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A combination of Earth orientation measurements has been generated from space-geodetic observations spanning 1976-1995. 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 IERS94 " , Journal of Geophysical Research, in press, 1996) and will be only briefly described here. Since it was desirable to combine only independent determinations of the Earth's orientation, only those series listed in Table 1 were used. Note that only the Scripps CPS measurements through May 31, 1992 were used, with the JPL GPS measurements being used after that date (series EOP(JPL)95 P 02 through January 27, 1995; the JPL FLINN Analysis series thereafter). Similarly, only the USNO IRIS Intensive UT1 determinations made after January 1, 1995 were used, with the NOAA IRIS intensive series being used before that date; and only the USNO Navnet UTPM values after December 29, 1994 were used, with the NASA/GSFC Space Geodesy Program (SGP) values being used before then.

Prior to their combination, the bias and rate of each series was iteratively adjusted so as to be in agreement with the bias and rate exhibited by a combination of all other series; the stated uncertainty of each series was adjusted by applying a multiplicative scale factor making the residual of that data, when differenced with a combination of all other data, have a reduced chi-square of one; and those data points whose residual values were greater than three times their adjusted uncertainties were deleted. In order for the final combination, SPACE95, to be given within a well-defined terrestrial reference frame, an additional common bias-rate correction was applied to each series so that, their combination, SPACE95, would be aligned with the IERS Earth orientation series EOP(IERS) C 04 during 1984-1995. The total bias-rate corrections and uncertainty scale factors that have been applied to the individual series prior to their combination into SPACE95 are given in Table 1 in the natural reference frame for each data type: the transverse (T) , vertical (V) frame for single baseline VLBI measurements; the variation-of-latitude (LAT) , UT0 frame for single station LLR measurements; and the usual UTPM (PMX, PMY, UT1) frame for all other measurements. The errors in the bias-rate corrections (given in parentheses in Table 1) are the formal errors in determining the incremental bias-rate corrections during the last iteration of the iterative, round-robin procedure.

ACKNOWLEDGMENTS . I would like to thank all those involved in taking and reducing the raw Earth orientation measurements that have been combined into SPACE95. This study would not have been possible without their considerable efforts. The work described in this paper was performed at the Jet Propulsion Laboratory, California Institute of Technology, under contract with the National Aeronautics and Space Administration.

TABLE 1. ADJUSTMENTS TO DATA SETS PRIOR TO COMBINATION

| DATA SET<br>NAME         | BIAS<br>(mas)            |                          | RATE<br>(mas/yr)         |                          | UNCERTAINTY<br>SCALE FACTOR |                          |        |       |       |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------------|--------------------------|--------|-------|-------|
|                          | VOI                      | UTO                      | VOI                      | UTO                      | VOI                         | UTO                      |        |       |       |
| ILR (JPL; 18 JAN96)      |                          |                          |                          |                          |                             |                          |        |       |       |
| McDonald Cluster         | -0.206<br><b>(0.140)</b> | 0.134<br><b>(0.130)</b>  | -0.568<br>(0.043)        | -0.156<br>(0.036)        | 1.630                       | 1.154                    |        |       |       |
| CERGA                    | 0.624<br>(0.068)         | -0.055<br>(0.055)        | 0.136<br>(0.032)         | -0.02<br>(0.021)         | 1.788                       | 1.423                    |        |       |       |
| Halca/Ala                | -0.010<br>(0.915)        | -1.454<br>(0. " )45)     | -0.283<br>(0.186)        | -0.170<br>(0.15"/)       | 1.549                       | 1.692                    |        |       |       |
| DSN (VIRI; JPL95R01)     |                          |                          |                          |                          |                             |                          |        |       |       |
| CA-Spain Cluster         | 0.178<br>(0.032)         | 0.053<br>(0.074)         | <b>0.083</b><br>(0.015)  | 0.059<br>(0.035)         | 1.354                       | 1.094                    |        |       |       |
| CA-Australia Cluster     | 0.323<br><b>(0.027)</b>  | -0.046<br><b>(0.071)</b> | -0.012<br><b>(0.011)</b> | -0.050<br>(0.031)        | 1.371                       | 1.098                    |        |       |       |
| NASA SGP (VIRI; GLB973f) |                          |                          |                          |                          |                             |                          |        |       |       |
| Westford-Ft. Davis       | 11.357<br>(3. "/29)      | 0.576<br>(6.555)         | 1.055<br>(0.376)         | -0.090<br>(0.657)        | 0.904                       | 0.870                    |        |       |       |
| Westford-Mojave          | 0.283<br>(0.210)         | 0.791<br>(0.439)         | -0.028                   | 0.008                    | 2.326                       | 0.954                    |        |       |       |
| NASA SGP(973f) PMX       | PMY                      | UT1                      | PMX                      | PMY                      | UT1                         | PMX                      | PMY    | UT1   |       |
| Multi-baseline           | -1.203<br>(0.015)        | -2.040<br>(0.013)        | 0.480<br>(0.019)         | -0.154<br><b>(0.006)</b> | -0.0"/2<br>(0.005)          | -0.121<br><b>(0.007)</b> | 2.226  | 1.963 | 2.192 |
| USNO (15FEB96) PMX       | PMY                      | UT1                      | PMX                      | PMY                      | UT1                         | PMX                      | PMY    | UT1   |       |
| Navict-                  | -0.153<br>(0.016)        | 1.190<br>(0.012)         | -0. "/05<br>(0.019)      | 0.193<br>(0.009)         | 0.099<br>(0.007)            | 0.043<br>(0.010)         | 2.012  | 1.602 | 1.783 |
| NOAA (31JAN95) PMX       | PMY                      | UT1                      | PMX                      | PMY                      | UT1                         | PMX                      | PMY    | UT1   |       |
| IRIS Inten. ---          |                          | 0.748<br>(0.022)         |                          |                          | <b>-0.072</b><br>(0.006)    | ---                      | ---    | 0.933 |       |
| USNO (15FEB96) PMX       | PMY                      | UT1                      | PMX                      | PMY                      | UT1                         | PMX                      | PMY    | UT1   |       |
| IRIS Inten. ---          | ---                      | ---                      | -0.898<br>(0.113)        |                          |                             | 0.156<br>(0.059)         | ---    | 1.840 |       |
| UTCSR (95101) PMX        | PMY                      | UT1                      | PMX                      | PMY                      | UT1                         | PMX                      | PMY    | UT1   |       |
| LAGEOS SLR -             | 0.010<br>(0.020)         | 0.023<br>(0.016)         | ---                      | 0.106<br>(0.006)         | -0.049<br>(0.005)           | ---                      | 0.849  | 0.743 | ---   |
| GPS (SJO93P01) PMX       | PMY                      | UT1                      | PMX                      | PMY                      | UT1                         | PMX                      | PMY    | UT1   |       |
| Scripps                  | -1.091<br>(0.035)        | -1.516<br>(0.039)        | ---                      | -0.027                   | -0.018                      | ---                      | 1.956  | 1.903 | ---   |
| GPS (JPL95P02) PMX       | PMY                      | UT1                      | PMX                      | PMY                      | UT1                         | PMX                      | PMY    | UT1   |       |
| JPL                      | -0.194<br>(0.025)        | -0.259<br>(0.023)        | ---                      | 0.057<br>(0.021)         | -0.156<br>(0.019)           | ---                      | 3.257  | 2.800 | ---   |
| GPS (1-I,INN) PMX        | PMY                      | UT1                      | PMX                      | PMY                      | UT1                         | PMX                      | PMY    | UT1   |       |
| JPL                      | 0.450<br>(0.035)         | 0.219<br>(0.016)         | ---                      | -0.027                   | -0.018                      | ---                      | 12.273 | 3.542 | ---   |

REFERENCE DATE FOR BIAS-RATE ADJUSTMENT IS 1993.0

Technical description of solution JPL 96 C 01

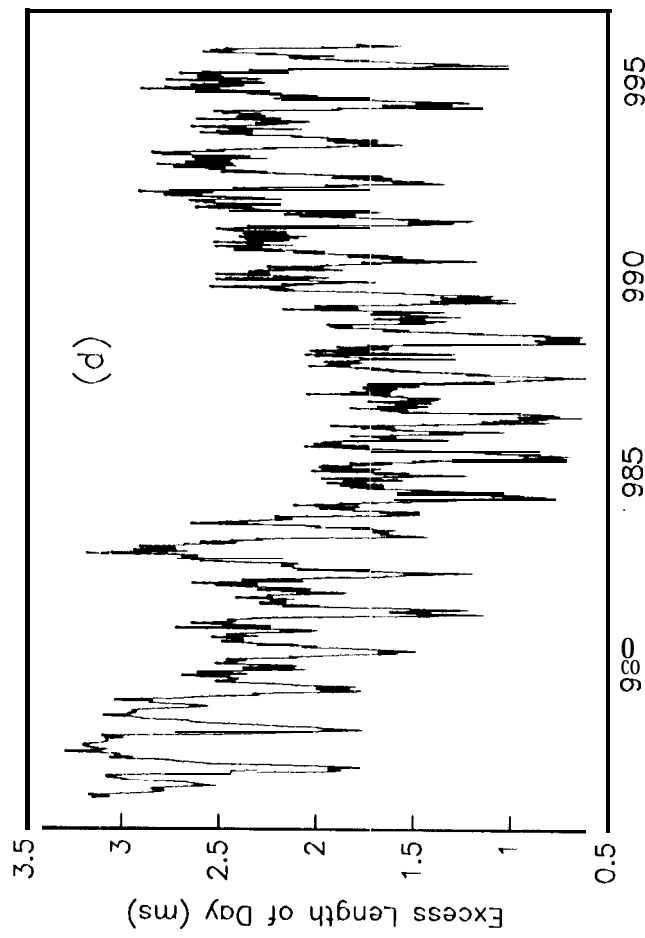
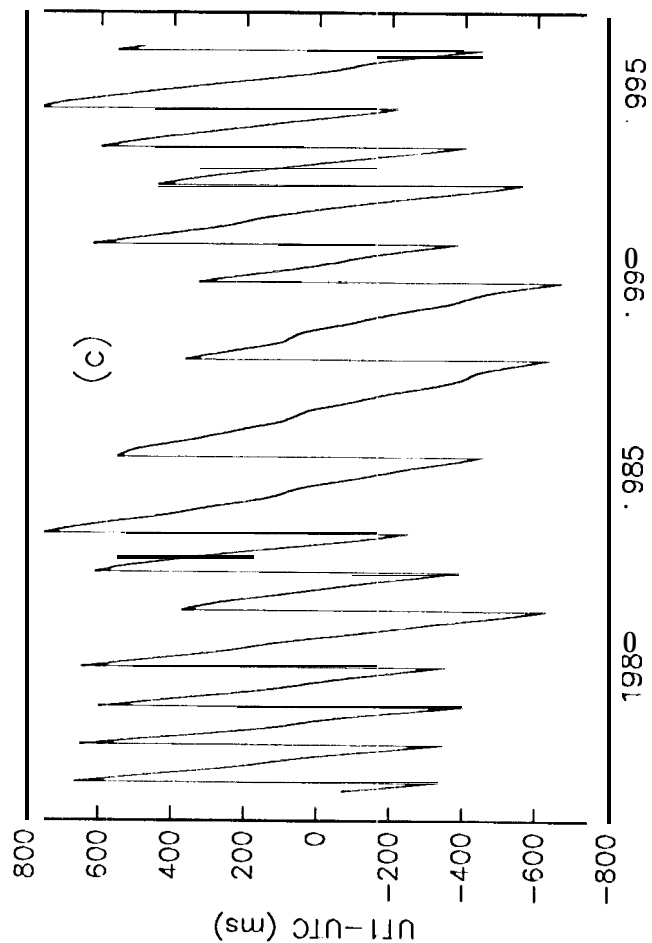
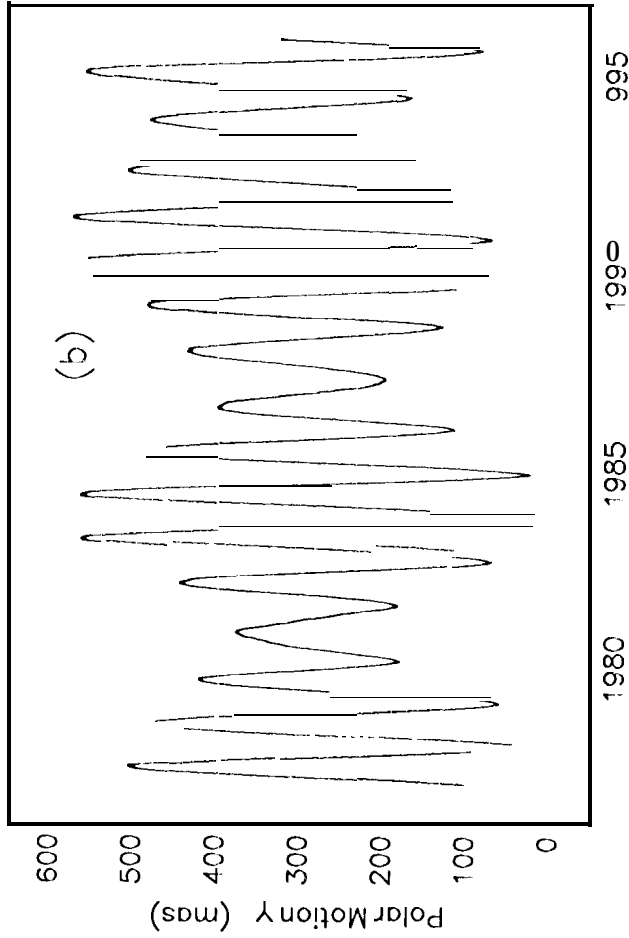
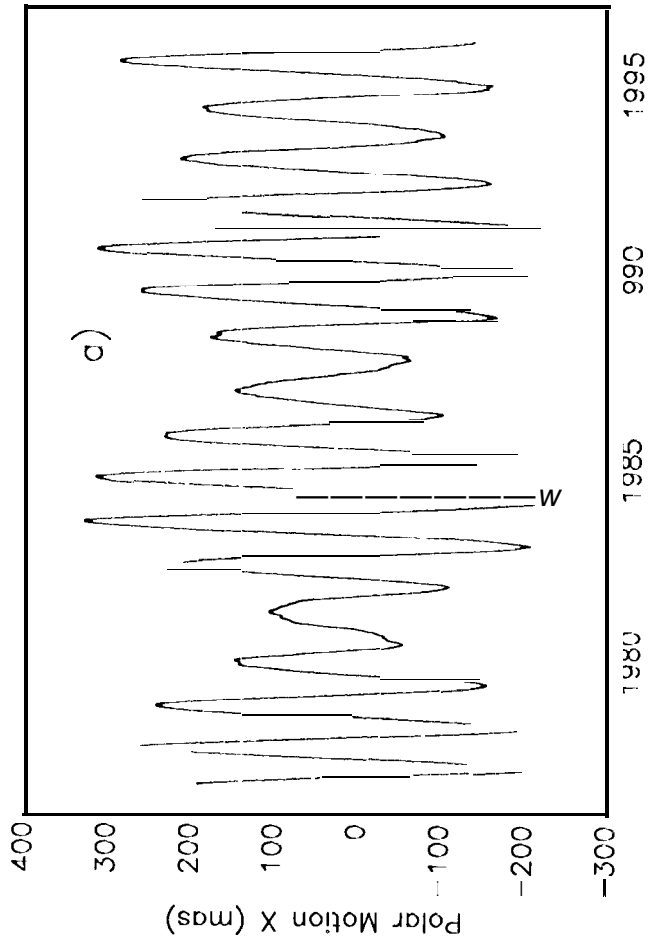
- 1 - Technique: Combined
- 2 - Analysis Center: JPL
- 3 - Software used: Kalman Earth Orientation Filter (KEOF)
- 4 - Data span: Oct 76 - Feb 96 at 1-day intervals
- 5 - Celestial ReferenceFrame: Not Applicable
  - a - Nature:
  - b - Definition of the orientation:
- 6 - Terrestrial Reference Frame: 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 01
  - 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 01 . Diurnal and semidiurnal tidal terms have not been added back and are therefore not included in the values reported in EOP(JPL) 96 C 01 .
- 8 - Estimated Parameters:
  - a - Celestial Frame:
  - b - Terrestrial Frame:
  - c - Earth Orientation: PMX, PMY, UT1-UTC
  - d. Others:

| MD           | PMX<br>(arc sec) | PMY<br>(arc see) | UT1-UTC<br>(sec) | SIG X<br>(arc sec) | SIG Y<br>(arc See) | SIG u<br>(sec) | COR XY | COR Xu  | COR YU  |         |       |
|--------------|------------------|------------------|------------------|--------------------|--------------------|----------------|--------|---------|---------|---------|-------|
| 43057.000    | 0.1903658        | 0.1385104        | -0.0700112       | 0 0 0.0005932      | 0.0033591          | 0.00033-2      | 0 0 0  | -0.0810 | 0.4450  | 0.3364  | 0 0 0 |
| 43058.000    | 0.1890051        | 0.1364069        | -0.0734918       | 0 0 0.0049780      | 0.0034776          | 0.000? 996     | 0 0 0  | -0.0698 | 0.5184  | 0.3040  | 0 0 0 |
| 43059.000    | 0.1875619        | 0.1343592        | -0.0769016       | 0 0 0.0048869      | 0.0034335          | 0.0002 "/-7    | 0 0 0  | -0.0614 | 0.5787  | 0.2506  | 0 0 0 |
| 43060.000    | 0.1860380        | 0.1323586        | -0.0802134       | 0 0 0.004 8158     | 0.0034213          | 0.000 26/4     | 0 0 0  | -0.0561 | 0.6208  | 0.1883  | 0 0 0 |
| 43061.000    | 0.1844373        | 0.1303981        | -0.0834149       | 0 0.004 "/60"/     | 0.003435?          | 0.0002680      | 0 0 0  | -0.0538 | (.6373  | 0.1282  | 0 0 0 |
| 43062.000    | 0.1827659        | 0.1284706        | -0.0 865089      | 0 0 0.004718()     | 0.0034693          | 0.0002813      | 0 0 0  | -0.0540 | (1.6206 | 0.07-3  | 0 0 0 |
| 43063.000    | 0.1810328        | 0.126 5679       | -0.0895171       | 0 0 0.00468")0     | 0.0035183          | 0.0003092      | 0 0 0  | -0.0559 | (1.573] | 0.0384  | 0 0 0 |
| 43064.000    | 0.1"/9245-       | 0.1246862        | -0.092474?       | 0 0 0.0046590      | (.0035766          | 0.00(13507     | 0 0 0  | -0.0586 | (1.5092 | 0.0113  | 0 0 0 |
| 43065.000    | 0.1774098        | 0.1228775        | -0.0954189       | 0 0 0.0046373      | (1 003 6387        | 0.0004015      | 0 0 0  | -0.0619 | (1.4450 | -0.0061 | 0 0 0 |
| 43066.000    | 0.1"/55279       | 0.1209936        | -0.09 83944      | 0 0 0.004618()     | (1.003/000         | 0.0004566      | 0 0 0  | -0.0653 | 0.3889  | -0.0171 | 0 0 0 |
| 43067.000    | 0.1736023        | 0.119186-        | -0.1014486       | 0 0 0.0046000      | 0.003' 5"/7        | 0.0005121      | 0 0 0  | -0.0686 | 0.3427  | -0.0243 | 0 0 0 |
| 43068.000    | 0.1716353        | 0.1174087        | -0.1046289       | 0 0 0.0045830      | 0.003 [097         | 0.0005652      | 0 0 0  | -0.0715 | 0.3054  | -0.0293 | 0 0 0 |
| 43069.000    | 0.1696287        | 0.1156615        | -0.1079744       | 0 0 0.00456-/i     | 0.003' 7522        | 0.0006139      | 0 0 0  | -0.0741 | 0.275-/ | -0.0331 | 0 0 0 |
| 430"/ 0.000  | 0.1675802        | 0.1139459        | -0.1115058       | 0 0 0.004552>      | 0.0038929          | 0.0006566      | 0 0 0  | -0.0761 | 0.2573  | -0.0365 | 0 0 0 |
| 430"/1 .000  | 0.1654896        | 0.1122606        | -0.1152127       | 0 0 0.0045360      | 0.0039204          | 0.0006923      | 0 0 0  | -0.0778 | 0.2343  | -0.0397 | 0 0 0 |
| 43072.000    | 0.1633575        | 0.1106043        | -0.1190458       | 0 0 0.004516"/     | (.0039359          | 0.0007202      | 0 0 0  | -0.0791 | 0.270'/ | -0.0430 | 0 0 0 |
| 430-/3.000   | 0.1611844        | 0.1089755        | -0.1729274       | 0 0 0.0044931      | 0.0039383          | 0.0007396      | 0 0 0  | -0.0803 | 0.2112  | -0.0466 | 0 0 0 |
| 430"/ 4.000  | 0.1589"/ 07      | 0.1073-/3?       | -0.126)464       | 0 0 0.0044645      | [1.0039"/-1        | 0.0007501      | 0 0 0  | -0.0813 | 0.7053  | -0.0505 | 0 0 0 |
| 43075 "000   | 0.1567168        | 0.1057960        | -0.1304389       | 0 0 0.0044305>     | (1.0039028         | 0.0007515      | 0 0 0  | -0.0824 | 0.2029  | -0.0548 | 0 0 0 |
| 430-/6.000   | 0.1544278        | 0.1042426        | -0.1339647       | 0 0 0.0043917      | (.0038663          | 0.0007437      | 0 0 0  | -0.0835 | 0.2038  | -0.0594 | 0 0 0 |
| 430"/ 7.000  | 0.1520873        | 0.1027106        | -0.1373402       | 0 0 0.0043485      | (.0038188          | 0.0007267      | 0 0 0  | -0.0848 | 0.2082  | -0.0644 | 0 0 0 |
| 430(1/ 8.000 | (J. 1497094      | 0.1011953        | -0.1406194       | 0 0 0.0043008      | 0.00371617         | 0.0007008      | 0 0 0  | -0.0863 | 0.2162  | -0.0697 | 0 0 0 |
| 430-/9.000   | 0.1472887        | 0.0996908        | -0.14386'/4      | 0 0 0.0042487      | 0.0036967          | 0.0006665      | 0 0 0  | -0.0883 | 0.2281  | -0.0749 | 0 0 0 |
| 43080.000    | 0.1448242        | (.0981925        | -0.1471360       | 0 0 0.0041930      | 0.00362.66         | 0.0006745      | 0 0 0  | -0.0909 | 0.2446  | -0.0799 | 0 0 0 |
| 43081.000    | 0.1423149        | (.0966951        | -0.1504519       | 0 0 0.0041347      | 0.0035544          | 0.0006579      | 0 0 0  | -0.0940 | 0.2661  | -0.0839 | 0 0 0 |
| 43082.000    | 0.1397593        | (.0951942        | -0.153818?       | 0 0 0.0040755      | 0.0034833          | 0.0006224      | 0 0 0  | -0.0977 | 0.293-/ | -0.0859 | 0 0 0 |
| 43083.000    | 0.1371573        | 0.09368 "/6      | -0.15 "/2%11     | 0 0 0.0040166      | 0.0034153          | 0.0004663      | 0 0 0  | -0.1022 | 0.3279  | -0.0842 | 0 0 0 |
| 43084.000    | 0.1345080        | 0.0921729        | -0.1606376       | 0 0 0.0039595      | 0.0033528          | 0.0004118      | 0 0 0  | -0.1075 | 0.3678  | -0.0760 | 0 0 0 |
| 43085.000    | 0.1318097        | 0.0906466        | -0.1640383       | 0 0 0.0039048      | 0.0032980          | 0.0003646      | 0 0 0  | -0.1135 | 0.4084  | -0.0572 | 0 0 0 |
| 43086.000    | 0.1290581        | 0.0891066        | -0.1673887       | 0 0 0.003853"/     | 0.0032529          | 0.0003314      | 0 0 0  | -0.1198 | 0.4393  | -0.0268 | 0 0 0 |

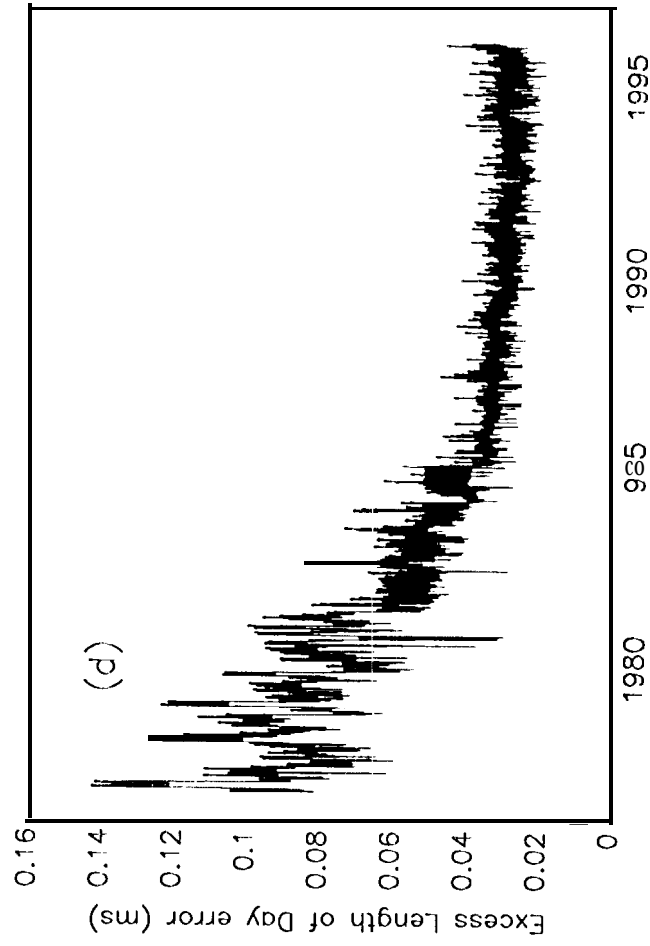
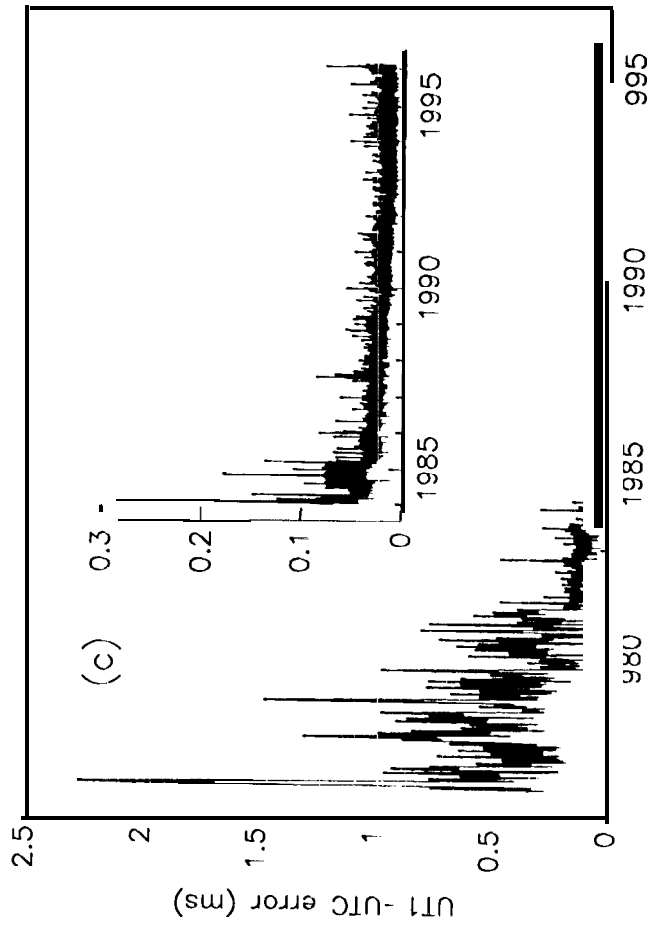
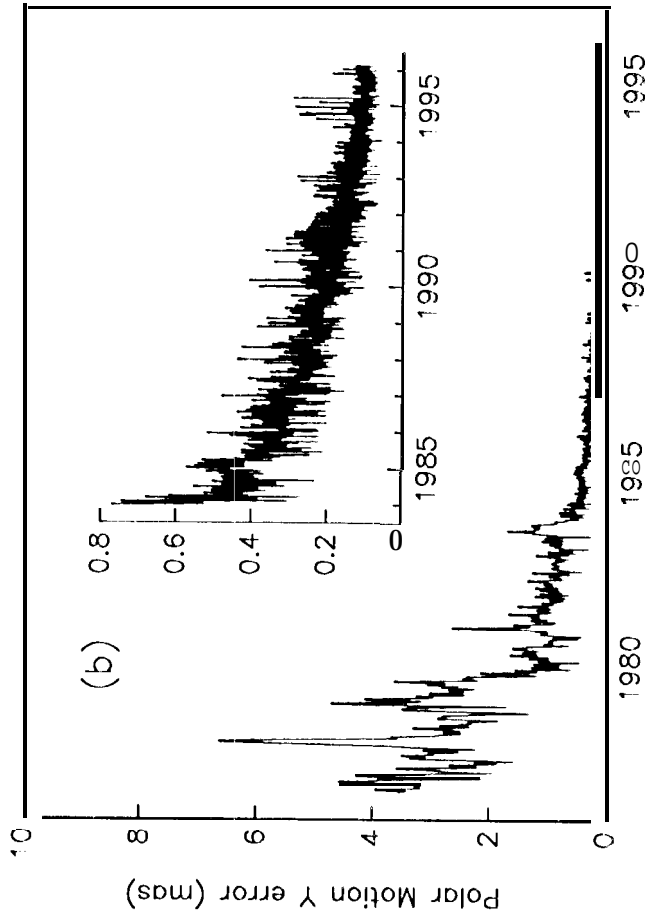
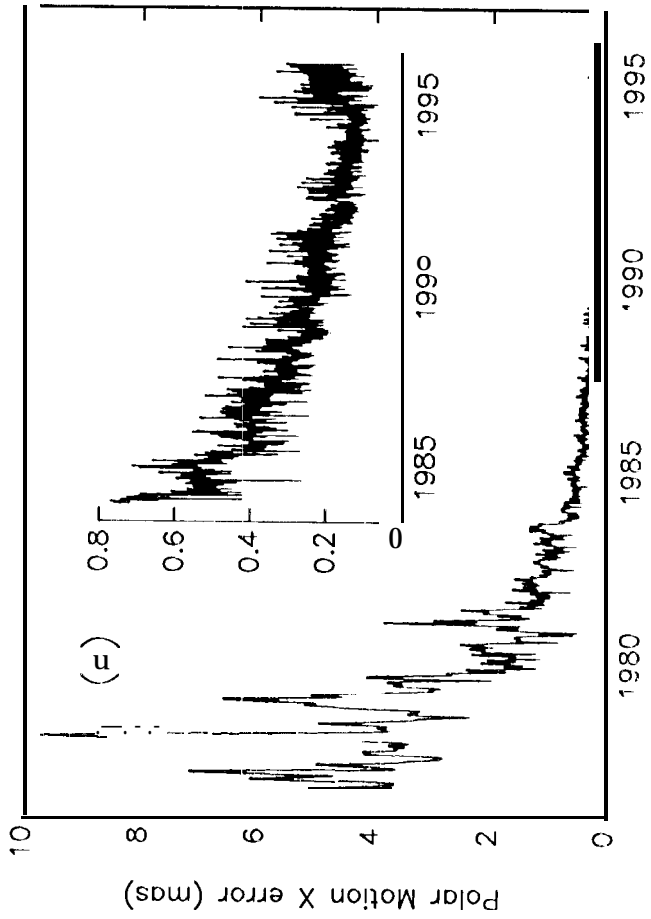
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|           |             |            |              |                |            |             |       |         |          |         |       |
|-----------|-------------|------------|--------------|----------------|------------|-------------|-------|---------|----------|---------|-------|
| 50094.000 | -0.1927458  | 0.2232161  | 0.5359379    | 0 0 0.0002496  | 0.0001304  | 0.0000156   | 0 0 0 | 0.0533  | -0.0066  | 0.0016  | 0 0 0 |
| 50095.000 | -0.1946945  | 0.2262369  | 0.5339324    | 0 0 0.0002906  | 0.0001339  | 0.0000167   | 0 0 0 | 0.0506  | 0.0022   | 0.0000  | 0 0 0 |
| 50096.000 | -0.1965129  | 0.2291293  | 0.5319246    | 0 0 0.0003016  | 0.0001799  | 0.0000256   | 0 0 0 | 0.0487  | -0.0097  | -0.0005 | 0 0 0 |
| 50097.000 | -0.1981678  | 0.2318614  | 0.5299502    | 0 0 0.0002.848 | 0.0001779  | 0.0000416   | 0 0 0 | 0.0300  | -0.0357  | 0.0019  | 0 0 0 |
| 50098.000 | -0.1996742  | 0.2345348  | 0.5280405    | 0 0 0.0007428  | 0.0001195  | 0.0000382   | 0 0 0 | 0.0163  | -0.1056  | 0.0162  | 0 0 0 |
| 50099.000 | 0.2010901   | 0.2373112  | 0.5262081    | 0 0 0.0001966  | 0.0000968  | 0.000014?   | 0 0 0 | 0.0218  | -0.4421  | 0.1034  | 0 0 0 |
| 50100.000 | -0.202493"/ | 0.2404510  | 0.5244373    | 0 0 0.0002033  | 0.0001006  | 0.0000233   | 0 0 0 | 0.0145  | -0.1363  | 0.0278  | 0 0 0 |
| 50101.000 | -0.2039254  | 0.2440333  | 0.5226756    | 0 0 0.0002391  | 0.0001110  | 0.0000423   | 0 0 0 | 0.0133  | -0.0111  | 0.0011  | 0 0 0 |
| 50102.000 | -0.2053871  | 0.2479039  | 0.5208412    | 0 0 0.0002632  | 0.0001125  | 0.0000649   | 0 0 0 | 0.0185  | -0.0004  | -0.0005 | 0 0 0 |
| 50103.000 | -0.2068570  | 0.2517307  | 0.5188905    | 0 0 0.0002671  | 0.0001125  | 0.0000784   | 0 0 0 | 0.0184  | -0.0104  | -0.0005 | 0 0 0 |
| 50104.000 | -0.2083079  | 0.2553219  | 0.51687? .35 | 0 0 0.0002526  | 0.0001122  | 0.0000741   | 0 0 0 | 0.0140  | -0.0364  | 0.0019  | 0 0 0 |
| 50105.000 | -0.2097125  | 0.2587571  | 0.5146835    | 0 0 0.0002255  | 0.0001074  | 0.0000512   | 0 0 0 | 0.0049  | -0.1101  | 0.0172  | 0 0 0 |
| 50106.000 | -0.2110370  | 0.2621586  | 0.512.5428   | 0 0 0.0002.001 | 0.0000978  | 0.0000166   | 0 0 0 | -0.0062 | -0.4603  | 0.1161  | 0 0 0 |
| 50107.000 | -0.2122497  | 0.2656243  | 0.51047'/4   | 0 0 0.0002158  | 0.000100-/ | 0.0000758   | 0 0 0 | 0.0043  | -0.1767  | 0.0371  | 0 0 0 |
| 50108.000 | -0.213417-/ | 0.269? 461 | 0.5085380    | 0 0 0.0002475  | 0.0001122  | 0.0000343   | 0 0 0 | 0.0103  | -0.0353  | 0.0038  | 0 0 0 |
| 50109.000 | -0.2146413  | 0.2730859  | 0.5067465    | 0 0 0.0002617  | 0.0001184  | 0.0000345   | 0 0 0 | 0.0097  | -0.0030  | -0.0001 | 0 0 0 |
| 50110.000 | -0.2159693  | 0.276994?  | 0.5051028    | 0 0 0.0002558  | 0.0001184  | 0.0000407   | 0 0 0 | 0.0085  | -0.0037  | -0.000> | 0 0 0 |
| 50111.000 | -0.2173675  | 0.2807086  | 0.5035821    | 0 0 0.0002372  | 0.0001135  | 0.0000477   | 0 0 0 | 0.0018  | -0.0231  | 0.0020  | 0 0 0 |
| 50112.000 | 0.2187348   | 0.2841625  | 0.5071516    | 0 0 0.0002116  | 0.0001096  | 0.0000373   | 0 0 0 | -0.0049 | -0.0813  | 0.0159  | 0 0 0 |
| 50113.000 | -0.2199481  | 0.28752.94 | 0.500 "/06   | 0 0 0.000193-/ | 0.0001063  | 0.000010")  | 0 0 0 | -0.0020 | -0.3998  | 0.1064  | 0 0 0 |
| 50114.000 | 0.2208996   | 0.2910205  | 0.4993910    | 0 0 0.0002183  | 0.0001188  | 0.0000228   | 0 0 0 | -0.0055 | -0.0864  | 0.0205  | 0 0 0 |
| 50115.000 | -0.2215968  | 0.294"/228 | 0.4979511    | 0 0 0.0002205  | 0.0001254  | 0.0000289   | 0 0 0 | -0.0036 | -0.0109  | 0.0018  | 0 0 0 |
| 50116.000 | -0.2221056  | 0.2985781  | 0.4963996    | 0 0 0.0002632  | 0.0001200  | 0.0000304   | 0 0 0 | -0.0104 | -0.0011  | -0.0001 | 0 0 0 |
| 50117.000 | -0.2225086  | 0.3023088  | 0.4947291    | 0 0 0.000255-/ | 0.0001137  | 0.0000798   | 0 0 0 | -0.0283 | -0.0006  | 0.0000  | 0 0 0 |
| 50118.000 | -0.222891?  | 0.3060487  | 0.4929557    | 0 0 0.000237?  | G. 0000135 | 0.0000396   | 0 0 0 | -0.0244 | -0.0096  | 0.0013  | 0 0 0 |
| 50119.000 | -0.2233157  | 0.3097567  | 0.4910778    | 0 0 0.0001855  | 0.0001102  | 0.0000359   | 0 0 0 | -0.0130 | -0.03"/1 | 0.0086  | 0 0 0 |
| 50120.000 | -0.2238025  | 0.3134120  | 0.4890931    | 0 0 0.0001346  | 0.0000837  | 0.0000103   | 0 0 0 | 0.0877  | -0.2551  | 0.0761  | 0 0 0 |
| 50121.000 | -0.2243341  | 0.3168994  | 0.487"/ 0137 | 0 0 0.0001591  | 0.0000960  | 0.0000210   | 0 0 0 | 0.0426  | -0.0570  | 0.0355  | 0 0 0 |
| 50122.000 | 0.2248472   | 0.3200492  | 0.4848825    | 0 0 0.0002220  | 0.000112"/ | 0.000030"/? | 0 0 0 | 0.0116  | -0.0056  | 0.0011  | 0 0 0 |
| 50123.000 | -0.2252807  | 0.3278658  | 0.4827756    | 0 0 0.0003105  | 0.0001233  | 0.0000312   | 0 0 0 | 0.0200  | 0.0000   | 0.0000  | 0 0 0 |

# COMBINED EARTH ORIENTATION SERIES: SPACE95



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# EOP(IERS)90C04 M NUS SPACE95

