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JCET AC Report on ILRS Data Analysis Activities

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**2004 ILRS Analysis Working Group Meeting
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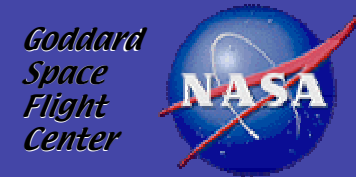


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Introduction

- JCET has converted its operations to comply with the ILRS AWG decisions at Kötzing, as of January 2004.
- Under the new regime, we now produce weekly three separate series of products
- After some SINEX v1.0 to v2.0 conversion problems, data delivery to CDDIS is now regularly done on a weekly basis.



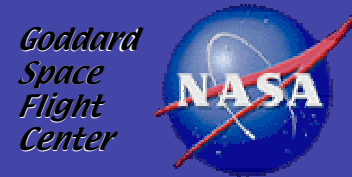
The Series

- **Operational series are the ones that are used for the generation of the weekly SINEX product.**
- **NEOS series are those that generate the EOP product that is sent to the NEOS/USNO service of the IERS.**
- **Definitive series are used to generate the annual product that is delivered to IERS annually.**



Data Processing

- **Production runs every Sunday afternoon**
- **Data are collected from CDDIS**
- **LAGEOS 1 & 2 and ETALON 1 & 2 data are converged in separate weekly arcs**
- **Normal equations are formed separately**
- **LAGEOS NEQs and ETALON NEQs are combined first in pairs, then combined into a single, optimally weighted matrix**



Solutions

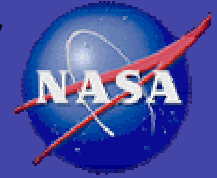
- **Several solutions are performed, all through a single production process:**
 - A set of LAGEOS-only products for all three series
 - A set of LAGEOS + ETALON products for all three series
- **The series that are submitted to ILRS AWG are from the second set of solutions**



Solution Description

Operational series

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- Data are selected applying the rules for minimum data yield on LAGEOS data ONLY
- Solution parameters are orbital state, EOP (x_p , y_p , LOD), selected (non-core sites) biases, and station positions with an epoch set to the mid-epoch of the arc
- Data editing is performed dynamically by GEODYN



Solution Description

NEOS series

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- Data are selected as is without any rules for minimum data yield on any data subset
- Solution parameters are orbital state, EOP (x_p, y_p, LOD) and biases for ALL stations (positions & velocities fixed at ITRF2000 for all sites)
- Data editing is performed dynamically by GEODYN



Solution Description

Definitive series

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- Data are selected *as is* without any rules for minimum data yield on any data subset
- Solution parameters on a weekly basis are orbital state, EOP (x_p , y_p , LOD), biases for ALL stations, 4x4 geopotential coefficients.
- Positions & velocities are estimated at ITRF2000 epoch 1997.0 for all sites.
- Data editing is performed dynamically by GEODYN



Solution Constraints I

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- The operational series used to produce the weekly SINEX product is solved with loose constraints on all solved-for parameters
- The NEOS series is a by construction absolutely constrained solution to yield precisely defined ITRF2000 EOPs and system quality performance through bias monitoring



Solution Constraints II

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- The definitive series is primarily produced as a re-analysis product at the end of each calendar year (actually in January of next year) as a contribution to IERS with *minimum constraints*
- For geocenter monitoring however, the series is also maintained during the year, by adding the weekly NEQs via a sequential LS solution to the accumulated NEQs, followed by a complete solution of the system for all stations POS+VEL, and the arc-parameters of the added arc, always under the same *minimum constraints*



Weekly NEOS Sites

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SLR_WEEKLY_NEOS Sun Apr 18 14:17:03 EDT 2004 ITRF2000 FIXED Solution

STATION	GEODETTIC COORDINATES						DELTA			STAND. DEV.			
	LATITUDE		E. LONG.		HEIGHT	LAT.	E. LONG.	HT.	LAT.	E. LONG	HT.		
-----	DEG	MN	SEC	DEG	MN	SEC	(M)	(SECONDS)	(M)	(SECONDS)	(M)		
18640000	38	41	5.62332	66	56	35.11930	2714.2969	-0.0007	-0.0003	-0.0060	14.7087	21.0402	761.4599
18730000	44	24	47.47619	33	59	27.42621	365.2327	0.0003	-0.0031	-0.0881	19.8978	27.5304	552.1824
18840000	56	56	54.78749	24	3	32.67583	32.0911	0.0003	0.0008	0.0795	0.0643	0.0747	21.4717
18930000	44	23	35.42769	33	58	12.45055	68.8531	-0.0003	-0.0018	-0.0239	19.3608	34.9017	1040.1174
70800000	30	40	48.96183	255	59	5.28660	2004.9974	0.0000	0.0000	-0.0001	0.0030	0.0034	0.0931
70860000	30	40	37.30933	255	59	2.61982	1962.1971	0.0000	0.0000	-0.0001	0.0000	0.0000	0.0000
70900000	-29	-2	-47.38243	115	20	48.29647	242.0592	0.0000	0.0000	0.0002	0.0039	0.0042	0.1301
71050000	39	1	14.17990	283	10	20.29779	19.9024	0.0000	0.0000	0.0000	0.0042	0.0055	0.1318
72100000	20	42	25.99436	203	44	38.70526	3068.2298	0.0000	0.0000	0.0000	0.0042	0.0045	0.1316
72370000	43	47	25.84562	125	26	36.45391	274.9449	0.0000	0.0000	0.0000	0.0043	0.0059	0.1319
72490000	39	36	24.96271	115	53	31.40371	82.5642	0.0000	0.0000	0.0000	0.0043	0.0055	0.1318
75010000	-25	-53	-22.95044	27	41	10.23127	1407.5120	0.0000	-0.0008	-0.0032	0.0059	0.0082	0.9691
78100001	46	52	38.02924	7	27	54.79812	952.0684	0.0001	-0.0001	0.0061	0.0036	0.0050	0.0880
78110000	52	16	37.13456	17	4	28.51732	123.3881	0.0001	0.0001	-0.0001	0.0041	0.0063	0.1320
78240001	36	27	54.91887	353	47	40.88853	99.0237	0.0000	0.0000	0.0000	0.0043	0.0053	0.1318
78320000	24	54	37.97228	46	24	1.32156	760.8487	0.0000	0.0000	0.0000	0.0042	0.0047	0.1316
78350000	43	45	16.89377	6	55	16.04957	1323.5529	0.0000	0.0000	0.0000	0.0043	0.0057	0.1319
78360000	52	22	48.07221	13	3	53.62326	134.2534	0.0000	0.0001	0.0000	0.0042	0.0068	0.1320
78380000	33	34	39.69781	135	56	13.33799	102.3411	0.0000	0.0000	0.0000	0.0043	0.0051	0.1317
78390000	47	4	1.69359	15	29	36.10690	540.1059	0.0000	0.0000	0.0000	0.0043	0.0060	0.1319
78400000	50	52	2.57596	0	20	10.05364	76.1348	-0.0001	0.0000	0.0001	0.0037	0.0054	0.1316
78410000	52	22	58.84597	13	3	41.16342	128.0728	0.0000	0.0000	0.0000	0.0043	0.0070	0.1320
79410000	40	38	55.21825	16	42	16.60133	537.6987	0.0000	0.0000	0.0000	0.0041	0.0054	0.1318
88340000	49	8	39.90745	12	52	40.83624	666.0935	0.0000	0.0000	0.0001	0.0039	0.0058	0.1317



Weekly Definitive Sites

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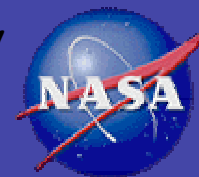
SLR_WEEKLY_OPS Sun Apr 18 14:16:45 EDT 2004 Loose Constraints Sol

STATION -----	GEODETTIC COORDINATES						DELTA			STAND. DEV.			
	LATITUDE		E. LONG.		HEIGHT	LAT.	E. LONG.	HT.	LAT.	E. LONG.	HT.		
	DEG	MN	SEC	DEG	MN	SEC	(SECONDS)	(M)	(SECONDS)	(M)	(M)		
18640000	38	41	5.60584	66	56	35.10497	2714.3411	-0.0182	-0.0146	0.0381	11.1068	16.5779	342.7384
18730000	44	24	47.45643	33	59	27.42523	365.1280	-0.0195	-0.0041	-0.1928	13.8995	22.0623	315.1088
18840000	56	56	54.76455	24	3	32.67643	32.0708	-0.0227	0.0014	0.0593	0.8160	1.6572	4.0858
18930000	44	23	35.40796	33	58	12.44344	68.7937	-0.0200	-0.0089	-0.0832	16.5166	25.7453	617.4214
70800000	30	40	48.97980	255	59	5.29195	2004.9920	0.0180	0.0054	-0.0055	0.8558	1.5038	0.3738
70860000	30	40	37.32731	255	59	2.62518	1962.1916	0.0180	0.0054	-0.0056	0.0000	0.0000	0.0000
70900000	-29	-2	-47.38476	115	20	48.30466	242.0526	-0.0023	0.0082	-0.0064	0.8233	1.4241	0.1911
71050000	39	1	14.18562	283	10	20.30235	19.8090	0.0057	0.0046	-0.0934	1.3482	3.6458	46.3588
72100000	20	42	26.01853	203	44	38.70036	3068.2139	0.0242	-0.0049	-0.0159	0.8209	1.5090	1.8346
72370000	43	47	25.84684	125	26	36.42647	275.0225	0.0012	-0.0274	0.0776	0.8098	1.7203	13.6118
72490000	39	36	24.96124	115	53	31.39972	82.2770	-0.0015	-0.0040	-0.2871	4.2005	5.4477	123.0920
75010000	-25	-53	-22.97350	27	41	10.22561	1407.5096	-0.0231	-0.0065	-0.0056	0.8236	1.5444	0.3919
78100001	46	52	38.00829	7	27	54.80388	952.0781	-0.0209	0.0056	0.0158	0.7962	1.4659	0.1864
78110000	52	16	37.11283	17	4	28.52107	123.2819	-0.0217	0.0038	-0.1063	0.8055	1.5473	5.3423
78240001	36	27	54.90095	353	47	40.89499	98.9114	-0.0179	0.0065	-0.1123	0.8023	1.4169	38.0718
78320000	24	54	37.94999	46	24	1.31378	760.8677	-0.0223	-0.0078	0.0190	0.8446	1.3910	2.3934
78350000	43	45	16.87311	6	55	16.05478	1323.5533	-0.0207	0.0052	0.0004	0.7984	1.4348	2.2126
78360000	52	22	48.05016	13	3	53.62966	134.2478	-0.0221	0.0065	-0.0056	0.8019	1.5480	0.9030
78380000	33	34	39.69990	135	56	13.32724	102.3494	0.0021	-0.0107	0.0083	3.3071	3.6491	113.4600
78390000	47	4	1.67076	15	29	36.10974	540.1346	-0.0228	0.0029	0.0287	0.8051	1.4704	1.0913
78400000	50	52	2.55614	0	20	10.06422	76.1379	-0.0199	0.0105	0.0032	0.7892	1.5221	0.2801
78410000	52	22	58.82433	13	3	41.16810	128.0620	-0.0216	0.0047	-0.0108	0.8049	1.5528	7.9741
79410000	40	38	55.19576	16	42	16.60196	537.6788	-0.0225	0.0006	-0.0200	0.8079	1.4143	2.1601
88340000	49	8	39.88548	12	52	40.84075	666.1138	-0.0220	0.0045	0.0204	0.8009	1.4956	2.2708



Weekly Operational Sites

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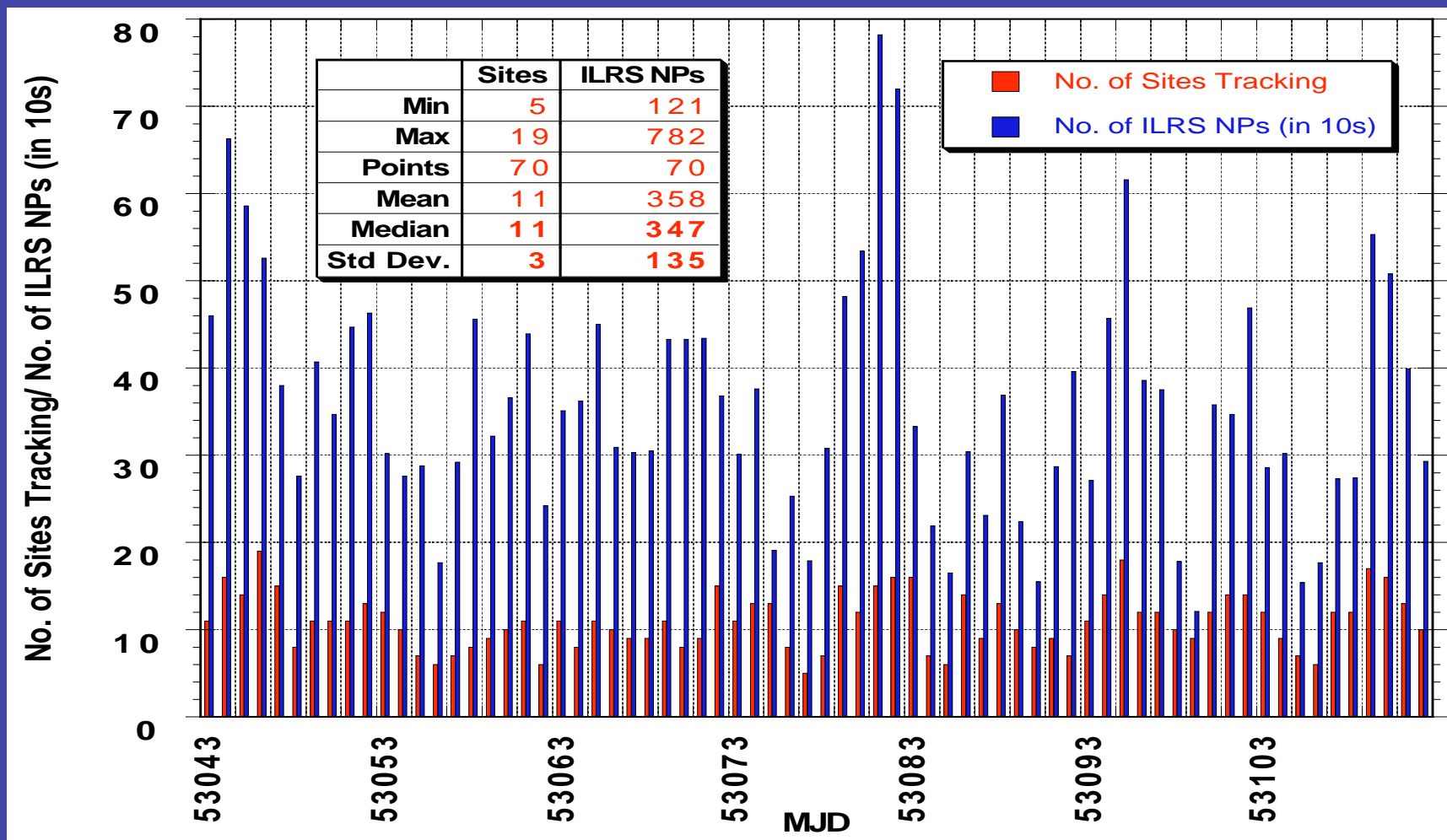
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18734900	5	12	0	0	0	10	11
18844400	0	11	17	37	10	0	0
18931800	0	0	0	0	10	12	0
70802416	0	0	1	18	28	0	34
70900512	79	55	74	78	80	7	26
71050728	0	0	0	0	21	0	0
72102312	0	0	0	21	0	0	0
72371904	19	16	9	11	19	21	21
72496104	0	0	0	1	10	0	5
75010600	8	34	71	59	84	67	0
78106808	0	8	21	60	21	103	48
78113800	0	0	14	36	24	21	6
78244504	0	5	8	0	0	7	0
78325504	0	3	28	63	0	0	42
78353104	0	0	3	16	0	0	0
78365800	0	0	0	7	16	10	0
78383600	0	64	0	16	71	66	0
78393400	16	19	0	0	0	0	0
78403504	50	30	25	59	30	30	57
78418704	0	0	0	47	37	16	0
79417704	0	0	0	0	27	0	0
88341000	0	0	0	8	20	29	43



Data Distribution

February 2004 to now

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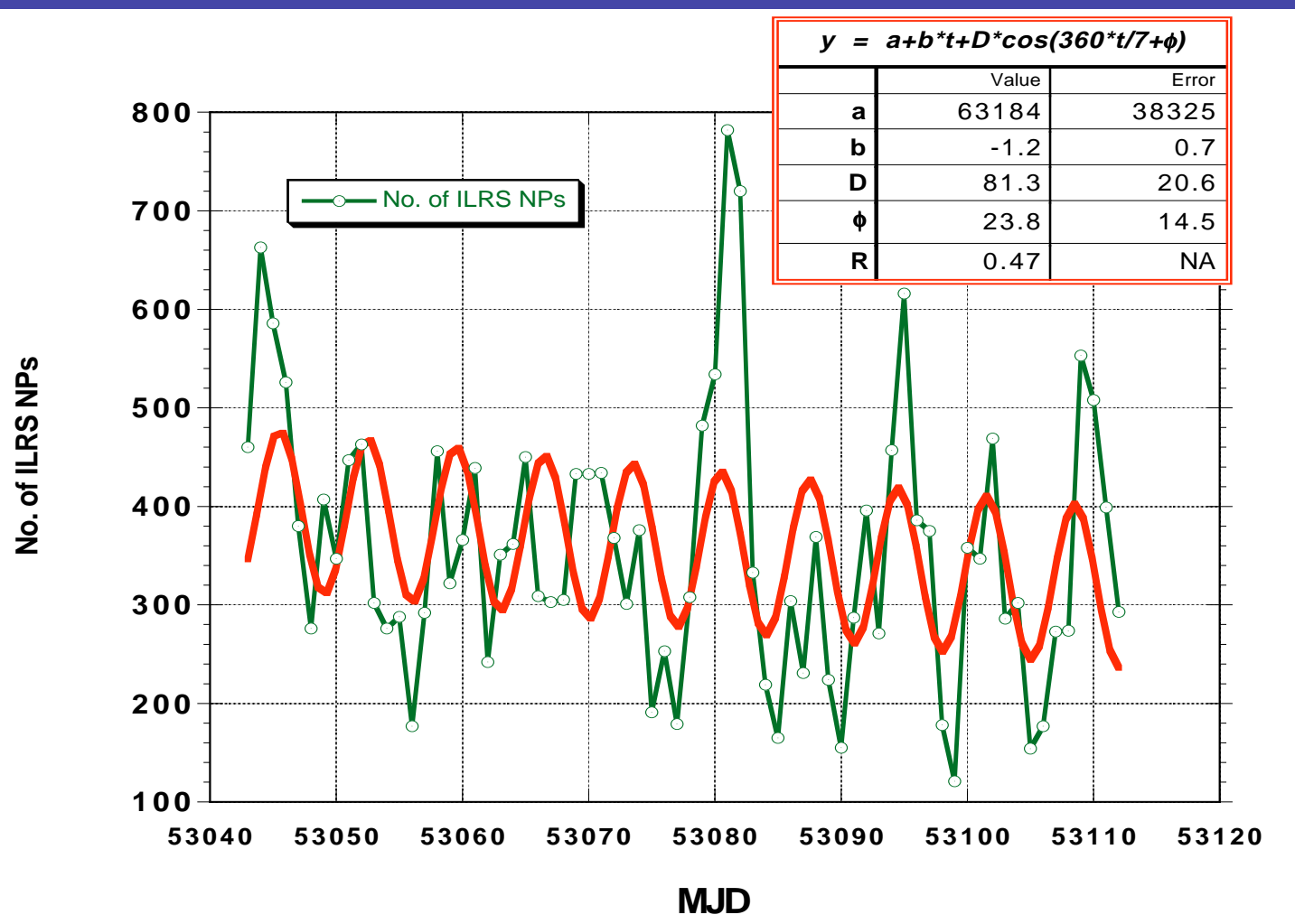


The “Weekend Effect”

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February 2004 to now





Summary

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- Regularly deliver weekly SINEX products for the ILRS AWG POS+EOP PP
- Automated procedure generates several of the required solutions to support various “customers” on an operational basis
- Data yield is significantly affected by the network size/quality reduction of early 2004
- At the moment we are completing the automation of our combination products and expanding our weekly data analysis service