COMBINATIONS OF EOP MEASUREMENTS: COMB95 & POLE95

EOP(JPL) 96 C 02
EOP(JPL) 96 C 03

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A Kalman filter has been used to combine independent measurements of the Earth's orientation taken by optical astrometry and the space-geodetic techniques of LLR, SLR, VLBI, and GPS. The approach taken is the same as that used in generating previous such combinations (e.g., Gross, "Combinations of Earth Orientation Measurements: SPACE94, COMB94, and POLE94", Journal of Geophysical Research, in press, 1996) and will be only briefly described here. Prior to incorporation of the optical astrometric measurements, the space-geodetic measurements were first combined together, resulting in the combined EOP series EOP (JPL) 96 C 01 (also known as SPACE95), the description of which can be found elsewhere in this volume. The incorporation of the optical astrometric measurements was then done in two stages: (1) the BIH optical astrometric series (Li, BIH Annual Report for 1984, pp. D31-D63) was first combined with SPACE95 to form COMB95, and (2) the International Latitude Service (ILS) optical astrometric series (Yumi and Yokoyama, Results of the ILS in a Homogeneous System, 1980) was combined with COMB95 to form POLE95.

Prior to forming COMB95, the BIH astrometric series was first corrected to have the same bias and rate as SPACE95, the stated measurement uncertainties of the BIH series were adjusted by applying a constant multiplicative scale factor that made the BIH residual, when differenced with SPACE95, have a reduced chi-square of one; and those BIH data points whose residual values were greater than three times their adjusted uncertainties were deleted. In addition, in order to correct for systematic, seasonally varying effects in optical astrometric measurements, the annual term of the BIH series was adjusted to be in agreement with the annual term exhibited by SPACE95. The corrections thus determined and applied to the BIH series prior to its combination with SPACE95 are shown in Tables 1 and 2, with the 1-sigma formal uncertainties in determining these bias, rate, and annual term corrections being shown in parentheses.

The result of combining the corrected BIH optical astrometric EOP measurements with SPACE95 is designated EOP(JPL) 96 C 02 (also known as COMB95), spans January 20, 1962 to February 6, 1996 at 5-day intervals, and consists of values of PMX, PMY, UT1-UTC, their 1-sigma formal uncertainties, and correlations.

The ILS optical astrometric series was then combined with COMB95 to form POLE95 after first: (1) correcting the ILS series to have the same bias, rate, and annual term as COMB95, (2) applying a constant multiplicative scale factor to the stated measurement uncertainties of the ILS series so that its residual, when differenced with COMB95, had a reduced chi-square of one, and (3) deleting those data points whose residual values were greater than three times their adjusted uncertainties (see Tables 1 and 2 for the values of the corrections applied to the ILS series). The result of combining the corrected ILS optical astrometric EOP

measurements with COMB95 is designated EOP(JPL) 96 C 03 (also known as POLE95), spans January 20, 1900 to January 21, 1996 at 30.4375-day intervals, and consists of values of PMX and PMY, their 1-sigma formal uncertainties, and correlations.

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TABLE 1. ADJUSTMENTS TO BIAS, RATE, AND UNCERTAINTY

DATA SET NAME	BIAS (mas)			RATE (mas/yr)			UNCERTAINTY SCALEFACTOR		
	PMX	PMY	UT1	PMX	PMY	UT1	PMX	PMY	UT1
BIH	-2.193	0.598	-8.083	1.581	0.583	5.409	1.814	1.595	1.860
	(0.840)	(0.721)	(0.727)	(0.482)	(0.193)	(0.315)			
IRS	PMX	PMY	UT1	PMX	PMY	UT1	PMX	PMY	UT1
	56.99(1	3.603		0.601	0.694		2.000	1.594	---
	(2.178)	(1.'/ 42)		(0.444)	(0.355)				

Reference date for rate adjustment of BIH series is 1980.0
Reference date for rate adjustment of IRS series is 1970.0

TABLE 2. ADJUSTMENTS TO ANNUAL TERM

DATA SET NAME	COEFFICIENT OF SINE TERM (mas)			COEFFICIENT OF COSINE TERM (mas)		
	PMX	PMY	UT1	PMX	PMY	UT1
BIH	-5.955	6.688	5.274	-2.953	10.2"/6	-0.911
	(1.016	(0.690	(6."/'/'/)	(1.069)	(0.'/ 62)	(0.828)
IRS	PMX	PMY	UT1	PMX	PMY	UT1
	- 0. '/1'/	8.048		9.915	.30 .608	---
	(3.061	(2.44'/		(3.065)	(2.450)	

Reference date for adjustment of BIH series is 1980.0
Reference date for adjustment of IRS series is 1970.0

ATTACHMENT 1

Technical description of solution JPL 96 C 02

1 Technique: Combined

2 Analysis Center: JPL

3 Software used: Kalman Earth Orientation Filter (KEOF)

4 Data span: Jan 62 - Feb 96 at 5-day intervals

5 Celestial Reference Frame: Not Applicable

a - Nature:

b - Definition of the orientation:

6 Terrestrial Reference Frame: Not Applicable

a - Relativity scale:

b - Velocity of light:

c - Geogravitational constant:

d - Permanent tidal correction:

e - Definition of the origin:

f - Definition of the orientation:

g - Reference epoch:

h - Tectonic plate model:

i - Constraint for time evolution:

7 Earth orientation: EOP(JPL) 96 C 02

a - A priori precession model: Not Applicable

b - A priori nutation model: Not Applicable

c - Short-period tidal variations in x, y, UT1:

When necessary, diurnal and semidiurnal tidal variations have been removed from the individual EOP series prior to their combination into EOP(JPL) 96 C 02. Diurnal and semidiurnal tidal terms have not been added back and are therefore not included in the values reported in EOP(JPL) 96 C 02.

8 Estimated Parameters:

a - Celestial Frame:

b - Terrestrial Frame:

c - Earth Orientation: PMX, PMY, UT1-UTC

d - Others:

ATTACHMENT 2

Technical description of solution JPL 96 C 03

1 - Technique: Combined

2 - Analysis Center: JPL

3 - Software used: Kalman Earth Orientation Filter (KEOF)

4 - Data span: Jan 1900 - Jan 1996 at 30.4375-day intervals

5 - Celestial Reference Frame: Not Applicable

a - Nature:

b - Definition of the orientation:

6 - Terrestrial Reference Frame: Not Applicable

a - Relativity scale:

b - Velocity of light :

c - Geogravitational constant:

d - Permanent tidal correction:

e - Definition of the origin:

f - Definition of the orientation:

g - Reference epoch:

h - Tectonic plate model:

i - Constraint for time evolution:

7 - Earth orientation: EOP(JPL) 96 C 03

a - A priori precession model: Not Applicable

b - A priori nutation model: Not Applicable

c - Short-period tidal variations in x, y, UT1:

When necessary, diurnal and semidiurnal tidal variations have been removed from the individual EOP series prior to their combination into EOP(JPL) 96 C 03. Diurnal and semidiurnal tidal terms have not been added back and are therefore not included in the values reported in EOP(JPL) 96 C 03.

8 - Estimated Parameters:

a - Celestial Frame:

b - Terrestrial Frame:

c - Earth Orientation: PMX, PMY

cl - Others:

MJD	PMX (arc sec)	PMY (arc sec)	UT1-UTC (sec)			SIG X (arc sec)	SIG Y (arc sec)	SIG U (sec)				COR XY	COR XU	COR YU			
37684.000	(1.04 4221	/0 0.2"/ 72742	0.0734062	0	o	0.009327"/	0.0076541	0,000913>	(1	0	0	-0.0075	0.0000	0.0000	0	0	0
3'/6[[9. 000	-0.0431891	0.2789800	0.0245875	o	0	0.0084509	0.0073398	0.0008")94	0	0	0	-0.006?	0.0000	0.0000	0	0	0
37694.000	-0.0432884	0.2806889	0.0244537	0	0	0.0081576	(1.0[) /069, /	0.0008391	0	0	o	-0,0020	0.0000	0.0000	0	0	0
3"/699 ,000	-0.0422728	0.28258'/8	0,0246326	0	0	0.0081665	0.0071648	0.0009205	0	0	0	0.0014	0.0000	0.0000	0	0	0
3.)'/04.000	-0.0400552	0,?849263	0.0221186	0	0	0.0082738	0.0072702	0.0009234	0	0	0	0.0026	0.0000	0.0000	0	0	0
377 09 .000	0.0366632	0.28'/ 9151	0.0206159	0	o	0,00[13'/3'/	0.0073470	0.0009213	0	0	0	0,0023	0.0000	0.0000	0	0	0
3'/./ 14,00[1	-0.0320376	0.2913160	0.0211282	0	0	0,0084242	0.0073771	0.0009293	0	0	0	0.0018	0.0000	0.0000	0	0	0
3"/'/19.00[)	0.0260918	0.294-/400	0.0202232	0	0	0.0084164	0.0073463	0.0009468	0	0	0	0.0015	0,0000	0.0000	0	0	0
377 24.000	-0.0188516	0.29-/8950	0.019320'/	o	0	0.0083443	0.00./2478	0.0009582	0	0	0	0.0009	0.0000	0.0000	0	0	0
37729 .000	0,01 05303	0.{004385	o 0176265	0	(1	0.0081959	o 00-/(1883	(1.0009 520	o	0	0	-0.0003	0.0000	0 "0000	0	0	0
37734	0000.OO1s 448	0.3019772	0,0135863	o	o	0.00'/ 9795	O.0068896	0.0009152	0	0	0	-0.0021	0,0000	0.0000	0	0	0
3-/'/39.000	0.0076986	0.3021378	0.0127851	0	0	0.007' /49"/	0.006722'9	0.0008809	0	0	0	-0.0039	0.0000	0.0000	o	0	0
3'/'/44 .000	0.0168463	0.3006941	0.0116487	0	0	0.0075668	0.0066282	0.0008633	0	0	0	-0,0046	0.0000	0.0000	0	0	0
3,/-/49,000	0.0257876	0.2976378	0.00951 "/5	o	0	0.00'/ 473?	0.006 (1'/9	0.0008590	o	0	0	-0.0039	0.0000	0.0000	0	0	0
3,1'/ 54.000	0.0344545	0.2931137	0.00s3254	0	0	0.00 -/4[16s	0.0066881	0.0008733	o	0	0	-0.0025	0.0000	0.0000	0	o	0
3 /./59 .000	0.0425393	0.2874603	0.0041941	0	0	0.0075804	0,0068019	0 .000894'/	0	0	o	-0.0030	0.0000	0.0000	0	0	0
3./'/[4.000	0.0498053	0.2812269	0.0008870	o	0	0.0077255	0.0069473	0,0009?36	0	0	o	0.0001	0.0000	0.0000	0	0	0
3'/769.000	0.0561894	0.2"/ 49105	-0,0003922	0	0	0.00"/ 8966	0.0071046	0.0009504	0	0	o	0.0011	0,000[!	0.0000	0	0	0
3./'/'/4.000	0.061 "/010	0.2686875	-0.003189s	0	c	o 0080893	0.00'/> 616	0.0009751	0	o	o	0.0021	0.0000	0.0000	0	0	0
37779.000	0.0663752	0.2626455	-0.00539,/0	o	o	0 0083013	0.0074208	0.0010080	(1	0	0	0,0026	0.0000	0.0000	0	0	0
37784.000	0.0'/024')1	0.2" 56"/94(	-0.0080805	0	0	0.0085017	0.0075631	0.0010359	0	0	0	0.0025	0.0000	0.0000	0	0	0
37789000	(1 0733908	0.?510441	-0.0031959	o	0	0.0086504	0.0076610	0.0010459	0	0	0	0.0018	0.0000	0.0000	0	0	0
37794 .000	0 075 9802	0.2451675	-0.0150 611	0	0	0.0087327	0.007'/ 1(12	0.0010522	0	c1	o	0.0009	0,0000	0.0000	o	0	0
37799 000	0.0"/ 8120'/	0.2389281	-0.01 "/(1136	0	0	0.008'/ 596	0.0077412	0. []010626	o	0	0	0.0007	0.0000	0.0000	0	0	0
37804.000	0.0798284	0.23> 00-/"/	-0.0193989	0	()	0.0087451	0.0077215	0,0010562	0	0	0	0.0014	0,0000	0.0000	0	0	0
37809.000	0.0811331	0,274'(328	-0.0202314	o	o	0.0087093	0.00"/ 6506	[1.0010282	0	0	0	0.0021	0.0000	0.0000	0	0	0
37814.000	0.0821255	0.?16140[,	-0.02288'/1	0	0	0.0086580	0.0075501	0,0009886	0	0	0	0,0017	0.0000	0.0000	0	0	0
37819.000	0.0828598	0.20./8330	- 0.023811-/	0	0	0.008596"/	0.0074659	0.0009643	0	0	o	-0.0002.	0.0000	0.0000	0	0	0
37824 .000	0.0S34496	0,1997512	-0.0221623	0	0	0.00s5390	0.0074358	0.(1009-/'/0	0	0	0	-0.0023	0,0000	0.0000	0	0	o
3/879.000	0.0839030	0.19? 2108	-0.0712974	0	0	0.0085048	0.00'/ 4(873	0.0010124	0	0	0	-0.0031	0.0000	0.0000	0	0	0

2428 records not shown

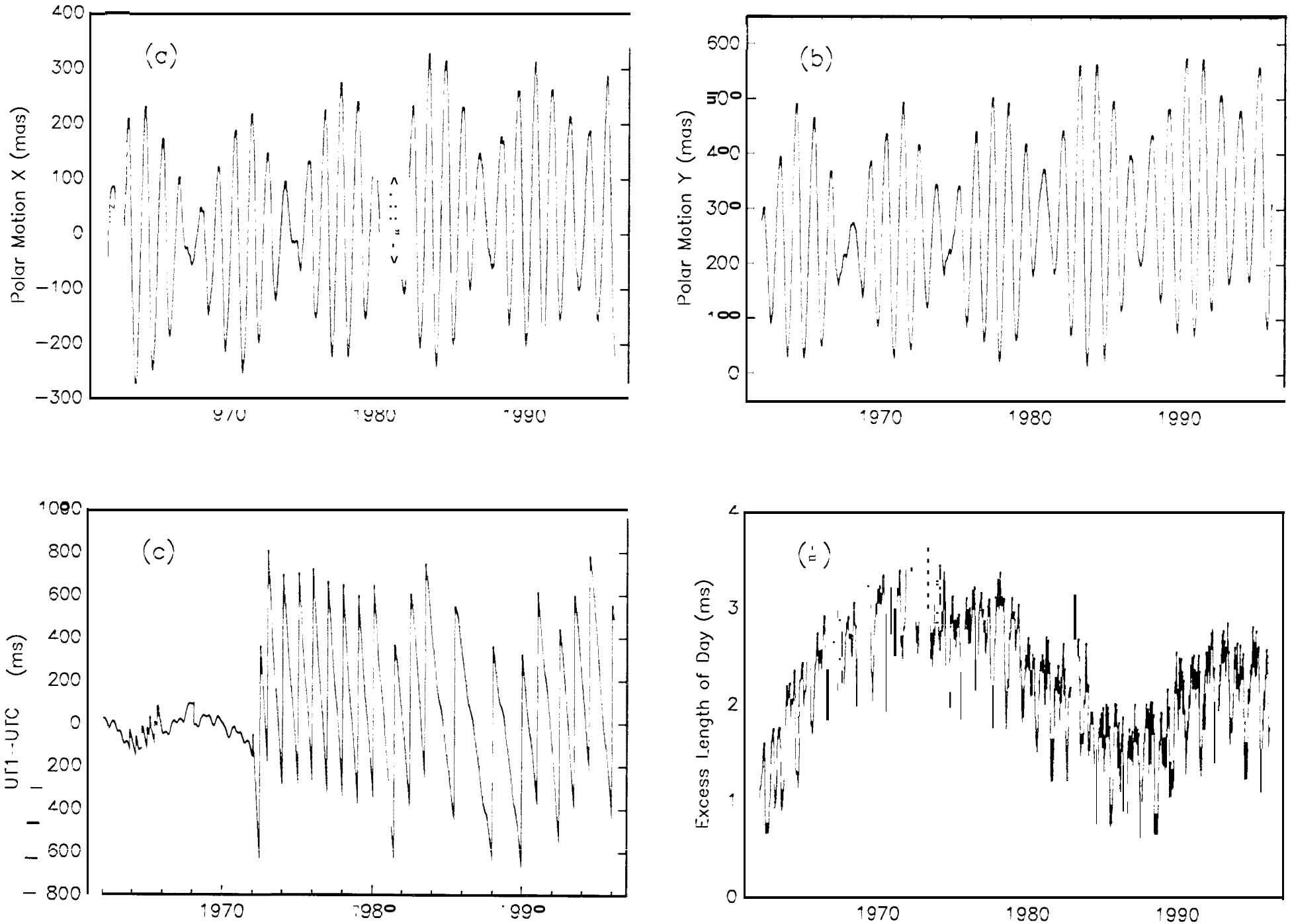
499/4.000	0,18,/9764	0,131 -/8?2	-0.18138"/'/	o	0	0.0001937	0.0001005	0.0000174	0	0	0	0.0358	-0.31-/"/	-0,0821	0	0	0
499"/9. 000	0.1739113	0.1225893	-0.1906672	o	0	0.0001725	0.0001(142	0.0000141	0	0	0	0.0065	0. "/523	-0.10-/3	0	c1	0
49984.0(10	0.15[[6498	0.1139163	-0.20 ?0[[13	0	0	0.0002092	0.0001216	().0(100: 302	0	0	0	0,0031	-0,1517	0.046-/	0	0	0
49989.000	0.1440533	0.1078182	-0.215006'9	0	0	0.0002289	0.0001155	0.0000225	(1	0	0	0.0424	-0.0454	0.0038	0	0	0
49)94 00 0	0.1265' /79	0.1028085	-0.22693'/1	(J	O	0.0001462	0.00008.{0	0.0000087	0	0	0	0.04.79	-0.3276	0,0294	0	o	0
49999 000	0.1063681	0.0964553	-0.2400-/31	0	0	0.0002365	0.0001106	0,0000300	0	0	0	0.0444	-0.1008	0.0?8	0	0	0
50004 0 00	0.0873745	0.0894828	-0,2510066	0	0	0.0002443	O, C1OLII2O?	0.0000213	cl	o	0	0.0051	-0.0075	-().0159	0	0	0
50009000	0.0698624	0.0856560	-0. ?610844	0	0	0,0001331	0.0000863	0.0000121	o	0	0	.0 .0068	-0.0355	-0,0706	0	0	0
50014 00(1	0.0551246	0.0840-/86	-0.27299 "/2	0	0	0.0001593	0.0000'/ 1'/	0.0000098	0	0	o	0.1303	-0.3388	0.3576	c	0	0
50019 .000	0.0352548	0.0811495	-0.2846489	0	0	0.0002554	0,0001195	0.0000151	0	0	0	0.0"/08	-0,1648	0.0213	c	0	0
50024.000	0.0193239	0.08222 "/9	-0.2975 "/6-/	0	0	0.00019S6	0.00010 "/8	0.0000133	0	0	0	-0.0?39	-0.1369	-0.0928	0	0	0
5002$).000	-0.00012.30	0.083'/ 932	-0,3100695	0	0	0,0001640	0.0000893	0.0000126	o	0	0	0.0493	-0. 490.7	0.1488	0	0	0
50034,000	0.0182691	0.0855'/10	-0.3207630	0	0	0.0002438	0.0001126	0.0000> 34	0	0	0	0.0142	0.1039	0.0063	0	0	0
50039.000	-0.0373823	0. 0909044	-0.3325772	0	o	0.0002657	0.00017-/1	0.0000190	0	0	0	-0.0350	-0,0002	0.000?	0	0	0
50044.000	-0.0576231	0.09'/ 1023	-0.3467114	0	0	0,0002987	0.0001575	0.0000183	o	0	0	0.0155	0.0015	0.0031	0	0	0
50049.000	-0.0 "/62388	0.10416S2	-0.3600913	0	0	0.0001999	0.0001036	0.0000158	0	0	0	0,0010	-0.0457	0.0128	0	0	0
50054.000	-0.0987772	0.1126021	-0.373 '/159	0	0	0.000? 162	0,0001500	0.0000115	0	0	0	-0,0095	-0.1604	0. 0"/50	0	0	0
500',9,000	0,1200: 358	0.12232.32	-0.38492,'/6	0	0	0.0002418	0.0001116	0.00 00192	o	0	0	0.02"/7	.0.0182	0.0075	0	0	0
50064.000	0.135159'/	0. 1327831	-0.3961898	0	0	0.0002456	0.0001081	0.0000356	0	0	0	-0,0662	-0.0533	-0.0252,	0	0	0
') 0(J69,	O(1O 0.1479802	0.1477153	-(1.4092903	0	0	0.0002544	0.000131"/	0.0000219	0	0	0	0.0141	-0.0093	0.0031	0	0	0
')OO'/ 4.000	-0.1587933	0,1625411	-0,4? 187'/")	0	0	0.0002769	0.0001262	0.0000160	0	0	0	0.0836	-0.0176	0.0019	0	0	0
500 "/9.000	0.1685535	0.1'/ 95989	-0.4354183	0	0	0. 0001579	0,000090'/	0.0000228	0	0	0	0.0520	-0.0007	-0.0058	0	0	0
50084.000	-0.1771840	0.1935358	0.5534600	0	0	0,000219[>	O. OOO1O4G	0,0000344	0	o	0	0.0018	-0.1252	0.0285	0	0	0
50089.000	- 0.18391(,8	0.2052841	0.5454739	0	0	0.0002823	0.0001384	0.0000169	c1	o	0	0.0802	-0.0565	0.0059	0	0	0
50094.000	0.192'/ 458	0.2232161	0.5359379	0	o	0.0002496	0.0001304	0.0000156	0	0	0	0.0533	-0,0066	0,0016	0	0	0
50099.000	0.2010901	0.2373112	0.5262081	0	0	0.0001966	0.0000968	0.0000142	0	0	0	0.0218	-0,4421	0.1034	0	0	0
',0104 .00[)	-0.2083079	0.2553219	0.5168235	0	o	0.00075>(	0.0001122	0,(10(1(1-/43	(1	0	0	0.0140	-0.0364	0.0019	0	0	0
50109 .000	0 214641 3	0.2730859	0 .506,/4(,5	0	0	0.0002617	0.0001184	0.0000345	0	0	0	0.0097	-0.0030	-0. 0001	0	o	0
',0114.000	0.2208996	0.2910205	0.4593910	0	0	0.0002183	0.00011 88	0.0000226	o	0	0	-0.0055	-(1.0864	0.0205	0	0	0
50119.000	0 2233157	0.{09-/567	[).4910'/'/8	0	0	0 0001895	0.0003102	0 0000.{59	0	0	0	0.0130	0.037]	0 0086	0	0	0

MJD	PMX (arcsec)	PMY (arcsec)	SIG X (arc sec)	SIG Y (arc sec)	COR XY
15039.67361111	-0.0562610	0.0312'/59 o 0 0	0,0151390	0.0161917	(1 0 0 0 -0.0011 0 0 0 0 0
1?IO"/O .11111111	-0.0546694	-0,0011-/33 o 0 0	0.019(110"/	0.0161397	0 0 0 0 -0.0004 0 0 0 0 0
15100.54861111	-0.0"/ 68818	- 0.019341-/ 0 0 0	0.0190038	0.0161362	0 0 0 0 -0,0003 0 0 0 0 0
15130.98611111	-0.10-/4133	-0.030332"/ 0 0 0	0.01 90036	0.0161339	0 0 0 0 -0.000? 0 0 0 0 0
15161 ,4?.761111	-0.1317073	-0.03 82264 0 0 0	0.0190026	0.0161360	0 0 0 0 -0.0001 0 0 0 0 0
15191,86111111	-0,1458968	-0.0392436 0 0 0	0.0190025	0.0161393	0 0 0 0 -0.0002 0 0 0 0 0
1522? .29861111	-0.1583460	-0.0? 78360 o 0 0	0.0190026	[1.0161: 94	0 0 0 0 -0.0003 0 0 0 0 0
15752' . "/3611111	-0.1 '/06'143	-0.0045202 0 0 0	0.0190028	0.0161363	0 0 0 0 -0,0003 0 0 0 0 0
15283.17361111	-0.1 "/56(164	0.025,2064 o 0 0	o 0190028	0,0161328	0 0 0 0 -0.0002. 0 0 0 0 0
15313.61111111	-0.1685191	0.05 09427 o 0 0	0,0190026	0.0161319	0 0 0 0 -0.0001 0 0 0 0 0
15344.04861111	-0,1489419	0.063800"/ o 0 0	0.0190025	0.0161 340	0 0 0 0 -0.0001 0 0 0 0 0
153"/ 4,48611111	-0.1206541	0.0(16'/ "/67 o 0 0	0.0190025	0.0161363	0 0 0 0 -0.0002 0 0 0 0 0
15404.92361111	-0.0924872	0.0'/ 48852 o 0 c	0.019007'/	0.0161363	0 0 0 0 -0.0002 0 0 0 0 0
15435.36111111	. 0.0659405	0.0813214 0 0 0	0,0190028	0.0161340	0 0 0 0 -0,0002 0 0 0 0 0
15465.79861111	-0.040> 604	0.083603"/ 0 o 0	0.01900>8	0.0161314	0 0 0 0 -0.0002 0 0 0 0 0
15496 .?3611111	-0.0133188	0.0629434 o 0 0	0.0190027	0.016130'/	0 0 0 0 -0.0001 0 0 0 0 0
15526.67361111	0.006166'/	0,0190305 0 0 0	0.0190026	0.0161322	0 0 0 0 -0.0001 0 0 0 0 0
15557 .1111111]	0.0146531	-0.0330?41 o 0 0	0.0190026	0.0161340	0 0 0 0 -0.0002 0 0 0 0 0
15587.54861111	-0.0025115	-0.08265'/5 O 0 0	0.0190027	0.0161341	0 0 0 0 -0,0002 0 0 0 0 0
15617.98611111	-0.0408801	-0.10 "/0368 0 0 0	O. OI9C1O29	0.0161323	0 0 0 0 -0.0002 0 0 0 0 0
15648.42361111	-0.0864 "/?5	-0.1054685 O 0 0	(1.0] 90029	(1.0] 61303	0 0 0 0 -0,0002 0 0 0 0 0
156'/ 8,86111111	-0.13230?1	-0.09030 "/8 O 0 0	0,0190?8	0.0161298	0 0 0 0 -0,0001 0 0 0 0 0
15709.29861111	-0.1"/ 34s41	-0.0615'/'/9 0 0 0	0 .0150028	0.0161310	0 o 0 0 -0.0001 0 0 0 0 0
15739.73611111	-0.19920-/5	0.010-/2'/'/ o 0 o	0,019002$3	0,016132'3	0 0 0 0 -0.0002 0 0 0 0 0
15"/70,1'/361111	-0.2007125	0.05984'/4 o 0 0	0.019(1029	0.0161324	0 0 0 0 -0.0002 0 0 0 0 0
15800.61111111	-0.1-/81004	0.1334651 0 0 0	0.019(1030	0.0161311	0 0 0 0 -0,0002 0 0 0 0 0
35831.04861111	-0.1315-/2"/	0.1966364 0 0 0	0,0190030	0.0161296	0 0 0 0 -0.0002 0 0 0 0 0
15861.48611111	-0.06 ?4113	0.2320227 o c1 o	0.0190030	0.0161292	0 0 0 0 -0,0001 0 0 0 0 0
1589] ,92361111	0.01475'/6	0.224804> 0 0 0	(),(1190030	0.0161301	0 0 (1 0 -0.0001 0 0 0 0 0
15922.36111111	0,0-/82481	0.1724940 0 0 0	0.0190030	0.0161311	0 0 0 0 -(1.0002 0 0 0 0 0

1093 records not shown

49220.98611111	-0.10184-/"/	0.2934275	0 0 0	0.0001490	0.0001289	0 0 0 0	0.0"/ "/"[	0 0 0 0 c1
49251.42361111	-0.09') 0140	0.35197'/0	0 0 0	0.0001368	0.0001266	0 0 0 0	-0.00 "/9	0 0 0 0 0
49281.86111111	-0.0-/93339	0.4061288	0 0 0	0.0001396	0.0001279	0 0 0 0	0.0252	0 0 0 0 0
49312.29861111	-0.0448154	0.4440158	0 0 0	0,0001915	0,0001820	0 0 0 0	0.0209	0 0 0 0 0
49342 . "/3611111	-0.0080612	0.472010"/	0 0 0	0.0001136	0.000090"/	0 0 0 0	0 .021-/	0 0 0 0 0
49.{ '/3.1-/361111	0.0578977	().4'/ 6584"/	0 0 0	0.0000657	0.0000583	0 0 0 0	-0.1?46	0 0 0 0 0
49403 .6]1] 131]	0,12'/ "/346	0.449'/ 132	0 0 0	0.0001403	0.0001304	0 0 0 0	0.0254	0 0 0 0 0
49434,04863131	0.164'1700	0.40729 "/9	0 0 0	0,0001303	0. 000113-/	0 0 0 0	-0.0500	0 0 0 0 0
49464 .486] 1111	0 .1835599	0.3529699	o 0 0	0,0001438	0.0001786	0 0 0 0	-0.0035	0 0 0 0 0
49494.97361113	0.1854403	0.2878727	0 cl 0	0.0001686	0.0001382	0 0 0 0	-0.0383	0 0 0 0 0
49525.36111111	0.1510068	0.2263313	0 0 0	0.0001278	0.00010'/2	0 0 0 0	0.0341	0 0 0 0 0
49555. "/9861111	0.096'/ 259	0.1804723	o 0 0	0.0001285	0.00010-/1	0 0 0 0	0 .050"/	0 0 0 0 0
49586.23611111	0.035-/692	0.16"/ 8402	0 0 0	0,0001459	0.0001291	0 0 0 0	0,0063	0 0 0 0 0
49616.67361111	-0.0401280	0.1859314	0 (. I o	0.0001093	0.0000920	0 0 0 0	-0.0009	0 0 0 0 0
4964'/ ,11111111	-0.11 ?2276	0.2372384	0 0 o	0.0002483	0. 0002057	0 0 0 0	0.0985	0 0 0 0 0
49677.54861111	-0.1530960	0.3094 569	0 0 0	0.0001367	0.0001181	0 0 0 0	0.0219	0 0 0 0 0
49'0'/ .98(811111	0.1585281	0.388 "/'/63	0 0 0	0.0001231	0.00010'/9	0 0 0 0	0,0041	0 0 0 0 0
49738.42361111	-0.1249516	0.463 "/")49	0 0 0	0.000156S	0.0001419	0 0 0 0	0.0138	0 0 0 (1 0
49'/68.86113]11	-0.0825006	0.51810"/"/	o 0 0	0.0001726	0.0001062	0 0 0 0	0.1159	0 0 0 0 0
49799.29861111	-0.0015600	0.5512431	o 0 0	0.0002239	0.0001186	(1 0 0 0	0.0346	0 0 0 0 0
49829 '/3611111	0,1005379	0.5534136	0 0 0	0,0001 "/'/5	0.0001020	0 0 0 0	0.0076	0 0 0 0 0
49860.17361111	0.2017297	0.5049195	0 0 0	(1.0002270	().00 ()1]8]	o 0 0 0	0.0835	0 0 0 0 0
49890 63111111	0.2715336	0.4341564	0 0 0	0.0002639	0.0001253	0 0 0 0	0.0?65	0 0 0 0 0
49921.04861111	0.2866565	0.29805'/9	o 0 0	0.0002035	0.0001256	o 0 0 c)	0.0'/02	0 0 0 0 0
49951 .48611111	0.2460521	0.1896451	0 0 0	6.0001 "/98	0.0000975	O C 1 O O	0.0863	0 0 0 0 0
49981 .92361111	0.1652610	0.11'/ 2331	0 0 0	0.0001580	0.0000836	0 0 0 0	-0.1010	0 0 0 0 0
50012.36111111	0 "0606274	0.0843480	0 0 0	o 0002145	0.0000949	0 o 0 0	0.0522	0 0 (I o o
50042.79861111	-0.0529464	0 095 8869	0 0 0	O 0002172	0.0000982	(1 0 0 0	0.0233	0 0 0 0 0
50073.23611111	-0.1573096	0.1600'/ 15	0 (1 0	o 0002617	0. C1C1012CIS	(0 o 0	0.0668	() 0 0 0 0
50103 67.{ (,1111	0.20-/8381	0.2541-/2"/	0 0 0	0.0002591	0.0001120	0 o 0 (1	0.0157	0 0 0 0 0

COMBINED EARTH ORIENTATION SERIES: COVB95



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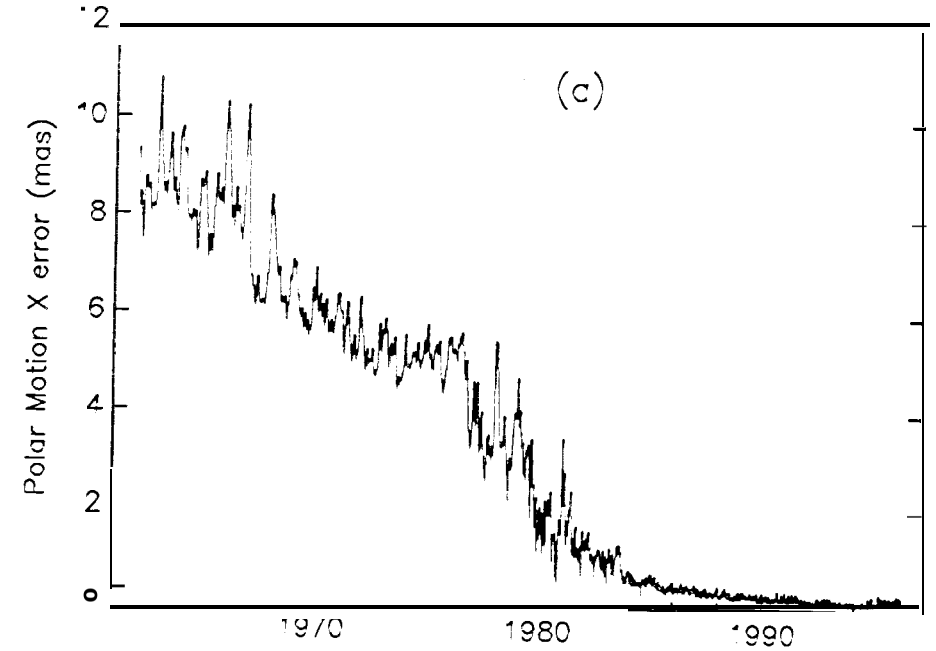

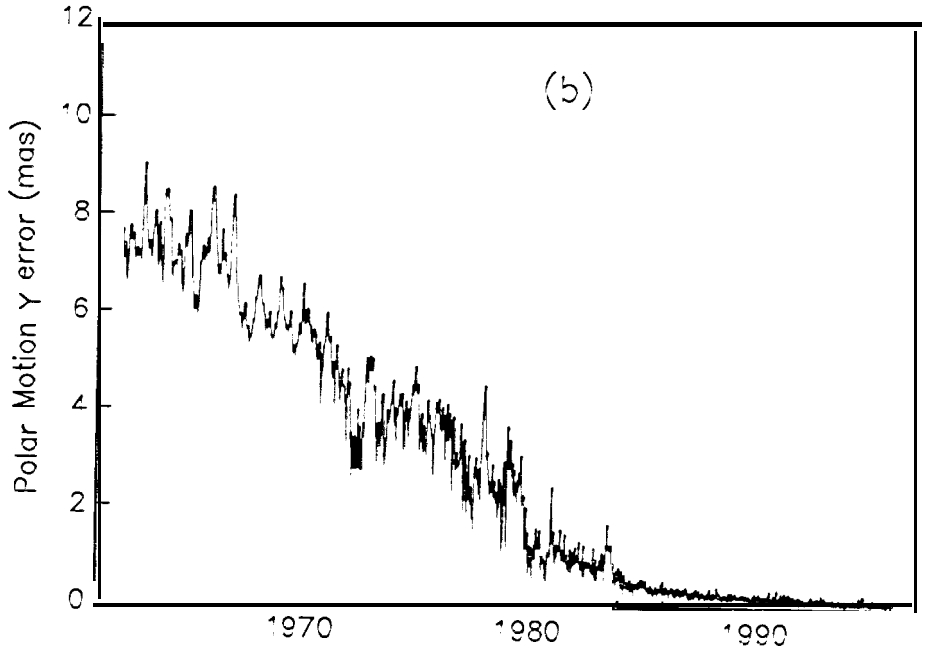

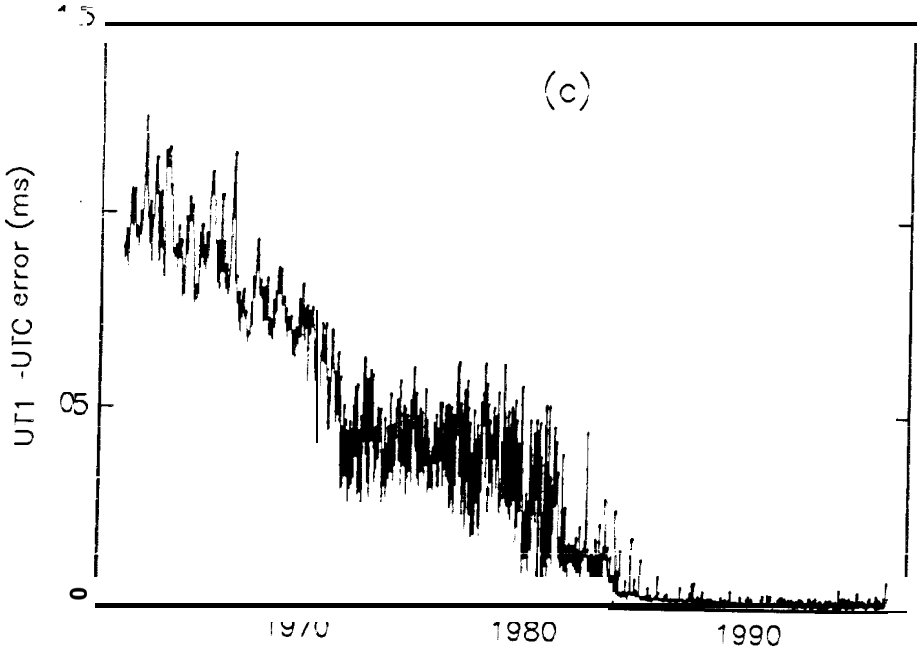

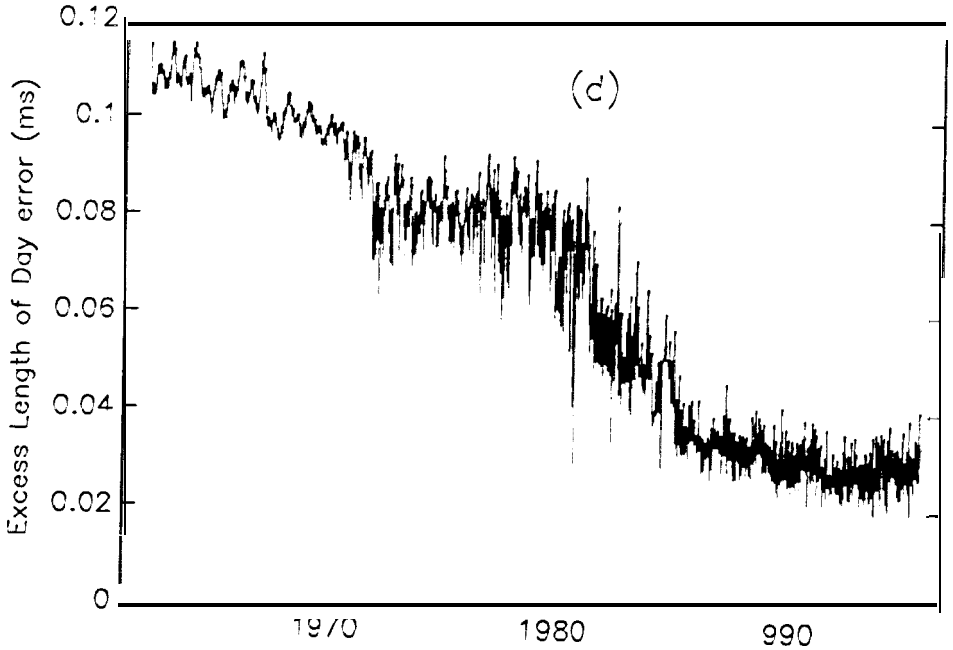

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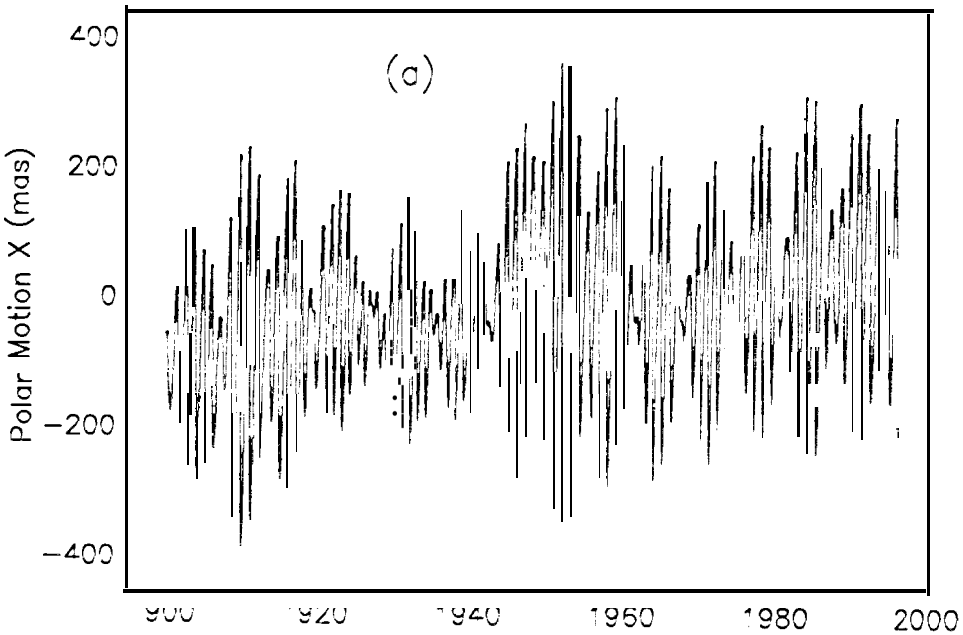

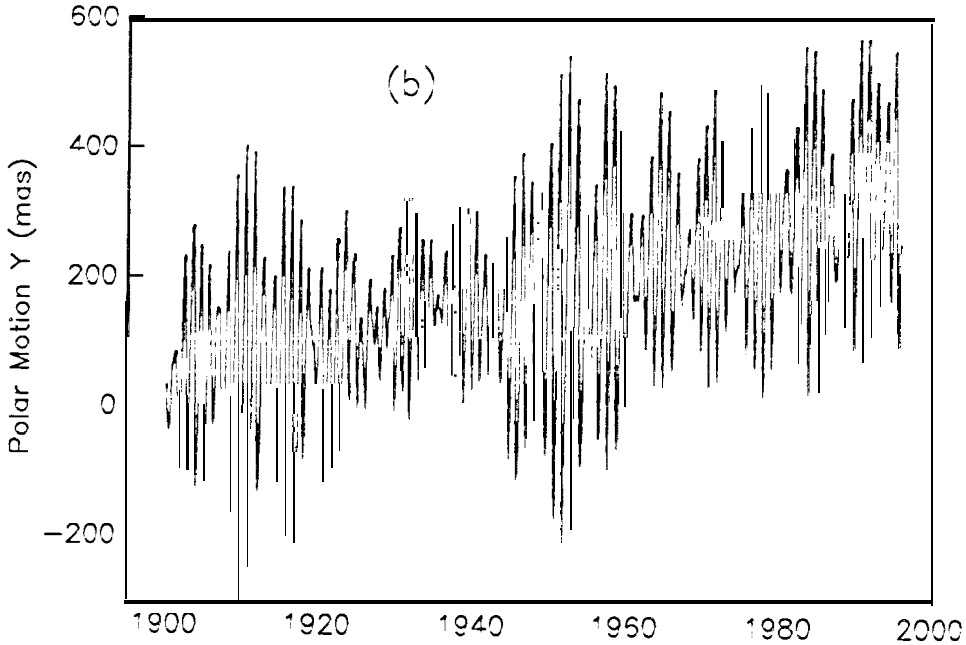

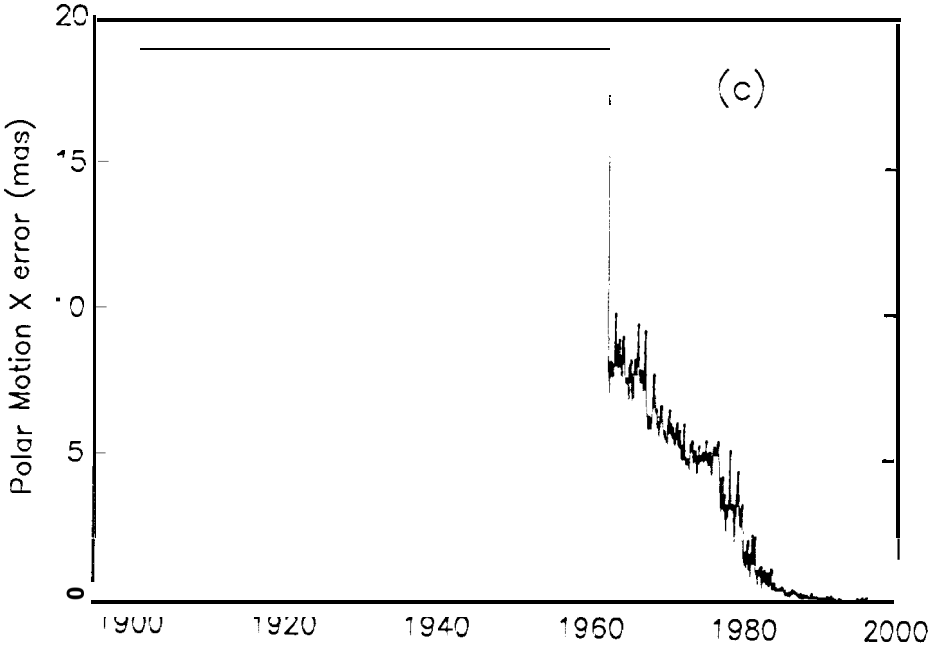

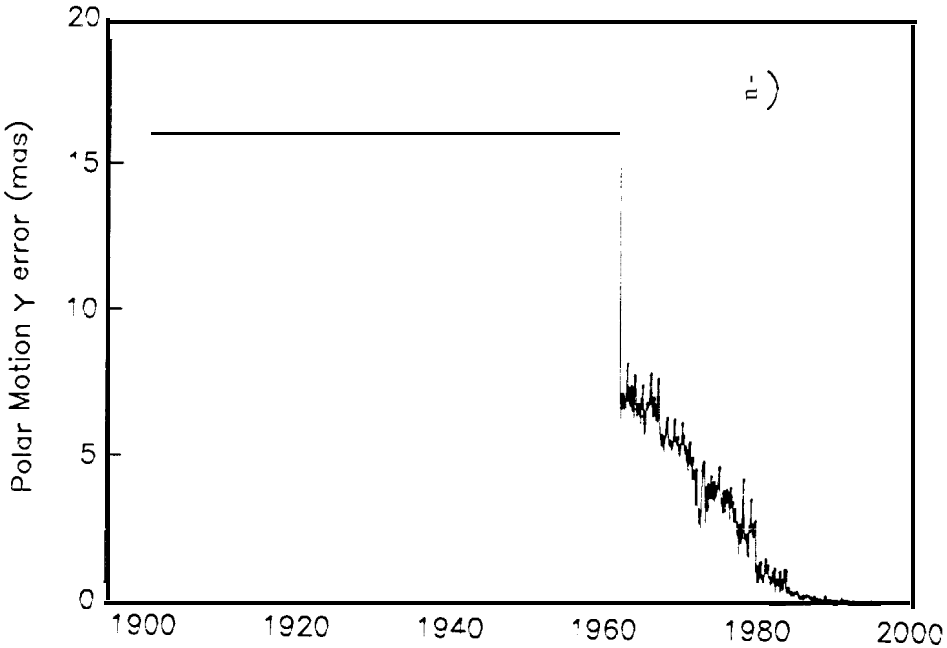
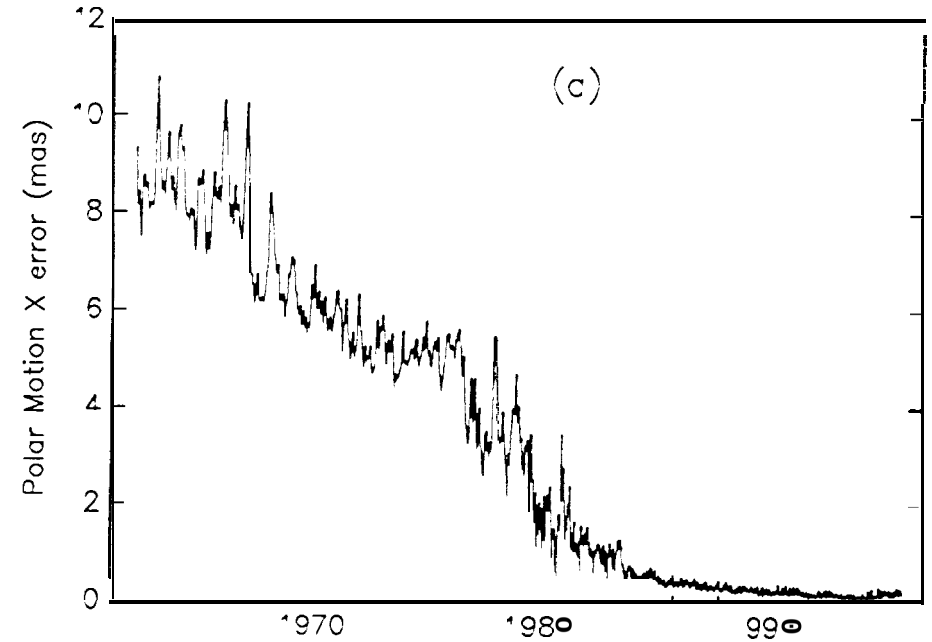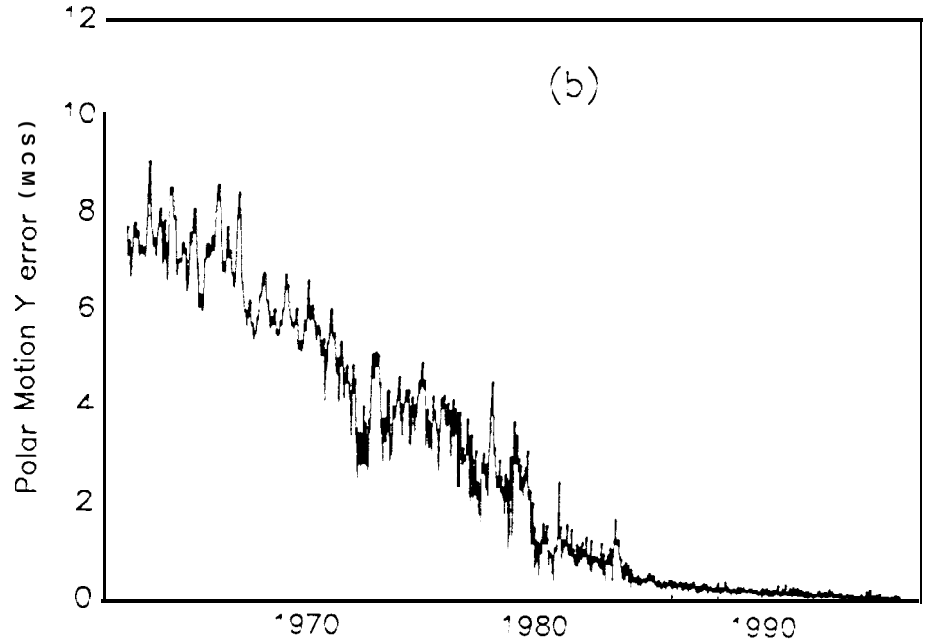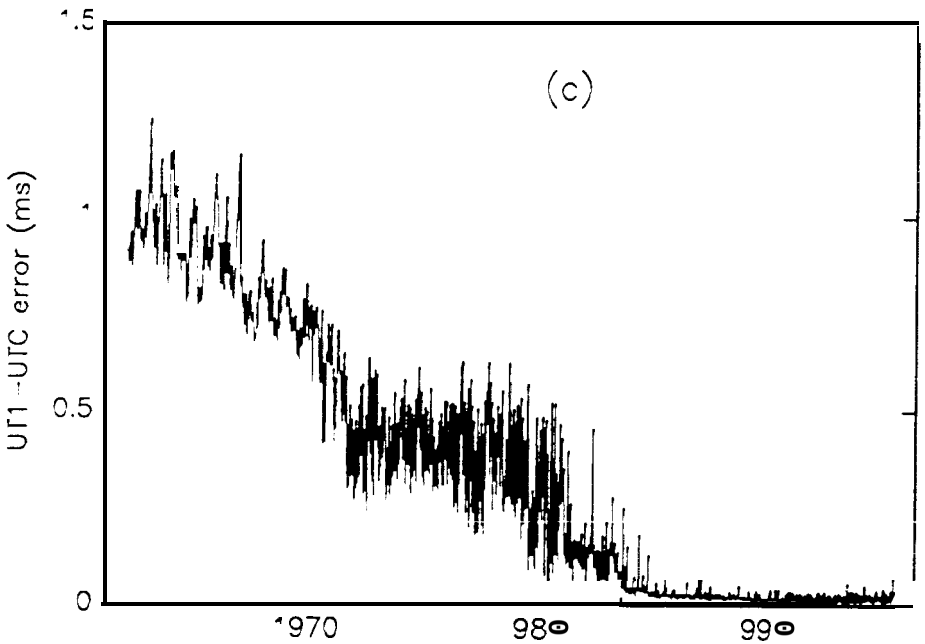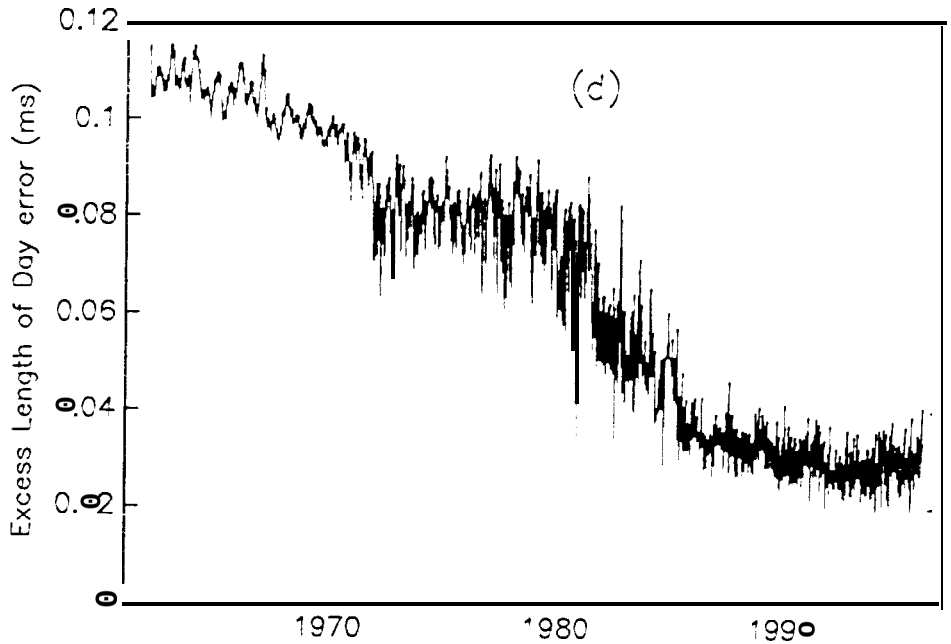
COMBINED EARTH ORIENTATION SERIES: COMB95