III. Selected data for ITRF96

III.1. Solutions submitted by the IERS analysis centers

The selected solutions for the ITRF96 combination are coming from those received in 1997 as well as some past data. Table 1 summarizes the solutions used in the ITRF96 combination. For each individual solution, a summary description is given in the next section, as provided by the analyis centers.

Table 1. Selected Solutions for the ITRF96 analysis

Solution	Ref. Epoch	Data Span
VLBI		
SSC(GSFC) 97 R 01	93:001	79-97
SSC(GIUB) 97 R 01	93:001	84-96
SSC(NOAA) 95 R 01	93:001	79-94
SSC(JPL) 97 R 01	93:001	91-96
SLR		
SSC(CSR) 96 L 01	93:001	76-96
SSC(GSFC) 97 L 01	86:182	80-96
GPS		
SSC(EMR) 97 P 01	96:001	95-97
SSC(GFZ) 97 P 02	94:365	93-96
SSC(CODE) 97 P 02	95:076	93-97
SSC(EUR) 97 P 04	96:090	95-96
SSC(EUR) 97 P 03	96:339	96-97
SSC(MIT) 97 P 01	97:151	94-97
SSC(NCL) 97 P 01	96:001	95-97
SSC(JPL) 97 P 02	96:001	91-96
DORIS		
SSC(GRGS) 97 D 01	93:001	93-96
SSC(CSR) 96 D 01	93:001	93-96
SSC(IGN) 97 D 04	95:100	90-97

III.1.1. Summary of the VLBI solutions

III.1.1.1. SSC(GSFC) 97 R 01

C. Ma and K. D. Baver (Hughes STX), Code 926, Goddard Space Flight Center, Greenbelt, MD 20771, USA, cma@virgo.gsfc.nasa.gov

Mark III VLBI delay observations between Aug 1979 and Jan 1997 acquired by the NASA Crustal Dynamics Project, POLARIS/IRIS organized by NOAA, the Communications Research Laboratory (Japan), the Geographical Survey Institute (Japan), the University of Bonn Geodetic Institute, the National Astronomical Observatory (Japan), the Naval Research Laboratory Reference Frame Program, the USNO NAVNET/ NAVEX, the NASA Space Geodesy Program-GSFC, and the National Earth Orientation Service (USA) have been analyzed for the complete set of RSC, SSC, SSV, and EOP. There are 128 points in the TRF and the CRF includes 600 radio sources. The origin and orientation of the TRF are connected to ITRF94 at 1993.0 by applying no net horizontal translation and no net rotation constraints to the position adjustments of nine stations with uniform station weighting for both constraints. The evolution of the TRF is connected to NNR-NUVEL1A by applying no net horizontal translation and no net rotation constraints to the velocity adjustments of five (of the nine above) stations with uniform station weighting for both constraints. The right ascension origin and orientation of the CRF are connected to ITRF95 by applying a no net rotation constraint to the position adjustments of the 212 ITRF95 defining sources with weighting proportional to the precision of the source positions. Three-dimensional velocities are adjusted for all sites with constraints for those sites with insufficient data. EOP values from 24-hr sessions are available at minimum weekly, and there are continuous periods up to two-weeks duration.

III.1.1.2. SSC(GIUB) 97 R 01

A. Nothnagel, K. Boerger, J. Campbell, R. Haas, A. Mueskens Geodetic Institute of the University of Bonn (GIUB) Nussallee 17, D-53115 Bonn, Germany E-mail: nothnagel@uni-bonn.de
V. Thorandt, D. Ullrich Institute for Applied Geodesy (IfAG) Karl-Rothe-Strasse 10-14 D-04105 Leipzig, Germany E-mail: vt@leipzig.ifag.de
G.D. Nicolson Hartebeesthoek Radio Astronomy Observatory (HartRAO) PO Box 443, Krugersdorp 1740, South Africa E-mail: george@bootes.hartrao.ac.za

Observing technique: VLBI, group delay observables Data span: January 19984 - December 1996 (1052 sessions) Type of results: EOP, RSC, SSC - station coordinates and velocities (X0,Y0,Z0,Xdot,Ydot,Zdot) - right ascension and declination of radio sources - earth orientation parameters (X,Y,UT1-UTC,dpsi,deps) - others: clock polynomials, wet zenith tropospheric delays - reference epochs for UT1-UTC and polarmotion: midnight epochs of each measurement - nutation offsets were estimated at the beginning of each experiment - number of sites: 43, number of radio sources: 293 - The orientation of the Celestial Reference Frame is defined by the ICRF (1995) WGRF Right Ascension value of OJ287 and fixing the nutations to the model values on April 2, 1988. The initial orientation and trans- lation of the terrestrial reference frame is defined by fixing the ITRF94 coordinates of Wettzell and the IERS Rapid service EOP values on April 2,1988. To avoid the singularities of the velocity vector field another 6 parameters were modelled, i.e. the height changes of HARTRAO were fixed to be zero and the motion of the station Wettzell as well as the orientation of the Wettzell- Westford baseline vector were modelled according to NNR-NUVEL-1A.

III.1.1.3. SSC(NOAA) 95 R 01

J.R. Ray, M.D. Abell, W.E. Carter, W.H. Dillinger, and M.L. Morrison, Geosciences Laboratory, NOAA N/OES13, SSMC-4, 1305 East-West Highway, Silver Spring, Maryland 20910-3281, USA

Two solutions are submitted using most of the available Mark III VLBI data from 1980 September through 1994, including 1216103 group delay observations from 1774 24-hour sessions. NOAA 95 R 01 includes estimated values for radio source coordinates, terrestrial site coordinates and velocities, and a time series of Earth orientation parameter values. A separate series of quasi-daily UT1 values is provided in NOAA 95 R 02, referred to the NOAA 94 R 01 reference frames.

The geocentric origin of the SSC(NOAA)95R01 terrestrial reference frame is specified for the epoch 1988.0 by constraining the vector sum of the adjusted coordinates for 20 VLBI sites to equal the corresponding sum for ITRF92. The net translational and rotation motions of the frame are specified by constraints on the vector sums of the respective adjusted velocity components for 10 VLBI sites using the NNR-NUVEL-1A model as the reference. Coordinates and velocity estimates are reported for 111 sites at epoch 1993.0; coordinates for 30 sites with insufficient data are projected using NNR-NUVEL-1A velocities. The full covariance matrix is also provided.

The right ascension origin of the RSC(NOAA)95R01 celestial reference frame at epoch J2000.0 is specified by constraining the sum of the adjusted RA values for 71 radio sources (weighted by cosine of declination) to equal the sum from RSC(IERS)93R01. Coordinates for 249 radio sources are reported.

EOP(NOAA)95R01 gives the adjusted EOP values for 1772 epochs; EOP values for the reference epoch 1991 August 12 19:49:50 have been held fixed at the interpolated values from the EOP(IERS) 90 C04 series. UT1 estimates are reported for 2397 epochs in EOP (NOAA) 95 R02. All tidal effects are included, including diurnal and semi-diurnal variations.

III.1.1.4. SSC(JPL) 97 R 01

J.A. Steppe, S.H. Oliveau, O.J. Sovers; Jet Propulsion Laboratory, California Institute of Technology; Pasadena, California 91109, USA E-mail: as@logos.jpl.nasa.gov

JPL. NASA's Deep Space Network operates radio telescopes in three complexes: in Australia, Spain, and the USA (California). VLBI data collected from these sites by JPL between 1978 and 1997 were analyzed for celestial and terrestrial frames and earth rotation parameters, and reported as JPL 97 R 01. The celestial frame gives coordinates for 287 radio sources and is tied to RSC(IERS)94 C 01 through three coordinates of two sources. The terrestrial frame gives station coordinates and velocities for 10 stations in 3 sites, and is tied to ITRF-93 in both location and velocity using one station in each site. The analysis gives a time series EOP(JPL)97 R 01 containing the UT0-UTC and Variation of Latitude of a baseline vector at a frequency of two measurements per week. Additional earth rotation information is provided in estimated corrections to precession, obliquity rate, celestial pole offsets at epoch, 23 coefficients of nutation terms, and 40 coefficients of a parametric model for the nearly-diurnal and nearly- semidiurnal tidal frequency variations of UT1 and polar motion.

III.1.2. Summary of the SLR solutions

III.1.2.1. SSC(CSR) 96 L 01

R. J. Eanes Center for Space Research, University of Texas at Austin, Austin TX 78712
M. M. Watkins Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109

Station positions and velocities were derived from a combination of Lageos-1 and Lageos - 2 SLR data. Lageos-1 data from May 7, 1976 through February 6, 1996 and Lageos-2 data from October 25, 1992 through February 6, 1996 was used. Earth orientation parameters were computed only from the Lageos-1 data. Epoch positions and velocities were adjusted for all sites using 100 mm/yr a priori sigma for the velocities. This constraint was insignificant for the strongest sites, while for the weakest sites it resulted in velocities which deviated only slightly from their a priori values. When available, a priori positions and velocities were taken from ITRF94. Otherwise, a priori positions were from earlier SLR solutions and velocities were from the NUVEL-1 NNR plate motion model. The velocities of all points at a given site were constrained to be equal. The solution for both positions and velocities was fiducial free, and the reference frame singularities were removed by using internal constraints on the rotation and rotation rate. The solution was then transformed to have no rotation or rotation rate with respect to ITRF94. The resulting polar motion series had significant linear trends with respect to the IERS C04 series, hence additional rotations and rotation rates about the x and y axes were applied to remove them. Earth orientation parameter solutions were made at 3-day intervals subject to the condition that the posteriori uncertainties were less than specified values. If the solution for a given 3 day interval yielded unacceptably large uncertainties the interval was extended by 3 days and the solution repeated. UT1 estimates were obtained from the Lageos-1 node residuals, with the constraint that they follow the JPL COMB95 series at periods longer than about 30 days.

III.1.2.2. SSC(GSFC) 97 L 01

D.E.Smith and R.Kolenkiewicz NASA/Goddard Space Flight Center, Greenbelt MD 20771
P.J.Dunn and M.H.Torrence Hughes STX Corp.,Greenbelt, MD 20770
E.C.Pavlis U. of Md. Dept. of Astronomy and NASA/GSFC, Greenbelt, MD 20771

The GSFC 97L solution was obtained by fitting data from LAGEOS I between January 1980 and December 1996 in 30 day arcs, and once per year (in July) in 35 day arcs, using normal points from the global SLR tracking network. The monthly arcs were combined to derive a set of station positions and station velocities. Earth Orientation Parameters were estimated as independent values of time and polar motion at 5 day intervals from January 1980 through December 1982, and daily intervals since January 1983. The LOD values given are for an epoch midway between the Xp Yp values. Orbit and force model parameters were adjusted at 15 day intervals until January 1990, and at 5 day intervals thereafter. The IERS standards were followed except that the JGM3 gravity field with expanded ocean tidal terms, and a value of GM 398600.4415 km3/s2 were adopted.

III.1.3. Summary of the GPS solutions

III.1.3.1. SSC(EMR) 97 P 01

R. Ferland, P. Tetreault, D. Hutchison, C. Huot, J. Kouba, J. Popelar, Geodetic Survey Division (GSD), Geomatics Canada, Natural Resources Canada (NRCan) (Formerly: Energy Mines and Resources (EMR)), 615 Booth St., Ottawa, Ont. K1A OE9

NRCan (formerly EMR). The 1995 and 1996 daily solutions were rigorously combined using unconstrained variance-covariance matrices to derive consistent sets of SSC(EMR) 97 P 01 (epoch 1996.0), and EOP(EMR) 97 P 01. The new EOP(EMR) 97 P 01 solution contains daily PM x, y and UT1-UTC, LOD, apriori PM x,y rates and apriori CP(IERS Bull A) corrections from Jan. 01/96 (MJD 50083.5), from June 30/96 (MJD 50264.5) to Dec. 31/96 estimated PM x,y rates and sigmas. Additionaly, from June 30/96 as recommended by IGS, the IERS subdaily EOP model is employed in EMR analysis. However, the reported EOP, as it is now required by IERS, do not include the subdaily EOP effects. The terrestrial reference frame origin and orientation are determined by the ITRF94 coordinates and velocities of the 13 fiducial stations, as recommended by IGS. The time evolution is highly constrained by the ITRF94 station velocities for the 13 stations. The EOP orientation and time evolution is thus consistent with the ITRF94 station coordinates/velocities and the SSC(EMR) 97 P 01. The estimated UT1-UTC is continuous and it was initialized on Jan. 2, 1994 to a Bull. A value. Although complete variance-covariance matrices between SSC/SSV and EOP were evaluated and are available, only a fully populated SSC/SSV covariance matrix was submitted for the SSC(EMR) 97 P 01.

III.1.3.2. SSC(GFZ) 97 P 02

G. Gendt, G. Dick, Ch. Reigber, W. Sommerfeld, Th. Nischan, G. Beeskow GeoForschungs Zentrum (GFZ) Potsdam

A global Set of Station Coordinates (SSC(GFZ) 97 P01) and Earth Rotation Parameters (ERP(GFZ) 97 P01) have been computed using the global GPS data spanning 4 years from January 1, 1993, to December 31, 1996, and the GFZ analysis software package EPOS.P.V2.

The number of sites used varies from 23 in 1993 to 63 in 1996. To solve for the SSC(GFZ) 97 P01 the site velocities were fixed to the ITRF94 velocities and the station coordinates were aligned to the ITRF94 system by a 7-parameter similarity transformation. The daily ERP results (ERP(GFZ) 97 P01 with x, y, LODR) are consistent with this coordinate set. Since June, 30 1996 the the daily and sub-daily polar motion and UT1 are modelled according IERS 1996 Standards.

In addition results from simultaneous adjustment of station coordinates and velocities are presented (SSC(GFZ) 97 P02). The velocities for all sites with more than half a year of observations were computed, the velocities for the other sites were fixed to ITRF94.

III.1.3.3. SSC(CODE) 97 P 02

M. Rothacher, G. Beutler, E. Brockmann, S. Fankhauser, S. Schaer, T. Springer (Astronomical Institute, University of Berne, rothacher@aiub.unibe.ch); U. Wild, A. Wiget (Federal Office of Topography, Wabern, adrian.wiget@se264.lt.admin.ch);
H. Seeger (Institute for Applied Geodesy, Frankfurt, seeger@gps.ifag.de);
C. Boucher (Institut Geographique National, Paris, boucher@ensg.ign.fr)

The solution made available to the IERS by the CODE Analysis Center of the IGS for the 1996 submission was produced as a combined, consistent analysis of both, the earth rotation parameters (x, y of pole and UT1-UTC) and the station coordinates and velocities using as observations the GPS data of the global IGS network. The UT1-UTC series was obtained by integration of the estimated LOD values (the first UT1-UTC value fixed to the Bulletin A solution). The time interval covered by the solution starts on day 200 of the year 1993 (July 19, 1993) and ends on day 060, 1997 (March 1, 1997). The spacing between subsequent EOP values is one day. The number of daily global IGS stations processed at CODE grew from about 35 (in 1993) to about 85 (in 1997). Regarding the satellite orbits the series is not homogeneous because the satellite orbit modeling was changed (improved) a few times. Concerning the EOP series we have to mention that sub-daily EOP variations were modeled (Ray model) starting with June 30, 1996, only.

III.1.3.4. SSC(EUR) 97 P 03 and P04

T.A. Springer, G. Beutler, W. Gurtner, M. Rothacher, S. Schaer (Astronomical Institute, University of Berne, springer@aiub.unibe.ch);

The solutions made available to the IERS by the EUREF combination center for the 1997 submission were produced based on the weekly EUREF combined solutions. It contains only site coordinates and velocities in the SINEX format. All results are based on GPS observations only! Two solutions were genereated: EUR97P93 which is based on all results prior to GPS week 860, and EUR97P94 which is based on all results from GPS week 860 to 904. This was necessary since in week 860 the reference frame, as given by the (IGS) orbits of the GPS satellites, was changed from the ITRF93 to the ITRF94. Therefore a "jump" is present in the EUREF coordinates solutions. The IERS requested the submission of 2 seperate solutions.

The EUREF weekly combinations are based on the results produced by the following EUREF Analysis Centers:

Contributing Solutions:

Group	Description	STA	DATA-SPAN (gpsweek)	WEEKS
ASI	Nuova Telespazio S.p.A., Space Geodesy Center	7	0867-0904	35
BEK	International Commission for Global Geodesy of the Bavarian Academy of Sciences (BEK)	14	0834-0904	71
COE	European solution created at CODE (Center for Orbit Determination in Europe)	37	0834-0904	71
GOP	Geodetic Observatory Pecny, Czech Republic	11	0890-0904	15
IFG	Institute for Applied Geodesy in Germany (IfAG)	16	0834-0904	71
LPT	Bundesamt fuer Landestopographie (L+T), Switzerland	6	0880-0904	25
NKG	Nordic Geodetic Commision (NKG)	27	0878-0904	26
OLG	Observatory Lustbuehel Graz (OLG)	17	0853-0904	51
ROB	Royal Observatory of Belgium (ROB)	12	0836-0904	69
WUT	Warsaw University of Technology (WUT)	16	0834-0904	66
EUR	Euref Combined solution in ITRF93 (EUR97P93)	39	0834-0859	26
EUR	Euref Combined solution in ITRF94 (EUR97P94)	57	0860-0904	45

Each of the EUREF Analysis Centers provides a weekly SINEX file containing their coordinate estimates. These individual solutions are combined to give the official EUREF solution which is submitted to the IGS to be included in the IGS densification project. These weekly EUREF results have been combined to produce this EUREF contribution to the IERS. The EUREF combinations are performed officially since gpsweek 0860 (June 30, 1996) but have been available since gpsweek 0834. Because of some problems with the earlier EUREF weekly SINEX files all weekly combinations have been redone in order to get a clean set of weekly EUREF SINEX files.

Note that for the following sites, which were available for only a few weeks in either one of the two solutions, the velocity was constrained to the Nuvel-1 velocities.

These sites are:

SITE		WEEKS	
SFER	13402M004	3	EUR97P93
OBER	14208M001	18	EUR97P94
SODA	10513M001	12	EUR97P94

III.1.3.5. SSC(MIT) 97 P 01

Tom Herring Massachusetts Institute of Techonology, Cambridge, Massachusetts, USA

We combined GPS SINEX files submitted to the CDDIS by the 7 IGS analsysis centers and the 6 regional analysis centers for the period from GPS week 818 to Week 900. In the combination, the station positions were assumed to evolve with linear rates after correcting most of the height discontinuities in the original SINEX files due to incorrect antenna heights (XIAN was one case missed in applying these corrections). The weights for the individual centers were determined using the algorithm discussed in our weekly SINEX summary files submitted to the CDDIS. In the combination, each center's station coordinates were allowed to rotate week-to-week, and between centers, but no explicit translation parameters were estimated. All centers were deconstrained to levels between 1-5 meters before combination. For some centers, in some weeks, we needed to scale the diagonal elements of the covariance matrix by typically 1 part-per- million after deconstraining because of numerical stability problems in the matrices.

III.1.3.6. SSC(NCL) 97 P 01

Description not available

III.1.3.7. SSC(JPL) 97 P 02

M. B. Heflin, M. M. Watkins, D. C. Jefferson, F. H. Webb, and J. F. Zumberge Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA

Velocities and positions for 219 sites are based on 90174 station days of GPS data spanning six years from 1991 through 1996. Daily estimation was carried out with JPL's GIPSY software using strategies which generally adhered to IERS/IGS standards as described by Zumberge and Jefferson (1992), Heflin et al. (1992, 1994), Blewitt et al. (1992), Vigue et al. (1994), Zumberge et al. (1995), Bar Sever et al. (1995), and Zumberge et al. (1996). Post-processing involved the following steps. First, antenna heights were corrected on each day by comparing the value used during analysis with the true value from the IGS site logs. Second, all solutions were combine with their full covariance matrices to obtain position and velocity estimates. Next, the reference frame was defined by application of internal constraints and transformation into ITRF94. Site positions and velocities were backsubstituted into the the daily normal equations to produce an improved, consistent EOP series.

III.1.4. Summary of the DORIS solutions

III.1.4.1. SSC(GRGS) 97 D 01

L. Soudarin, J.F. Cretaux and A. Cazenave Groupe de Recherche de Geodesie Spatiale, Toulouse, France

The solution gives the station coordinates and velocities of 48 DORIS sites with good observing histories. The DORIS data of 4 years of SPOT2, SPOT3 and TOPEX / POSEIDON (january 1993 to december 1996) were treated for this solution. The data were computed on a dayly basis for the SPOT2 and SPOT3 satelites and on a 3-days basis for the TOPEX/ POSEIDON satellites. The computations were made by a semi-dynamical approach in which the satellite orbits, station positions and velocities, and Earth orientation parameters are determined in a single inversion, together with selected parameters required to improve the force model and the measurement corrections. This method uses the GINS/ DYNAMO software developped for precise orbit computation and geopotential modelling. For the SSC solutions, the EOP parameters are being fixed to the IERS EOPC04 values. The gravity field model is JGM3 and the ocean tide model is FE95. The stations parameters (positions and velocities) were all estimated, to make the frame entirely free and connected to the IERS only by the EOP.

III.1.4.2. SSC(CSR) 96 D 01

M. M. Watkins Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA
J. C. Ries Center for Space Research, The University of Texas at Austin, Austin, USA

Positions and velocities have been computed for 47 separate DORIS beacons. The data set used consisted of 125 cycles (3.4 years) of tracking data to the Topex/Poseidon satellite. Although a total of over 60 beacons have tracked the Topex/Poseidon, SPOT-2, and SPOT-3 spacecraft, only 54 have sufficient data to estimate a reasonable velocity. The solution was performed without fiducial constraints on any site. Rotational constraints were applied to the network as a whole to remove the rotational singularity, and the network was aligned in rotation and rotation rate to the ITRF94 solution. Translation (geocenter) and scale are left as estimated from the DORIS data. The force and measurement models generally adhered to the IERS standards. Earth rotation parameters were held fixed to the operational values from the University of Texas Center for Space Research CSR95L02 series.

III.1.4.3. SSC(IGN) 97 D 04

P. Willis, P. Sillard, Institut Geographique National, ENSG/LAREG, Marne-la-Vallee, France

Positions and velocities have been computed for all available DORIS beacons in the DORIS/IERS data sets (total of 70 stations including all the stations relocations). The data used was for SPOT-2 (1990: April to June; 1992: January to March; from March 1994 to July 1997), for SPOT3 (from March 1994 to October 1996) and for TOPEX (from October 1992 to July 1997), equivalent to 61 months in total. DORIS data were computed on a daily basis using a free-network approach (loose constraints). Daily stations coordinates covariance matrices were combined on a monthly basis and then combined in a global adjustment in order to obtain a global position/velocity matrix in the SINEX format. All stations were kept in this solution (even with very few data available), no local tie information was added. The solution was approximately aligned in rotation (only) to ITRF94 solution leaving the scale and origin information coming from the DORIS data. In the daily solutions, the pole was also estimated. In the DORIS data computation (done with the JPL GIPSY/OASIS software), models generally adhered to the IERS standards. The gravity field model used was JGM-3. The troposphere correction was estimated by pass using a constrained between passes (equivalent to 5 cm for 1 day between passes).

III.1.5. Local surveys

As an improvement of the use of the local ties, all the eccentricities of colocated sites were converted into a complete set of positions for each site, provided in SINEX format. Each SINEX file reflects correlations between the cartesian components of the points within each site. This has been achieved by solving for the following system of observation equations (III.1):

$$\begin{pmatrix} \Delta x_s^{i,j} \\ \Delta y_s^{i,j} \\ \Delta z_s^{i,j} \end{pmatrix} = \begin{pmatrix} x^j - x^i \\ y^j - y^i \\ z^j - z^i \end{pmatrix} \tag{III.1}$$

Where ($\Delta x_s^{i,j}$, $\Delta y_s^{i,j}$, $\Delta z_s^{i,j}$) are the geocentric components of the tie vector linking two points i and j, of a given data set s. The standard deviations (SD) ($\sigma\Delta x_s^{i,j}$, $\sigma\Delta y_s^{i,j}$, $\sigma\Delta z_s^{i,j}$) for each local tie vector are used to compute a diagonal variance matrix. If these SD are not available, they are computed by :

$$\sigma_{computed} = \sqrt{\sigma_1^2 + \sigma_2^2} \tag{III.2}$$

where,

$$\sigma_1 = 3\,\text{mm} \qquad \text{et} \qquad \sigma_2 = 10^{-6} \times \sqrt{(\Delta x_s^{i,j})^2 + (\Delta y_s^{i,j})^2 + (\Delta z_s^{i,j})^2}$$

The equation system (III.1) needs of course initial coordinates for one point per tie vector set s, which are taken from ITRF94 solution with 1 meter as standard deviation.

Table T3 of the appendix lists the local ties vectors used in the ITRF96 combination.