1) INTRODUCTION

1.1) Objectives

The Bureau International de l'Heure (BIH) initiated in its Annual Report for 1984 the publication of a terrestrial reference frame based on a combination of the space geodetic data received from various analysis centers for the determination of Earth Rotation Parameters (ERP)

This work was directly inscribed in the frame of the MERIT/COTES project.

The initial rationale was to determine from comparisons of the terrestrial reference frames associated with individual ERP series the rotation angles which should correct them before combination into the BIH series (see for instance Boucher and Feissel, 1984).

The second output of this activity was to provide a conventional terrestrial frame consistent with the BIH ERP, named BIH Terrestrial System (BTS).

At the end of MERIT, the IAU and IUGG established a new service replacing both the BIH and IPMS. The International Earth Rotation Service (IERS) was formally in charge of the conventional celestial and terrestrial reference frames consistent with ERP series determined by this service. Consequently, the activity initiated for BIH continued for IERS. The purpose of this report is to present the evolution of this work, from 1985 to 1989, including all annual publications (BTS84 to 87, ITRF88) and the initial system ITRF-0, link from BIH to IERS, as well as a few recent test computations (ITRF88A and B).

1.2) Standard description of the combinations done by BIH and IERS

The combinations which will be discussed here have been done using a common scheme, but many changes have occured. In order to give the clearest picture of the evolutions in the successive solutions, we present here a standard description scheme.

The list of items is given in Table 1. We review here the successive solutions according to each item of this list. The specific informations are published for each solution in chapter 2.

The solutions will be numbered from X = 1 to 8. See Table 2.

1.2.1) Catalogue of sites and points

It is useful at this level to recall the terminology we use. Several of the items have been already described in the IERS Technical Note 1 (Boucher, Altamimi, 1989).

A site is an area of a few kilometers where one or several points are

Table 1

Standard description of a BIH/IERS solution

1) Input data

1.1) Catalogue of sites and points included in the solution, with description and occupancies

1.2) List of input data sets : stes of station coordinates (SSC) and set of excentricities for colocation sites

1.3) Detailed description of individual SSC
- 1.3.1) Identifiers
- 1.3.2) Description
- 1.3.3) Specific items for CTS
- 1.3.4) Raw data
- 1.3.5) Derived input data set (positions, velocities, epoch, variance-covariance)

1.4) Excentricities : values, variance, sources of data

2) Data analysis

2.1) Model

2.2) Adjusted parameters

2.3) Software

2.4) Constraints for
- 2.4.1) Origine
- 2.4.2) Scale
- 2.4.3) Orientation
- 2.4.4) Evolution with time

2.5) Procedure (if several steps)

3) Results

3.1) Values
- 3.1.1) Positions, velocities, epochs, variance
- 3.1.2) Transformation parameters
- 3.1.3) Individual realizations

3.2) Analysis of results
- 3.2.1) σ_o
- 3.2.2) Residuals by data sets
- 3.2.3) Residuals by stations
- 3.2.4) Transformation parameters and their variances

3.3) Comparisons with other solutions

Table 2

Summary of BIH/IERS solutions

X	Solution	Code	Nb. sites	Nb. R	Nb. M	Nb. L	Weighting	σ_o
1	BTS84	84	34	2	1	1	Values of analysis centers	4.3
2	BTS85	85	94	3	1	2	Values of analysis centers	5.9
3	BTS86	86	123	3	1	2	Values of analysis centers	2.7
4	BTS87	87	140	4	3	5	R > 1 cm L > 3 cm	1.7
5	ITRF-0	-0	63	2	0	2	Values of analysis centers	2.8
6	ITRF88	88	96	6	4	5	Values of analysis centers	5.5
7	ITRF88A	88A	96	3	3	2	R > 3 cm L > 4 cm M > 5 cm	1.3
8	ITRF88B	88B	96	2	1	2	R > 3 cm L > 4 cm M > 5 cm	1.3

occured. The site is identified by a 5 digits number, knowed as the DOMES number, initiated by the BIH during the MERIT campaign.

Table 3 gives the list of BIH/IERS sites (including 1989 sites). Pure Doppler sites are not included.

The points are of two kinds :

- geodetic markers (type M)

- reference point of a tracking system (type S): intersection of axis, phase center...

Again, two types of tracking systems exist :

- fixed systems (fixed VLBI antenna, fixed laser ranging system)

- mobile or transportable systems

In the first case, the reference point is of type S. In the second case, it is either of type S, or preferably of type M, a specific marker to which the instrument point (intersection of axis...) is accurately surveyed.

Both types of system can provide either a permanent (P) or temporary (T) tracking. The distinction is somewhat arbitrary. A regular tracking over one year is permanent, while a tracking during a few days to monthes is temporary. The following cases can occure :

System / Tracking	Fixed	Mobile
Permanent	Fixed system Permanently operating	Held permanently at a specific location
Temporary	Fixed equipement with system installed on a temporary basis (ex. TVDS for VLBI)	Mobile equipement at a specific occupancy (mobile SLR or VLBI)

An occupancy of a point is the period during which a tracking system in a specific state is continuously operating and fixed at a specific location.

The standard types of occupancies are :

- fixed system permanently tracking (S). The period covers all the time from the begining of the operation to the end or to a change of the system (e.g. upgrade of a laser)

- same case for a mobile equipment held at a fixed location (S or M)

- fixed system with temporary tracking (S). The occupancy is the period of operational tracking.

- mobile system temporary tracking at a given location (M or S by default). The occupancy is the one of the fixed marker by the system.

Following the IERS Technical Note 1, (P. 6) we define a <u>tracking point</u> as a point as used with a specific technique. We can have :

- intersection of axis of a fixed or mobile VLBI system (S)

- intersection of axis of a fixed or mobile SLR system (S)

- intersection of axis of a LLR system (S)

- mark of a mobile VLBI system (M)

- mark of a mobile SLR system (M)

- mark of a mobile LLR system (M)

The tracking points are those which should be primarly inventoried at each site. Other marks used for complementary monumentation, calibration or footprints for local stability surveys, can also be considered here.

It is also worthwhile to note that the relative position of the tracking points at a site has to be accurately known in order to compare or combine coordinates of these points, as derived from individual solutions. We currently distinguish the following types of sites :

- site with one tracking point (VLBI, SLR or LLR)

- site with two or more tracking points of the same technique

- site with tracking points of at least two techniques, or colocation (C).

In these conditions, two tracking points can be identical to a unique physical point : the intersection of axis of a laser system having both satellite and lunar capability, or a mark occupied successively by a mobile SLR and a mobile VLBI.

Finally, the concept of <u>primary</u> (P) site, by opposition to <u>secondary</u> (S), was introduced in IERS Technical Note 1 (p. 5-6).

A primary site is defined for a specific period, during which one can estimate in the ITRS its position at centimeter level. It is suggested in this report to estimate the Accuracy of Monthly Position (AMP). Consequently, during the period where the site is primary, AMP value is around 1 cm.

This can be guaranteed by tracking of VLBI (S/X Mark 3) or SLR (3rd generation), either permanent, or temporary with multiple occurences which permit interpolation at the cm level. The Knowledge of the site motion also enables us to extrapolate before the begining of the tracking, and after the end or the present epoch (extrapolation in the future) the position estimate for a few monthes or years, although unknown irregularities which may occure during this extrapolation period let these estimation somewhat speculative. A more strict definition of primary should constrain to stay between the measurement epochs.

Several catalogues were published by BIH and IERS.

For the BIH period, the catalogue was known as Directory of MERIT Sites (DOMES). It included all participating sites, for techniques used by BIH or the MERIT/COTES campaigns. In addition to VLBI (R), SLR (L) and LLR (M), it included optical astrometry (A) for instruments belonging to the BIH/IPMS network, connected element radio interferometry (CERI) for Greenbank, and NNSS Doppler tracking (D), which included TRANET and MEDOC networks, together with portable Doppler system which contributed to colocation with other techniques. The technique codes given in paranthesis will be used extensively in this report see (Table 4). Several editions of DOMES were published (note interne du BIH n. 2 3, 4 and 5, (Altamimi et al, 1985, 1986, 1987 and 1988).

For IERS, a catalogue of primary stations is given in IERS Technical Note 1, pp. 16-19. A complete catalogue of IERS stations will be available on various formats and media (paper, floppy disk...), derived from a data base established at IGN, Paris by the TRFS of the IERS.

Table 2 gives the number of sites for each combination. The BIH solution includes VLBI, LLR, SLR, but also Doppler sites, while the IERS solution only contains VLBI, LLR and SLR sites.

As all LLR sites are also SLR sites, we have given for each solution a map including VLBI and SLR sites with different codes. Double occurence indicates a colocation. These maps are given in chapter 2.

1.2.2) Input SSC

Table 5 gives a summary of Sets of Station Coordinates (SSC) as provided by the analysis centers from 1984 to 1988 to BIH and IERS. The standard labeling of the raw data is defined in. It uses a standard analysis center code given in Table 6.

The SSC are also described for each solution in Chapter 2. Detailed descriptions were published also in BIH Annual Report for 1984, 1985, 1986, 1987 and in IERS Technical Note 2, for 1988.

Table 3

List of IERS sites

DOMES Number	Name	Country	Long. d	Long. m	Lat. d	Lat. m	Plate	Status
10002	GRASSE	France	6	55	43	45	EURA	PC
10004	BREST	France	355	30	48	24	EURA	S
10302	TROMSO	Norway	18	56	69	40	EURA	S
10402	ONSALA	Sweden	11	55	57	24	EURA	P
10405	MARTSBO	Sweden	17	16	60	36	EURA	S
10503	METSAHOVI	Finland	24	23	60	13	EURA	S
11001	GRAZ	Austria	15	30	47	04	EURA	P
12205	BOROWIEC	Poland	17	04	52	17	EURA	S
12302	RIGA	URSS	24	04	56	57	EURA	S
12337	SIMEIS-KATZIVELY	URSS	33	58	44	24	EURA	S
12602	DIONYSOS	Greece	23	56	38	05	EURA	S
12612	ASKITES	Greece	25	34	40	56	EURA	S
12613	ROUMELLI	Greece	24	42	35	24	EURA	P
12614	KARITSA	Greece	20	40	39	44	EURA	S
12615	KATAVIA	Greece	27	47	35	57	EURA	S
12616	XRISOKALARIA	Greece	21	53	36	47	EURA	S
12706	LAMPEDUSA	Italy	12	34	35	31	EURA	S
12711	BOLOGNA	Italy	11	21	44	29	EURA	PC
12717	NOTO	Italy	14	59	36	53	EURA	S
12718	TRIESTE	Italy	13	53	45	39	EURA	P
12725	CAGLIARI	Italy	9	00	39	08	EURA	S
12734	MATERA	Italy	16	37	40	42	EURA	P
13201	CHILBOLTON	UK	358	37	51	11	EURA	S
13212	HERSTMONCEUX	UK		21	50	52	EURA	P
13296	CARNUTSY	UK	357	13	56	29	EURA	S
13407	MADRID	Spain	355	44	40	26	EURA	P
13504	KOOTWIJK	Netherlands	5	49	52	11	EURA	S
13506	WESTERBORK	Netherlands	6	36	52	55	EURA	S
14001	ZIMMERWALD	Switzerland	7	28	46	53	EURA	P
14005	MONTE GENEROSO	Switzerland	9	01	45	56	EURA	S
14106	POTSDAM	GDR	13	04	52	23	EURA	P
14201	WETTZELL	FRG	12	53	49	09	EURA	PC
14202	HOHENBUNSTORF	FRG	10	29	53	03	EURA	S
14209	EFFELSBERG	FRG	6	53	50	32	EURA	S
20702	BAR GIYYORA	Israel	35	05	31	43	AFRC	P
20801	DIYARBAKIR	Turkey	40	12	37	55	EURA	S
20802	YOZGAT	Turkey	34	49	39	48	EURA	S
20803	MELENGICLICK	Turkey	33	11	37	23	EURA	S
20804	YIGILCA	Turkey	31	26	40	56	EURA	S
21602	WUHAN	China	114	20	30	32	EURA	S
21605	SHANGHAI	China	121	26	31	01	EURA	PC
21701	KASHIMA	Japan	140	40	35	57	NOAM	P
21709	OKINAWA	Japan	127	43	26	08	EURA	S
21725	NOBEYAMA	Japan	138	28	35	56	EURA	S
21726	SIMOSATO	Japan	135	56	33	34	EURA	P
21732	CHICHIJIMA	Japan	142	13	27	06	EURA	S
21733	MINAMI TORI SHIMA	Japan	153	59	24	17	PCFC	S

21735	TSUSHIMA	Japan	129	25	34	24	EURA	S
21736	ISHIGAKI SHIMA	Japan	124	10	24	21	EURA	S
30101	HELWAN	Egypt	31	21	29	52	AFRC	S
30302	JOHANNESBURG	S. Africa	27	42	-25	53	AFRC	P
40104	ALGONQUIN	Canada	281	56	45	57	NOAM	S
40105	PENTICTON	Canada	240	23	49	19	NOAM	S
40118	WHITEHORSE	Canada	224	55	60	44	NOAM	S
40127	YELLOWKNIFE	Canada	245	32	62	29	NOAM	S
40400	PASADENA	USA	241	50	34	12	PCFC	PC
40403	PALOS VERDES	USA	241	36	33	45	PCFC	P
40404	PEARBLOSSOM	USA	242	05	34	31	PCFC	S
40405	GOLDSTONE	USA	243	06	35	20	NOAM	PC
40406	SAN FRANCISCO	USA	237	33	37	48	NOAM	P
40407	PINYON FLATS	USA	243	33	33	26	PCFC	S
40408	FAIRBANKS	USA	212	29	64	58	NOAM	P
40410	POINT REYES	USA	237	04	38	06	PCFC	P
40412	AUSTIN	USA	262	20	30	25	NOAM	S
40416	YAKATAGA	USA	217	31	60	05	NOAM	P
40417	PATRICK AFB	USA	279	24	28	14	NOAM	S
40419	KODIAK	USA	207	30	57	44	NOAM	P
40420	VANDENBERG AFB	USA	239	26	34	35	PCFC	PC
40421	NOME	USA	194	38	64	34	NOAM	S
40423	SANDPOINT	USA	343	31	55	21	NOAM	P
40424	KAUAI	USA	200	20	22	08	PCFC	P
40425	SOURDOUGH	USA	214	31	62	40	NOAM	S
40427	FORT ORD	USA	238	14	36	29	PCFC	P
40428	SANTA PAOLA	USA	241	00	34	12	PCFC	P
40430	BLACK BUTTE	USA	244	17	33	40	NOAM	P
40431	DEADMAN LAKE	USA	243	43	34	15	NOAM	P
40432	ELY	USA	244	55	39	19	NOAM	S
40433	QUINCY	USA	239	04	39	58	NOAM	PC
40434	MOUNT HOPKINS	USA	249	07	31	41	NOAM	S
40436	SAN DIEGO	USA	243	10	32	36	PCFC	S
40437	MAMMOTH LAKES	USA	241	04	37	38	NOAM	S
40438	BEAR LAKE	USA	248	35	41	56	NOAM	S
40439	OWENS VALLEY	USA	241	22	37	14	NOAM	PC
40440	WESTFORD	USA	288	31	42	37	NOAM	PC
40441	GREENBANK	USA	280	10	38	26	NOAM	S
40442	FORT DAVIS	USA	255	59	30	40	NOAM	PC
40445	MAUI	USA	203	44	20	43	PCFC	PC
40449	OCOTILLO	USA	244	12	32	47	PCFC	S
40451	WASHINGTON	USA	282	56	38	55	NOAM	P
40452	BLOOMINGTON	USA	273	30	39	11	NOAM	S
40453	CARROLLTON	USA	274	53	33	34	NOAM	S
40454	LEONARD	USA	264	12	35	55	NOAM	S
40455	MILES CITY	USA	254	08	46	24	NOAM	S
40456	PIETON	USA	251	53	34	18	NOAM	S
40457	SEATLE	USA	237	45	47	41	NOAM	S
40489	HAT CREEK	USA	238	32	40	49	NOAM	P
40490	MARYLAND POINT	USA	282	46	38	22	NOAM	P
40491	FLAGSTAFF	USA	258	22	35	13	NOAM	PC
40492	VERNAL	USA	250	26	40	20	NOAM	SC
40493	YUMA	USA	245	48	32	56	NOAM	PC
40496	PLATTEVILLE	USA	255	16	40	11	NOAM	PC
40497	MONUMENT PEAK	USA	243	35	32	54	PCFC	PC

40499	RICHMOND	USA	279	37	25	37	NOAM	PC
40504	MAZATLAN	Mexico	253	33	23	14	NOAM	P
40505	CABO SAN LUCAS	Mexico	250	08	22	55	PCFC	S
40506	ENSENADA	Mexico	243	50	31	15	PCFC	S
40701	SANTIAGO DE CUBA	Cuba	284	14	20	01	NOAM	S
41604	NATAL	Brazil	324	40	-5	56	SOAM	S
41703	EASTER ISLAND	Chile	250	34	-27	11	NAZC	P
41705	SANTIAGO	Chile	289	20	-33	09	SOAM	S
41706	CERRO TOLOLO	Chile	289	12	-30	10	SOAM	S
42202	AREQUIPA	Peru	288	30	-16	28	SOAM	P
42501	BERMUDA	UK	295	21	32	21	NOAM	S
43602	GRAND TURK	Bahama Is.	288	42	21	28	SOAM	S
50103	CANBERRA	Australia	148	59	-35	35	INDI	PC
50107	YARRAGADEE	Australia	115	25	-29	05	INDI	P
50116	HOBART	Australia	147	26	-42	48	INDI	S
50503	AMERICAN SAMOA	USA	189	17	-14	20	PCFC	S
50505	KWAJALEIN ATOLL	USA	167	29	9	24	PCFC	SC
92202	HUAHINE	France	208	58	-16	44	PCFC	P

P: Primary S: Secondary C: Colocation

Table 4

Codes for techniques

A	Optical Astrometry
C	Combination
D	Doppler
E	Excentricity
G	Terrestrial geodesy
L	SLR
M	LLR
P	GPS
R	VLBI

Table 5

Input SSC used in BIH/IERS solutions

Technique	Analysis center	Raw set	Input set
R	N	SSC(NGS) 83 R 01	RN84
		SSC(NGS) 85 R 02	RN85
		SSC(NGS) 87 R 01	RN86
		SSC(NGS) 88 R 01	RN87, RN-0
		SSC(NGS) 89 R 01	RN88, RN88A, RN88B
R	J	SSC(JPL) 83 R 05	RJ84, RJ85, RJ86,RJ87
		SSC(JPL) 89 R 02	RJ88, RJ88A
R	G	SSC(GSFC) 84 R 01	RG85
		SSC(GSFC) 87 R 01	RG86
		SSC(GSFC) 88 R 01	RG87, RG-0
		SSC(GSFC) 89 R 03	RG88, RG88A, RG88B
R	S	SSC(SO) 88 R 01	RS87
		SSC(SO) 89 R 01	RS88
R	M	SSC(NAMOZ)89 R 01	RM88
M	J	SSC(JPL) 84 M 02	MJ84
		SSC(JPL) 86 M 02	MJ85
		SSC(JPL) 87 M 01	MJ86
		SSC(JPL) 88 M 01	MJ87
		SSC(JPL) 89 M 01	MJ88, MJ88A, MJ88B
M	S	SSC(SO) 86 M 01	MS87, MS88
M	E	SSC(CERGA)88 M 01	ME87
		SSC(CERGA)89 M 01	ME88, ME88A
M	X	SSC(UTXMO)89 M 01	MX88, MX88A
L	C	SSC(CSR) 84 L 01	LC84
		SSC(CSR) 84 L 01	
		and 85 L 07	LC85
		SSC(CSR) 86 L 01	LC86
		SSC(CSR) 88 L 01	LC87, LC-0
		SSC(CSR) 89 L 02	LC88, LC88A, LC88B
L	D	SSC(DGFII)87 L 01	LD86
		SSC(DGFII)87 L 03	LD87
L	G	SSC(GSFC) 87 L 14	LG87, LG-0
		SSC(GSFC) 88 L 01	LG88, LG88A, LG88B
L	S	SSC(SO) 87 L 01	LS87
		SSC(SO) 88 L 01	LS88
L	U	SSC(DUT) 87 L 04	LU87
		SSC(DUT) 89 L 01	LU88
L	Z	SSC(ZIPE) 87 L 01	LZ88

Table 6

Codes for Analysis Centers

One-letter	Standard	Designation
B	BIH	Bureau International de l'Heure
C	CSR	Center for Space Research, University of Texas
D	DGFII	Deutsches Geodatisches Forschunginstitut,Abt. 1
E	CERGA	Centre d'Etude et de Recherches Géodinamiques et Astronomiques
G	GSFC	Goddard Space Flight Center
I	IERS	International Earth Rotation Service
J	JPL	Jet Propulsion Laboratory
K	GAOUA	Main Astronomical Observatory of the Ukrainian Academy of Science
L	LPAC	Astronomical Council of USSR
M	NAOMZ	National Astronomical Observatory, Mizusawa branch
N	NGS	National Geodetic Survey
O	USNO	United States Naval Observatory
R	GRGS	Groupe de Recherches de Géodésie Spatiale
S	SO/SHA	Shanghai Observatory
U	DUT	Delft University of Technology
X	UTXMO	Dept. of Astron. The University of Texas at Austin
Z	ZIPE	Zentralinstitut fur Physik der Erde

Each raw SSC is used for at least one or sometimes several combinations, either in case of test computations (e.g. 88, 88A and 88B) or when no new solution has been provided by a particular analysis center, and therefore the same has been used.

This is illustrated in Table 5, where specific labels are given to a SSC used as input for a combination.

These labels can be applied to input sets or results. The designation is :

X Y ZZ

where

X is the technique code (see Table 4)
Y is the analysis center code (see Table 6)
ZZ is the solution code (see Table 2)

The transformation from a raw SSC to an input set can comprize several steps:

- correction of reference epoch, when the raw data are given for an epoch different from the adopted epoch. The SSC which are concerned by this correction are mentionned in chapter 2, for each solution.

- correction of permanent tide (not used up to now)

- change of the variance, or adoption if the raw data does not provide it.

This change is necessary, because the given values are formal errors, while actual errors are required to optimize the least square combination.

The reweighting which has been done for each solution is given in Table 2.

In addition, the number of input SSC for each type (R,M,L) is also given in Table 2.

1.2.3) Local excentricities

Sources of excentricities are given for each solution in chapter 2.

For BIH computations, these data were available in the DOMES catalogue, which was published from the data base managed by IGN for BIH. The local excentricities were stored for each site relative to a particular point, referred as reference point. This is true up to ITRF-0. No variances were used, because these data were used as fixed in the computation (see below).

For ITRF88, A and B, used values can be found in appendix 3.

1.2.4.) Model

The model used is described in (Boucher, Feissel, 1984)

A first software was developped by IGN (GBIHMT) which used both SSC and ERP as data. All data are assumed to be at a same epoch. Adjusted parameters are:

- cartesian coordinates of the reference point at each site, local survey ties being used to reduce each tracking point to this reference,

- 7 transformation parameters (some of them can be fixed) for each system (one or several SSC or ERP can be referred to this system),

- ERP for each 0.05 year, during a selected time span (these values can be constrained to a specific series, which provides an orientation constraint).

This procedure was used for BIH and ITRF-0.

From ITRF88, results are obtained by a new software (SSCMIX) also developped by IGN with much more possibilities. Those which have been actually used for 88, A and B and which differ from previous options are:

- ERP are no longer used,

- local surveys are introduced with their variances,

- all points are therefore adjusted, and reference points are no longer necessary. Only points which occure in at least one SSC are considered.

The constraints for datum definition are explained for each solution in chapter 2.

For the origin (resp. the scale), three methods has been used:

a) to fix translation (resp. scale) parameters for one SSC,

b) idem for more than one SSC,

c) idem for an additional SSC used as a priori values

For the orientation, the three methods can be used for rotation angles, and in addition :

d) to fix constraints on adjusted ERPs.

Table 7 gives a summary of constraints.

1.2.5) Results

Details on published results can be found in chapter 2 for each solution.

The general features can be summarized as follow:

- cartesian coordinates were published first for only reference points (BTS84, 85, 86) then both for reference and tracking points (BTS87 and ITRF-0) and then only for tracking points (ITRF88, A and B),

- the permanent tidal correction has not been applied, while IERS Standards recommend it. It is given independently in IERS Technical Note 1 for primary sites (Table 2 p. 13),

- for BTS84 and 85, positions are referred to average individual epochs for each site, for BTS86 and 87, all sites are referred to epoch 1984.0, and from ITRF-0, they are referred to 1988.0.

- although input SSC are referred to the common reference epoch used for the adjustment, the time evolution assigned to the combined system has no influence on the adjustment, but only on the value of adjusted positions for epochs different from the reference epoch. In all cases, AMO-2 has been selected for velocity field.

Table 7

Constraints for datum definition

Solution	Origin	scale	orientation
BTS84	(b) for LC and MJ	(a) for LC	(d) for BIH 83 series
BTS85	(b) for LC and MJ	(a) for LC	(d) for BIH 84 series
BTS86	(b) for LC and MJ	(a) for LC	(d) for BIH 85 series
BTS87	(b) for LC, MJ, ME, MS	(b) for LC and LG	(c) for BTS86 and (d) for BIH 86 series
ITRF-0	(c) for BTS87	(c) for BTS87	(c) for BTS87
ITRF88	(c) for ITRF-0	(c) for ITRF-0	(c) for ITRF-0
ITRF88A	(c) for ITRF-0	(c) for ITRF-0	(c) for ITRF-0
ITRF88B	(a) for LC	(a) for LC	(a) for LC

1.3) Quality control

The quality control of each solution can be realized through several criteria :

1 : internal quality of a solution

1.1 : factor of unit variance

1.2 : formal error (scaled or unscaled) for coordinates

1.3 : formal error (scaled or unscaled) for transformation parameters

1.4 : weighted (or unweighted) RMS residuals for each SSC

1.5 : weighted (or unweighted) RMS residuals for each site

2 : external quality (comparison with previous solutions)

2.1 : comparison of the combined solutions

2.2 : closure error between changes in transformation parameters for successive solutions of a specific analysis center, and their direct comparison.

Items 1.3 and 2 are presented in chapter 3.

Item 1.1 is given in Table 2. This indicator is related to two effects:

- proper a priori weighting of input data, which is related to 1.4 for individual SSCs, and to 1.5 for weighting of local survey data,

- possible outliers in SSC (see 1.4) or local excentricities (see 1.5).

Item 1.2 is given in tables 8 and 9, which give a summary of coordinates from the various solutions for a standard sample of 6 stations (Hartebeestock, Fort Davis, Wettzell, Simosato, Arequipa, Canberra).

Items 1.4 and 1.5 were not computed here. Only a list of residuals for each site of ITRF-0 is published in the IERS Technical Note 1 (Appendix 4).

1.4) Access to BTS/ITRF

Several ways exist for users to have access to BTS/ITRF (B/I).

The most current procedures are :

1) to use a frame expressed in B/I and make a geodetic connection or densification by a terrestrial or spatial technique (e.g. GPS).

Two major cases:

1.1) direct use of the B/I frame with combined coordinates,

1.2) use of a frame corresponding to stations belonging to a unique data set from a specific analysis center (i.e. SLR or VLBI), and using as B/I coordinates the corresponding SSC transformation into B/I by the adjusted transformation formula.

2) to use a frame in one of the individuals SSC and make densification or connection as in 1). Then apply to the determined coordinates the transformation formula from this SSC to B/I.

3) to transform position from a system S into B/I using a specified formula (or from S to a specific SSC, and then from this SSC to B/I using the corresponding formula).

For instance a standard formula was published in the BIH Annual Report for 1987 between BTS87 and WGS84.

The adopted model for transformation of coordinates from reference system 1 into reference system 2 uses 7 parameters which are applied using the following formula :

$$\begin{vmatrix} X2 \\ Y2 \\ Z2 \end{vmatrix} = \begin{vmatrix} X1 \\ Y1 \\ Z1 \end{vmatrix} + \begin{vmatrix} T1 \\ T2 \\ T3 \end{vmatrix} + \begin{vmatrix} D & -R3 & R2 \\ R3 & D & -R1 \\ -R2 & R1 & D \end{vmatrix} \begin{vmatrix} X1 \\ Y1 \\ Z1 \end{vmatrix}$$

Example : the 7 transformation parameters from BTS87 to WGS84 are :

T1 = 0.071 m
T2 = -0.509 m
T3 = -0.166 m

D = -0.0173×10^{-6}

R1 = 0.0179 "
R2 = -0.0005 "
R3 = 0.0067 "

Table 8

Solutions for a sample of stations

I : Raw data

Notes :

- for each station this table gives:
  * the coordinates in the combined solution,
  * the original coordinates in 3 individual solutions (RN : VLBI NGS, RG : VLBI GSFC and LC : SLR CSR)
  * the transformed coordinates (T) in the corresponding combined solution using the transformation parameters between the combined solution and the individual one,

- USX : unscaled standard deviation on X,

- SSX : scaled standard deviation on X, in the case of combined solutions and a priori value adopted in the combination, in the case of individual solution.

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Solution Date	point	X (m) USX(m)	SSX(m)	Y (m) USY(m)	SSY(m)	Z (m) USZ(m)	SSZ(m)
BTS84	Ref	-4466609.379		2683169.487		-3667428.461	
		±0.035	(0.152)	±0.057	(0.247)	±0.043	(0.186)
	exc.	19060.843		-6035.322		-27568.432	
		------------		------------		------------	
	7943	-4447548.536		2677134.165		-3694996.893	
LC84	7943	-4447548.428		2677134.087		-3694997.055	
		±0.034	(0.034)	±0.056	(0.056)	±0.045	(0.045)
LC84(T)	7943	-4447548.524		2677134.111		-3694997.922	
BTS85	Ref	-4466609.899		2683169.893		-3667428.760	
		±0.021	(0.124)	±0.025	(0.150)	±0.023	(0.137)
	exc.	19061.118		-6035.390		-27568.117	
		------------		------------		------------	
	7943	-4447548.781		2677134.503		-3694996.877	
LC85	7943	-4447548.428		2677134.087		-3694997.055	
		±0.034	(0.034)	±0.056	(0.056)	±0.045	(0.045)
LC85(T)	7943	-4447548.466		2677134.179		-3694996.942	

BTS86	**Ref**	-4466609.542		2683169.672		-3667428.698	
1984.0		±0.012	(0.034)	±0.016	(0.043)	±0.014	(0.037)
	exc.	19061.118		-6035.390		-27568.117	
		------------		------------		------------	
	7943	-4447548.424		2677134.282		-3694996.815	
1988.0	7943	-4447548.568		2677134.270		-3694996.647	
LC86	7943	-4447548.398		2677134.198		-3694996.878	
1983.0		±0.018	(0.018)	±0.024	(0.024)	±0.020	(0.020)
1984.0	7943	-4447548.434		2677134.195		-3694996.836	
LC86(T)	7943	-4447548.436		2677134.181		-3694996.844	
1984.0							
1988.0	7943	-4447548.580		2677134.169		-3694996.676	
BTS87	7943	-4447548.581		2677134.104		-3694996.794	
1984.0		±0.012	(0.020)	±0.013	(0.022)	±0.012	(0.020)
1988.0	7943	-4447548.725		2677134.092		-3694996.626	
LC87	7943	-4447548.402		2677134.195		-3694996.869	
1983.0		±0.007	(0.030)	±0.008	(0.030)	±0.007	(0.030)
1984.0	7943	-4447548.438		2677134.192		-3694996.827	
LC87(T)	7943	-4447548.533		2677134.050		-3694996.816	
1984.0							
1988.0	7943	-4447548.677		2677134.038		-3694996.648	
ITRF-0	7943	-4447548.802		2677134.104		-3694996.661	
1988.0		±0.041	(0.114)	±0.039	(0.109)	±0.040	(0.113)
LC-0	7943	-4447548.402		2677134.195		-3694996.869	
1983.0		±0.007	(0.007)	±0.008	(0.008)	±0.007	(0.007)
1988.0	7943	-4447548.582		2677134.180		-3694996.659	
LC-0(T)	7943	-4447548.697		2677134.031		-3694996.659	
1988.0							
ITRF88	7943	-4447548.848		2677134.080		-3694996.708	
1988.0		±0.030	(0.165)	±0.029	(0.159)	±0.033	(0.182)
RG88	1545	-4460933.406		2682764.817		-3674381.113	
1988.0		±0.015	(0.015)	±0.011	(0.011)	±0.010	(0.010)
	exc.	13386.172		-5631.623		-20614.965	
		------------		------------		------------	
	7943	-4447547.234		2677133.194		-3694996.078	
RG88(T)		-4447548.857		2677134.081		-3694996.747	
1988.0							
LC88	7943	-4447548.581		2677134.298		-3694996.587	
1988.0		±0.013	(0.013)	±0.015	(0.015)	±0.014	(0.014)
LC88(T)	7943	-4447548.748		2677134.003		-3694996.691	
1988.0							

ITRF88A	7943	-4447548.805		2677134.068		-3694996.607	
1988.0		±0.032	(0.042)	±0.031	(0.040)	±0.034	(0.044)
RG88A	1545	-4460933.406		2682764.817		-3674381.113	
1988.0		±0.015	(0.030)	±0.011	(0.030)	±0.010	(0.030)
	exc.	13386.172		-5631.623		-20614.965	
		------------		------------		------------	
	7943	-4447547.234		2677133.194		-3694996.078	
RG88A(T)	7943	-4447548.906		2677134.061		-3694996.816	
1988.0							
LC88A	7943	-4447548.581		2677134.298		-3694996.587	
1988.0		±0.013	(0.040)	±0.015	(0.040)	±0.014	(0.040)
LC88A(T)	7943	-4447548.727		2677134.015		-3694996.648	
1988.0							
ITRF88B	7943	-4447548.832		2677134.082		-3694996.651	
1988.0		±0.022	(0.029)	±0.022	(0.029)	±0.022	(0.029)
RG88B	1545	-4460933.406		2682764.817		-3674381.113	
1988.0		±0.015	(0.030)	±0.011	(0.030)	±0.010	(0.030)
	exc.	13386.172		-5631.623		-20614.965	
		------------		------------		------------	
	7943	-4447547.234		2677133.194		-3694996.078	
RG88B(T)	7943	-4447548.874		2677134.039		-3694996.736	
1988.0							
LC88B	7943	-4447548.581		2677134.298		-3694996.587	
1988.0		±0.013	(0.040)	±0.015	(0.040)	±0.014	(0.040)
LC88B(T)	7943	-4447548.727		2677134.015		-3694996.648	
1988.0							

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Solution	point	X (m) USX(m)	SSX(m)	Y (m) USY(m)	SSY(m)	Z (m) USZ(m)	SSZ(m)
BTS84							
BTS85	Ref	-3822386.981		3699362.254		3507572.553	
	exc.	-1.258		1.216		1.161	
		------------		------------		------------	
	7838	-3822388.239		3699363.470		3507573.714	
LC85	7838	-3822388.295		3699363.512		3507572.967	
		±0.067	(0.067)	±0.061	(0.061)	±0.057	(0.057)
LC85(T)	7838	-3822388.235		3699363.455		3507573.092	
BTS86	Ref	-3822373.208		3699359.899		3507585.773	
1984.0		±0.021	(0.057)	±0.021	(0.057)	±0.021	(0.057)
	exc.	-14.966		3.681		-12.682	
		------------		------------		------------	
	7838	-3822388.174		3699363.580		3507573.091	
1988.0	7838	-3822388.262		3699363.536		3507573.039	
LC86	7838	-3822388.041		3699363.730		3507573.066	
1983.0		±0.021	(0.021)	±0.021	(0.021)	±0.021	(0.021)
1984.0	7838	-3822388.063		3699363.719		3507573.053	
LC86(T)	7838	-3822388.195		3699363.561		3507573.076	
1984.0							
1988.0	7838	-3822388.283		3699363.517		3507573.024	
BTS87	Ref	-3822386.991		3699362.259		3507572.965	
1984.0		±0.016	(0.028)	±0.016	(0.027)	±0.016	(0.028)
	exc.	-1.258		1.216		1.161	
		------------		------------		------------	
	7838	-3822388.249		3699363.475		3507573.126	
1988.0	7838	-3822388.337		3699363.431		3507573.074	
LC87	7838	-3822388.035		3699363.759		3507573.109	
1983.0		±0.006	(0.030)	±0.006	(0.030)	±0.006	(0.030)
1984.0	7838	-3822388.057		3699363.748		3507573.096	
LC87(T)	7838	-3822388.284		3699363.473		3507573.138	
1984.0							
1988.0	7838	-3822388.372		3699363.429		3507573.086	
ITRF-0	7838	-3822388.379		3699363.442		3507573.085	
1988.0		±0.029	(0.082)	±0.029	(0.081)	±0.035	(0.098)
LC-0	7838	-3822388.035		3699363.759		3507573.109	
1983.0		±0.006	(0.006)	±0.006	(0.006)	±0.006	(0.006)
1988.0	7838	-3822388.145		3699363.704		3507573.044	

LC-0(T) 1988.0	7838	-3822388.379		3699363.429		3507573.082	
ITRF88 1988.0	7838	-3822388.405 ±0.020	(0.110)	3699363.434 ±0.019	(0.105)	3507573.079 ±0.031	(0.171)
LC88 1988.0	7838	-3822388.009 ±0.013	(0.013)	3699363.804 ±0.013	(0.013)	3507573.109 ±0.013	(0.013)
LC88(T) 1988.0	7838	-3822388.407		3699363.445		3507573.071	
ITRF88A 1988.0	7838	-3822388.369 ±0.032	(0.041)	3699363.432 ±0.032	(0.041)	3507573.104 ±0.038	(0.049)
LC88A 1988.0	7838	-3822388.009 ±0.013	(0.040)	3699363.804 ±0.013	(0.040)	3507573.109 ±0.013	(0.040)
LC88A(T) 1988.0	7838	-3822388.374		3699363.435		3507573.100	
ITRF88B 1988.0	7838	-3822388.369 ±0.030	(0.039)	3699363.430 ±0.030	(0.039)	3507573.105 ±0.031	(0.040)
LC88B 1988.0	7838	-3822388.009 ±0.013	(0.040)	3699363.804 ±0.013	(0.040)	3507573.109 ±0.013	(0.040)
LC88B(T) 1988.0	7838	-3822388.374		3699363.435		3507573.100	

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Solution	point	X (m) USX(m)	SSX(m)	Y (m) USY(m)	SSY(m)	Z (m) USZ(m)	SSZ(m)
BTS84							
BTS85							
BTS86	Ref	5084867.669		2670346.298		-2768064.630	
1984.0		±0.019	(0.051)	±0.018	(0.048)	±0.018	(0.048)
	exc.	575.496		-2083.193		-632.787	
		------------		------------		------------	
	7232	5085443.165		2668263.105		-2768697.417	
1988.0	7232	5085443.157		2668263.201		-2768697.337	
RN86	7232	5085442.575		2668263.302		-2768697.524	
		±0.038	(0.038)	±0.020	(0.020)	±0.022	(0.022)
RN86(T)	7232	5085442.704		2668263.346		-2768697.336	
1984.0							
1988.0	7232	5085442.696		2668263.442		-2768697.256	
RG86	7232	5085444.324		2668262.211		-2768697.221	
			(0.010)		(0.010)		(0.010)
RG86(T)	7232	5085443.199		2668263.045		-2768697.436	
1984.0							
1988.0	7232	5085443.191		2668263.141		-2768697.356	
BTS87	7232	5085442.840		2668263.384		-2768697.439	
1984.0		±0.021	(0.036)	±0.016	(0.027)	±0.016	(0.028)
1988.0	7232	5085442.832		2668263.480		-2768697.359	
RN87	7232	5085442.656		2668263.457		-2768697.703	
1984.0		±0.026	(0.026)	±0.014	(0.014)	±0.017	(0.017)
RN87(T)	7232	5085442.781		2668263.429		-2768697.377	
1984.0							
1988.0	7232	5085442.773		2668263.525		-2768697.297	
RG87	7232	5085444.328		2668262.049		-2768697.257	
1980.8		±0.026	(0.026)	±0.017	(0.017)	±0.017	(0.017)
1984.0	7232	5085444.322		2668262.125		-2768697.193	
RG87(T)	7232	5085442.789		2668263.426		-2768697.440	
1984.0							
1988.0	7232	5085442.781		2668263.522		-2768697.360	
ITRF-0	7232	5085442.836		2668263.465		-2768697.297	
1988.0		±0.044	(0.124)	±0.045	(0.125)	±0.040	(0.112)
RN-0	7232	5085442.656		2668263.457		-2768697.703	
1984.0		±0.026	(0.026)	±0.014	(0.014)	±0.017	(0.017)
1988.0	7232	5085442.648		2668263.553		-2768697.623	

RN-0(T)	7232	5085442.839		2668263.394		-2768697.266	
1988.0							
RG-0	7232	5085444.328		2668262.049		-2768697.257	
1980.8		±0.026	(0.026)	±0.017	(0.017)	±0.017	(0.017)
1988.0	7232	5085444.314		2668262.221		-2768697.113	
RG-0(T)	7232	5085442.830		2668263.332		-2768697.325	
1988.0							
ITRF88	7232	5085442.883		2668263.355		-2768697.313	
1988.0		±0.032	(0.176)	±0.032	(0.176)	±0.028	(0.154)
RN88	7232	5085442.778		2668263.461		-2768697.652	
1984.0		±0.026	(0.026)	±0.013	(0.013)	±0.016	(0.016)
1988.0	7232	5085442.648		2668263.553		-2768697.623	
RN88(T)	7232	5085442.856		2668263.404		-2768697.263	
1988.0							
RG88	7232	5085444.366		2668262.522		-2768696.748	
1988.0		±0.018	(0.018)	±0.014	(0.014)	±0.010	(0.016)
RG88(T)	7232	5085442.878		2668263.352		-2768697.320	
1988.0							
ITRF88A	7232	5085442.868		2668263.394		-2768697.356	
1988.0		±0.039	(0.051)	±0.042	(0.055)	±0.039	(0.051)
RN88A	7232	5085442.778		2668263.461		-2768697.652	
1984.0		±0.026	(0.030)	±0.013	(0.030)	±0.016	(0.030)
1988.0	7232	5085442.648		2668263.553		-2768697.623	
RN88A(T)	7232	5085442.867		2668263.391		-2768697.328	
1988.0							
RG88A	7232	5085444.366		2668262.522		-2768696.748	
1988.0		±0.018	(0.030)	±0.014	(0.030)	±0.010	(0.030)
RG88A(T)	7232	5085442.867		2668263.396		-2768697.385	
1988.0							
ITRF88B	7232	5085442.826		2668263.365		-2768697.289	
1988.0		±0.039	(0.051)	±0.043	(0.056)	±0.042	(0.054)
RN88B	7232	5085442.778		2668263.461		-2768697.652	
1984.0		±0.026	(0.030)	±0.013	(0.030)	±0.016	(0.030)
1988.0	7232	5085442.648		2668263.553		-2768697.623	
RN88B(T)	7232	5085442.829		2668263.364		-2768697.270	
1988.0							
RG88B	7232	5085444.366		2668262.522		-2768696.748	
1988.0		±0.018	(0.030)	±0.014	(0.030)	±0.010	(0.030)
RG88B(T)	7232	5085442.822		2668263.367		-2768697.307	
1988.0							

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Solution	point	X (m) USX(m)	SSX(m)	Y (m) USY(m)	SSY(m)	Z (m) USZ(m)	SSZ(m)
BTS84	Ref	4075575.235		931832.070		4801568.902	
		±0.043	(0.185)	±0.042	(0.181)	±0.026	(0.111)
	exc.	-45.127		-50.784		49.292	
	7834	4075530.108		931781.286		4801618.194	
RN84	7224	4075541.906		931734.189		4801629.393	
		±0.016	(0.016)	±0.009	(0.009)	±0.022	(0.022)
	exc.	-10.127		46.116		-11.108	
	7834	4075531.779		931780.305		4801618.285	
RN84(T)	7834	4075530.094		931781.287		4801618.207	
LC84	7834	4075530.228		931781.300		4801618.176	
		±0.052	(0.052)	±0.068	(0.068)	±0.043	(0.043)
LC84(T)	7834	4075530.271		931781.238		4801618.151	
BTS85	Ref	4075575.216		931832.090		4801569.018	
		±0.018	(0.104)	±0.019	(0.110)	±0.013	(0.079)
	exc.	-45.127		-50.784		49.292	
	7834	4075530.089		931781.306		4801618.310	
RN85	7224	4075541.893		931734.241		4801629.397	
		±0.009	(0.009)	±0.005	(0.005)	±0.013	(0.013)
	exc.	-10.127		46.116		-11.108	
	7834	4075531.766		931780.357		4801618.289	
RN85(T)	7834	4075530.057		931781.314		4801618.304	
RG85	7224	4075541.876		931734.228		4801629.379	
			(0.100)		(0.100)		(0.100)
	exc.	-10.127		46.116		-11.108	
	7834	4075531.749		931780.344		4801618.271	
RG85(T)	7834	4075530.347		931780.977		4801618.265	
LC85	7834	4075530.208		931781.265		4801618.284	
		±0.057	(0.057)	±0.073	(0.073)	±0.047	(0.047)
LC85(T)	7834	4075530.274		931781.151		4801618.250	
BTS86	Ref	4075575.136		931831.943		4801568.908	
1984.0		±0.013	(0.036)	±0.012	(0.033)	±0.010	(0.027)
	exc.	-45.127		-50.784		49.292	
	7834	4075530.009		931781.159		4801618.200	
1988.0	7834	4075529.941		931781.227		4801618.244	

RN86	7224	4075540.267		931735.238		4801629.038	
		±0.007	(0.007)	±0.004	(0.004)	±0.011	(0.011)
	exc.	-10.127		46.116		-11.108	
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	7834	4075530.140		931781.354		4801617.930	
RN86(T)	7834	4075529.882		931781.182		4801618.211	
1984.0							
1988.0	7834	4075529.814		931781.250		4801618.255	
RG86	7224	4075541.953		931734.215		4801629.397	
			(0.010)		(0.010)		(0.010)
	exc.	-10.127		46.116		-11.108	
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	7834	4075531.826		931780.331		4801618.289	
RG86(T)	7834	4075530.205		931781.018		4801618.193	
1984.0							
1988.0	7834	4075530.137		931781.086		4801618.237	
LC86	7834	4075530.321		931781.133		4801618.124	
1983.0		±0.019	(0.019)	±0.025	(0.025)	±0.017	(0.017)
1984.0	7834	4075530.304		931781.150		4801618.135	
LC86(T)	7834	4075530.212		931781.132		4801618.217	
1984.0							
1988.0	7834	4075530.144		931781.200		4801618.261	
BTS87	7834	4075530.045		931781.242		4801618.088	
1984.0		±0.011	(0.018)	±0.010	(0.017)	±0.008	(0.014)
1988.0	7834	4075529.977		931781.310		4801618.132	
RN87	7224	4075540.310		931735.337		4801629.022	
1984.0		±0.007	(0.010)	±0.004	(0.010)	±0.011	(0.011)
	exc.	-10.127		46.116		-11.108	
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	7834	4075530.183		931781.453		4801617.914	
RN87(T)	7834	4075530.004		931781.267		4801618.090	
1984.0							
1988.0	7834	4075529.936		931781.335		4801618.134	
RG87	7224	4075541.876		931734.136		4801629.343	
1980.8		±0.006	(0.010)	±0.004	(0.010)	±0.011	(0.011)
1984.0	7224	4075541.821		931735.190		4801629.378	
	exc.	-10.127		46.116		-11.108	
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	7834	4075531.694		931780.306		4801618.270	
RG87(T)	7834	4075529.984		931781.285		4801618.118	
1984.0							
1988.0	7834	4075529.916		931781.353		4801618.162	
LC87	7834	4075530.306		931781.132		4801618.123	
1983.0		±0.009	(0.030)	±0.010	(0.030)	±0.007	(0.030)
1984.0	7834	4075530.289		931781.149		4801618.134	
LC87(T)	7834	4075530.188		931781.247		4801618.201	
1984.0							
1988.0	7834	4075530.120		931781.315		4801618.245	

ITRF-0	7834	4075530.100		931781.275		4801618.187	
1988.0		±0.026	(0.072)	±0.026	(0.072)	±0.027	(0.076)
RN-0	7224	4075540.310		931735.337		4801629.022	
1984.0		±0.007	(0.007)	±0.004	(0.004)	±0.011	(0.011)
1988.0	7224	4075540.242		931735.445		4801629.066	
	exc.	-10.003		46.149		-11.072	
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	7834	4075530.239		931781.554		4801617.994	
RN-0(T)	7834	4075530.086		931781.288		4801618.159	
1988.0							
RG-0	7224	4075541.876		931734.136		4801629.343	
1980.8		±0.006	(0.006)	±0.004	(0.004)	±0.011	(0.011)
1988.0	7224	4075541.754		931734.258		4801629.422	
	exc.	-10.003		46.149		-11.072	
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	7834	4075531.751		931780.407		4801618.340	
RG-0(T)	7834	4075530.077		931781.277		4801618.145	
1988.0							
LC-0	7834	4075530.306		931781.132		4801618.123	
1983.0		±0.009	(0.009)	±0.010	(0.010)	±0.007	(0.007)
1988.0	7834	4075530.221		931781.217		4801618.178	
LC-0(T)	7834	4075530.138		931781.329		4801618.230	
1988.0							
ITRF88	7834	4075530.090		931781.263		4801618.163	
1988.0		±0.017	(0.094)	±0.016	(0.088)	±0.019	(0.105)
RN88	7224	4075540.371		931735.319		4801629.057	
1984.0		±0.007	(0.007)	±0.004	(0.004)	±0.010	(0.010)
1988.0	7224	4075540.303		931735.387		4801629.101	
	exc.	-10.003		46.149		-11.072	
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	7834	4075530.300		931781.536		4801618.029	
RN88(T)	7834	4075530.102		931781.302		4801618.129	
1988.0							
RG88	7224	4075541.673		931734.246		4801629.685	
1988.0		±0.006	(0.006)	±0.004	(0.004)	±0.011	(0.011)
	exc.	-10.003		46.149		-11.072	
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	7834	4075531.670		931780.395		4801618.613	
RG88(T)	7834	4075530.089		931781.268		4801618.160	
1988.0							
LC88	7834	4075530.300		931781.077		4801618.122	
1988.0		±0.015	(0.015)	±0.018	(0.018)	±0.012	(0.012)
LC88(T)	7834	4075530.132		931781.307		4801618.213	
1988.0							

ITRF88A	7834	4075530.095		931781.301		4801618.149	
1988.0		±0.020	(0.026)	±0.020	(0.026)	±0.022	(0.029)
RN88A	7224	4075540.371		931735.319		4801629.057	
1984.0		±0.007	(0.030)	±0.004	(0.030)	±0.010	(0.030)
1988.0	7224	4075540.303		931735.387		4801629.101	
	exc.	-10.003		46.149		-11.072	
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	7834	4075530.300		931781.536		4801618.029	
RN88A(T)	7834	4075530.065		931781.384		4801618.111	
1988.0							
RG88A	7224	4075541.673		931734.246		4801629.685	
1988.0		±0.006	(0.030)	±0.004	(0.030)	±0.011	(0.030)
	exc.	-10.003		46.149		-11.072	
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	7834	4075531.670		931780.395		4801618.613	
RG88A(T)	7834	4075530.085		931781.332		4801618.133	
1988.0							
LC88A	7834	4075530.300		931781.077		4801618.122	
1988.0		±0.015	(0.040)	±0.018	(0.040)	±0.012	(0.040)
LC88A(T)	7834	4075530.142		931781.277		4801618.221	
1988.0							
ITRF88B	7834	4075530.073		931781.289		4801618.148	
1988.0		±0.020	(0.026)	±0.020	(0.026)	±0.022	(0.028)
RN88B	7224	4075540.371		931735.319		4801629.057	
1984.0		±0.007	(0.030)	±0.004	(0.030)	±0.010	(0.030)
1988.0	7224	4075540.303		931735.387		4801629.101	
	exc.	-10.003		46.149		-11.072	
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	7834	4075530.300		931781.536		4801618.029	
RN88B(T)	7834	4075530.028		931781.357		4801618.116	
1988.0							
RG88B	7224	4075541.673		931734.246		4801629.685	
1988.0		±0.006	(0.030)	±0.004	(0.030)	±0.011	(0.030)
	exc.	-10.003		46.149		-11.072	
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	7834	4075531.670		931780.395		4801618.613	
RG88B(T)	7834	4075530.044		931781.295		4801618.144	
1988.0							
LC88B	7834	4075530.300		931781.077		4801618.122	
1988.0		±0.015	(0.040)	±0.018	(0.040)	±0.012	(0.040)
LC88B(T)	7834	4075530.142		931781.277		4801618.221	
1988.0							

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Solution	point	X (m) USX(m)	SSX(m)	Y (m) USY(m)	SSY(m)	Z (m) USZ(m)	SSZ(m)
BTS84	Ref	1942784.821		-5804081.686		-1796911.445	
		±0.074	(0.321)	±0.027	(0.115)	±0.049	(0.212)
	exc.	7.057		3.980		-8.112	
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	7907	1942791.878		-5804077.706		-1796919.557	
LC84	7907	1942791.807		-5804077.804		-1796919.343	
		±0.066	(0.066)	±0.024	(0.024)	±0.049	(0.049)
LC84(T)	7907	1942791.891		-5804077.717		-1796919.534	
BTS85	Ref	1942784.801		-5804081.758		-1796911.340	
		±0.025	(0.146)	±0.011	(0.065)	±0.023	(0.133)
	exc.	7.057		3.980		-8.112	
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	7907	1942791.858		-5804077.778		-1796919.452	
LC85	7907	1942791.871		-5804077.813		-1796919.307	
		±0.071	(0.071)	±0.027	(0.027)	±0.055	(0.055)
LC85(T)	7907	1942791.825		-5804077.784		-1796919.454	
BTS86	Ref	1942784.701		-5804081.732		-1796911.275	
1984.0		±0.025	(0.067)	±0.011	(0.030)	±0.023	(0.062)
	exc.	7.057		3.980		-8.112	
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	7907	1942791.758		-5804077.752		-1796919.387	
1988.0	7907	1942791.738		-5804077.772		-1796919.351	
LC86	7907	1942791.620		-5804077.840		-1796919.270	
1983.0		±0.025	(0.025)	±0.011	(0.011)	±0.023	(0.023)
1984.0	7907	1942791.615		-5804077.845		-1796919.261	
LC86(T)	7907	1942791.766		-5804077.764		-1796919.358	
1984.0							
1988.0	7907	1942791.747		-5804077.784		-1796919.322	
BTS87	7907	1942791.969		-5804077.735		-1796919.376	
1984.0		±0.017	(0.029)	±0.015	(0.025)	±0.015	(0.026)
1988.0	7907	1942791.949		-5804077.755		-1796919.340	
LC87	7907	1942791.630		-5804077.857		-1796919.262	
1983.0		±0.007	(0.030)	±0.003	(0.030)	±0.006	(0.030)
1984.0	7907	1942791.625		-5804077.862		-1796919.253	
LC87(T)	7907	1942791.940		-5804077.722		-1796919.364	
1984.0							
1988.0	7907	1942791.920		-5804077.742		-1796919.328	

ITRF-0	7907	1942791.958		-5804077.741		-1796919.347	
1988.0		±0.033	(0.092)	±0.034	(0.094)	±0.033	(0.093)
LC-0	7907	1942791.630		-5804077.857		-1796919.262	
1983.0		±0.007	(0.007)	±0.003	(0.003)	±0.006	(0.006)
1988.0	7907	1942791.605		-5804077.882		-1796919.217	
LC-0(T)	7907	1942791.938		-5804077.750		-1796919.348	
1988.0							
ITRF88	7907	1942792.009		-5804077.744		-1796919.359	
1988.0		±0.021	(0.116)	±0.023	(0.127)	±0.022	(0.121)
LC88	7907	1942791.451		-5804077.903		-1796919.266	
1988.0		±0.015	(0.015)	±0.007	(0.007)	±0.017	(0.017)
LC88(T)	7907	1942791.950		-5804077.767		-1796919.364	
1988.0							
ITRF88A	7907	1942791.956		-5804077.738		-1796919.355	
1988.0		±0.032	(0.042)	±0.033	(0.043)	±0.032	(0.042)
LC88A	7907	1942791.451		-5804077.903		-1796919.266	
1988.0		±0.015	(0.040)	±0.007	(0.040)	±0.017	(0.040)
LC88A(T)	7907	1942791.935		-5804077.759		-1796919.355	
1988.0							
ITRF88B	7907	1942791.958		-5804077.737		-1796919.358	
1988.0		±0.030	(0.039)	±0.030	(0.039)	±0.030	(0.039)
LC88B	7907	1942791.451		-5804077.903		-1796919.266	
1988.0		±0.015	(0.040)	±0.007	(0.040)	±0.017	(0.040)
LC88B(T)	7907	1942791.935		-5804077.759		-1796919.355	
1988.0							

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Solution	point	X (m) USX(m)	SSX(m)	Y (m) USY(m)	SSY(m)	Z (m) USZ(m)	SSZ(m)
BTS84	Ref	-1330832.415		-5328746.820		3235663.778	
		±0.023	(0.133)	±0.015	(0.089)	±0.017	(0.098)
	exc.	707.178		219.952		486.522	
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	7086	-1330125.237		-5328526.868		3236150.300	
RN84	7216	-1324209.136		-5332024.036		3232118.961	
		±0.003	(0.003)	±0.011	(0.011)	±0.012	(0.012)
	exc.	-5914.414		3496.550		4031.858	
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	7086	-1330123.550		-5328527.486		3236150.819	
RN84(T)	7086	-1330125.239		-5328526.890		3236150.304	
LC84	7086	-1330125.342		-5328526.602		3236150.384	
		±0.046	(0.046)	±0.029	(0.029)	±0.045	(0.045)
LC84(T)	7086	-1330125.203		-5328526.719		3236150.248	
BTS85	Ref	-1330832.459		-5328746.736		3235663.823	
		±0.018	(0.079)	±0.017	(0.074)	±0.017	(0.072)
	exc.	707.178		219.952		486.522	
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	7086	-1330125.271		-5328526.784		3236150.345	
RN85	7216	-1324209.127		-5332024.031		3232118.963	
		±0.002	(0.002)	±0.006	(0.006)	±0.003	(0.003)
	exc.	-5914.414		3496.550		4031.858	
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	7086	-1330123.541		-5328527.463		3236150.821	
RN85(T)	7086	-1330125.280		-5328526.799		3236150.344	
RG85	7216	-1324209.131		-5332024.023		3232118.958	
			(0.100)		(0.100)		(0.100)
	exc.	-5914.414		3496.550		4031.858	
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	7086	-1330123.545		-5328527.473		3236150.816	
RG85(T)	7086	-1330125.510		-5328526.650		3236150.365	
LC85	7086	-1330125.351		-5328526.610		3236150.422	
		±0.053	(0.053)	±0.034	(0.034)	±0.051	(0.051)
LC85(T)	7086	-1330125.329		-5328526.671		3236150.331	
BTS86	Ref	-1330832.607		-5328746.680		3235663.748	
1984.0		±0.009	(0.024)	±0.009	(0.023)	±0.009	(0.024)
	exc.	707.178		219.952		486.522	
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	7086	-1330125.429		-5328526.728		3236150.270	
1988.0	7086	-1330125.485		-5328526.736		3236150.238	

RN86	7216	-1324210.756		-5332023.002		3232118.577	
		±0.002	(0.002)	±0.005	(0.005)	±0.006	(0.006)
	exc.	-5914.414		3496.550		4031.858	
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	7086	-1330125.170		-5328526.452		3236150.435	
RN86(T)	7086	-1330125.425		-5328526.787		3236150.272	
1984.0							
1988.0	7086	-1330125.481		-5328526.795		3236150.240	
RG86	7216	-1324209.138		-5332023.974		3232118.949	
			(0.010)		(0.010)		(0.010)
	exc.	-5914.414		3496.550		4031.858	
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	7086	-1330123.552		-5328527.424		3236150.807	
RG86(T)	7086	-1330125.552		-5328526.605		3236150.271	
1984.0							
1988.0	7086	-1330125.608		-5328526.613		3236150.239	
LC86	7086	-1330125.459		-5328526.457		3236150.403	
1983.0		±0.026	(0.026)	±0.014	(0.014)	±0.021	(0.021)
1984.0	7086	-1330125.473		-5328526.459		3236150.395	
LC86(T)	7086	-1330125.408		-5328526.558		3236150.259	
1984.0							
1988.0	7086	-1330125.464		-5328526.566		3236150.227	
BTS87	7086	-1330125.228		-5328526.644		3236150.265	
1984.0		±0.009	(0.015)	±0.008	(0.013)	±0.008	(0.013)
1988.0	7086	-1330125.284		-5328526.652		3236150.233	
RN87	7216	-1324210.830		-5332023.025		3232118.569	
1984.0		±0.002	(0.010)	±0.005	(0.010)	±0.006	(0.010)
	exc.	-5914.414		3496.550		4031.858	
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	7086	-1330125.244		-5328526.475		3236150.427	
RN87(T)	7086	-1330125.204		-5328526.659		3236150.243	
1984.0							
1988.0	7086	-1330125.260		-5328526.667		3236150.211	
RG87	7216	-1324209.126		-5332023.968		3232118.942	
1980.8		±0.002	(0.010)	±0.005	(0.010)	±0.005	(0.010)
1984.0	7216	-1324209.170		-5332023.962		3232118.916	
	exc.	-5914.414		3496.550		4031.858	
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	7086	-1330123.584		-5328527.412		3236150.774	
RG87(T)	7086	-1330125.271		-5328526.617		3236150.230	
1984.0							
1988.0	7086	-1330125.327		-5328526.625		3236150.198	
LC87	7086	-1330125.465		-5328526.469		3236150.434	
1983.0		±0.007	(0.030)	±0.004	(0.030)	±0.006	(0.030)
1984.0	7086	-1330125.479		-5328526.471		3236150.426	
LC87(T)	7086	-1330125.244		-5328526.612		3236150.290	
1984.0							
1988.0	7086	-1330125.300		-5328526.620		3236150.258	

ITRF-0	7086	-1330125.296		-5328526.632		3236150.240	
1988.0		±0.023	(0.066)	±0.023	(0.064)	±0.025	(0.070)
RN-0	7216	-1324210.830		-5332023.025		3232118.569	
1984.0		±0.002	(0.002)	±0.005	(0.005)	±0.006	(0.006)
1988.0	7216	-1324210.886		-5332023.033		3232118.537	
	exc.	-5914.414		3496.550		4031.858	
		------------		------------		------------	
	7086	-1330125.300		-5328526.483		3236150.395	
RN-0(T)	7086	-1330125.294		-5328526.630		3236150.217	
1988.0							
RG-0	7216	-1324209.126		-5332023.968		3232118.942	
1980.8		±0.002	(0.002)	±0.005	(0.005)	±0.005	(0.005)
1988.0	7216	-1324209.226		-5332023.982		3232118.884	
	exc.	-5914.414		3496.550		4031.858	
		------------		------------		------------	
	7086	-1330123.640		-5328527.432		3236150.742	
RG-0(T)	7086	-1330125.294		-5328526.635		3236150.215	
1988.0							
LC-0	7086	-1330125.465		-5328526.469		3236150.434	
1983.0		±0.007	(0.007)	±0.004	(0.004)	±0.006	(0.006)
1988.0	7086	-1330125.535		-5328526.479		3236150.394	
LC-0(T)	7086	-1330125.280		-5328526.633		3236150.253	
1988.0							
ITRF88	7086	-1330125.273		-5328526.693		3236150.236	
1988.0		±0.011	(0.061)	±0.011	(0.061)	±0.013	(0.072)
RN88	7216	-1324210.748		-5332023.121		3232118.544	
1984.0		±0.005	(0.005)	±0.017	(0.017)	±0.015	(0.015)
1988.0	7216	-1324210.804		-5332023.129		3232118.512	
	exc.	-5914.397		3496.510		4031.862	
		------------		------------		------------	
	7086	-1330125.201		-5328526.619		3236150.374	
RN88(T)	7086	-1330125.272		-5328526.679		3236150.200	
1988.0							
RG88	7216	-1324209.184		-5332023.991		3232118.820	
1988.0		±0.001	(0.001)	±0.002	(0.002)	±0.003	(0.003)
	exc.	-5914.397		3496.510		4031.862	
		------------		------------		------------	
	7086	-1330123.581		-5328527.481		3236150.682	
RG88(T)	7086	-1330125.272		-5328526.678		3236150.210	
1988.0							
LC88	7086	-1330125.610		-5328526.465		3236150.379	
1988.0		±0.015	(0.015)	±0.009	(0.009)	±0.013	(0.013)
LC88(T)	7086	-1330125.277		-5328526.668		3236150.244	
1988.0							

ITRF88A	7086	-1330125.275		-5328526.653		3236150.229	
1988.0		±0.015	(0.019)	±0.015	(0.020)	±0.016	(0.021)
RN88A	7216	-1324210.748		-5332023.121		3232118.544	
1984.0		±0.005	(0.030)	±0.017	(0.030)	±0.015	(0.030)
1988.0	7216	-1324210.804		-5332023.129		3232118.512	
	exc.	-5914.397		3496.510		4031.862	
		------------		------------		------------	
	7086	-1330125.201		-5328526.619		3236150.374	
RN88A(T)	7086	-1330125.251		-5328526.702		3236150.219	
1988.0							
RG88A	7216	-1324209.184		-5332023.991		3232118.820	
1988.0		±0.002	(0.030)	±0.005	(0.030)	±0.005	(0.030)
	exc.	-5914.397		3496.510		4031.862	
		------------		------------		------------	
	7086	-1330123.581		-5328527.481		3236150.682	
RG88A(T)	7086	-1330125.258		-5328526.680		3236150.204	
1988.0							
LC88A	7086	-1330125.610		-5328526.465		3236150.379	
1988.0		±0.015	(0.040)	±0.009	(0.040)	±0.013	(0.040)
LC88A(T)	7086	-1330125.275		-5328526.664		3236150.248	
1988.0							
ITRF88B	7086	-1330125.274		-5328526.653		3236150.226	
1988.0		±0.015	(0.020)	±0.016	(0.021)	±0.016	(0.021)
RN88B	7216	-1324210.748		-5332023.121		3232118.544	
1984.0		±0.005	(0.030)	±0.017	(0.030)	±0.015	(0.030)
1988.0	7216	-1324210.804		-5332023.129		3232118.512	
	exc.	-5914.397		3496.510		4031.862	
		------------		------------		------------	
	7086	-1330125.201		-5328526.619		3236150.374	
RN88B(T)	7086	-1330125.255		-5328526.683		3236150.222	
1988.0							
RG88B	7216	-1324209.184		-5332023.991		3232118.820	
1988.0		±0.002	(0.030)	±0.005	(0.030)	±0.005	(0.030)
	exc.	-5914.397		3496.510		4031.862	
		------------		------------		------------	
	7086	-1330123.581		-5328527.481		3236150.682	
RG88B(T)	7086	-1330125.259		-5328526.660		3236150.207	
1988.0							
LC88B	7086	-1330125.610		-5328526.465		3236150.379	
1988.0		±0.015	(0.040)	±0.009	(0.040)	±0.013	(0.040)
LC88B(T)	7086	-1330125.275		-5328526.664		3236150.248	
1988.0							

Table 9

Solutions for a sample of stations

II : Comparisons / ITRF-0

Note : this table is schematized in figures 1 to 6.

CANBERRA SLR 7943

Solution	X - XO cm	Y - YO cm	Z - ZO cm
BTS84	26.6	6.1	-23.2
LC84(T)	27.8	0.7	-26.1
BTS85	2.1	39.9	-21.6
LC85(T)	33.6	7.5	-28.1
BTS86	23.4	16.6	1.4
LC86(T)	22.2	6.5	-1.5
BTS87	7.7	-1.2	3.5
LC87(T)	12.5	-6.6	1.3
ITRF-0	0.0	0.0	0.0
LC-0(T)	10.5	-7.3	0.2
ITRF88	-4.6	-2.4	-4.7
RG88(T)	-5.5	-2.3	-8.6
LC88(T)	5.4	-10.1	-3.0
ITRF88A	-0.3	-3.6	5.4
RG88A(T)	-10.4	-4.3	-15.5
LC88A(T)	7.5	-8.9	1.3
ITRF88B	-3.0	-2.2	1.0
RG88B(T)	-7.2	-6.5	-7.5
LC88B(T)	7.5	-8.9	1.3

SIMOSATO SLR 7838

Solution	X - XO cm	Y - YO cm	Z - ZO cm
BTS85	14.0	2.8	62.9
LC85(T)	14.4	1.3	0.7
BTS86	11.7	9.4	-4.6
LC86(T)	9.6	7.5	-6.1
BTS87	4.2	-1.1	-1.1
LC87(T)	0.7	-1.3	0.1
ITRF-0	0.0	0.0	0.0
LC-0(T)	0.0	-1.3	-0.3
ITRF88	-2.6	-0.8	-0.6
LC88(T)	-2.8	0.3	-1.4
ITRF88A	1.0	-1.0	1.9
LC88A(T)	0.5	-0.7	1.5
ITRF88B	1.0	-1.2	2.0
LC88B(T)	0.5	-0.7	1.5

HARTEBEESTHOEK VLBI 7232

Solution	X - XO cm	Y - YO cm	Z - ZO cm
BTS86	32.1	-26.4	-4.0
RN86(T)	-14.0	-2.3	4.1
RG86(T)	35.5	-32.4	-5.9
BTS87	-0.4	1.5	-6.2
RN87(T)	-6.3	6.0	0.0
RG87(T)	-5.5	5.7	-6.3
ITRF-0	0.0	0.0	0.0
RN-0(T)	0.3	-7.0	3.1
RG-0(T)	-0.6	-13.3	-2.8
ITRF88	4.7	-11.0	-1.6
RN88(T)	2.0	-6.1	3.4
RG88(T)	4.2	-11.3	-2.3
ITRF88A	3.2	-7.1	-5.9
RN88A(T)	3.1	-7.4	-3.1
RG88A(T)	3.1	-6.9	-8.8
ITRF88B	-1.0	-10.0	0.8
RN88B(T)	-0.7	-10.1	2.7
RG88B(T)	-1.4	-9.8	1.0

WETTZELL SLR 7834

Solution	X - XO cm	Y - YO cm	Z - ZO cm
BTS84	0.8	1.1	0.7
RN84(T)	-0.6	1.2	2.0
LC84(T)	17.1	0.8	-3.6
BTS85	-1.0	3.1	12.3
RN85(T)	-4.3	3.9	11.7
RG85(T)	24.7	-29.8	7.8
LC85(T)	17.4	-12.4	6.3
BTS86	-15.9	-4.8	5.7
RN86(T)	-28.6	-2.5	6.8
RG86(T)	3.7	-18.9	5.0
LC86(T)	4.4	-7.5	7.4
BTS87	-12.3	3.5	-5.5
RN87(T)	-16.4	6.0	-5.3
RG87(T)	-18.4	7.8	-2.5
LC87(T)	2.0	4.0	5.8
ITRF-0	0.0	0.0	0.0
RN-0(T)	-1.4	1.3	-2.8
RG-0(T)	-2.3	0.2	-4.2
LC-0(T)	3.8	5.4	4.3
ITRF88	-1.0	-1.2	-2.4
RN88(T)	0.2	2.7	-5.8
RG88(T)	-1.1	-0.7	-2.7
LC88(T)	3.2	3.2	2.6
ITRF88A	-0.5	2.6	-3.8
RN88A(T)	-3.5	10.9	-7.6

RG88A(T)	-1.5	5.7	-5.4
LC88A(T)	4.2	0.2	3.4
ITRF88B	-2.7	1.4	-3.9
RN88B(T)	-7.2	8.2	-7.1
RG88B(T)	-5.6	2.0	-4.3
LC88B(T)	4.2	0.2	3.4

AREQUIPA SLR 7907

Solution	X - X0 cm	Y - Y0 cm	Z - Z0 cm
BTS84	-8.0	3.5	-21.0
LC84(T)	-6.7	2.4	-18.7
BTS85	-10.0	-3.7	-10.5
LC85(T)	-13.3	-4.3	-10.7
BTS86	-22.0	-3.1	-0.4
LC86(T)	-21.1	-4.3	2.5
BTS87	-0.9	-1.4	0.7
LC87(T)	-3.8	-0.1	1.9
ITRF-0	0.0	0.0	0.0
LC-0(T)	-2.0	-0.9	-0.1
ITRF88	5.1	-0.3	-1.2
LC88(T)	-0.8	-2.6	-1.7
ITRF88A	-0.2	0.3	-0.8
LC88A(T)	-2.3	-1.8	-0.8
ITRF88B	0.0	0.4	-1.1
LC88B(T)	-2.3	-1.8	-0.8

FORT DAVIS SLR 7086

Solution	X - X0 cm	Y - Y0 cm	Z - Z0 cm
BTS84	5.9	-23.6	6.0
RN84(T)	5.7	-25.8	6.4
LC84(T)	9.3	-8.7	0.8
BTS85	2.5	-15.2	10.5
RN85(T)	1.6	-16.7	10.4
RG85(T)	-21.4	-1.8	12.5
LC85(T)	-3.3	-3.9	9.1
BTS86	-18.9	-10.4	-0.2
RN86(T)	-18.5	-16.3	0.0
RG86(T)	-31.2	1.9	-0.1
LC86(T)	-16.8	6.6	-1.3
BTS87	1.2	-2.0	-0.7
RN87(T)	3.6	-3.5	-2.9
RG87(T)	-3.1	0.7	-4.2
LC87(T)	-0.4	1.2	1.8
ITRF-0	0.0	0.0	0.0
RN-0(T)	0.2	0.2	-2.3
RG-0(T)	0.2	-0.3	-2.5
LC-0(T)	1.6	-0.1	1.3

ITRF88	2.3	-6.1	-0.4
RN88(T)	2.4	-4.7	-4.0
RG88(T)	2.4	-4.6	-3.0
LC88(T)	1.9	-3.6	0.4
ITRF88A	2.1	-2.1	-1.1
RN88A(T)	4.5	-7.0	-2.1
RG88A(T)	3.8	-4.8	-3.6
LC88A(T)	2.1	-3.2	0.8
ITRF88B	2.2	-2.1	-1.4
RN88B(T)	4.1	-5.1	-1.8
RG88B(T)	3.7	-2.8	-3.3
LC88B(T)	2.1	-3.2	0.8

FIG. 1 CANBERRA SLR 7943

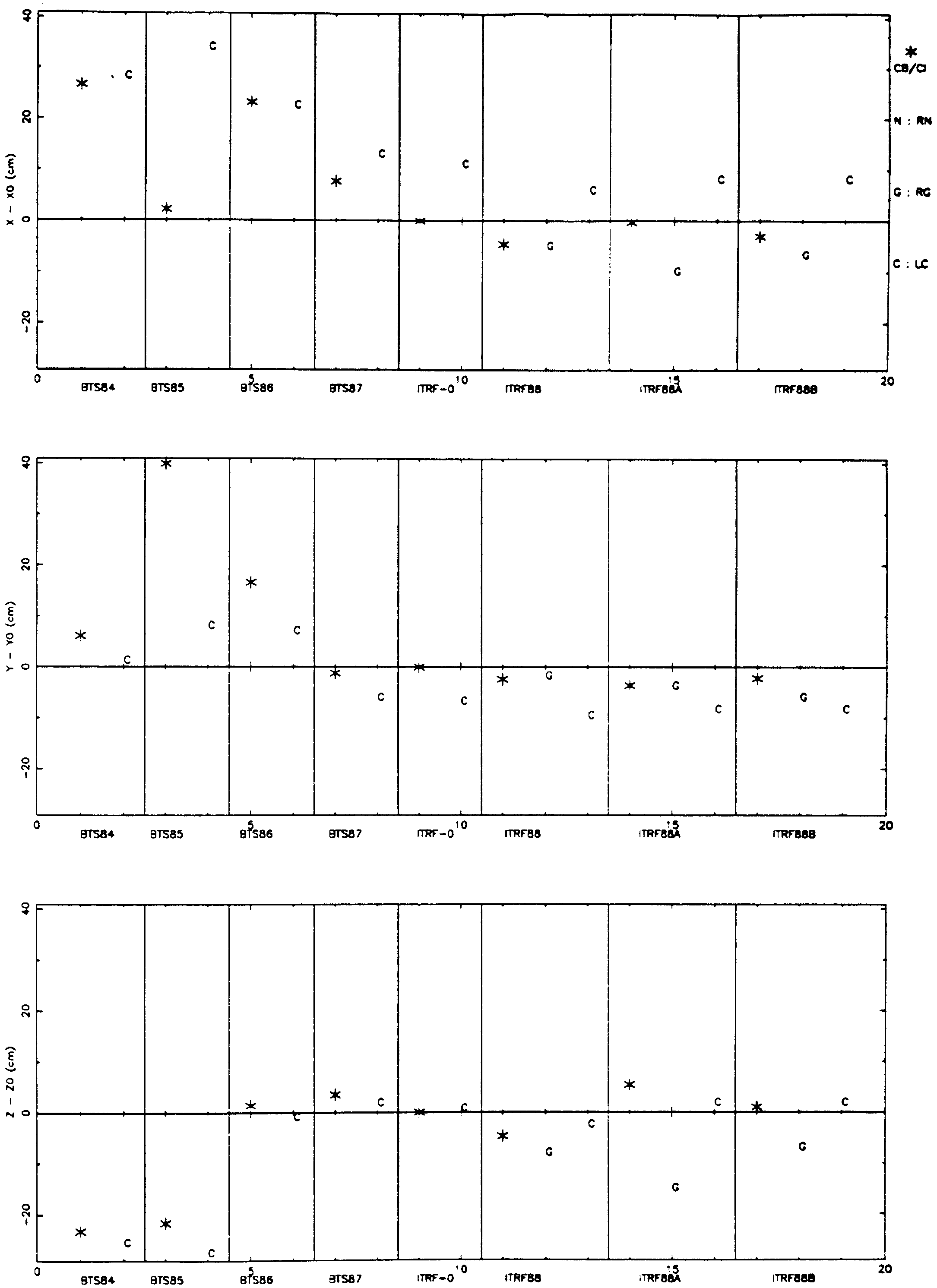

FIG. 2 SIMOSATO SLR 7838

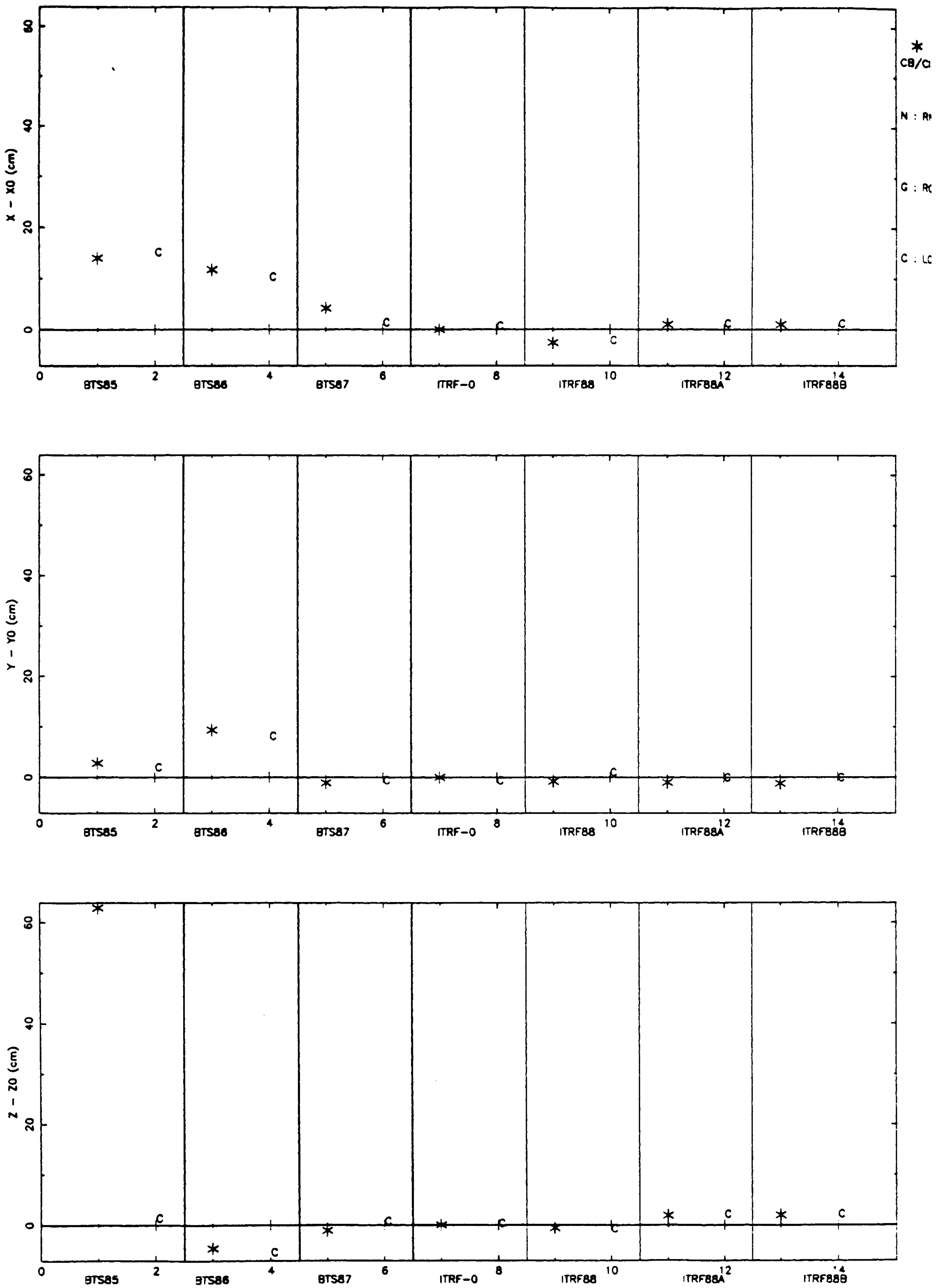

FIG. 3 HARTEBEESTHOEK VLBI 7232

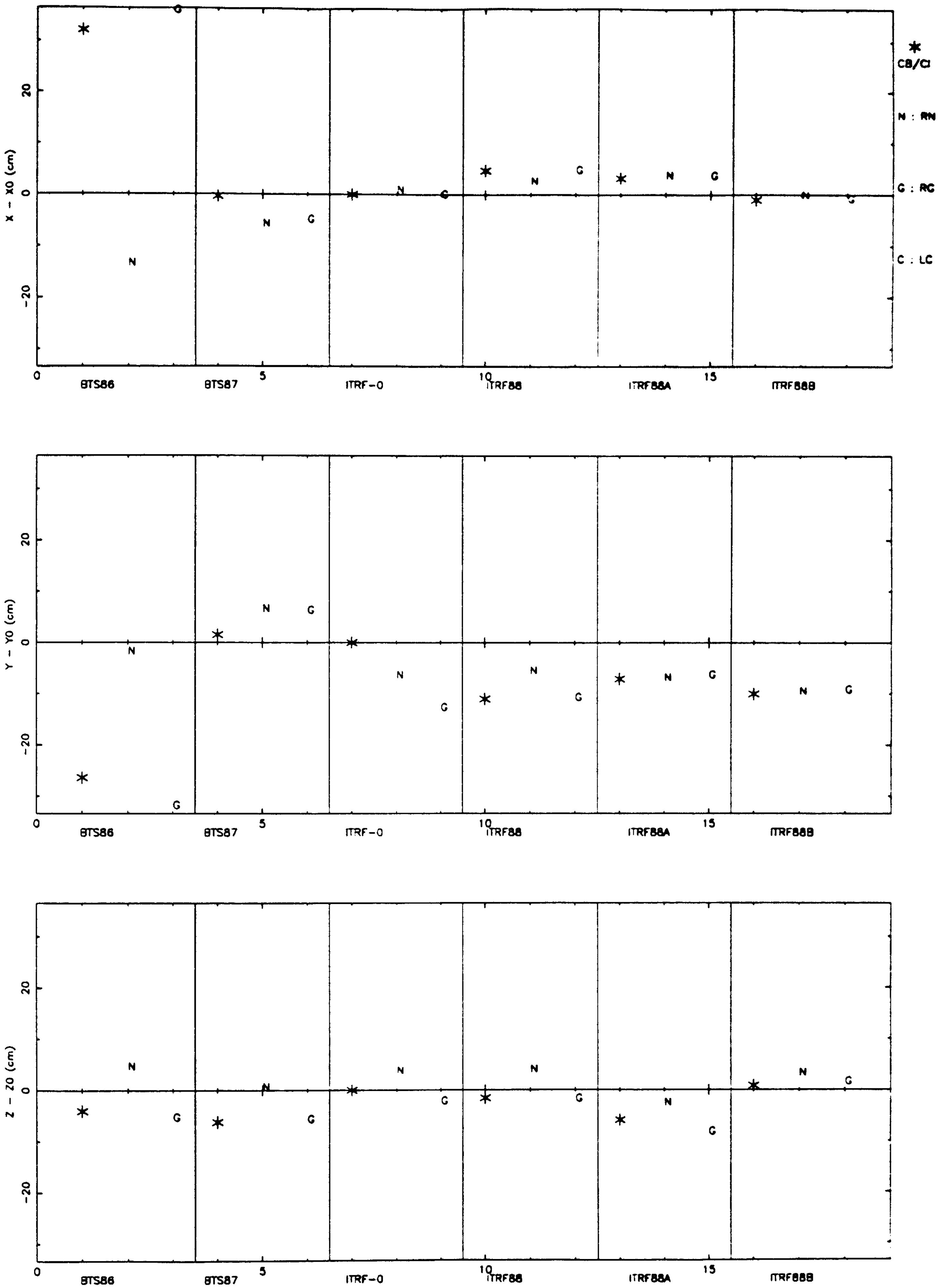

FIG. 4 WETTZELL SLR 7834

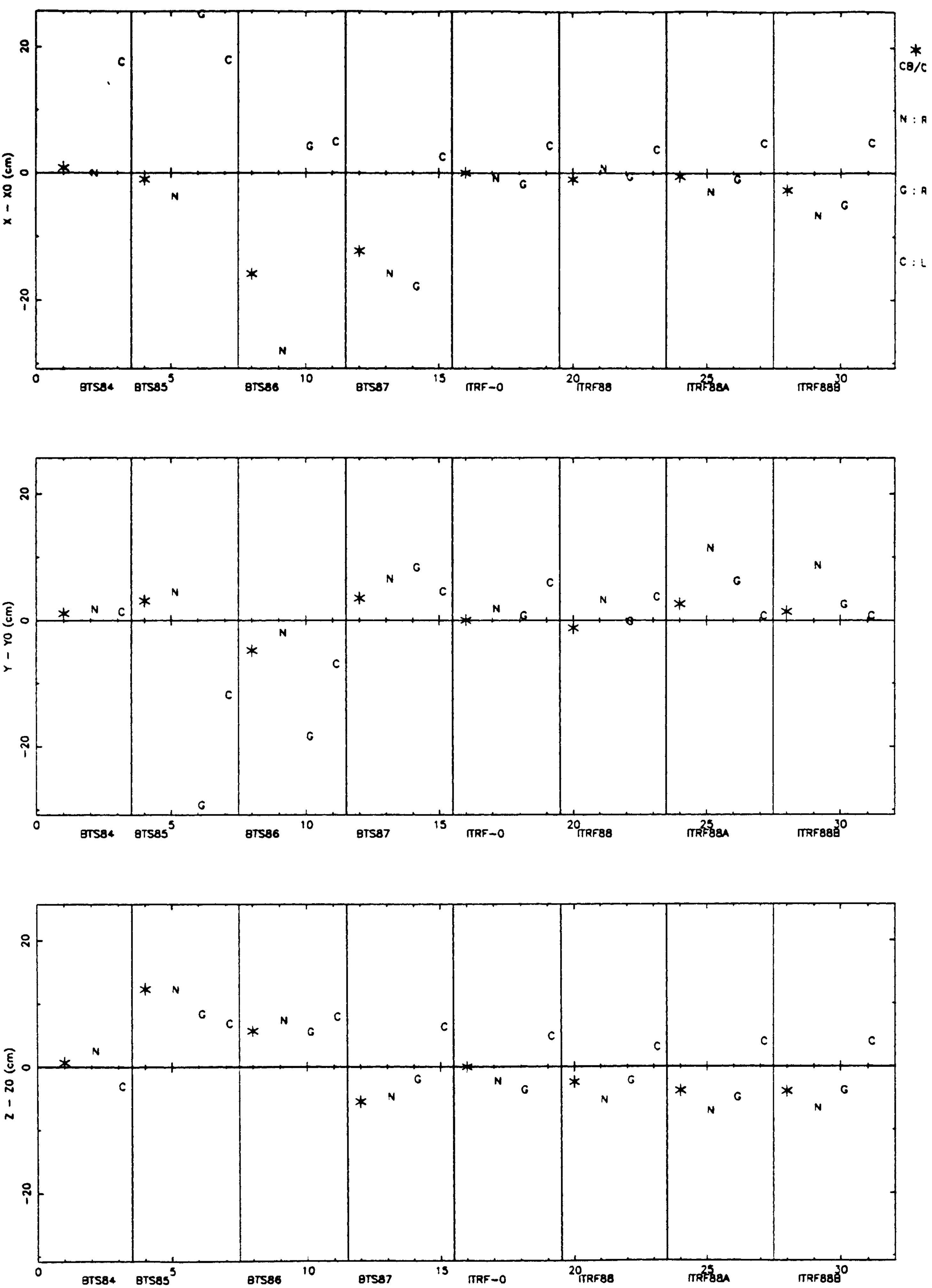

FIG. 5 AREQUIPA SLR 7907

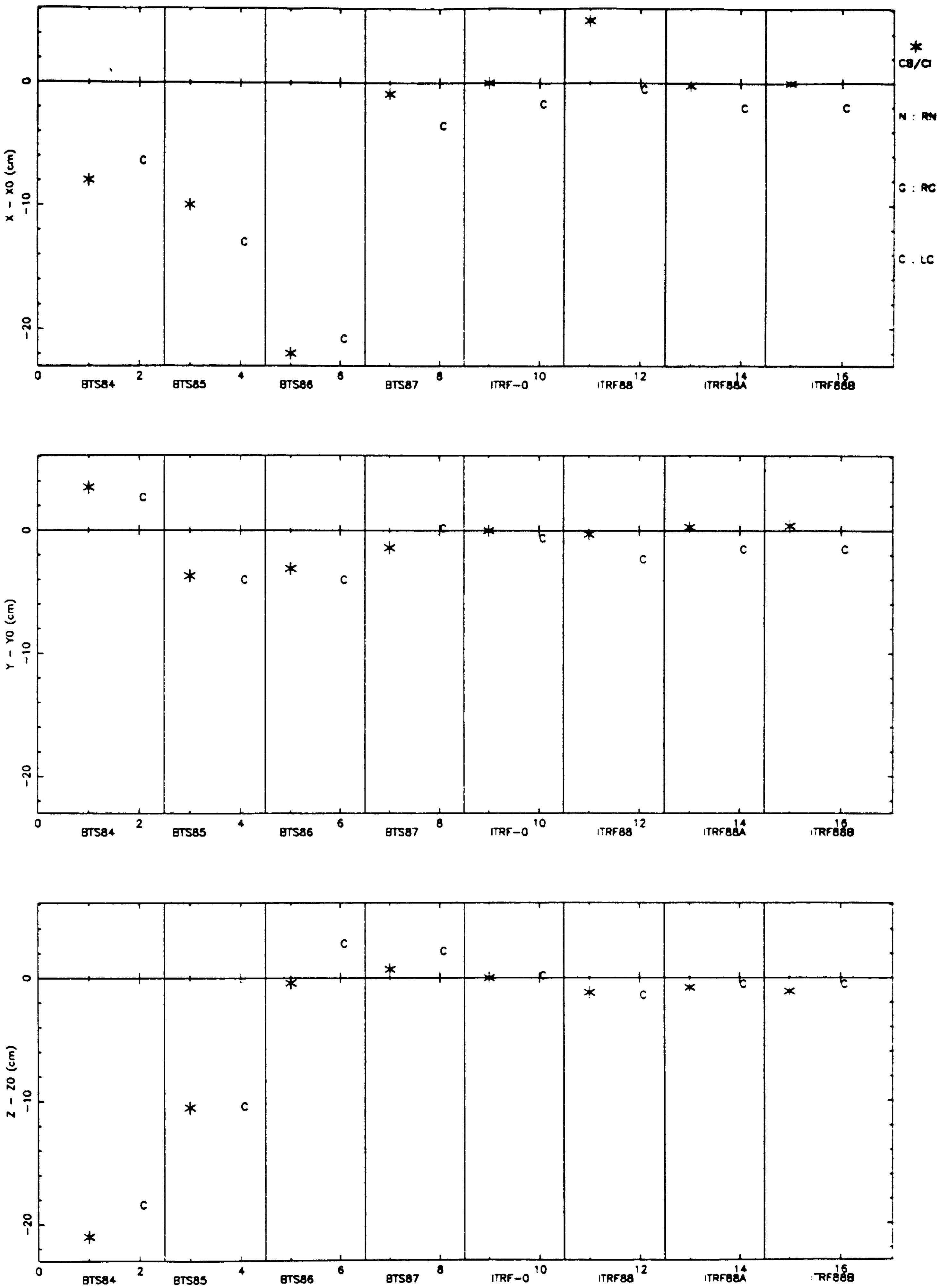

FIG. 6 FORT DAVIS SLR 7086