BULLETIN OF THE ASTRONOMICAL INSTITUTES OF THE NETHERLANDS.

1926 Mai 1 Volume III. No. 93.

COMMUNICATION FROM THE OBSERVATORY AT LEIDEN.

The longitudes of Jupiter's Satellites derived from photographic plates taken at the Royal Observatory, Cape of Good Hope, in 1924, by *W. de Sitter* and *G. Pels.*

As has been explained in the annual report for 1924 (*B. A. N.* **72**, p. 191), a further series of photographs of Jupiter's Satellites was taken at the Cape Observatory with the Victoria telescope, cut down to 12 inches aperture as in the former series.

Before starting on this series of observations the object glass was taken apart and cleaned and has been carefully readjusted.

The standard stars photographed on the plates, and their positions for 1924·0 derived from observations with the reversible transit circle, are

C. P. D. — 21° 6100	16h 5m 49s·96	— 21° 57′ 29″·5
— 21 6118	9 50·27	56 37·4

The difference of declination derived from differential observations on 20 nights is

$$52''\cdot12 \pm 0''\cdot04.$$

The distance and position angle for 1924·0 are thus

$$s = 3343''\cdot73 \qquad p = 89°6'24''\cdot7 \pm 2''\cdot5.$$

The stars have been so chosen as to have a small difference in declination, which is determined very accurately, as the plates were also intended to derive the inclinations and nodes from the measures of the y-coordinates. The discussion of these will be published in one of the next numbers of the *B.A.N.*; the present paper gives only the results for the longitudes derived from the x-coordinates in the same way as for the other series, discussed in *M. N.* **76**, p. 448 and *B. A. N.* **50, 61, 62.**

The telescope was between the exposures moved in declination. The six images of each satellite are consequently arranged in a row which makes an angle of about 9° with the axis of y, instead of being parallel to it, as in the other series. It has consequently not been possible to refer all images to one and the same scale division. This circumstance has, however, only made the measures and reductions somewhat more complicated, but it is believed that the accuracy of the results is not seriously affected by it.

The plates were measured by G. PELS, who also is responsible for all the computations and reductions. The images on the plates are as a rule very sharp and round. The average errors σ, ε and ζ were derived in the same way as for the other series (see *B. A. N.* **50**, p. 62, **61**, p. 141 and **62**, p. 153). We have, in units of $\frac{1}{5}$ of a micron:

ζ from σ and ε	: ± 6·4
ζ from I—II	: ± 10·0
ζ from plates measured twice	: ± 7·1

We adopt again $\zeta = \pm 7\cdot5$, which gives for the probable error of unit weight $\rho = \pm\ '\cdot00036$. The comparison with the value of ρ derived from the final residuals gives:

series	ρ *from residuals*	*plate error*
1924	± ′·00055	± ′·00042

The plate error is of the same order as those found for the other series, see *B. A. N.* **50**, p. 62, **61**, p. 141, **62**, p. 153. The probable error of unit weight derived from the residuals of the solution *B*, in which every night has received the same weight, was ± ′·00044. As there are on the average three plates on a night, the probable error of the measures derived from ζ, must for the mean of the plates be divided by $\sqrt{3}$. We thus find for the

$$\textit{night error} : \pm\ '\cdot00039.$$

It thus appears that the night error is only very little smaller than the plate error, or in other words the different plates taken on the same night are subjected to common errors, and not much is gained by taking more than one plate on the same night.

The scale value was also determined from the satellites for each plate individually, as was done for the other series. The average residual was thereby brought down from ± ′·00065 to ± ′·00048, *i. e.* in

the ratio of 1 to 0·74. The theoretical reatio (see *B. A. N.* **50**, p. 65) is 0·79. The individual scale values are therefore probably not real, and they were not applied. It should be noted that the residuals of the two plates 7001 and 7004 taken on July 26 are enormously improved by the application of the individual scale values. The definition on this date was very bad. The correction for scale value as derived from the stars and the satellites, and the average residuals in the two cases, for the four plates taken on this night, are:

Plate	*Scale value from stars*	*Scale value from Sat.*	*Average Residual*	
	I	II	I	II
7001	+ ·00078	+ ·00136	± ′·00163	± ′·00058
7002	+ 95	+ 87	58	53
7003	+ 90	+ 72	67	46
7004	+ 88	+ 35	128	21

It is very difficult to understand how a continuous change in the scale value, as seems to be indicated by the satellites, could arise without affecting also the standard stars, which were only a few degees distant from Jupiter. It has been thought better to reject the whole date in the final solution.

The other three rejected plates are 6989, 7006, 7018, all taken in very bad definition. None of these is improved by applying the scale value derived from the satellites.

After the preliminary solution *O*, two solutions *A* and *B* were made, in the first of which equal weights were assigned to every plate, and in the other to every date. The results from the different solutions are given below.

1924	*O*	*A*	*B*
λ_1	+ ·000750	— ·000005	+ ·000014
λ_2	+ 636	+ 29	+ 22
λ_3	+ 204	+ 13	+ 6
λ_4	+ 472	+ 8	+ 12
μ	+ ·000020	— ·000006	— ·000022
c_1	— ·00186	+ ·00009	+ ·00006
c_2	+ 169	— 13	— 9
c_3	+ 20	— 2	— 7
c_4	— 3	+ 6	+ 10
aver. resid.	± ·00065	± ·00064	± ·00049

The mean of the solutions *A* and *B* was adopted. The probable errors of the unknowns were derived as in the case of the former series. Returning to the original unknowns we have

$$1924{\cdot}56 \begin{cases} \Delta l_1 = + 0^{\circ}{\cdot}1131 \pm 0^{\circ}{\cdot}0063 \\ \Delta l_2 = + \cdot 0662 \pm 29 \\ \Delta l_3 = + \cdot 0143 \pm 15 \\ \Delta l_4 = + \cdot 0161 \pm 9 \end{cases}$$

The following tables are arranged exactly as those in *B. A. N.* **50**, **61** and **62**. The observers were

JL Dr. J. LUNT,
JJ Mr. J. W. JACKSON,
AB Mr. A. BAINES.

The remarks printed in italics were made by the observers at the Cape during the exposure, the others by Mr. PELS during the measurement at Leiden.

Plate N°. Obsr. Defn.	Date 1924 G.M.T.	Satellite	*v*	*ρ*	*x*	*y*	*a*	x_{obs}	*n*	Residuals	Remarks
6979	July 16	I	310°·4636	0·997161	+ 1′·84719	— 0′·05169	+ 2·82	+ 2′·11610	+ 0′·00074	+ 0′·00049	
JL		II	109·7305	0·991819	— 2·13182	+ 0·15247	— 4·60	— 1·86632	— 267	— 110	
1—2	7h 11m 58s	III	99·0203	1·000218	— 2·58370	+ 0·22156	— 5·59	— 2·31628	— 75	+ 50	
		IV	261·6502	0·993924	+ 1·79564	— 0·43323	+ 5·42	+ 2·06650	+ 269	+ 13	
6980	July 16	I	316·9704	0·997459	+ 1·95814	— 0·04115	+ 2·26	+ 2·24045	— 0·00002	+ 0·00009	
JL		II	113·0076	0·992042	— 2·27928	+ 0·14589	— 4·38	— 1·99875	— 180	— 45	
1—2	7h 57m 46s	III	100·6196	1·000258	— 2·71679	+ 0·21767	— 5·51	— 2·43564	— 118	— 3	
		IV	262·3446	0·993871	+ 1·90860	— 0·43267	+ 5·41	+ 2·19393	+ 300	+ 38	
6981	July 16	I	321·6519	0·997692	+ 2·02250	— 0·03324	+ 1·83	+ 2·31666	— 0·00081	— 0·00042	
JL		II	115·3655	0·992218	— 2·38085	+ 0·14085	— 4·21	— 2·08800	— 212	— 92	
1—2	8h 30m 44s	III	101·7709	1·000289	— 2·81130	+ 0·21481	— 5·44	— 2·51625	+ 8	+ 117	
		IV	262·8446	0·993835	+ 1·98976	— 0·43224	+ 5·40	+ 2·28758	+ 285	+ 17	
6982	July 17	I	148·0769	1·001907	— 2·09370	+ 0·02194	— 1·23	— 0·93953	— 0·00289	+ 0·00081	
JL		II	208·9294	1·005020	— 2·27849	— 0·13535	+ 4·45	— 1·11761	+ 382	+ 37	
1—2	6h 35m 1s	III	147·9676	1·001244	— 5·30892	+ 0·04330	— 1·39	— 4·15324	— 138	— 20	
		IV	282·9519	0·992738	+ 5·05288	— 0·38828	+ 4·66	+ 6·21038	+ 44	— 97	

Plate N°. Obsr. Defn.	Date 1924 G.M.T.	Satellite	v	ρ	x	y	a	x_{obs}	n	Residuals	Remarks
6983	July 17	I	152°.6849	1.001642	−2′.12379	+0′.01370	−0.78	−0′.99981	−0′.00318	+0′.00029	
JL		II	211.2096	1.005316	−2.17555	−0.14059	+4.61	−1.04387	+452	+107	
1—2	$7^h\ 7^m\ 45^s$	III	149.1087	1.001259	−5.33140	+0.03820	−1.27	−4.20716	−292	−166	
		IV	283.4494	0.992723	+5.12210	−0.38658	+4.63	+6.25085	+159	+29	
6984	July 17	I	159.3957	1.001239	−2.14295	+0.00156	−0.13	−1.07057	−0.00282	+0.00032	
AB		II	214.5253	1.005733	−2.01967	−0.14780	+4.82	−0.94050	+397	+55	
1—2	$7^h\ 55^m\ 23^s$	III	150.7688	1.001278	−5.36029	+0.03077	−1.09	−4.28734	−225	−85	
		IV	284.1733	0.992699	+5.22212	−0.38403	+4.60	+6.29842	+110	−1	
6985	July 18	I	354.2023	0.999754	+2.07615	+0.02502	−1.31	−0.03083	−0.00324	+0.00037	
JJ		II	309.6321	1.006217	+2.92981	−0.10594	+3.05	+0.82798	+191	−81	
3, 3—4	$6^h\ 48^m\ 12^s$	III	198.5998	1.001401	−4.27531	−0.16905	+3.88	−6.37832	+73	+68	
		IV	305.0474	0.992561	+7.68433	−0.28652	+3.20	+5.58117	+58	−24	
6986	July 18	I	359.9892	1.000130	+2.01575	+0.03504	−1.85	−0.13417	−0.00453	−0.00065	
JJ		II	312.4798	1.005884	+3.01261	−0.09792	+2.81	+0.86951	+229	−42	
3, 3—4	$7^h\ 29^m\ 8^s$	III	200.0265	1.001389	−4.19033	−0.17381	+4.01	−6.33486	+86	+64	
		IV	305.6700	0.992572	+7.74352	−0.28296	+3.15	+5.59952	+139	+45	
6987	July 18	I	5.4850	1.000486	+1.93929	+0.04420	−2.35	−0.24424	−0.00470	−0.00058	
JJ		II	315.1883	1.005552	+3.08435	−0.09010	+2.56	+0.90743	+191	−78	
3, 3—4	$8^h\ 8^m\ 4^s$	III	201.3821	1.001379	−4.10723	−0.17824	+4.12	−6.28588	+18	−20	
		IV	306.2618	0.992583	+7.79894	−0.27956	+3.10	+5.62271	+260	+156	
6988	July 19	I	195.0699	0.998840	−1.75359	−0.05893	+3.15	−4.61346	+0.00106	+0.00027	*July 19th. Defn. very bad at times due to thin cloud.*
JJ		II	50.3017	0.992508	+1.16694	+0.17185	−5.52	−1.69478	−79	+97	
3—4	$6^h\ 35^m\ 37^s$	IV	326.7378	0.993447	+9.16943	−0.14633	+1.31	+6.30823	−27	−123	
6989	July 19	I	199.9988	0.998538	−1.64287	−0.06594	+3.54	−4.50127	+0.00007	[−0.00095]	
JJ		II	52.7891	0.992305	+1.02838	+0.17483	−5.60	−1.83008	+1	[+190]	
3—4	$7^h\ 10^m\ 25^s$	IV	327.2656	0.993480	+9.18992	−0.14256	+1.26	+6.33136	−9	[−94]	
6990	July 19	I	204.4969	0.998274	−1.53130	−0.07190	+3.86	−4.38965	+0.00064	−0.00057	*Instr. not clamped in declination during first two exp. of satellites.*
JJ		II	55.0578	0.992132	+0.90038	+0.17726	−5.67	−1.95948	−87	+113	
3—4	$7^h\ 42^m\ 9^s$	IV	327.7473	0.993511	+9.20789	−0.13912	+1.22	+6.34913	+23	−55	
6991	July 20	I	36.9889	1.002404	+1.17771	+0.08629	−4.65	−1.62154	−0.00402	+0.00041	
JJ		II	152.0476	0.996659	−3.33480	+0.03693	−0.87	−6.12755	+248	+62	
3	$6^h\ 19^m\ 23^s$	III	298.1240	0.999320	+3.97763	−0.16153	+4.23	+1.18465	+225	+28	
		IV	348.3134	0.995251	+9.36036	+0.01276	−0.75	+6.56441	−72	−133	
6992	July 20	I	40.9948	1.002597	+1.05082	+0.09002	−4.86	−1.72701	−0.00519	−0.00061	
JJ		II	154.0665	0.996951	−3.35094	+0.03047	−0.66	−6.12236	+124	−77	
3	$6^h\ 47^m\ 53^s$	III	299.1209	0.999297	+4.04008	−0.15805	+4.15	+1.27073	+329	+131	
		IV	348.7441	0.995294	+9.35060	+0.01588	−0.79	+6.57863	+67	+7	
6993	July 20	I	45.0593	1.002779	+0.91675	+0.09336	−5.04	−1.83675	−0.00450	+0.00022	
JJ		II	156.1140	0.997253	−3.36307	+0.02390	−0.45	−6.11055	+152	−63	
3	$7^h\ 16^m\ 48^s$	III	300.1329	0.999271	+4.10217	−0.15449	+4.06	+1.35621	+304	+107	
		IV	349.1811	0.995340	+9.34012	+0.01908	−0.83	+6.59106	−6	−66	
6994	July 22	II	351.9830	0.999970	+3.29803	+0.02795	−1.18	−0.72698	+0.00149	−0.00010	Sat. I too near planet.
JJ		III	38.6075	0.998880	+2.83071	+0.22251	−5.31	−1.19680	−101	−78	
3, 3—4	$6^h\ 7^m\ 44^s$	IV	31.4775	1.000515	+5.95076	+0.30427	−4.29	+1.92379	−47	+89	
6995	July 22	I	86.1404	1.003722	−0.57565	+0.09835	−5.35	−3.41215	−0.00261	+0.00121	
JJ		II	354.0693	0.999643	+3.27015	+0.03464	−1.39	+0.43914	+288	+9	
3, 3—4	$6^h\ 37^m\ 21^s$	III	39.6452	0.998899	+2.74749	+0.22467	−5.37	−0.08601	+39	−69	
		IV	31.9210	1.000573	+5.89359	+0.30665	−4.31	+3.05904	−66	−62	
6996	July 22	I	90.1323	1.003705	−0.71659	+0.09612	−5.23	−3.47757	−0.00406	−0.00034	
JJ		II	356.0755	0.999325	+3.23925	+0.04099	−1.58	+0.48387	+154	−114	
3, 3—4	$7^h\ 5^m\ 49^s$	III	40.6417	0.998916	+2.66670	+0.22669	−5.42	−0.08794	+228	+120	
		IV	32.3471	1.000627	+5.83832	+0.30888	−4.34	+3.08165	+25	+30	
6997	July 24	I	137.1156	1.002212	−1.93888	+0.03928	−2.18	+0.64940	−0.00304	−0.00021	*Break in cloud.*
JJ		II	200.8734	1.004625	−2.55469	−0.11326	+3.82	+0.04227	+564	+99	
3, 3—4	$7^h\ 8^m\ 10^s$	III	141.3288	1.001249	−5.05891	+0.06904	−2.03	−2.46798	−39	−68	
		IV	75.2531	1.005500	−0.81278	+0.42911	−5.49	+1.77632	−222	−10	

Plate N°. Obsr. Defn.	Date 1924 G.M.T.	Satellite	v	ρ	x	y	a	x_{obs}	n	Residuals	Remarks
6997*a*	July 24	I	140°7821	1·002014	−1′98755	+0′03320	−1·85	+0′61871	−0′00230	+0′00035	*Cloudy at times. Clouded over—rain at end.*
JJ		II	202·6901	1·004871	−2·48454	−0·11789	+3·96	+0·12903	+ 501	+ 35	
3, 3—4	7h 34m 13s	III	142·2372	1·001263	−5·08565	+0·06519	−1·94	−2·47739	− 30	− 52	
		IV	75·6395	1·005532	−0·87652	+0·42915	−5·49	+1·72965	− 239	− 18	
6998	July 25	I	338·4983	0·999085	+2·09619	−0·00239	+0·17	+3·11995	−0·00196	−0·00017	
JL		II	299·2680	1·006827	+2·53529	−0·12872	+3·85	+3·56400	+ 299	− 94	
2—3	6h 48m 3s	III	190·7978	1·001442	−4·59305	−0·13896	+3·15	−3·56665	+ 68	+ 10	
		IV	96·2583	1·006937	−4·14130	+0·40248	−4·95	−3·11729	− 171	+ 100	
6999	July 25	I	342·5638	0·999342	+2·09609	+0·00476	−0·22	+3·10448	−0·00230	−0·00030	
JL		II	301·2634	1·006615	+2·60995	−0·12395	+3·69	+3·62519	+ 455	+ 64	
2—3	7h 16m 46s	III	191·7986	1·001435	−4·54468	−0·14258	+3·24	−3·53356	+ 43	− 26	
		IV	96·6829	1·006956	−4·20413	+0·40135	−4·93	−3·19612	− 268	− 7	
7000	July 25	I	347·8476	0·999684	+2·08021	+0·01401	−0·72	+3·07300	−0·00289	−0·00063	
JL		II	303·8591	1·006326	+2·70226	−0·11755	+3·48	+3·70159	+ 365	− 23	
2—3	7h 54m 8s	III	193·0999	1·001426	−4·47972	−0·14724	+3·36	−3·48325	+ 79	− 5	
		IV	97·2347	1·006983	−4·28547	+0·39981	−4·90	−3·29135	− 156	+ 92	
7001	July 26	I	176·3298	0·999699	−2.01103	−0·02853	+1·52	+0·01089	−0·00081	[−0·00086]	*Defn. v. poor.*
JJ		II	38·2564	0·993131	+1·75469	+0·14957	−4·91	+3·77523	− 219	[− 134]	Images hazy.
4	6h 14m 2s	III	239·8128	1·000658	−0.96240	−0·24765	+6·08	+1·06135	+ 102	[− 110]	
		IV	117·0151	1·007474	−6·87218	+0·32323	−3·76	−4·84746	+ 199	[+ 328]	
7002	July 26	I	180·0886	0·999455	−1·96806	−0·03477	+1·86	+0·05770	+0·00045	[+0·00019]	
JJ		II	40·1540	0·992944	+1·66034	+0·15291	−5·00	+3·68441	− 124	[− 26]	
3—4, 4	6h 40m 37s	III	240·7405	1·000636	−0·87761	−0·24810	+6·10	+1·15056	+ 286	[+ 79]	
		IV	117·4074	1·007475	−6·91591	+0·32129	−3·73	−4·89267	− 207	[− 74]	
7003	July 26	I	183·3045	0·999248	−1·92459	−0·03998	+2·15	+0·10186	+0·00036	[−0·00007]	
JJ		II	41·7772	0·992792	+1·57823	+0·15564	−5·08	+3·60464	+ 32	[+ 140]	
3—4	7h 3m 20s	III	241·5338	1·000620	−0·80494	−0·24841	+6·11	+1·22246	+ 131	[− 73]	
		IV	117·7427	1·007477	−6·95306	+0·31967	−3·71	−4·92896	− 199	[− 62]	
7004	July 26	I	186·6551	0·999037	−1·87290	−0·04528	+2·43	+0·15299	+0·00037	[−0·00022]	
JJ		II	43·4681	0·992638	+1·49139	+0·15836	−5·16	+3·51802	+ 111	[+ 228]	
3—4	7h 27m 1s	III	242·3600	1·000598	−0·72908	−0·24876	+6·12	+1·29884	+ 240	[+ 40]	
		IV	118·0920	1·007476	−6·99149	+0·31788	−3·68	−4·96984	− 387	[− 247]	
7005	July 27	I	24·2987	1·002014	+1·50386	+0·07031	−3·81	+3·23410	−0·00451	−0·00089	
JJ		II	143·0697	0·996083	−3·16312	+0·06264	−1·71	−1·42636	+ 201	+ 52	
3, 3—4	6h 40m 16s	III	291·0471	0·999360	+3·45837	−0·17888	+4·66	+5·19464	+ 152	− 71	
		IV	138·6586	1·007009	−8·73810	+0·19667	−2·01	−6·99237	+ 98	+ 106	
7006	July 27	I	27·8695	1·002204	+1·41046	+0·07464	−4·05	+3·16328	−0·00276	[+0·00103]	*Second exp. of stars prolonged for cloud.*
JJ		II	144·8699	0·996335	−3·19279	+0·05723	−1·53	−1·43752	− 30	[− 193]	
3, 3—4	7h 5m 38s	III	291·9351	0·999338	+3·51985	−0·17618	+4·59	+5·27702	+ 159	[− 65]	
		IV	139·0335	1·006994	−8·75984	+0·19418	−1·98	−7·00278	+ 148	[+ 153]	
7007	July 29	II	341·2967	1·000865	+3·30715	−0·00576	−0·11	+3·98762	+0·00102	−0·00002	*July 29th. Hazy at times.*
JJ		III	30·6640	0·998829	+3·35333	+0·19887	−4·73	+4·03192	− 86	+ 48	
3, 3—4	6h 4m 0s	IV	180·7881	1·003410	−8·69884	−0·10510	+1·91	−8·01955	− 16	− 47	
7008	July 29	II	342·9354	1·000606	+3·30301	−0·00058	−0·28	+3·99737	+0·00102	+0·00006	
JJ		III	31·4805	0·998843	+3·29493	+0·20094	−4·78	+3·98777	− 50	+ 83	
3, 3—4	6h 27m 19s	IV	181·1348	1·003368	−8·67796	−0·10754	+1·94	−7·98514	− 52	− 88	
7009	July 29	II	344·6710	1·000332	+3·29570	+0·00492	−0·45	+4·00585	+0·00101	+0·00012	
JJ		III	32·3448	0·998856	+3·23240	+0·20306	−4·84	+3·93987	− 167	− 37	
3, 3—4	6h 52m 0s	IV	181·5018	1·003324	−8·65554	−0·11013	+1·97	−7·94573	+ 67	+ 26	
7010	July 30	II	80·7515	0·991025	−0·60195	+0·17784	−5·61	+2·19105	−0·00140	+0·00014	*Defn. went off badly at times.*
JJ		III	79·5443	0·999892	−0·86013	+0·24052	−6·05	+1·93386	− 41	+ 24	
3—4	5h 21m 4s	IV	201·6228	1·000821	−6·92112	−0·24063	+3·56	−4·12491	+ 181	− 37	
7011	July 30	II	82·2863	0·991047	−0·68781	+0·17712	−5·58	+2·14526	−0·00088	+0·00064	
JJ		III	80·2925	0·999912	−0·92789	+0·23978	−6·03	+1·90517	− 89	− 23	
3—4	5h 42m 29s	IV	201·9428	1·000779	−6·88616	−0·24245	+3·59	−4·05043	+ 178	− 40	

3907

Plate N°. Obsr. Defn.	Date 1924 G.M.T.	Satellite	v	ρ	x	ν	a	x_{obs}	n	Residuals	Remarks
7012	July 30	II	83°.6586	0.991074	−0′.76417	+0′.17639	−5.55	+2′.10306	−0′.00185	−0′.00034	*Defn. went off badly at times.*
JJ		III	80.9616	0.999929	−0.98837	+0.23909	−6.02	+1.88002	−69	−2	
3—4	$6^h\ 1^m\ 37^s$	IV	202.2291	1.000741	−6.85471	−0.24411	+3.60	−3.98309	+254	+36	
7013	Aug. 2	I	159.5476	1.000445	−2.05523	+0.00016	−0.05	−2.36441	−0.00241	−0.00032	
JJ		II	27.1943	0.993749	+2.21237	+0.12384	−4.15	+1.90520	−40	+90	
3	$6^h\ 6^m\ 13^s$	III	231.7577	1.000749	−1.63849	−0.23443	+5.75	−1.94452	+74	−36	
		IV	267.4235	0.993671	+2.70844	−0.39922	+5.05	+2.40372	+205	−24	
7014	Aug. 2	I	162.6886	1.000242	−2.05263	−0.00518	+0.24	−2.37449	−0.00171	+0.00020	
JJ		II	28.7804	0.993573	+2.14516	+0.12732	−4.26	+1.82297	−204	−63	
3	$6^h\ 28^m\ 27^s$	III	232.5337	1.000733	−1.57124	−0.23524	+5.78	−1.89085	+54	−53	
		IV	267.7608	0.993649	+2.75933	−0.39870	+5.04	+2.44238	+320	+95	
7015	Aug. 2	I	165.8816	1.000035	−2.04366	−0.01061	+0.54	−2.37971	−0.00106	+0.00065	
JJ		II	30.3928	0.993399	+2.07520	+0.13072	−4.36	+1.73852	−169	−17	
3	$6^h\ 51^m\ 4^s$	III	233.3227	1.000716	−1.50258	−0.23604	+5.80	−1.83725	+32	−71	
		IV	268.1039	0.993629	+2.81101	−0.39819	+5.03	+2.47845	+243	+23	
7016	Aug. 3	I	4.7085	1.001177	+1.86482	+0.04130	−2.24	−0.02406	−0.00266	+0.00072	
JJ		II	130.6100	0.995040	−2.82506	+0.09507	−2.78	−4.71242	−114	−98	
3	$6^h\ 12^m\ 17^s$	III	282.2724	0.999553	+2.76552	−0.19711	+5.11	+0.88053	+123	−12	
		IV	289.3883	0.992734	+5.73962	−0.33901	+4.08	+3.85595	+255	+37	
7017	Aug. 3	I	7.8143	1.001368	+1.81607	+0.04603	−2.50	−0.07572	−0.00366	−0.00012	
JJ		II	132.1765	0.995248	−2.86804	+0.09096	−2.65	−4.75737	−120	−115	
3	$6^h\ 34^m\ 20^s$	III	283.0431	0.999533	+2.82421	−0.19520	+5.07	+0.93853	+245	+107	
		IV	289.7234	0.992727	+5.78030	−0.33768	+4.06	+3.89457	+240	+19	
7018	Aug. 3	I	10.7241	1.001541	+1.76553	+0.05033	−2.74	−0.12690	−0.00340	[+0.00030]	
JJ		II	133.6441	0.995447	−2.90640	+0.08704	−2.52	−4.79589	−46	[−53]	
3	$6^h\ 54^m\ 59^s$	III	283.7656	0.999520	+2.87878	−0.19339	+5.03	+0.99273	+298	[+157]	
		IV	290.0372	0.992722	+5.81821	−0.33639	+4.04	+3.93005	+87	[−136]	