80	0.0044	
hz	10	16	396.8793	105.3140	0.0010	-1.3	-0.0012	-2.1	0.0004	-2.9	-1.4	80	0.0044	
hz	10	205	392.6105	105.3559	0.0010	-0.0	-0.0000	-0.0	0.0004	-0.1	-0.0	79	0.0044	
hz	10	202	392.6116	105.3510	0.0010	-0.8	-0.0008	-1.2	0.0004	-1.7	-0.9	80	0.0044	
hz	10	100	306.3249	6.1327	0.0019	1.1	0.0022	0.2	0.0012	1.8	1.5	60	0.0102	
hz	10	103	306.3317	6.1643	0.0019	-1.1	-0.0021	-0.2	0.0015	-1.4	-1.7	40	0.0125	
hz	10	12	276.5761	12.8831	0.0014	1.8	0.0025	0.5	0.0006	4.0	2.0	80	0.0064	
hz	10	13	328.7503	44.4450	0.0010	0.5	0.0005	0.4	0.0005	0.9	0.6	74	0.0050	
zen	10	11	95.2356	8.3767	0.0027	0.6	0.0016	0.2	0.0007	2.2	0.6	93	0.0116	
zen	10	15	103.4161	87.7189	0.0013	-0.7	-0.0009	-1.2	0.0004	-2.4	-0.7	92	0.0057	
zen	10	16	103.5473	105.3140	0.0013	-1.5	-0.0019	-3.2	0.0003	-6.0	-1.5	94	0.0056	
zen	10	205	103.0981	105.3559	0.0015	-4.8	-0.0072	-11.9	-	-	-	-	-	-

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
zen	10	202	103.0358	105.3510	0.0013	-0.4	-0.0005	-0.8	0.0003	-1.5	-0.4	94	0.0056	
zen	10	100	101.2249	6.1327	0.0064	0.8	0.0053	0.5	0.0031	1.7	0.9	76	0.0301	
zen	10	103	106.5588	6.1643	0.0033	-0.1	-0.0002	-0.0	0.0021	-0.1	-0.1	57	0.0177	
zen	10	12	99.8019	12.8831	0.0022	1.1	0.0024	0.5	0.0005	5.0	1.1	95	0.0092	
zen	10	13	105.2177	44.4450	0.0015	-3.1	-0.0045	-3.2	-	-	-	-	-	-
dist	10	11	8.3771	8.3767	0.0005	-0.8	-0.0004	-0.4	0.0001	-4.1	-0.8	96	0.0021	
dist	10	15	87.7194	87.7189	0.0005	-1.0	-0.0005	-0.5	0.0002	-2.9	-1.1	88	0.0022	
dist	10	16	105.3137	105.3140	0.0005	0.6	0.0003	0.3	0.0002	1.7	0.7	85	0.0022	
dist	10	103	6.1641	6.1643	0.0005	0.5	0.0002	0.2	0.0002	1.0	0.5	81	0.0023	
dist	10	12	12.8832	12.8831	0.0005	-0.1	-0.0001	-0.1	0.0001	-0.6	-0.1	95	0.0021	
dist	10	13	44.4447	44.4450	0.0005	0.7	0.0003	0.3	0.0002	1.7	0.7	85	0.0022	
tour	11	3000	203.8945	280.6157	0.0009	0.0	0.0000	0.2	0.0006	0.1	0.1	62	0.0048	
hz	11	13	339.4986	46.6733	0.0010	-1.5	-0.0016	-1.2	0.0005	-3.1	-1.8	76	0.0049	
hz	11	15	394.1440	95.5092	0.0010	-0.7	-0.0007	-1.0	0.0004	-1.6	-0.7	82	0.0044	
hz	11	16	397.8038	113.2807	0.0010	0.3	0.0003	0.4	0.0004	0.6	0.3	82	0.0043	
hz	11	205	393.8317	113.1379	0.0010	1.5	0.0015	2.6	0.0004	3.5	1.7	81	0.0044	
hz	11	202	393.8337	113.1329	0.0010	-0.2	-0.0002	-0.3	0.0004	-0.5	-0.2	82	0.0043	
hz	11	12	320.8157	10.3274	0.0015	-0.5	-0.0007	-0.1	0.0007	-1.1	-0.5	79	0.0070	
hz	11	100	372.9599	9.4760	0.0016	-0.5	-0.0008	-0.1	0.0010	-0.8	-0.6	60	0.0083	
hz	11	106	373.4407	9.4891	0.0016	0.0	0.0000	0.0	0.0016	0.0		0		

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
hz	11	107	372.4813	9.5091	0.0016	0.0	0.0000	0.0	0.0016	0.0		0		
hz	11	10	17.0717	8.3767	0.0017	1.8	0.0030	0.4	0.0007	4.1	2.0	81	0.0076	
zen	11	13	105.8217	46.6733	0.0015	-0.6	-0.0008	-0.6	0.0005	-1.5	-0.6	87	0.0065	
zen	11	15	103.5550	95.5092	0.0013	-0.5	-0.0006	-0.9	0.0003	-1.8	-0.5	93	0.0057	
zen	11	16	103.6490	113.2807	0.0013	-0.6	-0.0007	-1.3	0.0003	-2.5	-0.6	95	0.0055	
zen	11	205	103.2375	113.1379	0.0015	-4.4	-0.0066	-11.7	-	-	-	-	-	-
zen	11	202	103.1793	113.1329	0.0013	-0.1	-0.0001	-0.1	0.0003	-0.2	-0.1	95	0.0055	
zen	11	12	103.6147	10.3274	0.0024	1.1	0.0027	0.4	0.0006	4.6	1.1	94	0.0103	
zen	11	100	105.0061	9.4760	0.0046	0.4	0.0016	0.2	0.0020	0.8	0.4	80	0.0209	
zen	11	106	107.0633	9.4891	0.0025	0.6	0.0015	0.2	0.0015	1.0	0.7	64	0.0130	
zen	11	107	107.0502	9.5091	0.0025	0.0	0.0001	0.0	0.0015	0.1	0.1	64	0.0130	
zen	11	10	104.7587	8.3767	0.0027	1.5	0.0042	0.6	0.0007	5.9	1.6	93	0.0116	
dist	11	13	46.6727	46.6733	0.0005	1.2	0.0006	0.6	0.0002	3.1	1.3	85	0.0022	
dist	11	15	95.5095	95.5092	0.0005	-0.5	-0.0003	-0.3	0.0002	-1.6	-0.6	88	0.0022	
dist	11	16	113.2803	113.2807	0.0005	0.8	0.0004	0.4	0.0002	2.1	0.9	85	0.0022	
dist	11	12	10.3272	10.3274	0.0005	0.4	0.0002	0.2	0.0001	1.9	0.4	96	0.0021	
dist	11	106	9.4891	9.4891	0.0005	0.1	0.0000	0.0	0.0005	0.1	0.7	1	0.0174	
dist	11	107	9.5091	9.5091	0.0005	0.0	0.0000	0.0	0.0005	0.0	0.1	1	0.0174	
dist	11	10	8.3766	8.3767	0.0005	0.2	0.0001	0.1	0.0001	1.1	0.2	96	0.0021	
tour	12	3000	0.0000	283.5479	0.0009	0.6	0.0006	2.5	0.0006	0.9	0.8	55	0.0051	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
hz	12	10	274.3542	12.8831	0.0014	-1.7	-0.0023	-0.5	0.0007	-3.4	-1.9	77	0.0065	
hz	12	100	251.6346	7.9085	0.0017	-0.2	-0.0003	-0.0	0.0011	-0.3	-0.2	57	0.0093	
hz	12	108	251.1051	7.9161	0.0017	0.0	0.0000	0.0	0.0017	0.0		0		
hz	12	109	252.2231	7.9206	0.0017	-0.0	-0.0000	-0.0	0.0017	-0.0		0		
hz	12	11	319.1695	10.3274	0.0015	0.3	0.0005	0.1	0.0008	0.6	0.4	74	0.0072	
hz	12	13	143.0267	36.9131	0.0011	0.5	0.0005	0.3	0.0007	0.7	0.6	54	0.0060	
zen	12	10	100.1933	12.8831	0.0022	1.2	0.0025	0.5	0.0005	5.3	1.2	95	0.0092	
zen	12	100	101.2686	7.9085	0.0052	0.8	0.0043	0.5	0.0024	1.8	0.9	78	0.0242	
zen	12	108	103.7377	7.9161	0.0028	-0.1	-0.0003	-0.0	0.0017	-0.2	-0.1	61	0.0147	
zen	12	109	103.7362	7.9206	0.0028	-0.3	-0.0008	-0.1	0.0017	-0.4	-0.4	61	0.0147	
zen	12	11	96.3799	10.3274	0.0024	1.2	0.0028	0.5	0.0006	4.9	1.2	94	0.0103	
zen	12	13	106.3483	36.9131	0.0015	0.2	0.0004	0.2	0.0007	0.5	0.3	81	0.0070	
dist	12	10	12.8832	12.8831	0.0005	-0.1	-0.0001	-0.1	0.0001	-0.6	-0.1	95	0.0021	
dist	12	108	7.9161	7.9161	0.0005	-0.0	-0.0000	-0.0	0.0005	-0.0		0		
dist	12	109	7.9206	7.9206	0.0005	-0.0	-0.0000	-0.0	0.0005	-0.0		0		
dist	12	11	10.3272	10.3274	0.0005	0.4	0.0002	0.2	0.0001	1.9	0.4	96	0.0021	
dist	12	13	36.9136	36.9131	0.0005	-1.0	-0.0005	-0.5	0.0002	-2.5	-1.1	84	0.0022	
tour	13	3000	0.0000	308.1318	0.0009	0.1	0.0001	0.5	0.0007	0.1	0.2	35	0.0064	
hz	13	11	343.8211	46.6733	0.0010	0.9	0.0010	0.7	0.0005	2.0	1.1	78	0.0048	
hz	13	10	332.4918	44.4450	0.0010	2.2	0.0023	1.6	0.0005	4.8	2.5	79	0.0048	-0.0029

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
hz	13	100	335.9866	38.7589	0.0011	-1.7	-0.0018	-1.1	0.0005	-3.5	-1.9	77	0.0050	
hz	13	103	335.9848	38.7153	0.0011	-0.4	-0.0004	-0.2	0.0005	-0.7	-0.4	75	0.0050	
hz	13	14	195.6458	43.8415	0.0010	-1.3	-0.0013	-0.9	0.0007	-1.8	-1.8	49	0.0061	
hz	13	12	348.9892	36.9131	0.0011	7.5	0.0080	4.7	-	-	-	-	-	-
zen	13	11	94.1790	46.6733	0.0015	0.4	0.0005	0.4	0.0005	1.0	0.4	87	0.0065	
zen	13	10	94.7964	44.4450	0.0015	-6.2	-0.0092	-6.4	-	-	-	-	-	-
zen	13	100	94.2133	38.7589	0.0020	1.2	0.0025	1.5	0.0008	3.2	1.3	86	0.0090	
zen	13	103	95.0599	38.7153	0.0015	-0.0	-0.0000	-0.0	0.0007	-0.1	-0.0	80	0.0070	
zen	13	14	101.0836	43.8415	0.0015	0.1	0.0002	0.1	0.0008	0.2	0.1	69	0.0074	
zen	13	12	93.6541	36.9131	0.0015	-1.6	-0.0024	-1.4	0.0007	-3.6	-1.7	81	0.0070	
dist	13	11	46.6728	46.6733	0.0005	1.0	0.0005	0.5	0.0002	2.6	1.1	85	0.0022	
dist	13	10	44.4458	44.4450	0.0005	-1.5	-0.0008	-0.8	0.0002	-3.9	-1.7	85	0.0022	
dist	13	103	38.7147	38.7153	0.0005	1.3	0.0006	0.6	0.0003	2.6	1.5	74	0.0024	
dist	13	14	43.8418	43.8415	0.0005	-0.5	-0.0003	-0.3	0.0003	-0.9	-0.7	65	0.0026	
dist	13	12	36.9132	36.9131	0.0005	-0.2	-0.0001	-0.1	0.0002	-0.5	-0.2	84	0.0022	
tour	14	3000	0.0000	351.6893	0.0009	-0.3	-0.0003	-1.6	0.0007	-0.4	-0.5	36	0.0062	
hz	14	13	396.1898	43.8415	0.0010	-0.2	-0.0002	-0.2	0.0008	-0.3	-0.3	46	0.0063	
hz	14	15	265.9929	42.7405	0.0010	0.6	0.0006	0.4	0.0008	0.8	0.8	47	0.0063	
zen	14	13	98.9170	43.8415	0.0015	-0.3	-0.0004	-0.3	0.0008	-0.5	-0.3	69	0.0074	
zen	14	15	100.4795	42.7405	0.0015	-0.3	-0.0005	-0.3	0.0008	-0.6	-0.4	75	0.0071	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
dist	14	13	43.8407	43.8415	0.0005	1.7	0.0008	0.8	0.0003	2.8	2.1	65	0.0026	
dist	14	15	42.7407	42.7405	0.0005	-0.5	-0.0002	-0.2	0.0003	-0.9	-0.6	70	0.0025	
tour	15	3000	0.0000	375.1751	0.0009	0.7	0.0006	3.8	0.0005	1.3	0.8	73	0.0044	
hz	15	10	390.5904	87.7189	0.0010	0.6	0.0005	0.8	0.0005	1.2	0.6	77	0.0046	
hz	15	11	392.7299	95.5092	0.0010	1.4	0.0013	2.0	0.0005	2.8	1.5	77	0.0045	
hz	15	16	215.3147	18.7483	0.0012	-0.4	-0.0004	-0.1	0.0007	-0.6	-0.4	68	0.0062	
hz	15	205	190.7455	17.6438	0.0013	-1.3	-0.0016	-0.4	0.0011	-1.5	-2.5	27	0.0100	
hz	15	202	190.7466	17.6415	0.0013	-0.3	-0.0004	-0.1	0.0008	-0.6	-0.4	63	0.0065	
hz	15	206	190.2153	17.5663	0.0013	-0.0	-0.0000	-0.0	0.0013	-0.0		0		
hz	15	207	191.2928	17.6963	0.0013	-0.0	-0.0000	-0.0	0.0013	-0.0		0		
hz	15	18	101.3993	14.6671	0.0013	0.3	0.0004	0.1	0.0008	0.5	0.3	68	0.0066	
hz	15	14	59.7127	42.7405	0.0010	-1.4	-0.0015	-1.0	0.0006	-2.6	-1.7	69	0.0052	
zen	15	10	96.5856	87.7189	0.0013	-0.0	-0.0000	-0.0	0.0004	-0.1	-0.0	92	0.0057	
zen	15	11	96.4466	95.5092	0.0013	-0.1	-0.0002	-0.2	0.0003	-0.4	-0.1	93	0.0057	
zen	15	16	103.9353	18.7483	0.0019	0.1	0.0001	0.0	0.0006	0.2	0.1	90	0.0081	
zen	15	205	101.4740	17.6438	0.0030	1.2	0.0035	1.0	0.0016	2.1	1.4	70	0.0147	
zen	15	202	101.1469	17.6415	0.0019	-0.6	-0.0012	-0.3	0.0007	-1.6	-0.7	85	0.0085	
zen	15	206	100.6054	17.5663	0.0019	-0.7	-0.0014	-0.4	0.0009	-1.6	-0.8	79	0.0089	
zen	15	207	100.5989	17.6963	0.0019	0.2	0.0004	0.1	0.0009	0.4	0.2	79	0.0089	
zen	15	18	104.3367	14.6671	0.0021	0.1	0.0001	0.0	0.0008	0.1	0.1	85	0.0092	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
zen	15	14	99.5222	42.7405	0.0015	-0.6	-0.0008	-0.6	0.0008	-1.1	-0.7	75	0.0071	
dist	15	10	87.7194	87.7189	0.0005	-1.0	-0.0005	-0.5	0.0002	-2.9	-1.1	88	0.0022	
dist	15	11	95.5095	95.5092	0.0005	-0.5	-0.0003	-0.3	0.0002	-1.6	-0.6	88	0.0022	
dist	15	16	18.7483	18.7483	0.0005	0.0	0.0000	0.0	0.0002	0.0	0.0	89	0.0022	
dist	15	206	17.5663	17.5663	0.0005	-0.0	-0.0000	-0.0	0.0005	-0.0		0		
dist	15	207	17.6963	17.6963	0.0005	0.0	0.0000	0.0	0.0005	0.0		0		
dist	15	18	14.6672	14.6671	0.0005	-0.3	-0.0001	-0.1	0.0002	-0.7	-0.3	84	0.0022	
dist	15	14	42.7407	42.7405	0.0005	-0.5	-0.0002	-0.2	0.0003	-0.9	-0.6	70	0.0025	
tour	15	3000	0.0000	375.1751	0.0009	-0.3	-0.0003	-1.7	0.0005	-0.6	-0.4	72	0.0044	
hz	15	17	140.1664	24.4137	0.0012	0.3	0.0004	0.1	0.0006	0.6	0.4	69	0.0057	
hz	15	18	101.3987	14.6671	0.0013	0.0	0.0000	0.0	0.0007	0.1	0.0	69	0.0066	
hz	15	11	392.7304	95.5092	0.0010	-0.1	-0.0001	-0.2	0.0005	-0.3	-0.1	77	0.0045	
hz	15	10	390.5896	87.7189	0.0010	0.4	0.0004	0.6	0.0005	0.9	0.5	77	0.0046	
hz	15	14	59.7116	42.7405	0.0010	-1.3	-0.0013	-0.9	0.0006	-2.3	-1.5	69	0.0052	
hz	15	202	190.7437	17.6415	0.0013	1.2	0.0015	0.4	0.0008	1.9	1.5	62	0.0066	
zen	15	17	96.7375	24.4137	0.0017	-2.1	-0.0037	-1.4	0.0006	-6.6	-2.2	90	0.0075	
zen	15	18	104.3360	14.6671	0.0021	0.4	0.0008	0.2	0.0008	1.0	0.4	85	0.0092	
zen	15	11	96.4479	95.5092	0.0013	-1.1	-0.0015	-2.2	0.0003	-4.2	-1.1	93	0.0057	
zen	15	10	96.5856	87.7189	0.0013	-0.0	-0.0000	-0.0	0.0004	-0.1	-0.0	92	0.0057	
zen	15	14	99.5216	42.7405	0.0015	-0.2	-0.0002	-0.2	0.0008	-0.3	-0.2	75	0.0071	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
zen	15	202	101.1459	17.6415	0.0019	-0.1	-0.0002	-0.1	0.0007	-0.3	-0.1	85	0.0085	
dist	15	17	24.4134	24.4137	0.0005	0.5	0.0003	0.3	0.0002	1.5	0.6	86	0.0022	
dist	15	18	14.6672	14.6671	0.0005	-0.3	-0.0001	-0.1	0.0002	-0.7	-0.3	84	0.0022	
dist	15	11	95.5091	95.5092	0.0005	0.3	0.0001	0.1	0.0002	0.8	0.3	88	0.0022	
dist	15	10	87.7190	87.7189	0.0005	-0.2	-0.0001	-0.1	0.0002	-0.6	-0.2	88	0.0022	
dist	15	14	42.7402	42.7405	0.0005	0.5	0.0003	0.3	0.0003	1.0	0.6	70	0.0025	
tour	16	3000	0.0000	393.3998	0.0009	-1.1	-0.0010	-5.9	0.0005	-1.9	-1.3	68	0.0046	
hz	16	10	394.1563	105.3140	0.0010	1.4	0.0014	2.3	0.0005	2.8	1.7	74	0.0046	
hz	16	11	395.6647	113.2807	0.0010	0.7	0.0007	1.3	0.0005	1.5	0.9	74	0.0046	
hz	16	15	14.5883	18.7483	0.0012	-0.4	-0.0005	-0.2	0.0007	-0.8	-0.5	72	0.0060	
hz	16	17	89.3611	24.5597	0.0012	-1.0	-0.0012	-0.5	0.0007	-1.8	-1.2	67	0.0058	
hz	16	205	92.7538	7.0903	0.0018	0.3	0.0006	0.1	0.0017	0.3	1.3	6	0.0298	
hz	16	202	92.7512	7.1000	0.0018	-0.1	-0.0002	-0.0	0.0013	-0.2	-0.2	46	0.0109	
hz	16	208	91.2781	7.1002	0.0018	0.0	0.0000	0.0	0.0018	0.0		0		
hz	16	209	94.0687	7.1851	0.0018	0.0	0.0000	0.0	0.0018	0.0		0		
zen	16	10	96.4569	105.3140	0.0013	-1.0	-0.0013	-2.2	0.0003	-4.1	-1.0	94	0.0056	
zen	16	11	96.3537	113.2807	0.0013	-0.7	-0.0010	-1.7	0.0003	-3.2	-0.8	95	0.0055	
zen	16	15	96.0658	18.7483	0.0019	-0.6	-0.0010	-0.3	0.0006	-1.7	-0.6	90	0.0081	
zen	16	17	93.7439	24.5597	0.0017	-0.9	-0.0015	-0.6	0.0006	-2.6	-0.9	89	0.0075	
zen	16	205	93.2724	7.0903	0.0057	-1.4	-0.0079	-0.9	0.0040	-2.0	-2.0	50	0.0330	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
zen	16	202	92.4405	7.1000	0.0030	1.0	0.0031	0.3	0.0018	1.7	1.3	65	0.0153	
zen	16	208	91.0846	7.1002	0.0030	-1.2	-0.0036	-0.4	0.0019	-1.9	-1.6	58	0.0160	
zen	16	209	91.1859	7.1851	0.0030	-0.0	-0.0001	-0.0	0.0019	-0.0	-0.0	59	0.0159	
dist	16	10	105.3137	105.3140	0.0005	0.6	0.0003	0.3	0.0002	1.7	0.7	85	0.0022	
dist	16	11	113.2808	113.2807	0.0005	-0.2	-0.0001	-0.1	0.0002	-0.5	-0.2	85	0.0022	
dist	16	15	18.7483	18.7483	0.0005	0.0	0.0000	0.0	0.0002	0.0	0.0	89	0.0022	
dist	16	17	24.5604	24.5597	0.0005	-1.4	-0.0007	-0.7	0.0002	-3.5	-1.6	82	0.0023	
dist	16	208	7.1001	7.1002	0.0005	0.3	0.0001	0.1	0.0005	0.3	1.6	3	0.0127	
dist	16	209	7.1851	7.1851	0.0005	0.0	0.0000	0.0	0.0005	0.0	0.0	3	0.0129	
tour	18	15	384.7531	14.6671	0.0013	0.4	0.0006	0.1	0.0009	0.7	0.5	59	0.0071	
hz	18	17	261.3747	15.1118	0.0013	-1.6	-0.0022	-0.5	0.0009	-2.3	-2.3	51	0.0076	
hz	18	205	322.4371	20.9668	0.0012	0.9	0.0011	0.3	0.0008	1.3	1.2	51	0.0069	
hz	18	202	322.4404	20.9697	0.0012	-0.1	-0.0001	-0.0	0.0007	-0.1	-0.1	68	0.0060	
hz	18	210	321.9782	21.0234	0.0012	0.0	0.0000	0.0	0.0012	0.0		0		
hz	18	211	322.9353	20.9594	0.0012	0.0	0.0000	0.0	0.0012	0.0		0		
hz	18	203	322.4402	20.9719	0.0012	0.3	0.0004	0.1	0.0007	0.5	0.4	67	0.0060	
zen	18	15	95.6630	14.6671	0.0021	0.2	0.0003	0.1	0.0008	0.4	0.2	85	0.0092	
zen	18	17	90.4838	15.1118	0.0020	0.3	0.0005	0.1	0.0009	0.6	0.3	79	0.0094	
zen	18	205	98.2097	20.9668	0.0027	0.7	0.0019	0.6	0.0014	1.4	0.8	73	0.0130	
zen	18	202	97.9326	20.9697	0.0018	-0.0	-0.0001	-0.0	0.0007	-0.1	-0.0	85	0.0080	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
zen	18	210	97.4815	21.0234	0.0018	-0.4	-0.0008	-0.3	0.0008	-1.0	-0.5	80	0.0083	
zen	18	211	97.4737	20.9594	0.0018	-0.4	-0.0007	-0.2	0.0008	-0.8	-0.4	80	0.0083	
zen	18	203	97.7300	20.9719	0.0018	1.0	0.0017	0.6	0.0006	2.8	1.0	88	0.0079	
dist	18	15	14.6673	14.6671	0.0005	-0.5	-0.0002	-0.2	0.0002	-1.2	-0.5	84	0.0022	
dist	18	17	15.1123	15.1118	0.0005	-1.0	-0.0005	-0.5	0.0002	-2.3	-1.1	81	0.0023	
dist	18	210	21.0234	21.0234	0.0005	0.0	0.0000	0.0	0.0005	0.0		0		
dist	18	211	20.9594	20.9594	0.0005	0.0	0.0000	0.0	0.0005	0.0		0		
tour	17	15	87.7350	24.4137	0.0012	-1.5	-0.0017	-0.7	0.0007	-2.5	-1.8	64	0.0059	
hz	17	16	37.6515	24.5597	0.0012	0.4	0.0005	0.2	0.0007	0.7	0.5	64	0.0059	
hz	17	18	125.5832	15.1118	0.0013	0.7	0.0009	0.2	0.0009	1.0	1.0	53	0.0075	
hz	17	202	36.2784	17.4758	0.0013	0.5	0.0006	0.2	0.0008	0.7	0.6	60	0.0067	
hz	17	212	36.8213	17.5323	0.0013	0.0	0.0000	0.0	0.0013	0.0		0		
zen	17	15	103.2670	24.4137	0.0017	-0.4	-0.0006	-0.2	0.0006	-1.1	-0.4	90	0.0075	
zen	17	16	106.2580	24.5597	0.0017	-0.1	-0.0002	-0.1	0.0006	-0.3	-0.1	89	0.0075	
zen	17	18	109.5143	15.1118	0.0020	0.7	0.0015	0.4	0.0009	1.6	0.8	79	0.0094	
zen	17	202	105.7288	17.4758	0.0019	-1.9	-0.0036	-1.0	0.0009	-4.1	-2.1	79	0.0089	
zen	17	212	105.1578	17.5323	0.0019	-0.4	-0.0008	-0.2	0.0010	-0.8	-0.5	73	0.0092	
dist	17	15	24.4134	24.4137	0.0005	0.5	0.0003	0.3	0.0002	1.5	0.6	86	0.0022	
dist	17	16	24.5594	24.5597	0.0005	0.6	0.0003	0.3	0.0002	1.3	0.6	82	0.0023	
dist	17	18	15.1123	15.1118	0.0005	-1.0	-0.0005	-0.5	0.0002	-2.3	-1.1	81	0.0023	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
dist	17	212	17.5323	17.5323	0.0005	-0.0	-0.0000	-0.0	0.0005	-0.0		0		
tour	15	3000	0.0000	375.1751	0.0009	-0.2	-0.0002	-1.3	0.0006	-0.4	-0.3	55	0.0051	
hz	15	16	215.3126	18.7483	0.0012	0.6	0.0008	0.2	0.0007	1.1	0.8	66	0.0063	
hz	15	17	140.1639	24.4137	0.0012	2.5	0.0029	1.1	0.0007	4.4	3.1	67	0.0058	-0.0044
hz	15	18	101.4024	14.6671	0.0013	-2.7	-0.0036	-0.8	0.0008	-4.7	-3.3	66	0.0067	0.0054
hz	15	203	190.7460	17.6404	0.0013	-0.5	-0.0006	-0.2	0.0008	-0.7	-0.7	56	0.0069	
zen	15	16	103.9339	18.7483	0.0019	0.8	0.0015	0.4	0.0006	2.5	0.8	90	0.0081	
zen	15	17	96.7339	24.4137	0.0017	-0.0	-0.0001	-0.0	0.0006	-0.1	-0.0	90	0.0075	
zen	15	18	104.3367	14.6671	0.0021	0.1	0.0001	0.0	0.0008	0.1	0.1	85	0.0092	
zen	15	203	100.9065	17.6404	0.0019	0.2	0.0004	0.1	0.0006	0.6	0.2	89	0.0084	
dist	15	16	18.7483	18.7483	0.0005	0.0	0.0000	0.0	0.0002	0.0	0.0	89	0.0022	
dist	15	17	24.4140	24.4137	0.0005	-0.7	-0.0003	-0.3	0.0002	-1.8	-0.7	86	0.0022	
dist	15	18	14.6668	14.6671	0.0005	0.5	0.0003	0.3	0.0002	1.3	0.6	84	0.0022	
tour	16	3000	0.0000	393.3998	0.0009	-0.8	-0.0008	-4.7	0.0007	-1.1	-1.2	46	0.0055	
hz	16	15	14.5881	18.7483	0.0012	-0.1	-0.0001	-0.0	0.0008	-0.2	-0.1	63	0.0064	
hz	16	17	89.3591	24.5597	0.0012	0.9	0.0010	0.4	0.0007	1.4	1.1	60	0.0061	
hz	16	203	92.7501	7.1081	0.0018	0.4	0.0008	0.1	0.0014	0.6	0.7	42	0.0114	
zen	16	15	96.0651	18.7483	0.0019	-0.2	-0.0003	-0.1	0.0006	-0.6	-0.2	90	0.0081	
zen	16	17	93.7425	24.5597	0.0017	-0.1	-0.0001	-0.0	0.0006	-0.2	-0.1	89	0.0075	
zen	16	203	91.8481	7.1081	0.0030	2.4	0.0070	0.8	0.0015	4.8	2.7	76	0.0141	-0.0093

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
dist	16	15	18.7483	18.7483	0.0005	0.0	0.0000	0.0	0.0002	0.0	0.0	89	0.0022	
dist	16	17	24.5594	24.5597	0.0005	0.6	0.0003	0.3	0.0002	1.3	0.6	82	0.0023	
obs\SC_VERT_OLD.obs														
tour	SLN	150	101.2806	3.8163	0.0026	1.0	0.0026	0.2	0.0017	1.5	1.4	56	0.0141	
hz	SLN	151	101.2724	3.8495	0.0026	1.0	0.0027	0.2	0.0018	1.4	1.5	49	0.0151	
hz	SLN	152	101.2910	3.8342	0.0026	-0.9	-0.0023	-0.1	0.0018	-1.2	-1.3	49	0.0151	
hz	SLN	153	101.2923	3.8484	0.0026	-1.0	-0.0025	-0.2	0.0018	-1.4	-1.4	50	0.0150	
hz	SLN	10	154.9226	7.9717	0.0017	-0.7	-0.0012	-0.1	0.0011	-1.1	-0.9	62	0.0089	
hz	SLN	11	229.0077	7.2217	0.0018	0.3	0.0006	0.1	0.0012	0.5	0.4	57	0.0097	
hz	SLN	12	357.5384	4.9184	0.0022	-1.0	-0.0021	-0.2	0.0014	-1.6	-1.2	61	0.0115	
hz	SLN	SLE	50.6744	4.5090	0.0023	2.5	0.0058	0.4	0.0015	3.8	3.4	56	0.0127	-0.0105
hz	SLN	104	101.2993	4.0026	0.0026	-1.3	-0.0033	-0.2	0.0019	-1.7	-2.0	43	0.0161	
zen	SLN	150	99.6979	3.8163	0.0095	-0.5	-0.0044	-0.3	0.0042	-1.0	-0.5	80	0.0436	
zen	SLN	151	91.8974	3.8495	0.0045	-64.8	-0.2922	-17.7	-	-	-	-	-	-
zen	SLN	152	106.0093	3.8342	0.0045	34.9	0.1577	9.5	-	-	-	-	-	-
zen	SLN	153	108.2113	3.8484	0.0045	0.4	0.0020	0.1	0.0030	0.7	0.6	55	0.0250	
zen	SLN	10	98.8865	7.9717	0.0028	0.8	0.0022	0.3	0.0008	2.8	0.8	92	0.0120	
zen	SLN	11	93.2372	7.2217	0.0030	1.4	0.0040	0.5	0.0009	4.7	1.4	92	0.0127	
zen	SLN	12	97.6825	4.9184	0.0038	0.8	0.0030	0.2	0.0012	2.5	0.8	90	0.0164	
zen	SLN	SLE	99.0775	4.5090	0.0040	3.0	0.0121	0.9	-	-	-	-	-	-

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
zen	SLN	104	119.5312	4.0026	0.0044	0.1	0.0004	0.0	0.0024	0.1	0.1	70	0.0215	
dist	SLN	153	3.8481	3.8484	0.0005	0.6	0.0003	0.3	0.0002	1.6	0.6	89	0.0022	
dist	SLN	10	7.9721	7.9717	0.0005	-0.7	-0.0004	-0.4	0.0001	-3.7	-0.8	96	0.0021	
dist	SLN	11	7.2211	7.2217	0.0005	1.2	0.0006	0.6	0.0001	6.4	1.3	96	0.0021	
dist	SLN	12	4.9181	4.9184	0.0005	0.5	0.0003	0.3	0.0001	2.8	0.6	96	0.0021	
dist	SLN	SLE	4.5091	4.5090	0.0005	-0.2	-0.0001	-0.1	0.0001	-1.0	-0.2	96	0.0021	
dist	SLN	104	4.0018	4.0026	0.0005	1.6	0.0008	0.8	0.0001	5.9	1.7	93	0.0021	
tour	SLE	150	192.5902	3.2851	0.0028	0.0	0.0001	0.0	0.0018	0.1	0.1	58	0.0153	
hz	SLE	151	192.5897	3.3138	0.0028	0.3	0.0009	0.0	0.0020	0.5	0.5	52	0.0162	
hz	SLE	152	192.5915	3.3138	0.0028	-0.0	-0.0001	-0.0	0.0020	-0.0	-0.0	52	0.0162	
hz	SLE	104	192.6031	3.5235	0.0028	0.1	0.0001	0.0	0.0021	0.1	0.1	46	0.0171	
hz	SLE	SLN	254.8413	4.5090	0.0023	-1.6	-0.0037	-0.3	0.0013	-2.9	-1.9	70	0.0113	
hz	SLE	10	190.7926	9.4152	0.0016	0.0	0.0000	0.0	0.0010	0.0	0.0	63	0.0082	
hz	SLE	11	241.5000	11.5508	0.0015	0.9	0.0014	0.2	0.0009	1.5	1.2	64	0.0075	
hz	SLE	12	311.3233	6.3035	0.0019	-0.2	-0.0004	-0.0	0.0013	-0.3	-0.3	56	0.0104	
zen	SLE	150	100.8994	3.2851	0.0109	-0.5	-0.0059	-0.3	0.0051	-1.1	-0.6	78	0.0506	
zen	SLE	104	123.5359	3.5235	0.0048	0.5	0.0025	0.1	0.0029	0.8	0.6	63	0.0248	
zen	SLE	SLN	100.9071	4.5090	0.0040	0.8	0.0033	0.2	0.0019	1.7	0.9	78	0.0187	
zen	SLE	10	99.4940	9.4152	0.0026	0.4	0.0011	0.2	0.0009	1.2	0.5	87	0.0112	
zen	SLE	11	96.1331	11.5508	0.0023	1.0	0.0022	0.4	0.0007	2.9	1.0	90	0.0100	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
zen	SLE	12	98.8433	6.3035	0.0032	0.7	0.0024	0.2	0.0013	1.8	0.8	83	0.0145	
dist	SLE	104	3.5231	3.5235	0.0005	0.8	0.0004	0.4	0.0002	2.7	0.9	90	0.0022	
dist	SLE	SLN	4.5091	4.5090	0.0005	-0.2	-0.0001	-0.1	0.0001	-1.0	-0.2	96	0.0021	
dist	SLE	10	9.4152	9.4152	0.0005	0.0	0.0000	0.0	0.0001	0.0	0.0	93	0.0021	
dist	SLE	11	11.5502	11.5508	0.0005	1.3	0.0006	0.6	0.0001	5.2	1.3	94	0.0021	
dist	SLE	12	6.3041	6.3035	0.0005	-1.1	-0.0006	-0.6	0.0001	-4.7	-1.1	94	0.0021	
StaCrz.obs														
dE	104	104r	0.0000	0.2000	0.0002	0.0	0.0000	0.0	0.0002	0.0		0		
dN	104	104r	0.0000	0.2000	0.0002	0.0	0.0000	0.0	0.0002	0.0		0		
den	104r	104	0.2000	0.2000	0.0001	-0.0	-0.0000	-0.0	0.0001	-0.0		0		
den	150	152	-0.3900	0.3892	0.0005	1.6	0.0008	0.8	0.0003	2.5	2.0	62	0.0026	
den	152	151	0.8770	0.8770	0.0005	-0.0	-0.0000	-0.0	0.0005	-0.0		0		
den	152	153	-0.1244	0.1243	0.0002	0.6	0.0001	0.1	0.0002	0.7	2.0	10	0.0026	
dE	150	151	0.0000	0.4878	0.0002	2.0	0.0004	0.4	0.0001	3.3	2.4	65	0.0010	
dN	150	151	0.0000	0.4878	0.0002	1.6	0.0003	0.3	0.0001	2.5	2.0	60	0.0011	
dE	150	152	0.0000	0.3892	0.0002	-1.5	-0.0003	-0.3	0.0001	-2.5	-1.8	65	0.0010	
dN	150	152	0.0000	0.3892	0.0002	-0.8	-0.0002	-0.2	0.0001	-1.2	-1.0	60	0.0011	
dE	150	153	0.0000	0.5135	0.0002	-1.4	-0.0003	-0.3	0.0001	-2.1	-1.8	58	0.0011	
dN	150	153	0.0000	0.5135	0.0002	-1.6	-0.0003	-0.3	0.0002	-2.2	-2.5	43	0.0012	0.0008
dE	100	101	0.0000	0.4860	0.0002	0.0	0.0000	0.0	0.0002	0.0		0		

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
dN	100	101	0.0000	0.4860	0.0002	-0.0	-0.0000	-0.0	0.0002	-0.0		0		
dE	100	102	0.0000	0.3910	0.0002	0.0	0.0000	0.0	0.0002	0.0		0		
dN	100	102	0.0000	0.3910	0.0002	-0.0	-0.0000	-0.0	0.0002	-0.0		0		
dE	100	105	0.0000	0.1400	0.0002	0.2	0.0000	0.0	0.0001	0.2	0.2	53	0.0011	
dN	100	105	0.0000	0.1400	0.0002	-0.3	-0.0001	-0.1	0.0001	-0.4	-0.4	51	0.0012	
dE	100	103	0.0000	0.5154	0.0002	1.0	0.0002	0.2	0.0002	1.3	1.9	31	0.0015	
dN	100	103	0.0000	0.5154	0.0002	-0.7	-0.0001	-0.1	0.0002	-0.9	-1.3	34	0.0014	
den	100	102	-0.3900	0.3910	0.0005	-2.1	-0.0010	-1.0	0.0003	-3.3	-2.6	61	0.0026	0.0017
den	102	101	0.8770	0.8770	0.0005	-0.0	-0.0000	-0.0	0.0005	-0.0		0		
den	102	103	-0.1244	0.1244	0.0002	-0.1	-0.0000	-0.0	0.0002	-0.1	-0.1	23	0.0017	
den	102	106	0.0847	0.1120	0.0002	0.3	0.0001	0.1	0.0002	0.3	0.7	18	0.0019	
den	102	107	0.0847	0.1105	0.0002	0.0	0.0000	0.0	0.0002	0.0	0.1	18	0.0019	
den	102	108	0.0847	0.1073	0.0002	-0.1	-0.0000	-0.0	0.0002	-0.1	-0.1	20	0.0018	
den	102	109	0.0847	0.1119	0.0002	-0.2	-0.0000	-0.0	0.0002	-0.2	-0.4	20	0.0018	
den	102	105	0.2521	0.2510	0.0005	-2.2	-0.0011	-1.1	0.0002	-5.6	-2.4	85	0.0022	
dE	200	201	0.0000	0.0083	0.0001	-0.0	-0.0000	-0.0	0.0001	-0.0		0		
dN	200	201	0.0000	0.0083	0.0001	0.0	0.0000	0.0	0.0001	0.0		0		
dE	200	202	0.0000	0.0428	0.0001	0.2	0.0000	0.0	0.0001	0.3	0.8	10	0.0013	
dN	200	202	0.0000	0.0428	0.0001	0.0	0.0000	0.0	0.0001	0.0	0.1	7	0.0016	
dE	200	203	0.0000	0.1090	0.0001	-0.2	-0.0000	-0.0	0.0001	-0.3	-0.8	10	0.0013	

Code	From	To	Observation	Distance	Total σ	Normalized residual	Residual	Residual mm	A posteriori σ	Standard residual	Standardized residual	Redondancy	∇	Probable error
dN	200	203	0.0000	0.1090	0.0001	-0.0	-0.0000	-0.0	0.0001	-0.0	-0.1	7	0.0016	
den	200	201	0.0083	0.0083	0.0002	0.0	0.0000	0.0	0.0002	0.0		0		
den	201	202	0.0346	0.0345	0.0002	-0.4	-0.0001	-0.1	0.0002	-0.5	-0.8	27	0.0016	
den	201	203	0.1006	0.1007	0.0002	0.4	0.0001	0.1	0.0002	0.5	0.8	27	0.0016	
den	203	206	0.0847	0.1846	0.0002	-0.3	-0.0001	-0.1	0.0002	-0.3	-0.8	11	0.0025	
den	203	207	0.0847	0.1828	0.0002	0.1	0.0000	0.0	0.0002	0.1	0.2	11	0.0025	
den	203	208	0.0847	0.1845	0.0002	-0.7	-0.0001	-0.1	0.0002	-0.8	-1.6	21	0.0018	
den	203	209	0.0847	0.1819	0.0002	-0.0	-0.0000	-0.0	0.0002	-0.0	-0.0	21	0.0018	
den	203	210	0.0847	0.1809	0.0002	-0.1	-0.0000	-0.0	0.0002	-0.2	-0.5	9	0.0027	
den	203	211	0.0847	0.1842	0.0002	-0.1	-0.0000	-0.0	0.0002	-0.1	-0.4	9	0.0027	
den	203	212	0.0847	0.1846	0.0002	-0.2	-0.0000	-0.0	0.0002	-0.2	-0.5	10		

Residual repartition



Suggestions

System redundancy: 297

Observations sigmas may be multiplied by:

- Distances: 0.9348
- Direct levelling: Not enough redundancy
- Horizontal angles: 0.9919
- Zenith angles: 1.0048
- Centering: Not enough redundancy
- Coordinates: Not enough observations

Compensated coordinates

Name	E comp	N comp	Eh comp	ΔE	ΔN	ΔEh	σ_x init	σ_y init	σ_z init	η	ξ	Active obs
200	800121.1600	9917784.7600	1.7738	-0.0000	0.0000	-0.0000	0.0001	0.0001	0.0001	1.27	-6.50	11
201	800121.1600	9917784.7600	1.7821	0.0000	-0.0000	0.0000	-	-	-	1.27	-6.50	5

Name	E comp	N comp	Eh comp	ΔE	ΔN	ΔEh	σ_x init	σ_y init	σ_z init	η	ξ	Active obs
202	800121.1600	9917784.7600	1.8166	0.0000	0.0000	0.0000	-	-	-	1.27	-6.50	17
203	800121.1600	9917784.7600	1.8828	-0.0000	-0.0000	-0.0000	-	-	-	1.27	-6.50	16
205	800121.1607	9917784.7602	1.7246	0.0000	-0.0001	0.0000	-	-	-	1.27	-6.50	9
206	800121.1930	9917784.9207	1.9674	0.0000	-0.0001	0.0000	-	-	-	1.27	-6.50	4
207	800121.1099	9917784.6058	1.9675	-0.0000	0.0000	-0.0000	-	-	-	1.27	-6.50	4
208	800121.0229	9917784.8502	1.9673	0.0000	0.0000	0.0000	-	-	-	1.27	-6.50	4
209	800121.3140	9917784.7128	1.9675	-0.0000	0.0000	-0.0000	-	-	-	1.27	-6.50	4
210	800121.3179	9917784.7344	1.9675	-0.0000	-0.0000	-0.0000	-	-	-	1.27	-6.50	4
211	800120.9964	9917784.7531	1.9675	0.0000	-0.0000	-0.0000	-	-	-	1.27	-6.50	4
212	800120.9992	9917784.7931	1.9675	0.0000	-0.0000	-0.0000	-	-	-	1.27	-6.50	4
150	800043.1521	9917853.7922	6.7189	0.0002	-0.0000	0.0026	-	-	-	1.26	-6.54	16
151	800043.1525	9917853.7925	7.2067	0.0002	-0.0000	0.0027	-	-	-	1.26	-6.54	8
152	800043.1518	9917853.7920	6.3297	0.0002	0.0000	0.0027	-	-	-	1.26	-6.54	10
153	800043.1518	9917853.7919	6.2054	0.0001	-0.0000	0.0026	-	-	-	1.26	-6.54	12
104	800043.1512	9917853.7924	5.4917	0.0002	0.0001	0.0026	-	-	-	1.26	-6.54	18
104r	800043.1512	9917853.7924	5.2917	0.0002	0.0001	0.0026	-	-	-	1.26	-6.54	3
100	800043.1513	9917853.7922	6.7212	0.0001	-0.0000	0.0027	-	-	-	1.26	-6.54	17
101	800043.1513	9917853.7922	7.2072	0.0001	-0.0000	0.0027	-	-	-	1.26	-6.54	3
102	800043.1513	9917853.7922	6.3302	0.0001	0.0000	0.0027	-	-	-	1.26	-6.54	10
103	800043.1515	9917853.7921	6.2058	0.0001	-0.0000	0.0027	-	-	-	1.26	-6.54	9
105	800043.1514	9917853.7921	6.5812	0.0002	0.0000	0.0027	-	-	-	1.26	-6.54	28
106	800043.1106	9917853.7314	6.4149	0.0002	-0.0000	0.0026	-	-	-	1.26	-6.54	4
107	800043.1805	9917853.8570	6.4149	0.0002	-0.0001	0.0027	-	-	-	1.26	-6.54	4
108	800043.2172	9917853.7931	6.4149	0.0001	0.0000	0.0027	-	-	-	1.26	-6.54	4
109	800043.0783	9917853.7968	6.4148	0.0002	-0.0000	0.0026	-	-	-	1.26	-6.54	4
10	800038.4131	9917849.8936	6.8396	0.0001	-0.0000	0.0026	-	-	-	1.26	-6.54	98
11	800034.3285	9917857.1869	7.4660	0.0002	-0.0000	0.0028	-	-	-	1.26	-6.54	107
12	800043.6114	9917861.6914	6.8796	0.0002	-0.0000	0.0029	-	-	-	1.26	-6.54	88
13	800080.2583	9917864.5200	3.2045	0.0002	-0.0000	0.0028	-	-	-	1.28	-6.53	27
14	800115.0277	9917837.7738	2.4572	0.0001	-0.0001	0.0017	-	-	-	1.29	-6.51	16

Name	E comp	N comp	Eh comp	ΔE	ΔN	ΔEh	σ_x init	σ_y init	σ_z init	η	ξ	Active obs
15	800107.3123	9917795.7057	2.1345	0.0000	-0.0000	0.0004	-	-	-	1.27	-6.51	77
16	800116.5518	9917779.4180	0.9757	-0.0000	0.0001	-0.0002	-	-	-	1.27	-6.50	47
17	800131.5191	9917798.7622	3.3865	0.0000	-0.0001	0.0004	-	-	-	1.28	-6.49	29
18	800118.1796	9917805.5208	1.1364	0.0001	-0.0000	0.0007	-	-	-	1.28	-6.50	30
SLN	800041.5144	9917857.2422	6.7007	0.0001	-0.0000	0.0028	-	-	-	1.26	-6.54	58
SLE	800045.7787	9917855.7685	6.7651	0.0001	-0.0000	0.0027	-	-	-	1.26	-6.54	31
SLE-2	800045.7816	9917855.7703	6.7643	0.0002	0.0000	0.0027	-	-	-	1.26	-6.54	14
3000	799850.8804	9918067.3778	39.4376	-0.0042	0.0044	0.0000	-	-	-	1.24	-6.63	15

Confidence ellipsoids

Name	1/2 Axis (mm)	Azimuth (gr)	Tilt (gr)
200	0.10	58.2927	195.7785
	0.10	75.5244	95.7823
	0.10	100.0000	0.0000
201	0.22	63.9904	100.0000
	0.14	72.2055	0.0000
	0.14	100.0000	0.0000
202	0.28	40.4481	99.9069
	0.14	32.8422	0.0924
	0.14	132.8422	199.9889
203	0.28	40.4481	99.9069
	0.14	32.8422	0.0924
	0.14	132.8422	199.9889
205	0.53	36.6127	97.7627
	0.37	33.6618	2.2348
	0.26	133.6654	199.8964
206	0.55	143.5634	199.9890
	0.43	43.5635	199.6807
	0.34	41.3652	99.6805
207	0.55	144.6224	199.9879

Name	1/2 Axis (mm)	Azimuth (gr)	Tilt (gr)
	0.43	44.6225	199.6883
	0.34	42.1499	99.6880
208	0.57	43.5466	1.7973
	0.33	44.1035	98.2027
	0.27	143.5470	0.0157
209	0.57	45.8167	198.2405
	0.33	46.8851	98.2403
	0.27	145.8175	199.9705
210	0.57	193.2563	0.2183
	0.47	93.2565	199.9218
	0.34	15.1583	99.7681
211	0.57	193.8031	0.2178
	0.47	93.8034	199.9206
	0.34	16.0548	99.7682
212	0.57	42.9788	0.0755
	0.43	142.9788	0.0099
	0.34	51.2657	99.9238
150	0.69	44.8951	1.6019
	0.64	182.3281	97.1134
	0.28	144.8347	2.4008
151	0.81	122.6190	98.5297
	0.69	44.7690	0.5014
	0.28	144.7798	198.6179
152	0.69	44.8384	1.6583
	0.64	183.2156	97.0766
	0.28	144.7757	2.4070
153	0.69	44.2021	1.3686
	0.62	176.1758	97.1585
	0.30	144.1485	2.4899
104	0.69	44.8528	1.4354

Name	1/2 Axis (mm)	Azimuth (gr)	Tilt (gr)
	0.61	177.1198	97.0446
	0.28	144.7945	2.5830
104r	0.72	44.8426	198.9001
	0.62	168.0943	96.9227
	0.34	144.7929	197.1262
100	0.68	46.4271	2.5016
	0.66	0.2019	96.6559
	0.28	146.3399	2.2180
101	0.79	115.9407	98.1977
	0.71	46.3194	0.8279
	0.34	146.3403	198.3992
102	0.71	46.3726	199.2191
	0.61	161.8346	96.7557
	0.34	146.3339	196.8513
103	0.70	46.8680	199.2675
	0.62	163.9088	97.2322
	0.29	146.8373	197.3310
105	0.68	45.3018	199.0854
	0.60	165.4527	97.0636
	0.27	145.2617	197.2098
106	0.73	61.7083	198.7175
	0.63	178.4724	95.0820
	0.53	161.6125	4.7472
107	0.73	62.0250	198.7420
	0.63	178.7866	95.1749
	0.52	161.9328	4.6576
108	0.81	31.8405	199.6953
	0.63	137.5678	96.6119
	0.42	131.8243	196.6257
109	0.81	32.1284	199.6825

Name	1/2 Axis (mm)	Azimuth (gr)	Tilt (gr)
	0.63	138.1497	96.6408
	0.41	132.1117	196.6559
10	0.68	43.1671	199.2348
	0.59	159.6473	97.0127
	0.26	143.1324	197.1125
11	0.70	44.2293	199.4238
	0.59	156.7475	97.0526
	0.26	144.2032	197.1095
12	0.69	47.0014	199.0309
	0.60	167.8165	96.9847
	0.27	146.9579	197.1449
13	0.65	71.3935	85.9178
	0.61	59.9748	13.8634
	0.36	160.5136	197.5664
14	0.59	114.8667	101.9405
	0.47	92.1357	1.8182
	0.36	192.1551	199.3221
15	0.31	42.5913	101.3546
	0.25	19.4869	1.2664
	0.23	119.4964	0.4808
16	0.31	46.7341	86.8560
	0.28	46.9281	13.1439
	0.19	146.9199	0.0389
17	0.34	12.9496	97.0784
	0.30	187.8771	2.6982
	0.26	87.9245	1.1198
18	0.33	78.8549	96.7047
	0.32	77.4377	3.2945
	0.27	177.4415	0.0732
SLN	0.69	45.4284	199.1434

Name	1/2 Axis (mm)	Azimuth (gr)	Tilt (gr)
	0.60	164.1172	97.0415
	0.26	145.3902	197.1684
SLE	0.68	45.6885	198.7745
	0.61	171.8364	96.9326
	0.27	145.6343	197.1884
SLE-2	0.70	46.2257	198.8603
	0.61	169.4259	96.8046
	0.31	146.1722	197.0151
3000	37.68	151.3816	0.0000
	1.48	51.3816	0.0000

Confidence semi-intervals

Name	$\hat{\sigma}_x$	$\hat{\sigma}_y$	$\hat{\sigma}_z$
200	0.1	0.1	0.1
201	0.1	0.1	0.2
202	0.1	0.1	0.3
203	0.1	0.1	0.3
205	0.3	0.3	0.5
206	0.5	0.5	0.3
207	0.5	0.5	0.3
208	0.4	0.5	0.3
209	0.4	0.5	0.3
210	0.5	0.6	0.3
211	0.5	0.6	0.3
212	0.5	0.5	0.3
150	0.5	0.6	0.6
151	0.5	0.6	0.8
152	0.5	0.6	0.6
153	0.5	0.6	0.6
104	0.5	0.6	0.6

Name	$\hat{\sigma}_x$	$\hat{\sigma}_y$	$\hat{\sigma}_z$
104r	0.5	0.6	0.6
100	0.5	0.5	0.7
101	0.5	0.6	0.8
102	0.5	0.6	0.6
103	0.5	0.6	0.6
105	0.5	0.5	0.6
106	0.7	0.6	0.6
107	0.7	0.6	0.6
108	0.5	0.7	0.6
109	0.5	0.7	0.6
10	0.5	0.6	0.6
11	0.5	0.6	0.6
12	0.5	0.5	0.6
13	0.5	0.5	0.6
14	0.5	0.4	0.6
15	0.2	0.2	0.3
16	0.2	0.2	0.3
17	0.3	0.3	0.3
18	0.3	0.3	0.3
SLN	0.5	0.5	0.6
SLE	0.5	0.5	0.6
SLE-2	0.5	0.6	0.6
3000	26.1	27.2	-

Copyright 1992-2022 IGN France - Licensed to IGN/ENSG only -

6.3.2 Sinex file : 42005_IGN_2023-166_v10.SNX

```

%=SNX 2.10 IGN 23:247:50019      23:166:00000 23:166:00000 C 00009
*-----
+FILE/COMMENT
* File created by COMP3D v5.21rc4-win
* Original computation file: Sant-Cruz3.comp
* Matrix Scalling Factor used:      0.9988
-FILE/COMMENT
*-----
+SITE/ID
*CODE PT  DOMES  T  STATION DESCRIPTION  APPROX_LON  APPROX_LAT  APP_H
GLPS  A  42005M002  P                269 41 46.8    0 44 34.7     1.8
SCRC  A  42005S002  D                269 41 44.3    0 44 32.4     6.7
SCSC  A  42005S003  D                269 41 44.3    0 44 32.4     6.7
-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  GLPS  A    1 23:166:00000 m    2 -0.338007270697725E+05 0.99939E-04
  2 STAY  GLPS  A    1 23:166:00000 m    2 -0.637751651738609E+07 0.99939E-04
  3 STAZ  GLPS  A    1 23:166:00000 m    2 -0.821541977819741E+05 0.99939E-04
  4 STAX  SCRC  A    1 23:166:00000 m    2 -0.338787512730664E+05 0.49166E-03
  5 STAY  SCRC  A    1 23:166:00000 m    2 -0.637752194169650E+07 0.64246E-03
  6 STAZ  SCRC  A    1 23:166:00000 m    2 -0.820853323574328E+05 0.55286E-03
  7 STAX  SCSC  A    1 23:166:00000 m    2 -0.338787520506713E+05 0.49947E-03
  8 STAY  SCSC  A    1 23:166:00000 m    2 -0.637752194397680E+07 0.65839E-03
  9 STAZ  SCSC  A    1 23:166:00000 m    2 -0.820853323739151E+05 0.54222E-03
-SOLUTION/ESTIMATE
*-----
+SOLUTION/MATRIX_ESTIMATE L COVA
*PARA1 PARA2  PARA2+0  PARA2+1  PARA2+2
  1    1  0.998786205521057E-08
  2    1  0.271418638493962E-24  0.998786205521059E-08
  3    1  -0.172605290417254E-23  -0.155096364853693E-24  0.998786205521059E-08
  4    1  0.998786140574692E-08  -0.122539963913743E-12  -0.158919454640664E-14
  4    4  0.241734429988673E-06
  5    1  -0.400131529056885E-17  0.998786130023688E-08  -0.979109423667798E-17
  5    4  -0.122348233291913E-07  0.412755408534085E-06
  6    1  0.573950732108182E-15  0.108292590464071E-12  0.998786345963351E-08
  6    4  0.194401546917619E-06  0.748314921094599E-08  0.305649934083547E-06
  7    1  0.998786140574134E-08  -0.122541015365509E-12  -0.158920820049425E-14
  7    4  0.230805686702156E-06  -0.125857439329562E-07  0.192492151558694E-06
  7    7  0.249468044875250E-06
  8    1  -0.400126264827768E-17  0.998786130024728E-08  -0.979095865660570E-17
  8    4  -0.122691562669076E-07  0.348144243132311E-06  0.715452790243913E-08
  8    7  -0.115566571803778E-07  0.433483912202463E-06
  9    1  0.573950343012600E-15  0.108292514601890E-12  0.998786345963251E-08
  9    4  0.186405638269269E-06  0.706914425887470E-08  0.283447774334930E-06
  9    7  0.191569609665221E-06  0.813248561326787E-08  0.293999143888932E-06
-SOLUTION/MATRIX_ESTIMATE L COVA
%ENDSNX

```

Diffusion interne		
Direction / Service	Fonction	Adresse électronique
DOT	Directeur	philippe.gerbe@ign.fr
DOT	Directeur adjoint	alexandre.pauthonnier@ign.fr
DP / SDPU	MO géodésie	laurent.toustou@ign.fr
DP / SDPU	MO géodésie	thierry.duquesnoy@ign.fr
DP / SDPU	MO géodésie	eva.chen-yen-su@ign.fr
ENSG	CDoS	cdos@ensg.eu
ENSG	Centre de compétences géodésie	olivier.bock@ensg.eu
ENSG	Chef du centre de compétences	serge.botton@ensg.eu
DOT / SGM	Chef de Service	bruno.garayt@ign.fr
DOT / SGM	Responsable documentation	xavier.della-chiesa@ign.fr
DOT / SGM	Responsable Produits & Qualité	olivier.jamet@ign.fr
DOT / SGM	Chefs de départements	chefs.sgm@ign.fr
DOT / SGM	Rédacteur	damien.pesce@ign.fr
DOT / SGM	Commanditaire	sebastien.saur@ign.fr
DOT / SGM	Archives ITRF	itrf@ign.fr

Diffusion externe		
Organisme	Fonction ou Prénom Nom	Adresse électronique
CNES / DOA / MDA / OC	Thierry Guinle	thierry.guinle@cnes.fr
CNES / DOA / MDA / OC	François Didelot	francois.didelot@cnes.fr
CNES / DTN / TSA / IS	Etienne Mercey	etienne.mercey@cnes.fr
CNES / DTN / TSA / IS	Vincent Garcia	vincent.garcia@cnes.fr
CNES / DOA / MDA / TA	Claude Boniface	claud.boniface@cnes.fr

Mots-clé

DORIS ; GNSS ; local tie survey

Résumé

La réalisation ITRF2020 (dernière en date de l'International Terrestrial Reference System) calculée par l'équipe géodésie IGN de l'IPGP est le résultat de la combinaison des référentiels terrestres issus des quatre techniques de géodésie spatiale (à savoir GNSS, DORIS, SLR et VLBI). Pour réaliser un repère unique, un moyen consiste à ajouter dans la combinaison les résultats de rattachements sur des sites co-localisés. La station scientifique de la Fondation Charles Darwin à Puerto Ayora aux Galápagos est équipée d'une station DORIS et d'une station GNSS. Le présent rapport décrit le rattachement de précision réalisé en juin 2023 sur ce site lors de la rénovation de la station DORIS et présente les résultats obtenus.

Matériel

Système d'exploitation

Windows 10 Professionnel

Logiciel

Microsoft Office

Validation

	Fonction	Nom	Visa
Rédacteur principal	Technicien d'études	Damien Pesce	22/08/2023
Commanditaire	Chef de département	Sébastien Saur	03/10/2023
Approbateur	Chef de service	Bruno Garayt	04/10/2023