ETRS89 COORDINATES AT EPOCH 10.07.2002 FOR SEVENTEEN PERMANENT GPS STATIONS IN ITALY

(AND ADDITIONAL 22 REFERENCE EPN SITES IN ITALY, FRANCE, SWITZERLAND AND AUSTRIA)

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Sommario

Il ruolo delle stazioni permanenti GPS è di rappresentare punti di riferimento per una varietà di applicazioni, dal rilevamento topografico alla navigazione. Un prerequisito è la conoscenza delle loro coordinate secondo regole che siano scientificamente valide e internazionalmente riconosciute. In Europa lo standard è rappresentato dal sistema ETRS89, che viene annualmente realizzato mediante un insieme di stazioni permanenti GPS che formano la Rete Europea Permanente (EPN). La realizzazione del sistema ETRS89 in Italia è costituita dal sistema IGM95. Tale realizzazione può agevolmente essere ripetuta annualmente per mezzo delle stazioni permanenti GPS operanti in Italia siano esse parte dell'EPN o meno.
In questa memoria vengono presentate le coordinate ETRS89 di 17 stazioni permanenti operanti in Italia, e di 22 stazioni aggiuntive che appartengono all'EPN, con riferimento all'epoca 2002.6. Tali stazioni appartengono in parte all'Agenzia Spaziale Italiana ASI, e per il resto sono gestite da Enti Pubblici o Organizzazioni Private. Tutte le stazioni sono a doppia frequenza con antenna certificata IGS e solidamente monumentate, e mettono liberamente a disposizione i dati in formato RINEX a 30 secondi, secondo lo standard EUREF. La tecnica di calcolo qui usata consiste nel combinare le equazioni normali relative ad elaborazioni settimanali della rete italiana con analoghe equazioni normali relative, per la stessa settimana, alla rete europea e distribuite dall'EUREF come prodotto ufficiale. Vengono considerate 4 settimane, così da coprire il massimo numero di stazioni permanenti GPS italiane. Le 4 equazioni normali della rete EPN+Italia vengono infine combinate in un'unica equazione normale, e le coordinate risultanti rappresentano il nostro risultato, nel sistema ITRF2000. La rappresentazione in ETRF89 è ottenuta mediante la formula standard di Boucher e Altamimi, e le nostre coordinate, identificate con ETRS89_2002_6_ITA.CRD, rappresentano una realizzazione locale di ETRF2002 all'epoca media 2002.6. La ripetibilità delle soluzioni giornaliere e settimanali è in media meglio di 1 cm, e pertanto consistente con i requisiti per stazioni di Classe B. L'accordanza con coordinate ETRF2000 di stazioni EPN in comune , dopo una trasformazione di Helmert a 6 parametri, risulta di 1.2 cm r.m.s..

Si conclude raccomandando che le coordinate ETRS89 elencate nel file ETRS89_2002_6_ITA.CRD vengano adottate nelle monografie delle stazioni corrispondenti, nello header dei files RINEX generati da tali stazioni e negli identificativi di stazione relativi alle correzioni RTCM/RTK. Solo in tal caso viene assicurata la massima coerenza nella definizione del sistema di riferimento, a livello europeo e mondiale.

Summary

The role of permanent GPS stations is that of reference stations serving a variety of applications, from local surveys to navigation. A prerequisite is their coordinates being computed according to rules which are valid scientifically and internationally recognized. In Europe the recommended standard is represented by the ETRS89 reference system, which is almost annually realised by a set of permanent stations forming the European Permanent Network (EPN). The realization of ETRS89 in Italy is represented by the IGM95 network. In addition, ETRS89 can be relatively easily realized at any epoch by means of the permanent GPS stations operating at that epoch in the Country. This includes EPN stations as well as other permanent stations.
In this paper we present the computation of the ETRS89 coordinates of 17 permanent GPS stations in Italy, and of additional 22 EPN stations, with reference epoch 2002.6. Part of the Italian stations belong to the Italian Space Agency ASI, part are managed by Public and Private Organizations. Each station is equipped with dual frequency receivers and IGS certified antenna. The data are freely available in RINEX format with 30 sec. sampling rate, in compliance with EUREF standards. We use the technique of combining Normal Equations pertaining the Italian Network with official EPN Normal Equations for the same period . Both sets of Normal Equations are computed according to the EUREF standards. We do this for 4 weeks, so that the maximum number of stations is covered. Eventually the 4 Normal Equations pertaining the EPN+Italian network are merged to one solution, which represent the average coordinates in the ITRF2000 system. The corresponding ETRS89 coordinates are obtained by the standard Boucher – Altamimi formula. Our coordinates represent a local realization of ETRF2002. The internal consistency, in the sense of repeatability, of the weekly solutions is better than 1 cm. The final coordinate set is named ETRS89_2002_6_ITA.CRD is validated with the closest available official product of EUREF, which is the ETRF2000 set of coordinates. The comparison is done in terms of a Helmert transformation, and the r.m.s. discrepancy is 1.2 cm. This implicitely confirms the alignment of the Italian GPS network with IGM95 to within 1 cm r.m.s..
We conclude by recommending the use of the coordinates listed in this paper as the coordinates to be used, for example in the monographies or in the RINEX header or RTCM/RTK station identifier, so that the best uniformity with similar stations elsewhere in Europe and in the world can be maintained.

Introduction

In 1992 the Istituto Geografico Militare Italiano (IGMI) decided that the national geodetic network, comprising about 30.000 trigonometric vertexes, should be integrated with a new, precision , three dimensional geodetic network, with well monumented and easily accessible points, called IGM95. This network was completed in 1995, using the GPS technique. About one half of the IGM95 points coincides with pre-existing geodetic vertexes; one third is tied to levelling points of the Italian precision levelling network. Several VLBI, SLR and EUREF vertexes in the Italian territory have become part of IGM95. This enabled transformation formulas between Roma 40, ED50, ETRF89 and WGS84 to be computed and made available to users, to facilitate the switch to the new standards (Donatelli et al., 2002).

The IGM95 points are distributed with a mean distance of 20 km (4 points in each 1:100000 sheet), for a total of over 1600 points. The average precision of the IGM95 network is 2.5 cm horizontal and 4 cm vertical, to 95% confidence.

The IGM95 system was designed to comply with Resolution 1 of the 1990 EUREF Symposium in Firenze, in the sense that it is coincident with ITRS at the Epoch 1989.0, and fixed to the stable part

of the Eurasian Plate. Hence IGM95 represents the realization of the European Terrestrial Reference System 89 (ETRS 89), on the GRS80 ellipsoid (resolution n. 3 of the 1992 EUREF Symposium in Bern).

Since the completion of IGM95 several new permanent stations have become operational in Italy. Some of them have become part of the European Permanent Network (EPN) and their data are analysed weekly according to the EPN processing scheme. The remaining stations provide an unofficial, local densification of the EUREF geodetic backbone. The permanent stations, in Italy as elsewhere, are often used as reference for local or regional surveys. Therefore it is appropriate to compute their ETRS89 coordinates. This is done by connecting them, using GPS data, to the European stations used to align the EPN to ITRF, and then roto-translating the resulting coordinates according to the standard Boucher Altamimi (2001) procedure. This computation also offers the opportunity to validate and update the coordinates of the permanent GPS stations used for the computation of IGM95. It may be recalled that in the early 90's the permanent GPS stations in Italy were Matera, Medicina, Cagliari and Padova (MATE, MEDI, CAGL and UPAD) , while in 2002 they are about 30, and since 1995 MATE and UPAD have been subject to major changes in coordinates, as documented in the station logs archived at the EPN Central Bureau.

It is particularly appropriate to compute such coordinates in 2002, because beginning this epoch GPS precise orbits generated by IGS are consistent with ITRF2000, and because –since week 1130- new processing standards have been implemented, concerning elevation cutoff, tropospheric mapping function, ocean loading effects and frequency of the estimates of tropospheric zenith delays.

This report describes the procedure we have followed to compute ETRS89 coordinates for 17 permanent GPS sites in Italy (Figure 1), which are not part of the EPN. The same computation has also given coordinates of additional stations belonging to the EPN, most of them in Italy. Therefore we aim at establishing an up-to-date list of ETRS89 coordinates for most, if not all, Italian permanent GPS sites which are of significance for cartographic and survey work, with a Class B precision level.

The stations we have processed are run by public and private organizations, and make they data available at the GEODAF Data Center of ASI in Matera, except CARE, MERA and TREN, which are archived by the University of Padova, and CAVA, SFEL and VOLT which are archived by SOPAC.

As shown in Table 1, all stations are equipped with dual frequency receivers and with antenna of known Phase Center Vector (PCV), according to IGS recommendations. Their are mounted typically on the roof of concrete buildings. The long term stability is certainly sufficient for geodetic applications, although seasonal effects on the mount can be present, mostly in the height component (e.g. thermal dilatation for antennas supported by a metallic mast, or height changes due to underground water flow).

The campaigns

Because the stations are permanent, we have no observing campaigns in a conventional sense. Rather we have identified time intervals during which all the stations were active. Unfortunately this could not be accomplished in just one week, but required four weeks, namely weeks 1157, 1174, 1183 and 1186. The mean epoch falls in week 1175, so that we shall consider the mean coordinates as referred to ETRS89 at epoch 10 July 2002, or 2002.6:

ETRS89_2002_6_ITA.CRD

Processing strategy

The processing strategy we have adopted follows the guidelines on the use of the IGS/EUREF Permanent Network for EUREF densification campaigns (Gurtner et al., 1998). The four weekly sessions are divided into daily sessions, as shown in Table 2. Normal equations are computed for each day, as in routine EPN processing, for the network comprising the 17 non-EPN stations plus the Italian EPN stations. We shall refer to this network as the Densified Italian Network (DIN).

We then process with the program ADDNEQ the daily normal equations as follows:

1. Compute for each week one normal equation for the entire DIN. Verify that the day-to-day repeatability of the coordinates is within 1 cm r.m.s (Class B requirement)
2. Combine each DIN normal equation with the corresponding EUR<gpswk>7 normal equation for the same week, generating one Locally Densified European Network (LDEN) for that week.
3. Combine the four LDEN normal equations into one normal equation. The constraints are IGS 2000 coordinates at the mean epoch of the four weeks (week 1175.5) for the IGS/EPN stations CAGL, GRAS, GRAZ, MATE, HFLK, MEDI, WTZR, ZIMM, all with 5+ years of tracking history that the LDEN is aligned to ITRF2000 at epoch 2002.6. Verify that the week to week repeatability of the coordinates is within 1 cm r.m.s (Class B requirement)
4. The ITRF2000 coordinates at the mean epoch 2002.6 are then rototranslated to ETRS89 at the same mean epoch 2002.6, using the standard Boucher Altamimi (2001)formula:

$$X^E(t_c) = X^I_{YY}(t_c) + T_{YY} + \begin{bmatrix} 0 & -\dot{R3}_{YY} & \dot{R2}_{YY} \\ \dot{R3}_{YY} & 0 & -\dot{R1}_{YY} \\ -\dot{R2}_{YY} & \dot{R1}_{YY} & 0 \end{bmatrix} \times X^I_{YY}(t_c) \bullet (t_c - 1989.0)$$

Where:

- $X^E(t_c)$ are the –unknown- coordinates ETRS89 of the stations at the measurement epoch t_c,
- $X^I_{YY}(t_c)$ are the coordinates in ITRF-YY of the stations
- T, R are parameters of roto-translation. We have used those appropriate for the transformation ITRF2000-->ETRS89.

We have not attempted to map the ETRS89 coordinates from epoch 2002.6 to 1989.0, because we think that there is insufficient knowledge of the station velocities. Standard velocity fields such as NUVEL1A-NNR cannot be used either, because the area is under active deformation and intraplate velocities could be of the order of 0.5 to 1 cm/yr. Such inaccuracies would clearly spoil the accuracy of the calculation, when projecting over a time interval of 13 years.

Comparison with coordinates of fundamental EUREF/EPN stations

The coordinates listed in ETRS89_2002_6_ITA.CRD need to be checked against known standards. These are represented by the coordinates of permanent GPS stations of the European Permanent Network, and available at the WEB site of the EUREF Central Bureau (http://www.epncb.oma.be/coordina.html) in the file ETRF2000.SSC. More precisely, this file contains the coordinates of European Permanent GPS stations in the ETRF2000 realization of the ETRS89 standards, computed at the Bundesamt fuer Kartographie und Geodaesie in Frankfurt (Germany). The proper way to do the comparison is by means of a 6 – parameter Helmert transformation applied to the coordinates of stations in common to the two files. The transformation parameters are computed using the three stations which are at the perimeter of the network and with longest tracking history, in our case GRAS (Grasse, France), MATE (Matera, Italy) and ZIMM (Zimmerwald, Switzerland). The rest of the stations are used as test. The results are shown under item Results of a Helmert Transformation between ETRF2000 (epoch 1989.0) and a realization of ETRF2002 in Italy (epoch2002.6). The root mean square discrepancy is 0.012 m, on average for all the three components. This figure implies that the target accuracy of 0.01 m is maintained. The coefficients of the rototranslation are molt probably the combination of several factors, such as different reference epoch between the two data sets, different tracking record, different standards of analysis. It is almost impossible to separate the different contributions.

Conclusion

On the basis of the data collected during the year 2002 by the 17 permanent GPS stations shown in the figure, and the results of the analysis done in conjunction with data of other EPN stations, we conclude that the coordinates for epoch 2002.6 (10 July 2002) have a repeatability better than 1 cm r.m.s. both over each one of the individual weeks, and across the four weeks. Comparison with independently computed coordinates of common stations shows a r.m.s. discrepancy of 1.1 cm.

The coordinates listed in this paper as ETRS89_2002_6_ITA.CRD, in conjunction with antenna specification and instrumental height listed in Table 1 should be used in the monographies of the site, in the RINEX header of the observation data files and to identify the station coordinates when broadcasting RTCM/RTK corrections, so that the best uniformity with similar stations elsewhere in Europe and in the world can be maintained.

References

Boucher C. and Altamini Z. (2001)
"Memo: Specifications for Reference Frame Fixing in the Analysis of a EUREF GPS Campaign"

(PDF file, 47Kb)

Donatelli D., Maseroli R. and Pierozzi M.(2002), "La trasformazione tra i sistemi di riferimento utilizzati in Italia", Bollettino di Geodesia e Scienze Affini, Anno LXI-n.4, Ottobre-Novembre-Dicembre 2002, pp.247-281.

Gurtner W., Boucher C., Bruyninx C. and v.d. Marel H. (1998)
"The Use of the IGS/EUREF Permanent Network for EUREF Densification Campaigns"
Proceedings of EUREF Symposium, Sofia, Bulgaria, June 1997
EUREF Publication No. 6, ed. E. Gubler and H. Hornik, pp. 50-51
(PDF file, 17Kb)

Processing Details

The organization of the tabular supporting information is as follows:

1. Analysis of Campaign week <gpswk>, with gpswk=[1157,1174,1183,1186]: for each of the four weeks we give, for each Italian (EPN and non-EPN) station, the repeatibility of the day-to-day coordinates relative to the weekly mean, in the North, East, Up direction**,** and the corresponding r.m.s. spread. The second table gives a concise summary of the statistics of the individual (daily) normal equation files.
2. Combination of DIN (=Densified Italian Network) and EUR Normal Equations for Campaign week <gpswk>, with gpswk=[1157,1174,1183,1186]: for each of the four weeks we give the misalignment error between common stations in the EUR<gpswk>.NEQ and UPA<gpswk>.NEQ normal equation files. No Helmert transformation was done: the tabular data show that it would have been unnecessary, as expected. We use consistently the same Earth Rotation Parameters, IGS final orbits and constraints. The second table gives a concise summary of the statistics of the individual (EUR and UPA) weekly normal equation files.
3. Combination of the four weekly solutions into the 2002.6 solution in ITRF2000(2002.6): we give the residuals in North, East and Up directions of the weekly coordinates relative to the mean coordinates of the center epoch (10 July 2002 = 2002.6). The second table gives a concise summary of the statistics of the individual (EUP = EUR + UPA) weekly normal equation files.
4. Final results in ITRF2000(2002.6): these are the mean coordinates at epoch 2002.6 (10 July 2002), from the stacking of the four normal equation files comprising the seventeen non EPN stations, and the EPN stations used as reference for the alignment to ITRF2000(2002.6). The EPN stations which were used for aligning purposes are flagged with a W, to signify that the solution was constrained at the ITRF2000(2002.6) coordinates of these stations. These coordinates were obtained from their conventional (1997.0) value using the officially adopted velocities in the Table under item 6 below. Note that some station appears with a different label (A, B, C ..) to identify possible resets. A fictitious DOMES number 00000M000 has been introduced as a place holder and carrier for the reset label. Reset epochs are given in the Table under item 7 below. Weighted and unweighted r.m.s. of the coordinates are given, in meters.
5. Final results in ETRS89(2002.6): these are the result of the application of the Boucher Altamimi (2001) formula to the coordinates listed under item 4, above.
6. Comparison, for common sites, of our coordinates in ETRS89(2002.6) with the official EUREF product ETRF2000.SSC consisting of coordinates computed with EUREF/EPN stations.
7. Velocities in the ITRF2000 system of the stations used in the alignement of the network at weeks 1157, 1174,1183, 1186 and at the mean epoch 1175 (10 July 2002).
8. Table of station resets and labelling: the time intervals associated to the labels A,B,C .. attached to the DOMES number of each station are detailed. At the epoch of each reset, new coordinates were estimated. Whenever a DOMES number is not yet given to a station, a fictitious DOMES number 00000M000 was preliminarly given.

1.1 Analysis of Campaign week 1157

STATION	DOMES	#FIL	C	RMS	1	2	3	4	5	6
COSE	00000M000	6	N	0.7	0.2	-0.2	1.2	-0.5	-0.1	-0.5
			E	0.3	0.5	0.1	0.1	-0.3	-0.4	0.1
			U	5.0	-4.2	-7.9	3.5	4.8	1.9	2.5
INGR	00000M000	5	N	0.9	1.3	0.5	-0.1	-0.6		-0.9
			E	0.9	0.7	-0.5	0.1	0.9		-1.2
			U	5.1	-7.9	1.8	-1.9	5.1		2.7
MILO	00000M000	6	N	2.6	5.0	-0.4	-0.7	-2.2	0.1	-1.9
			E	1.3	-1.2	0.5	0.3	1.5	0.5	-2.1
			U	4.6	-5.8	-3.4	-0.2	7.3	2.6	1.0
CAVA	00000M000A	6	N	1.3	2.1	0.9	-1.1	-1.5	-0.1	-0.6
			E	1.3	1.8	-0.7	-0.8	0.3	-1.7	0.9
			U	4.6	-7.6	-2.0	1.6	5.5	-1.1	3.2
MERA	00000M000B	6	N	3.6	3.7	3.9	0.0	-4.4	0.1	-4.0
			E	3.1	2.3	-1.4	2.4	0.8	-5.0	2.8
			U	7.8	-12.3	-3.5	-1.6	10.6	1.9	5.0
NOVA	00000M000	4	N	2.5	3.4	1.0		-1.6	-1.6	
			E	0.6	-0.3	-0.5		0.8	-0.5	
			U	7.5	-9.6	-3.2		6.9	4.4	
PRAT	12760M001	6	N	1.1	1.9	0.2	-0.3	-0.8	-0.1	-1.1
			E	1.5	1.8	0.5	0.8	0.2	-2.5	-1.0
			U	4.5	-7.6	-0.6	5.2	3.1	-1.3	2.1
PAVI	00000M000A	6	N	2.0	2.9	1.2	0.7	-2.3	-1.5	-1.0
			E	0.7	0.0	-0.5	-0.8	1.0	-0.3	0.5
			U	8.1	-9.9	-3.6	-7.2	8.5	9.2	2.5
SFEL	00000M000A	6	N	1.5	2.2	1.0	-1.7	-1.6	0.4	-0.5
			E	1.2	0.9	-0.7	-0.3	0.6	-2.1	1.2
			U	3.8	-4.9	-3.9	3.5	2.7	-1.2	3.5
TGRC	00000M000B	6	N	1.2	1.9	-1.1	0.1	-0.6	0.9	-1.2
			E	1.2	0.9	-2.2	-0.3	0.5	0.0	1.3
			U	4.6	-3.0	-4.7	-0.8	3.9	7.7	-0.9
TREN	12753M001F	6	N	1.7	1.9	1.7	0.8	-1.5	-1.5	-1.4
			E	1.1	1.0	-1.1	0.0	-1.2	-0.3	1.5
			U	7.5	-10.4	-2.9	1.8	1.5	12.6	-1.7
VOLT	00000M000A	6	N	1.6	2.3	1.1	-1.5	-1.9	-0.2	0.0
			E	0.8	0.7	-0.6	-0.3	0.5	-1.2	0.7
			U	4.7	-5.8	-3.7	-0.9	5.3	-1.5	5.8
VLUC	00000M000F	5	N	1.3		1.4	-0.3	-1.3	-0.1	-1.7
			E	1.8		1.3	-1.3	1.0	2.8	-1.0
			U	5.6		-2.1	1.1	7.1	8.2	-1.8

FILE	FILE NAME	RMS(SINGLE DIFFERENCE) (meters)	#OBS
1	C:\WK1157\OUT\UP_02069.NEQ	0.0014	71330
2	C:\WK1157\OUT\UP_02070.NEQ	0.0014	76342
3	C:\WK1157\OUT\UP_02072.NEQ	0.0013	68685
4	C:\WK1157\OUT\UP_02073.NEQ	0.0013	77289
5	C:\WK1157\OUT\UP_02074.NEQ	0.0013	69256
6	C:\WK1157\OUT\UP_02075.NEQ	0.0013	72660
	ALL	0.0013	435562

1.2 Analysis of Campaign week 1174

STATION	DOMES	#FIL	C	RMS	1	2	3	4	5	6	7
MILO	00000M000	7	N	6.1	1.4	6.8	-7.6	-8.9	5.8	1.2	-0.2
			E	1.9	0.7	-0.3	-1.2	-2.1	3.7	-0.6	-0.8
			U	8.7	11.7	-10.2	8.9	-1.8	-11.1	-0.8	2.7
COMO	12761M001	7	N	2.9	-2.8	0.0	-1.9	-3.2	-0.5	3.9	3.4
			E	1.9	2.3	1.0	1.8	-1.4	-1.1	-1.1	-2.9
			U	6.6	7.0	-3.6	0.4	-9.6	2.1	8.5	-5.4
INGR	00000M000	6	N	2.0	-1.7	1.8	-2.5	-1.9	-1.2	1.2	
			E	1.4	2.5	-0.3	0.5	-0.4	-1.7	-0.4	
			U	7.2	12.2	-4.1	-0.2	-9.2	-0.9	2.1	
NOVA	00000M000	7	N	3.1	-3.1	3.0	-0.5	-1.2	-2.2	-2.5	5.3
			E	1.9	0.3	0.6	0.3	-0.5	-3.7	2.7	-0.3
			U	7.2	11.7	-2.7	-4.8	-9.5	-4.1	5.4	2.0
PRAT	12760M001	7	N	2.2	-1.8	0.6	-2.1	0.2	-2.2	0.6	3.8
			E	2.2	3.2	1.9	0.8	-2.5	-2.5	-1.3	-0.5
			U	8.7	16.9	-2.6	-0.9	-11.8	-0.1	-4.2	0.8
PAVI	00000M000B	7	N	2.0	-2.3	3.0	-1.8	-1.6	-1.1	1.7	0.8
			E	2.5	4.5	1.3	0.3	-3.2	-2.0	-1.1	-0.7
			U	7.5	10.2	-4.7	-2.7	-12.7	-1.6	5.3	3.1
TGRC	00000M000B	7	N	2.9	1.7	-2.2	-0.7	-2.4	-2.9	0.2	5.2
			E	2.4	3.4	0.1	0.9	0.3	-4.4	0.7	-1.7
			U	5.5	10.1	1.5	-2.8	-2.5	-3.5	1.6	-7.1
TITO	00000M000	7	N	4.1	-2.3	2.5	-2.9	-3.6	-3.6	1.7	7.2
			E	1.8	1.9	1.1	1.3	0.0	-2.6	-2.5	0.6
			U	7.9	13.3	-2.2	0.9	-11.9	-4.5	-2.5	4.8
TREN	12753M001F	7	N	3.0	-1.9	3.7	-4.0	-0.9	-3.0	1.7	3.1
			E	2.6	2.9	1.3	-0.9	0.2	-2.0	-4.6	2.2
			U	11.5	9.7	-2.7	14.7	-20.8	-3.4	-4.8	3.9
MERA	00000M000B	3	N	1.0		0.7	-0.9	0.9			
			E	4.9		0.7	2.1	-6.6			
			U	15.5		4.3	0.6	-21.5			
VLUC	00000M000F	3	N	3.3		3.6		-2.5		-1.3	
			E	4.2		3.9		-0.5		-4.5	
			U	12.0		-5.8		-13.5		8.4	

FILE	FILE NAME	RMS(SINGLE DIFFERENCE) (meters)	#OBS
1	C:\WK1174\OUT\UP_02188.NEQ	0.0013	67742
2	C:\WK1174\OUT\UP_02189.NEQ	0.0013	73726
3	C:\WK1174\OUT\UP_02190.NEQ	0.0014	66086
4	C:\WK1174\OUT\UP_02191.NEQ	0.0015	67278
5	C:\WK1174\OUT\UP_02192.NEQ	0.0015	69211
6	C:\WK1174\OUT\UP_02193.NEQ	0.0015	64731
7	C:\WK1174\OUT\UP_02194.NEQ	0.0017	60474
ALL		0.0015	469248

1.3 Analysis of Campaign week 1184

STATION	DOMES	#FIL	C	RMS	1	2	3	4	5	6	7
MILO	00000M000	7	N	3.5	-1.2	0.1	1.9	5.6	1.1	-5.7	-1.5
			E	1.5	-0.8	0.9	2.7	-0.7	-0.2	-1.5	-1.0
			U	4.6	3.2	-4.5	-5.5	-3.8	0.5	7.1	1.6
COMO	12761M001	7	N	2.8	-1.3	0.4	1.1	3.1	2.0	-5.4	0.4
			E	1.8	0.3	-1.8	-0.2	3.4	0.4	-1.5	-1.4
			U	4.2	-7.0	5.0	-1.7	-1.3	-0.9	0.4	5.2
CAVA	00000M000B	7	N	2.2	1.5	1.5	-2.9	0.1	1.7	-3.3	1.3
			E	1.3	-1.0	-2.2	0.9	0.5	2.0	-0.2	-0.1
			U	4.3	-0.1	-4.1	-6.5	0.5	1.6	0.4	6.8
NOVA	00000M000	7	N	2.4	-2.8	0.6	-0.4	3.0	2.1	-3.3	1.3
			E	1.1	0.6	0.3	-0.6	0.6	-0.6	-2.3	0.8
			U	3.0	4.5	-2.4	-0.8	-3.1	-2.6	1.2	2.9
PRAT	12760M001	7	N	2.3	-1.3	0.0	2.5	-0.4	3.0	-3.8	0.0
			E	1.7	-1.4	-1.9	-0.9	1.3	2.2	-1.3	1.5
			U	6.3	-4.7	0.7	-6.5	-6.5	10.9	1.0	3.5
PAVI	00000M000C	7	N	2.0	-0.3	1.0	0.4	1.1	1.1	-4.4	1.2
			E	1.3	0.1	-0.6	-0.2	2.1	1.0	-0.9	-1.9
			U	3.9	-7.2	0.3	-0.5	0.4	5.2	-1.3	3.1
SFEL	00000M000B	7	N	1.9	0.2	2.0	-1.7	0.9	1.3	-3.5	1.0
			E	1.2	-0.3	-2.0	0.6	-0.2	2.0	-0.3	0.3
			U	6.6	1.7	-0.3	-12.0	-1.1	0.6	-1.1	10.6
TGRC	00000M000B	7	N	2.3	1.2	1.4	0.8	-2.3	0.5	-4.2	2.3
			E	2.0	4.1	-1.3	0.1	-1.3	-0.3	-1.9	0.3
			U	6.6	9.4	-6.5	4.7	4.8	-1.4	-6.6	-6.1
TITO	00000M000	7	N	2.9	-3.0	-2.9	-1.1	1.2	0.9	-3.7	4.1
			E	1.7	0.7	-0.3	-2.9	2.1	1.7	-0.9	0.1
			U	7.6	-11.5	-7.1	-7.2	-2.4	8.0	1.7	6.5
TREN	12753M001F	7	N	2.3	-2.3	1.3	-2.0	1.6	2.6	-2.8	2.0
			E	1.4	2.5	-0.2	0.6	-0.8	0.1	-2.1	-0.9
			U	5.6	-2.5	-9.0	8.3	1.0	3.3	-4.5	1.4
VOLT	00000M000B	7	N	1.8	0.3	1.7	-0.8	0.7	1.3	-3.5	0.5
			E	1.7	-1.2	-1.7	-1.3	1.0	3.2	0.0	-0.5
			U	5.5	0.9	0.1	-11.4	-1.5	4.7	0.8	4.7
MARA	00000M000	4	N	3.7				-2.1	-3.1	4.3	2.7
			E	1.9				0.7	-0.7	3.1	-0.2
			U	22.3				-32.5	15.0	-14.7	1.4
VLUC	00000M000F	2	N	1.2				1.1	0.5		
			E	1.8				1.1	1.4		
			U	14.7				-3.8	14.2		

FILE	FILE NAME	RMS(SINGLE DIFFERENCE) (meters)	#OBS
1	C:\WK1183\OUT\UP_02251.NEQ	0.0013	50583
2	C:\WK1183\OUT\UP_02252.NEQ	0.0013	59147
3	C:\WK1183\OUT\UP_02253.NEQ	0.0015	61790
4	C:\WK1183\OUT\UP_02254.NEQ	0.0014	62742
5	C:\WK1183\OUT\UP_02255.NEQ	0.0014	63108
6	C:\WK1183\OUT\UP_02256.NEQ	0.0012	50318
7	C:\WK1183\OUT\UP_02257.NEQ	0.0013	67419
	ALL	0.0013	415107

1.4 Analysis of Campaign week 1186

STATION	DOMES	#FIL	C	RMS	1	2	3	4	5	6	7
CARE	00000M000	7	N	1.8	-0.3	-1.5	-1.9	-0.1	-0.8	0.9	3.5
			E	1.1	2.0	-0.3	-0.5	-1.1	-0.6	-0.7	0.9
			U	6.4	1.7	2.4	-10.8	1.8	-3.0	-3.5	9.9
MILO	00000M000	7	N	1.7	1.4	1.8	-0.9	0.5	-3.0	1.1	-1.2
			E	1.0	1.9	0.4	-0.2	-0.5	-1.0	-0.2	-0.9
			U	4.6	-1.7	0.4	-7.5	0.4	0.5	7.8	-2.4
COMO	12761M001	7	N	0.9	1.0	-0.9	-0.4	0.9	-1.0	0.8	-0.4
			E	1.0	1.7	-0.4	-0.2	-1.5	-0.4	0.4	0.1
			U	6.2	-1.6	-1.9	-13.0	4.0	4.1	2.5	4.4
CAVA	00000M000B	7	N	1.4	1.7	1.3	-1.2	0.7	-2.1	-1.1	0.7
			E	1.0	1.3	-0.6	1.2	-1.6	-0.1	-0.8	0.3
			U	5.0	0.8	2.1	-10.8	4.3	-1.8	1.6	2.3
NOVA	00000M000	7	N	1.0	1.8	-0.3	-0.5	1.0	-0.2	-0.3	-1.3
			E	1.5	2.9	0.5	-0.6	-1.7	-0.8	0.2	-0.8
			U	7.1	-0.6	6.0	-14.4	-0.1	-1.3	0.2	7.7
PRAT	12760M001	7	N	1.7	2.8	1.2	-2.6	-0.3	0.2	-0.2	-0.8
			E	1.3	2.8	-0.9	-0.5	-0.5	-0.2	-0.8	-0.1
			U	4.4	-7.2	-1.0	-4.1	5.7	2.2	-1.7	2.4
PAVI	00000M000C	7	N	1.3	0.3	-0.1	-1.8	2.3	0.0	0.5	-1.0
			E	1.3	2.2	-0.3	0.3	-2.1	-0.4	-0.6	0.9
			U	6.0	2.2	2.7	-11.4	2.6	-4.5	6.9	-0.1
SFEL	00000M000B	7	N	1.3	1.6	0.9	-1.5	0.9	-1.7	0.7	-0.9
			E	0.7	0.8	-0.9	0.3	-1.0	-0.1	0.9	-0.3
			U	6.2	-2.0	3.4	-13.1	3.3	0.1	5.4	1.5
TGRC	00000M000B	7	N	1.8	-0.9	0.6	-2.4	0.8	-0.9	3.0	-1.3
			E	1.3	0.8	-1.3	-0.1	-0.9	-0.6	2.5	-0.9
			U	8.3	4.5	-1.9	-15.1	-2.8	-1.4	4.3	11.8
TREN	12753M001F	7	N	1.0	1.8	0.3	-0.8	0.3	-1.3	0.0	-0.4
			E	1.0	-1.6	0.2	0.2	1.2	0.7	-1.1	0.1
			U	5.3	-1.9	-1.1	-6.8	3.6	-5.1	8.6	1.1
VOLT	00000M000B	7	N	1.4	1.5	-0.3	-1.6	1.0	-1.8	1.7	-0.4
			E	0.4	0.1	0.1	0.2	-0.8	0.1	0.2	-0.2
			U	5.5	-3.1	2.0	-9.4	7.5	-2.6	4.3	0.0
TITO	00000M000	6	N	2.1		0.5	-4.4	0.9	0.0	1.2	0.6
			E	0.8		0.4	-0.3	-1.3	-0.7	0	0.9
			U	6.1		3.3	-11.4	6.6	-1.2	1	0.3
MARA	00000M000	6	N	1.2		-1.3	-1.7	0	0.3	-1.3	1.2
			E	2.1		-2	-1.3	-1.7	-0.3	-0.4	3.6
			U	7		6.5	-6.8	4.6	-5.5	8.1	-6.4

FILE	FILE NAME	RMS(SINGLE DIFFERENCE)	#OBS
1	C:\WK1186\OUT\UP_02272.NEQ	0.0012	64975
2	C:\WK1186\OUT\UP_02273.NEQ	0.0012	69873
3	C:\WK1186\OUT\UP_02274.NEQ	0.0012	74541
4	C:\WK1186\OUT\UP_02275.NEQ	0.0012	69478
5	C:\WK1186\OUT\UP_02276.NEQ	0.0013	71618
6	C:\WK1186\OUT\UP_02277.NEQ	0.0013	74254
7	C:\WK1186\OUT\UP_02278.NEQ	0.0013	71726
	ALL	0.0012	496465

2.1 Combination of DIN and EUR Normal Equations for Campaign week 1157

STATION	DOMES	#FIL	C	RMS	1	2
AQUI	12757M001D	2	N	2.0	-2.0	0.2
			E	2.9	2.9	-0.4
			U	0.6	0.6	0.1
BZRG	12751M001B	2	N	1.4	1.4	0.1
			E	3.2	3.1	-0.3
			U	1.7	-1.7	0.3
CAGL	12725M003	2	N	0.4	0.4	0.0
			E	0.4	0.4	-0.1
			U	0.0	0.0	0.0
CAME	12754M001	2	N	2.4	-2.4	0.2
			E	3.3	3.3	-0.4
			U	0.7	-0.6	0.2
ELBA	12721M002	2	N	2.1	-2.1	0.2
			E	2.4	2.4	-0.3
			U	0.3	-0.3	0.2
LAMP	12706M002	2	N	0.8	-0.8	0.2
			E	1.8	1.8	-0.3
			U	0.3	-0.2	0.1
MATE	12734M008C	2	N	0.2	-0.2	0.0
			E	0.2	0.1	-0.2
			U	0.0	0.0	0.0
MEDI	12711M003	2	N	0.1	-0.1	0.0
			E	0.6	-0.6	-0.1
			U	0.0	0.0	0.0
NOT1	12717M004D	1	N	0.0	-0.7	
			E	0.0	1.0	
			U	0.0	-0.1	
TORI	12724M002	2	N	1.9	-1.9	0.2
			E	1.2	1.2	-0.3
			U	1.8	-1.7	0.3
UNPG	12752M001	2	N	1.9	-1.9	0.2
			E	2.1	2.0	-0.3
			U	1.5	-1.4	0.3
VENE	12741M001C	1	N	0.0	-0.8	
			E	0.0	1.2	
			U	0.0	-0.7	
WTZR	14201M010B	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
GENO	12712M002	2	N	1.9	-1.9	0.2
			E	1.4	1.4	-0.3
			U	0.2	0.1	0.2
GRAS	10002M006	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
PADO	12750S001B	2	N	2.1	-2.1	0.2
			E	3.1	3.0	-0.4
			U	5.3	-5.3	0.7
GRAZ	11001M002B	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
ZIMM	14001M004C	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
HFLK	11006S003B	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
COSE	00000M000	1	N	0.0		0.2
			E	0.0		-0.3
			U	0.0		0.1
INGR	00000M000	1	N	0.0		0.2
			E	0.0		-0.3
			U	0.0		0.2
MILO	00000M000	1	N	0.0		0.2
			E	0.0		-0.3
			U	0.0		0.2
CAVA	00000M000A	1	N	0.0		0.2
			E	0.0		-0.3
			U	0.0		0.2
MERA	00000M000B	1	N	0.0		0.1
			E	0.0		-0.3
			U	0.0		0.2
NOVA	00000M000	1	N	0.0		0.1
			E	0.0		-0.3
			U	0.0		0.2
PRAT	12760M001	1	N	0.0		0.1
			E	0.0		-0.3
			U	0.0		0.2
PAVI	00000M000B	1	N	0.0		0.1
			E	0.0		-0.3
			U	0.0		0.2
SFEL	00000M000A	1	N	0.0		0.1
			E	0.0		-0.3
			U	0.0		0.2
TGRC	00000M000B	1	N	0.0		0.2
			E	0.0		-0.3
			U	0.0		0.1
TREN	12753M001F	1	N	0.0		0.1
			E	0.0		-0.3
			U	0.0		0.2
VOLT	00000M000A	1	N	0.0		0.1
			E	0.0		-0.3
			U	0.0		0.2
VLUC	00000M000F	1	N	0.0		0.2
			E	0.0		-0.3
			U	0.0		0.2

FILE	FILE NAME	RMS (SINGLE DIFFERENCE) (meters)	#OBS
1	C:\STORICRD\OUT\EUR11577.NEQ	0.0017	144115
2	C:\STORICRD\OUT\UPA11577.NEQ	0.0013	510033
	ALL	0.0014	654148

2.2 Combination of DIN and EUR Normal Equations for Campaign week 1174

STATION	DOMES	#FIL	C	RMS	1	2
AQUI	12757M001D	2	N	2.6	2.6	-0.3
			E	1.3	1.3	-0.2
			U	0.8	-0.8	0.0
BZRG	12751M001B	2	N	1.7	1.7	-0.2
			E	1.6	1.6	-0.2
			U	10.7	10.6	-0.6
CAGL	12725M003	2	N	1.3	-1.3	-0.1
			E	0.2	-0.2	-0.1
			U	0.0	0.0	0.0
ELBA	12721M002	2	N	2.3	2.3	-0.2
			E	1.5	1.4	-0.2
			U	3.9	3.9	-0.3
LAMP	12706M002	2	N	4.0	4.0	-0.3
			E	0.5	0.5	-0.1
			U	5.1	-5.1	0.2
MATE	12734M008C	2	N	1.3	1.3	0.0
			E	0.5	-0.4	-0.1
			U	0.0	0.0	0.0
MEDI	12711M003	2	N	0.0	0.0	0.0
			E	0.7	0.7	0.0
			U	0.0	0.0	0.0
NOT1	12717M004D	1	N	0.0	0.9	
			E	0.0	0.3	
			U	0.0	1.1	
UNPG	12752M001	2	N	1.9	1.9	-0.2
			E	0.9	0.9	-0.1
			U	2.8	2.8	-0.2
VENE	12741M001C	1	N	0.0	0.9	
			E	0.0	0.5	
			U	0.0	1.5	
WTZR	14201M010B	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
TORI	12724M002	2	N	0.9	0.9	-0.2
			E	1.1	1.1	-0.1
			U	6.8	6.8	-0.4
GENO	12712M002	2	N	1.6	1.6	-0.2
			E	1.4	1.4	-0.2
			U	2.5	-2.5	0.0
GRAS	10002M006	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
GRAZ	11001M002B	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
ZIMM	14001M004C	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
CAME	12754M001	2	N	2.2	2.2	-0.2
			E	1.0	1.0	-0.1
			U	0.2	-0.2	-0.1
HFLK	11006S003B	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
MILO	00000M000	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.1
COMO	12761M001	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.2
CAVA	00000M000B	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.2
INGR	00000M000	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.1
VENE	12741M001	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.2
NOVA	00000M000	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.1
PRAT	12760M001	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.1
PAVI	00000M000C	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.1
SFEL	00000M000B	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.2
TGRC	00000M000B	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.1
TITO	00000M000	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.1
TREN	12753M001F	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.2
VOLT	00000M000B	1	N	0.0		-0.2
			E	0.0		-0.1
			U	0.0		-0.2
MERA	00000M000B	1	N	0.0		-0.1
			E	0.0		-0.1
			U	0.0		-0.2

VLUC	00000M000F	1	N	0.0	-0.2		U	0.0	-0.1
			E	0.0	-0.1				

FILE	FILE NAME	RMS(SINGLE DIFFERENCE) (meters)	#OBS
1	C:\STORICRD\OUT\EUR11747.NEQ	0.0034	150052
2	C:\STORICRD\OUT\UPA11747.NEQ	0.0015	469248
	ALL	0.0016	619300

2.3 Combination of DIN and EUR Normal Equations for Campaign week 1183

STATION	DOMES	#FIL	C	RMS	1	2
AQUI	12757M001D	2	N	0.0	0.0	0.0
			E	0.3	0.3	0.0
			U	3.0	-2.9	0.7
BZRG	12751M001B	2	N	0.8	0.7	-0.1
			E	1.1	1.1	-0.1
			U	1.3	-1.2	0.6
CAGL	12725M003	2	N	0.1	-0.1	0.0
			E	0.3	0.3	0.0
			U	0.0	0.0	0.0
GENO	12712M002	2	N	0.5	-0.5	0.0
			E	0.4	-0.4	0.0
			U	1.4	1.4	0.4
MATE	12734M008C	2	N	0.2	0.2	0.0
			E	0.1	-0.1	-0.1
			U	0.0	0.0	0.0
MEDI	12711M003	2	N	0.1	-0.1	0.0
			E	0.1	-0.1	0.0
			U	0.0	0.0	0.0
NOT1	12717M004D	1	N	0.0	-0.1	
			E	0.0	0.2	
			U	0.0	-0.8	
TORI	12724M002	2	N	0.3	-0.3	-0.1
			E	1.8	-1.8	0.1
			U	1.4	-1.3	0.6
UNPG	12752M001	2	N	0.2	-0.2	0.0
			E	0.4	0.4	0.0
			U	5.3	-5.2	0.9
VENE	12741M001C	1	N	0.0	0.1	
			E	0.0	0.1	
			U	0.0	-1.6	
WTZR	14201M010B	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
LAMP	12706M002	2	N	0.4	0.4	0.1
			E	0.2	-0.2	0.0
			U	2.0	-1.9	0.6
GRAS	10002M006	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
PADO	12750S001B	2	N	0.3	0.3	-0.1
			E	0.7	0.7	-0.1
			U	9.8	-9.7	1.6
GRAZ	11001M002B	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
ZIMM	14001M004C	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
MILO	00000M000	1	N	0.0		0.0
			E	0.0		0.0
			U	0.0		0.5
COMO	12761M001	1	N	0.0		-0.1
			E	0.0		0.0
			U	0.0		0.6
CAVA	00000M000	1	N	0.0		-0.1
			E	0.0		0.0
			U	0.0		0.6
NOVA	00000M000	1	N	0.0		-0.1
			E	0.0		0.0
			U	0.0		0.6
PRAT	12760M001	1	N	0.0		-0.1
			E	0.0		0.0
			U	0.0		0.6
PAVI	00000M000	1	N	0.0		-0.1
			E	0.0		0.0
			U	0.0		0.6
SFEL	00000M000	1	N	0.0		-0.1
			E	0.0		0.0
			U	0.0		0.6
TGRC	00000M000B	1	N	0.0		0.0
			E	0.0		-0.1
			U	0.0		0.6
TITO	00000M000	1	N	0.0		0.0
			E	0.0		-0.1
			U	0.0		0.6
TREN	12753M001B	1	N	0.0		-0.1
			E	0.0		0.0
			U	0.0		0.6
VOLT	00000M000	1	N	0.0		-0.1
			E	0.0		0.0
			U	0.0		0.6
MARA	00000M000	1	N	0.0		0.0
			E	0.0		-0.1
			U	0.0		0.5
VLUC	00000M000	1	N	0.0		0.0
			E	0.0		-0.1
			U	0.0		0.6

FILE	FILE NAME	RMS(SINGLE DIFFERENCE) (meters)	#OBS
1	C:\STORICRD\OUT\EUR11837.NEQ	0.0033	160034
2	C:\STORICRD\OUT\UPA11837.NEQ	0.0013	415107
	ALL	0.0015	575141

2.4 Combination of DIN and EUR Normal Equations for Campaign week 1186

STATION	DOMES	#FIL	C	RMS	1	2
AQUI	12757M001D	2	N	1.3	-1.3	0.2
			E	3.6	3.6	-0.5
			U	2.7	-2.7	0.0
BZRG	12751M001B	2	N	1.8	-1.8	0.3
			E	5.0	4.9	-0.6
			U	2.4	2.4	-0.3
CAGL	12725M003	2	N	0.6	0.6	0.0
			E	1.3	-1.3	-0.2
			U	0.0	0.0	0.0
CAME	12754M001	2	N	1.2	-1.2	0.2
			E	2.4	2.4	-0.4
			U	1.1	-1.1	-0.1
ELBA	12721M002	2	N	1.5	-1.5	0.2
			E	3.6	3.5	-0.5
			U	1.8	-1.8	-0.1
GENO	12712M002	2	N	1.3	-1.3	0.2
			E	3.3	3.3	-0.5
			U	2.3	-2.3	0.0
LAMP	12706M002	2	N	0.1	0.1	0.0
			E	2.8	2.8	-0.4
			U	1.5	-1.5	-0.2
MATE	12734M008C	2	N	0.4	-0.4	0.0
			E	0.4	0.4	-0.1
			U	0.0	0.0	0.0
MEDI	12711M003	2	N	0.2	-0.2	0.1
			E	0.7	0.6	-0.2
			U	0.0	0.0	0.0
NOT1	12717M004D	1	N	0.0	-0.6	
			E	0.0	1.4	
			U	0.0	-0.3	
TORI	12724M002	2	N	2.0	-2.0	0.2
			E	3.4	3.4	-0.5
			U	1.1	1.0	-0.2
UNPG	12752M001	2	N	1.1	-1.0	0.2
			E	3.1	3.1	-0.4
			U	2.9	-2.9	0.0
VENE	12741M001C	1	N	0.0	-0.8	
			E	0.0	2.0	
			U	0.0	-0.8	
WTZR	14201M010B	1	N	0.0	0.0	
			E	0.0	0.1	
			U	0.0	0.0	
GRAS	10002M006	1	N	0.0	0.0	
			E	0.0	0.0	
			U	0.0	0.0	
PADO	12750S001B	2	N	2.3	-2.3	0.3
			E	3.6	3.6	-0.5
			U	5.4	-5.4	0.3
GRAZ	11001M002B	1	N	0.0	0.0	
			E	0.0	0.1	
			U	0.0	0.0	
ZIMM	14001M004C	1	N	0.0	0.0	
			E	0.0	0.1	
			U	0.0	0.0	
CARE	00000M000	1	N	0.0		0.2
			E	0.0		-0.4
			U	0.0		-0.2
MILO	00000M000	1	N	0.0		0.1
			E	0.0		-0.4
			U	0.0		-0.2
COMO	12761M001	1	N	0.0		0.2
			E	0.0		-0.4
			U	0.0		-0.2
CAVA	00000M000B	1	N	0.0		0.2
			E	0.0		-0.4
			U	0.0		-0.2
NOVA	00000M000	1	N	0.0		0.2
			E	0.0		-0.4
			U	0.0		-0.2
PRAT	12760M001	1	N	0.0		0.2
			E	0.0		-0.4
			U	0.0		-0.2
PAVI	00000M000C	1	N	0.0		0.2
			E	0.0		-0.4
			U	0.0		-0.2
SFEL	00000M000B	1	N	0.0		0.2
			E	0.0		-0.4
			U	0.0		-0.2
TGRC	00000M000B	1	N	0.0		0.1
			E	0.0		-0.3
			U	0.0		-0.3
TREN	12753M001F	1	N	0.0		0.2
			E	0.0		-0.4
			U	0.0		-0.1
VOLT	00000M000B	1	N	0.0		0.2
			E	0.0		-0.4
			U	0.0		-0.2
TITO	00000M000	1	N	0.0		0.2
			E	0.0		-0.3
			U	0.0		-0.2
MARA	00000M000	1	N	0.0		0.2
			E	0.0		-0.3
			U	0.0		-0.1

FILE	FILE NAME	RMS(SINGLE DIFFERENCE) (meters)	#OBS
1	C:\STORICRD\OUT\EUR11867.NEQ	0.0033	158883
2	C:\STORICRD\OUT\UPA11867.NEQ	0.0012	496465
	ALL	0.0014	655348

3. Combination of the weekly solutions into the 2002.6 solution in ITRF2000(2002.6)

STATION	DOMES	#FIL	C	RMS	1	2	3	4
AQUI	12757M001D	4	N	1.3	1.8	-0.9	-0.7	-0.5
			E	1.4	1.8	-0.8	-0.7	-1.2
			U	4.0	-3.4	-1.6	4.8	3.3
BZRG	12751M001B	4	N	11.4	-17.7	4.3	4.8	5.9
			E	7.5	11.4	-4.1	-2.6	-3.8
			U	4.1	2.4	-3.6	4.9	2.9
CAGL	12725M003	4	N	0.6	0.5	0.8	0.2	0.5
			E	0.2	-0.3	0.3	0.0	0.1
			U	0.0	0.0	0.0	0.0	0.0
CAME	12754M001	3	N	0.6	0.6	0.1		-0.6
			E	0.8	-1.0	0.0		0.4
			U	5.6	0.5	-4.4		6.6
ELBA	12721M002	3	N	0.4	0.4	-0.1		-0.3
			E	0.6	0.3	-0.5		-0.5
			U	2.0	-0.4	-0.3		2.8
LAMP	12706M002	4	N	1.2	-0.7	0.3	1.9	0.3
			E	0.7	0.5	0.1	-0.7	-1.0
			U	4.1	-1.0	4.3	-5.2	2.2
MATE	12734M008C	4	N	0.4	-0.3	-0.5	-0.1	-0.2
			E	0.8	-1.1	-0.7	-0.6	-0.2
			U	0.0	-0.1	0.0	0.0	0.0
MEDI	12711M003	4	N	0.4	-0.4	-0.3	-0.3	-0.3
			E	0.6	0.8	-0.2	-0.2	-0.5
			U	0.0	0.0	0.0	0.0	0.0
NOT1	12717M004D	4	N	0.3	-0.2	-0.2	0.3	0.2
			E	1.9	0.2	2.3	-0.8	-2.2
			U	2.4	1.4	0.5	2.7	-2.8
TORI	12724M002	4	N	0.6	0.1	0.3	-0.9	-0.6
			E	1.3	1.3	-1.7	0.7	-0.6
			U	5.1	0.4	-5.1	4.0	5.9
UNPG	12752M001	4	N	4.2	5.8	-1.2	-2.8	-3.1
			E	0.8	-1.1	-0.3	-0.3	0.7
			U	4.4	-3.0	-1.4	5.6	4.0
VENE	12741M001C	4	N	0.9	1.2	-0.9	-0.6	0.1
			E	1.8	-2.1	1.9	0.8	-0.7
			U	2.2	0.5	-2.6	2.8	0.8
WTZR	14201M010B	4	N	0.2	0.1	0.2	0.1	0.0
			E	0.1	-0.1	-0.1	-0.1	-0.1
			U	0.0	0.0	0.0	0.0	0.0
GENO	12712M002	4	N	1.6	2.1	-1.5	-0.1	-0.8
			E	1.1	1.1	-1.5	0.5	-0.2
			U	3.9	-2.8	0.1	-0.8	6.0
GRAS	10002M006	4	N	0.1	-0.1	0.0	-0.1	-0.1
			E	0.2	-0.2	-0.1	-0.1	-0.2
			U	0.0	0.0	0.0	0.0	0.0

PADO	12750S001B	3	N	2.1	1.1		-2.8	-0.1
			E	1.8	-1.2		2.3	-0.5
			U	2.5	1.3		1.1	3.0
GRAZ	11001M002B	4	N	0.1	0.1	0.1	0.1	0.1
			E	0.5	0.4	0.4	0.5	0.4
			U	0.0	0.0	0.0	0.0	0.0
ZIMM	14001M004C	4	N	0.1	0.1	0.1	0.0	0.1
			E	0.1	0.1	0.1	0.0	0.1
			U	0.0	0.0	0.0	0.0	0.0
HFLK	11006S003B	2	N	0.1	0.0	-0.1		
			E	0.4	0.3	0.3		
			U	0.0	0.0	0.0		
COSE	00000M000	1	N	0.0	0.7			
			E	0.0	-0.3			
			U	0.0	0.9			
INGR	00000M000	2	N	1.1	0.9	-0.6		
			E	3.3	1.9	-2.7		
			U	3.6	-2.8	2.2		
MILO	00000M000	4	N	2.3	1.0	3.0	-1.7	-1.4
			E	3.0	-4.3	2.6	1.4	0.3
			U	4.0	0.5	0.4	-1.3	6.8
CAVA	00000M000A	1	N	0.0	-0.1			
			E	0.0	0.1			
			U	0.0	0.6			
MERA	00000M000B	2	N	9.0	1.1	-8.9		
			E	0.3	0.1	-0.2		
			U	11.9	1.6	-11.8		
NOVA	00000M000	4	N	1.9	2.7	-1.6	-0.6	-0.6
			E	1.1	0.5	-1.7	0.8	-0.1
			U	4.1	2.3	-4.3	0.8	5.0
PRAT	12760M001	4	N	0.9	0.3	0.8	-0.4	-1.3
			E	0.6	0.3	-0.8	0.2	-0.3
			U	4.7	-0.1	-4.9	5.7	3.2
PAVI	00000M000B	1	N	0.0	0.0			
			E	0.0	0.3			
			U	0.0	1.0			
SFEL	00000M000A	1	N	0.0	-0.1			
			E	0.0	0.1			
			U	0.0	0.6			
TGRC	00000M000B	4	N	1.0	-1.0	0.5	-0.1	1.3
			E	1.5	-1.7	-1.3	0.6	1.5
			U	1.7	0.7	2.7	0.7	0.4
TREN	12753M001F	4	N	0.4	0.0	-0.5	-0.4	0.0
			E	0.5	-0.4	-0.4	0.6	-0.3
			U	3.4	-2.0	0.4	5.5	1.0
VOLT	00000M000A	1	N	0.0	-0.1			
			E	0.0	0.2			
			U	0.0	0.6			
VLUC	00000M000F	2	N	1.1	0.0	1.1		
			E	0.6	-0.6	0.3		
			U	2.6	1.4	-2.2		

COMO	12761M001	3	N	1.3	1.1	-0.5	-1.3
			E	0.6	0.2	-0.1	-0.8
			U	3.5	-2.0	0.7	4.6
CAVA	00000M000B	3	N	0.7	0.3	-0.9	0.1
			E	0.5	-0.6	0.1	-0.4
			U	1.6	0.6	2.0	1.0
PAVI	00000M000C	3	N	1.6	1.6	-1.1	-1.1
			E	1.2	-1.6	0.3	0.5
			U	4.8	-4.5	4.1	3.2
SFEL	00000M000B	3	N	0.6	0.3	-0.8	-0.1
			E	0.7	-0.8	0.3	-0.5
			U	2.3	3.1	-0.4	0.9
TITO	00000M000	3	N	1.5	-0.5	1.5	-1.4
			E	1.0	-1.4	0.3	0.3
			U	1.7	1.6	0.6	1.6
VOLT	00000M000B	3	N	0.5	-0.6	-0.2	0.2
			E	0.8	-0.6	0.4	-0.7
			U	2.0	0.3	0.5	2.8
MARA	00000M000	2	N	1.1		-1.1	-0.1
			E	1.3		1.1	-0.7
			U	6.1		5.8	2.0
VLUC	00000M000	1	N	0.0		-0.1	
			E	0.0		0.0	
			U	0.0		2.4	
CARE	00000M000	1	N	0.0			-0.6
			E	0.0			-0.4
			U	0.0			2.4

FILE	FILE NAME	RMS(SINGLE DIFFERENCE) (meters)	#OBS
1	C:\STORICRD\OUT\EUP_1157.NEQ	0.0014	654148
2	C:\STORICRD\OUT\EUP_1174.NEQ	0.0016	619300
3	C:\STORICRD\OUT\EUP_1183.NEQ	0.0015	575141
4	C:\STORICRD\OUT\EUP_1186.NEQ	0.0014	655348
ALL		0.0015	2503937

4. Final results in ITRF2000(2002.6)

STATION	DOMES	#	F	X(M)	RMS1	RMS2	Y(M)	RMS1	RMS2	Z(M)	RMS1	RMS2	RMS1-XYZ
AQUI	12757M001D	4	M	4592507.6205	0.0003	0.0019	1089876.3094	0.0001	0.0004	4276392.9515	0.0003	0.0011	0.0004
BZRG	12751M001B	4	M	4312657.5307	0.0004	0.0035	864634.6135	0.0001	0.0043	4603844.3840	0.0004	0.0039	0.0005
CAGL	12725M003	4	W	4893378.8594	0.0001	0.0002	772649.7318	0.0001	0.0001	4004182.1192	0.0001	0.0002	0.0001
CAME	12754M001	3	M	4542009.1849	0.0004	0.0023	1058964.1932	0.0001	0.0008	4336932.9221	0.0004	0.0020	0.0006
CARE	00000M000	1	M	4329506.7441	0.0009	0.0000	817636.6607	0.0002	0.0000	4599876.9135	0.0009	0.0000	0.0012
CAVA	00000M000A	1	M	4372204.6444	0.0006	0.0000	975914.9218	0.0002	0.0000	4524895.2839	0.0006	0.0000	0.0008
CAVA	00000M000B	3	M	4372204.6253	0.0004	0.0009	975914.9191	0.0001	0.0003	4524895.2623	0.0004	0.0005	0.0005
COMO	12761M001	3	M	4398306.3204	0.0004	0.0019	704149.8041	0.0001	0.0001	4550154.6338	0.0004	0.0010	0.0005
COSE	00000M000	1	M	4750531.5902	0.0006	0.0000	1390089.5399	0.0002	0.0000	4010089.6227	0.0005	0.0000	0.0008
ELBA	12721M002	3	M	4616533.9640	0.0004	0.0010	831568.6190	0.0001	0.0002	4307569.9558	0.0004	0.0007	0.0005
GENO	12712M002	4	M	4507892.3676	0.0004	0.0018	707621.4281	0.0001	0.0005	4441603.4754	0.0003	0.0012	0.0005
GRAS	10002M006	4	W	4581690.9437	0.0001	0.0000	556114.7781	0.0001	0.0001	4389360.7481	0.0001	0.0000	0.0001
GRAZ	11001M002B	4	W	4194423.8683	0.0001	0.0001	1162702.6425	0.0001	0.0002	4647245.3706	0.0001	0.0000	0.0001
HFLK	11006S003B	2	W	4248505.1010	0.0001	0.0001	855575.7006	0.0001	0.0003	4667172.2460	0.0001	0.0001	0.0001
INGR	00000M000	2	M	4646739.2736	0.0006	0.0028	1031416.5707	0.0002	0.0018	4231463.9649	0.0005	0.0011	0.0007
LAMP	12706M002	4	M	5073164.8071	0.0004	0.0015	1134512.5177	0.0001	0.0005	3683181.1023	0.0003	0.0011	0.0005
MARA	00000M000	2	M	4710293.1032	0.0008	0.0028	1323002.6063	0.0003	0.0012	4078383.0615	0.0007	0.0018	0.0011
MATE	12734M008C	4	W	4641949.6092	0.0001	0.0002	1393045.3716	0.0001	0.0004	4133287.4119	0.0001	0.0002	0.0001
MEDI	12711M003	4	W	4461400.7958	0.0001	0.0001	919593.5235	0.0001	0.0003	4449504.7280	0.0001	0.0001	0.0001
MERA	00000M000B	2	M	4301950.9327	0.0006	0.0006	848418.5654	0.0002	0.0003	4616835.7369	0.0006	0.0056	0.0009
MILO	00000M000	4	M	4911059.0081	0.0004	0.0018	1096340.2431	0.0001	0.0016	3906214.9629	0.0003	0.0013	0.0005
NOT1	12717M004D	4	M	4934546.2782	0.0014	0.0009	1321264.9593	0.0005	0.0011	3806456.0677	0.0011	0.0007	0.0018
NOVA	00000M000	4	M	4431899.1716	0.0004	0.0013	671367.1777	0.0001	0.0006	4522512.2169	0.0004	0.0018	0.0005
PADO	12750S001B	3	M	4388882.0809	0.0004	0.0013	924567.4131	0.0001	0.0011	4519588.6978	0.0004	0.0012	0.0005
PAVI	00000M000B	1	M	4444603.3624	0.0006	0.0000	714786.0538	0.0001	0.0000	4503373.2646	0.0006	0.0000	0.0009
PAVI	00000M000C	3	M	4444603.3135	0.0004	0.0025	714786.0470	0.0001	0.0011	4503373.2143	0.0004	0.0013	0.0005
PRAT	12760M001	4	M	4518264.2080	0.0004	0.0019	886376.6393	0.0001	0.0006	4399019.3063	0.0003	0.0014	0.0005
SFEL	00000M000A	1	M	4396376.7604	0.0006	0.0000	957869.5466	0.0002	0.0000	4505424.8049	0.0006	0.0000	0.0008
SFEL	00000M000B	3	M	4396376.7416	0.0004	0.0009	957869.5435	0.0001	0.0002	4505424.7846	0.0004	0.0011	0.0005
TGRC	00000M000B	4	M	4838808.9813	0.0004	0.0008	1355666.5779	0.0001	0.0006	3914997.2312	0.0003	0.0007	0.0005
TITO	00000M000	3	M	4668652.8033	0.0004	0.0011	1314383.3796	0.0001	0.0005	4129435.6084	0.0004	0.0007	0.0006

TORI	12724M002	4 M	4472544.3899	0.0004	0.0019	601634.2919	0.0001	0.0008	4492545.1587	0.0004	0.0016	0.0005
TREN	12753M001F	4 M	4349450.3139	0.0004	0.0012	855093.9930	0.0001	0.0004	4571025.6146	0.0004	0.0012	0.0006
UNPG	12752M001	4 M	4555145.7970	0.0003	0.0028	997822.3795	0.0001	0.0010	4337432.6897	0.0003	0.0010	0.0005
VENE	12741M001C	4 M	4379724.8081	0.0009	0.0008	957495.8355	0.0003	0.0009	4521605.2043	0.0010	0.0009	0.0013
VLUC	00000M000F	3 M	4704470.8203	0.0006	0.0013	1283989.3179	0.0002	0.0002	4097861.0312	0.0005	0.0014	0.0008
VOLT	00000M000A	1 M	4390693.1856	0.0006	0.0000	926138.4555	0.0002	0.0000	4517507.0063	0.0006	0.0000	0.0008
VOLT	00000M000B	3 M	4390693.1667	0.0004	0.0009	926138.4531	0.0001	0.0003	4517506.9865	0.0004	0.0009	0.0005
WTZR	14201M010B	4 W	4075580.6037	0.0001	0.0000	931853.7491	0.0001	0.0001	4801568.0993	0.0001	0.0001	0.0001
ZIMM	14001M004C	4 W	4331297.1038	0.0001	0.0000	567555.8290	0.0001	0.0000	4633133.8909	0.0001	0.0000	0.0001

5. Final results in ETRF89(2002.6): the ETRS89_2002_6_ITA.CRD file

STATION	DOMES	X(M)	Y(M)	Z(M)
AQUI	12757M001D	4592507.8692	1089876.0982	4276392.7612
BZRG	12751M001B	4312657.7783	864634.4151	4603844.2015
CAGL	12725M003	4893379.0828	772649.5064	4004181.9175
CAME	12754M001	4542009.4340	1058963.9843	4336932.7333
CARE	00000M000	4329506.9891	817636.4615	4599876.7302
CAVA	00000M000A	4372204.8952	975914.7208	4524895.1001
CAVA	00000M000B	4372204.8761	975914.7181	4524895.0785
COMO	12761M001	4398306.5579	704149.6016	4550154.4477
COSE	00000M000	4750531.8460	1390089.3219	4010089.4289
ELBA	12721M002	4616534.2003	831568.4064	4307569.7633
GENO	12712M002	4507892.6017	707621.2204	4441603.2858
GRAS	10002M006	4581691.1683	556114.5669	4389360.5553
GRAZ	11001M002B	4194424.1328	1162702.4501	4647245.1935
HFLK	11006S003B	4248505.3501	855575.5052	4667172.0655
INGR	00000M000	4646739.5178	1031416.3569	4231463.7725
LAMP	12706M002	5073165.0390	1134512.2846	3683180.8967
MARA	00000M000	4710293.3577	1323002.3900	4078382.8686
MATE	12734M008C	4641949.8691	1393045.1586	4133287.2216
MEDI	12711M003	4461401.0412	919593.3182	4449504.5410
MERA	00000M000B	4301951.1798	848418.3675	4616835.5547
MILO	00000M000	4911059.2452	1096340.0173	3906214.7624
NOT1	12717M004D	4934546.5238	1321264.7328	3806455.8676
NOVA	00000M000	4431899.4065	671366.9736	4522512.0295
PADO	12750S001B	4388882.3289	924567.2112	4519588.5132
PAVI	00000M000B	4444603.5989	714785.8491	4503373.0771
PAVI	00000M000C	4444603.5500	714785.8423	4503373.0268
PRAT	12760M001	4518264.4501	886376.4313	4399019.1173
SFEL	00000M000A	4396377.0096	957869.3444	4505424.6202
SFEL	00000M000B	4396376.9908	957869.3413	4505424.5999
TGRC	00000M000B	4838809.2322	1355666.3558	3914997.0344
TITO	00000M000	4668653.0590	1314383.1652	4129435.4168
TORI	12724M002	4472544.6202	601634.0858	4492544.9697
TREN	12753M001F	4349450.5599	855093.7929	4571025.4309
UNPG	12752M001	4555146.0429	997822.1699	4337432.5001
VENE	12741M001C	4379725.0578	957495.6341	4521605.0201
VLUC	00000M000F	4704471.0734	1283989.1018	4097860.8383
VOLT	00000M000A	4390693.4336	926138.2535	4517506.8216
VOLT	00000M000B	4390693.4147	926138.2511	4517506.8018
WTZR	14201M010B	4075580.8611	931853.5620	4801567.9248
ZIMM	14001M004C	4331297.3368	567555.6295	4633133.7062

6. Results of a Helmert Transformation between ETRF2000 (epoch 1989.0) and a realization of ETRF2002 in Italy (epoch2002.6)

FILE 1: FILE ETRF2000.SSC: ETRF2000SOLUTION EXPRESSED IN ETRS89 AT 1989.
FILE 2: FILE ETRF2002_89_UPA:ETRF2000SOLUTION IN ETRS89 AT 2002.6

LOCAL GEODETIC DATUM: IGS00
RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

station	DOMES	North (m)	East (m)	Up (m)	Flag
GRAS	10002M006	0.0017	0.0033	-0.0083	M
GRAZ	11001M002B	0.0030	0.0034	-0.0054	
MEDI	12711M003	0.0014	0.0081	-0.0056	
CAGL	12725M003	-0.0007	0.0078	0.0020	
MATE	12734M008C	0.0039	0.0033	-0.0034	M
BZRG	12751M001B	-0.0052	-0.0233	0.0297	
GENO	12712M002	-0.0129	-0.0037	-0.0151	
LAMP	12706M002	-0.0009	-0.0033	0.0006	
TORI	12724M002	0.0185	0.0053	0.0002	
WTZR	14201M010B	-0.0032	0.0056	-0.0064	
ZIMM	14001M004	0.0020	-0.0014	0.0001	M
	r.m.s.	0.0089	0.0105	0.0132	

NUMBER OF PARAMETERS : 6
NUMBER OF COORDINATES : 24
RMS OF TRANSFORMATION : 0.0119 M

PARAMETERS COMPUTED USING STATIONS FLAGGED WITH M :

TRANSLATION IN X : 0.1961 +- 0.0042 M
TRANSLATION IN Y : 0.2924 +- 0.0042 M
TRANSLATION IN Z : 0.0068 +- 0.0042 M
ROTATION AROUND X-AXIS: 0 0 0.0113 +- 0.0046 "
ROTATION AROUND Y-AXIS: - 0 0 0.0063 +- 0.0019 "
ROTATION AROUND Z-AXIS: 0 0 0.0055 +- 0.0017 "

7. ITRF2000 velocities used to map ITRF2000 coordinates of Reference Stations to Campaign Epochs

STATION	VX (M/Y)	VY (M/Y)	VZ (M/Y)	FLAG
CAGL 12725M003	-0.0122	0.0195	0.0116	ITR00
GRAS 10002M006	-0.0131	0.0189	0.0101	ITR00
GRAZ 11001M002	-0.0165	0.0182	0.0092	IGS00
HFLK 11006S003	-0.0134	0.0187	0.0111	ITR00
MATE 12734M008	-0.0176	0.0203	0.0141	IGS00
MEDI 12711M003	-0.0187	0.0200	0.0086	ITR00
WTZR 14201M010	-0.0151	0.0174	0.0097	IGS00
ZIMM 14001M004	-0.0138	0.0185	0.0100	ITR00

9. Table of station resets and labelling

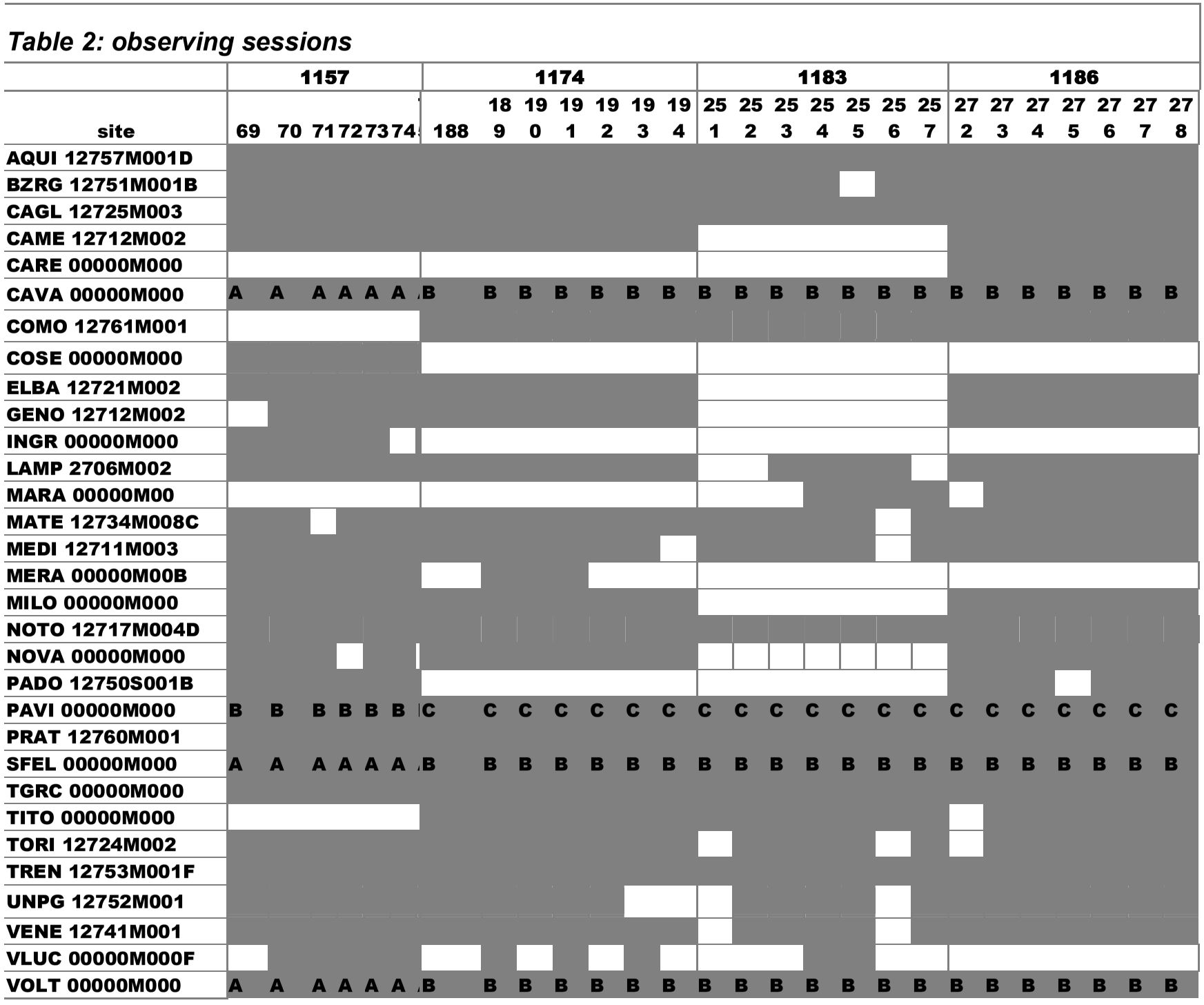
NAME	FROM						TO						
	YYYY	MM	DD	HH	MM	SS	YYYY	MM	DD	HH	MM	SS	GPSWEEK
AQUI 12757M001A	1992	1	1	0	0	0	2000	1	8	23	59	59	1043.5
AQUI 12757M001B	2000	1	9	0	0	0	2000	7	15	23	59	59	1070.5
AQUI 12757M001C	2000	7	16	0	0	0	2001	11	10	23	59	59	1139.5
AQUI 12757M001D	2001	11	11	0	0	0	2100	12	31	23	59	59	
BZRG 12751M001A	1992	1	1	0	0	0	2001	7	14	23	59	59	1122.5
BZRG 12751M001B	2001	7	15	0	0	0	2100	12	31	23	59	59	
CAVA 00000M000A	1992	1	1	0	0	0	2002	7	6	23	59	59	1173.5
CAVA 00000M000B	2002	7	7	0	0	0	2100	12	31	23	59	59	
COSE 00000M000	1992	1	1	0	0	0	2100	12	31	23	59	59	
GRAZ 11001M002A	1992	1	1	0	0	0	2001	6	2	23	59	59	1116.5
GRAZ 11001M002B	2001	6	3	0	0	0	2100	12	31	23	59	59	
HFLK 11006S003A	1992	1	1	0	0	0	1997	11	1	23	59	59	929.5
HFLK 11006S003B	1997	11	2	0	0	0	2100	12	31	23	59	59	
MATE 12734M008A	1992	1	1	0	0	0	1997	10	25	23	59	59	928.5
MATE 12734M008B	1997	10	26	0	0	0	1999	6	19	23	59	59	1014.5
MATE 12734M008C	1999	6	20	0	0	0	2100	12	31	23	59	59	
MERA 00000M000A	1992	1	1	0	0	0	2001	7	14	23	59	59	1122.5
MERA 00000M000B	2001	7	15	0	0	0	2100	12	31	23	59	59	
NOT1 12717M004A	1992	1	1	0	0	0	1997	11	8	23	59	59	930.5
NOT1 12717M004B	1997	11	9	0	0	0	1998	7	8	23	59	59	965.5
NOT1 12717M004C	1998	7	9	0	0	0	2000	9	16	23	59	59	1079.5
NOT1 12717M004D	2000	9	17	0	0	0	2100	12	31	23	59	59	
PAVI 00000M000A	1992	1	1	0	0	0	2002	1	12	23	59	59	1148.5
PAVI 00000M000B	2002	1	13	0	0	0	2002	3	16	23	59	59	1157.5
PAVI 00000M000C	2002	3	17	0	0	0	2100	12	31	23	59	59	
SFEL 00000M000A	1992	1	1	0	0	0	2002	7	6	23	59	59	1173.5
SFEL 00000M000B	2002	7	7	0	0	0	2100	12	31	23	59	59	
TGRC 00000M000A	1992	1	1	0	0	0	2001	9	29	23	59	59	1133.5
TGRC 00000M000B	2001	9	30	0	0	0	2100	1	1	0	0	0	
TREN 12753M001A	1992	1	1	0	0	0	1999	7	31	23	59	59	1020.5
TREN 12753M001B	1999	8	1	0	0	0	2000	1	1	23	59	59	1042.5
TREN 12753M001C	2000	1	2	0	0	0	2000	6	24	23	59	59	1067.5
TREN 12753M001D	2000	6	25	0	0	0	2001	8	25	23	59	59	1128.5
TREN 12753M001E	2001	8	26	0	0	0	2001	11	10	23	59	59	1139.5
TREN 12753M001F	2001	11	11	0	0	0	2100	1	1	0	0	0	
PADO 12750S001A	1997	12	28	0	0	0	2001	12	1	23	59	59	1142.5
PADO 12750S001B	2001	12	2	0	0	0	2100	12	31	23	59	59	
VENE 12741M001A	1992	1	1	0	0	0	1997	10	4	23	59	59	925.5
VENE 12741M001B	1997	10	5	0	0	0	2001	1	27	23	59	59	1098.5
VENE 12741M001C	2001	1	28	0	0	0	2100	12	31	23	59	59	
VLUC 00000M000A	1992	1	1	0	0	0	1999	12	11	23	59	59	1039.5
VLUC 00000M000B	1999	12	12	0	0	0	2000	5	6	23	59	59	1060.5
VLUC 00000M000C	2000	5	7	0	0	0	2000	6	3	23	59	59	1064.5
VLUC 00000M000D	2000	6	4	0	0	0	2000	7	22	23	59	59	1071.5
VLUC 00000M000E	2000	7	23	0	0	0	2001	9	22	23	59	59	1132.5
VLUC 00000M000F	2001	9	23	0	0	0	2100	12	31	23	59	59	
VOLT 00000M000A	1992	1	1	0	0	0	2002	7	6	23	59	59	1173.5
VOLT 00000M000B	2002	7	7	0	0	0	2100	12	31	23	59	59	

WTZR 14201M010A	1992	1	1	0	0	0	1997	11	1	23	59	59	929.5
WTZR 14201M010B	1997	11	2	0	0	0	2100	12	31	23	59	59	
ZIMM 14001M004A	1992	1	1	0	0	0	1997	11	1	23	59	59	929.5
ZIMM 14001M004B	1997	11	2	0	0	0	1998	11	7	23	59	59	1087.5
ZIMM 14001M004C	1998	11	8	0	0	0	2100	12	31	23	59	59	

Table 1 : Approximate coordinates, receiver and antenna types and antenna heights.

Site	lat (dd.ddd)	lon (ddd.ddd)	rcvr	ant	h_stru (m)
AQUI 12757M001	42.177	13.350	TRIMBLE 4700	TRM29659.00	0.0000
BZRG 12751M001	46.521	11.286	LEICA CRS1000	LEIAT504	0.2120
CAGL 12725M003	38.948	8.973	TRIMBLE 4000SSI	TRM29659.00	0.0450
CAME 12712M002	43.112	13.124	TRIMBLE 4000SSI	TRM29659.00	0.0000
CARE	46.425	10.694	TRIMBLE 4700	TRM29659.00	0.0533
CAVA	45.479	12.583	LEICA RS500	LEIAT504	0.0274
COMO 12761M001	45.802	9.096	TRIMBLE 4000SSI	TRM29659.00	0.1130
COSE	39.013	16.310	TRIMBLE 4000SSI	TRM29659.00	0.0000
ELBA 12721M002	42.753	10.211	TRIMBLE 4000SSI	TRM29659.00	0.0000
GENO 12712M002	44.527	8.921	TRIMBLE 4000SSI	TRM29659.00	0.0000
INGR	41.828	12.515	TRIMBLE 4000SSI	TRM29659.00	0.0000
LAMP 2706M002	35.318	12.606	TRIMBLE 4700	TRM29659.00	0.0000
MARA	40.004	15.689	TRIMBLE 4000SSI	TRM22020.00+GP	0.0000
MATE 12734M008	40.459	16.705	TRIMBLE 4000SSI	TRM29659.00	0.1010
MEDI 12711M003	44.328	11.647	TRIMBLE 4000SSI	TRM29659.00	0.0000
MERA	46.669	11.157	LEICA SR9500	LEIAT302-GP	0.0770
MILO	38.008	12.584	TRIMBLE 4000SSI	TRM29659.00	0.0000
NOTO	36.692	14.990	TRIMBLE 4000SSI	TRM29659.00	0.0000
NOVA	45.447	8.614	TRIMBLE 4000SSI	TRM29659.00	0.0000
PADO 12750S001	45.214	11.878	TRIMBLE 4700	TRM29659.00	0.0000
PAVI	45.203	9.136	TRIMBLE 4700	TRM29659.00	0.0000
PRAT 12760M001	43.693	11.099	TRIMBLE 4000SSI	TRM29659.00	0.0280
SFEL	45.230	12.291	LEICA RS500	LEIAT504	0.0270
TGRC	38.108	15.651	LEICA SR9500	LEIAT303	0.0420
TITO	40.601	15.724	TRIMBLE 4000SSI	TRM29659.00	0.0000
TORI 12724M002	44.871	7.661	TRIMBLE 4000SSI	TRM29659.00	0.0000
TREN 12753M001	45.880	11.122	TRIMBLE 4000SSI	TRM29659.00	0.0000
UNPG 12752M001	42.928	12.356	ASHTECH Z-XII3	ASH700936D_M	0.0520
VENE 12741M001	45.437	12.332	TRIMBLE 4700	TRM29659.00	0.0000
VLUC	40.041	15.266	LEICA SR9500	LEIAT302-GP	0.0000
VOLT	45.384	11.911	LEICA RS500	LEIAT504	0.0278

Table 2: observing sessions



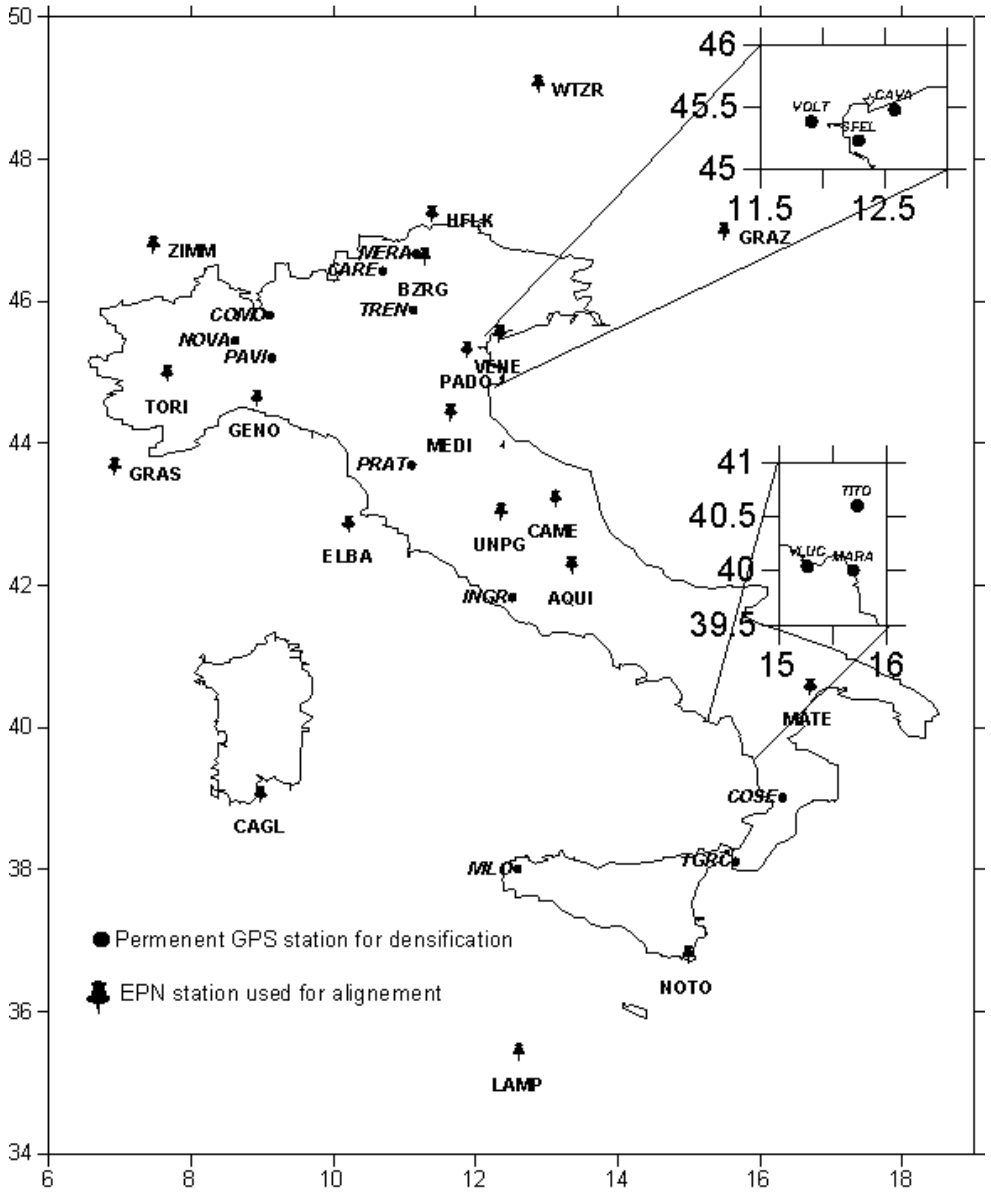


Figure 1 : location of all stations (EPN + 17 national stations). CAGL, GRAS, GRAZ, MATE, MEDI, HFLK,WTZR and ZIMM are constrained to align the network to ITRF2000.