

São tabulados para zero hora TU de cada dia :

- a) Tempo Sideral Aparente (ou verdadeiro) de Greenwich
- b) Tempo Sideral Médio (ou uniforme) de Greenwich
- c) Termo de longo e curto período da equação dos equinócios
(nutação em ascensão reta)
- d) Obliquidade da Eclíptica
- e) Termos de longo e curto período da nutação em obliquidade
- f) Termos de longo e curto período da nutação em longitude

A nutação é calculada com base na Teoria de E.W.Woolard, cuja expressões são dadas no volume Improved Lunar Ephemeris 1952-1959, 1954.

Os termos de curto período (menores que 35 dias) da nutação em obliquidade e em longitude são utilizados na correção às posições aparentes das estrelas não polares (Seção E).

A fim de que a hora e o minuto dos Tempos Siderais Médio e Aparente sejam comuns, os segundos podem ultrapassar o valor de 60. O grau e o minuto da obliquidade da eclíptica são dados no alto da coluna em cada página.

Para se obter o Tempo Sideral Local para uma determinada Hora Legal (HL) deve-se:

1) Passar o instante em HL para Tempo Universal (TU) através da relação :

$$TU = HL + FUSO$$

onde o FUSO do lugar pode ser encontrado nas páginas deste volume referentes ao Serviço da Hora.

2) Converter o intervalo de tempo TU desde a zero hora TU para intervalo de Tempo Sideral, utilizando para isso as tabelas da Seção G.

3) Somar essa quantidade ao Tempo Sideral de Greenwich a zero hora TU obtendo-se, dessa forma o Tempo Sideral em Greenwich para o instante considerado.

4) Finalmente, para se ter o Tempo Sideral Local basta agora subtrair (ou somar) a longitude oeste (ou leste) do Tempo Sideral em Greenwich.

TEMPO SIDERAL, OBLIQUIDADE DA ECLÍPTICA E NUTAÇÃO, 2020
O HORA TEMPO UNIVERSAL

3 F

DATA H O TU	TEMPO SIDERAL				EQ. EQUIN. PERÍODO		OBLIQ. ECLIP. G ' 23 26 "	NUT. OBLIQ. PERÍODO		NUT. LONG. PERÍODO		
	APARENTE		MÉDIO	LONGO	CURTO	LONGO		CURTO	LONGO	CURTO		
	H	M	S								S	S
JAN.	0	6	36	31.575	32.587	-1.024	+0.012	10.302	-1.778	+0.037	-16.736	+0.191
	1	6	40	28.129	29.142	-1.021	+0.008	10.342	-1.763	+0.064	-16.693	+0.126
	2	6	44	24.682	25.698	-1.018	+0.002	10.372	-1.747	+0.079	-16.650	+0.040
	3	6	48	21.234	22.253	-1.016	-0.003	10.388	-1.730	+0.080	-16.607	-0.054
	4	6	52	17.787	18.809	-1.013	-0.009	10.391	-1.713	+0.067	-16.565	-0.142
	5	6	56	14.340	15.364	-1.011	-0.013	10.382	-1.695	+0.041	-16.524	-0.211
	6	7	0	10.896	11.919	-1.008	-0.015	10.365	-1.677	+0.007	-16.484	-0.249
	7	7	4	7.454	8.475	-1.006	-0.015	10.344	-1.658	-0.031	-16.445	-0.248
	8	7	8	4.014	5.030	-1.004	-0.012	10.328	-1.638	-0.066	-16.406	-0.204
	9	7	12	0.577	1.585	-1.001	-0.008	10.323	-1.618	-0.090	-16.369	-0.123
	10	7	15	57.141	58.141	-0.999	-0.001	10.337	-1.597	-0.096	-16.332	-0.019
	11	7	19	53.705	54.696	-0.997	+0.005	10.372	-1.576	-0.080	-16.296	+0.085
	12	7	23	50.267	51.252	-0.995	+0.010	10.427	-1.554	-0.046	-16.262	+0.165
	13	7	27	46.826	47.807	-0.993	+0.012	10.495	-1.532	+0.000	-16.228	+0.199
	14	7	31	43.383	44.362	-0.991	+0.011	10.562	-1.509	+0.046	-16.196	+0.181
	15	7	35	39.936	40.918	-0.989	+0.007	10.619	-1.485	+0.081	-16.165	+0.116
	16	7	39	36.488	37.473	-0.987	+0.002	10.655	-1.462	+0.095	-16.135	+0.025
	17	7	43	33.039	34.028	-0.985	-0.004	10.670	-1.437	+0.087	-16.106	-0.066
	18	7	47	29.592	30.584	-0.984	-0.008	10.666	-1.413	+0.059	-16.079	-0.133
	19	7	51	26.147	27.139	-0.982	-0.010	10.650	-1.387	+0.019	-16.053	-0.161
	20	7	55	22.705	23.694	-0.980	-0.009	10.632	-1.362	-0.023	-16.028	-0.143
	21	7	59	19.266	20.250	-0.979	-0.005	10.622	-1.336	-0.057	-16.005	-0.086
	22	8	3	15.827	16.805	-0.978	-0.000	10.626	-1.310	-0.078	-15.983	-0.004
	23	8	7	12.389	13.361	-0.976	+0.005	10.648	-1.283	-0.081	-15.963	+0.086
24	8	11	8.951	9.916	-0.975	+0.010	10.687	-1.257	-0.068	-15.944	+0.163	
25	8	15	5.510	6.471	-0.974	+0.013	10.740	-1.230	-0.041	-15.927	+0.214	
26	8	19	2.067	3.027	-0.973	+0.014	10.799	-1.202	-0.007	-15.911	+0.228	
27	8	22	58.622	59.582	-0.972	+0.013	10.860	-1.175	+0.027	-15.897	+0.205	
28	8	26	55.175	56.137	-0.972	+0.009	10.916	-1.147	+0.056	-15.884	+0.149	
29	8	30	51.726	52.693	-0.971	+0.004	10.961	-1.119	+0.075	-15.873	+0.068	
30	8	34	48.276	49.248	-0.970	-0.002	10.994	-1.091	+0.081	-15.864	-0.025	
31	8	38	44.827	45.803	-0.970	-0.007	11.012	-1.063	+0.072	-15.856	-0.116	
FEV.	1	8	42	41.378	42.359	-0.969	-0.012	11.017	-1.035	+0.051	-15.849	-0.193
	2	8	46	37.930	38.914	-0.969	-0.015	11.013	-1.007	+0.019	-15.845	-0.244
	3	8	50	34.485	35.470	-0.969	-0.016	11.003	-0.978	-0.018	-15.842	-0.259
	4	8	54	31.042	32.025	-0.969	-0.014	10.993	-0.950	-0.054	-15.840	-0.234
	5	8	58	27.601	28.580	-0.969	-0.010	10.992	-0.922	-0.083	-15.840	-0.171
	6	9	2	24.162	25.136	-0.969	-0.005	11.005	-0.893	-0.097	-15.842	-0.077
	7	9	6	20.724	21.691	-0.969	+0.002	11.038	-0.865	-0.090	-15.846	+0.030
	8	9	10	17.285	18.246	-0.970	+0.008	11.093	-0.837	-0.063	-15.851	+0.124
	9	9	14	13.843	14.802	-0.970	+0.011	11.163	-0.809	-0.019	-15.857	+0.183
	10	9	18	10.398	11.357	-0.970	+0.012	11.240	-0.781	+0.030	-15.865	+0.188

DATA	TEMPO SIDERAL				EQ. EQUIN.		OBLIQ.	NUT. OBLIQ.		NUT. LONG.	
H	APARENTE				PERÍODO	PERÍODO	ECLIP.	PERÍODO	PERÍODO	PERÍODO	PERÍODO
O TU	MÉDIO				LONGO	CURTO	G ' 23 26	LONGO	CURTO	LONGO	CURTO
	H	M	S	S	S	S	"	"	"	"	"
FEV. 10	9	18	10.398	11.357	-0.970	+0.012	11.240	-0.781	+0.030	-15.865	+0.188
11	9	22	6.950	7.913	-0.971	+0.009	11.308	-0.753	+0.072	-15.875	+0.141
12	9	26	3.500	4.468	-0.972	+0.003	11.357	-0.725	+0.095	-15.887	+0.056
13	9	30	0.048	1.023	-0.973	-0.002	11.382	-0.698	+0.094	-15.899	-0.038
14	9	33	56.598	57.579	-0.973	-0.007	11.384	-0.671	+0.070	-15.914	-0.113
15	9	37	53.150	54.134	-0.974	-0.009	11.371	-0.644	+0.032	-15.930	-0.149
16	9	41	49.705	50.689	-0.975	-0.009	11.353	-0.617	-0.012	-15.947	-0.139
17	9	45	46.263	47.245	-0.977	-0.005	11.341	-0.591	-0.049	-15.966	-0.088
18	9	49	42.822	43.800	-0.978	-0.001	11.341	-0.565	-0.073	-15.986	-0.010
19	9	53	39.381	40.355	-0.979	+0.005	11.358	-0.539	-0.081	-16.008	+0.078
20	9	57	35.940	36.911	-0.981	+0.010	11.392	-0.514	-0.071	-16.031	+0.158
21	10	1	32.497	33.466	-0.982	+0.013	11.439	-0.489	-0.048	-16.055	+0.214
22	10	5	29.052	30.022	-0.984	+0.014	11.494	-0.464	-0.016	-16.081	+0.237
23	10	9	25.605	26.577	-0.985	+0.014	11.552	-0.440	+0.019	-16.108	+0.223
24	10	13	22.156	23.132	-0.987	+0.011	11.605	-0.417	+0.050	-16.136	+0.174
25	10	17	18.705	19.688	-0.989	+0.006	11.649	-0.393	+0.072	-16.166	+0.099
26	10	21	15.253	16.243	-0.991	+0.000	11.680	-0.371	+0.082	-16.197	+0.007
27	10	25	11.800	12.798	-0.993	-0.005	11.697	-0.348	+0.077	-16.228	-0.086
28	10	29	8.349	9.354	-0.995	-0.010	11.699	-0.327	+0.059	-16.261	-0.169
29	10	33	4.898	5.909	-0.997	-0.014	11.690	-0.305	+0.030	-16.295	-0.229
MAR. 1	10	37	1.450	2.464	-0.999	-0.016	11.674	-0.285	-0.006	-16.330	-0.257
2	10	40	58.004	59.020	-1.001	-0.015	11.656	-0.265	-0.043	-16.366	-0.248
3	10	44	54.560	55.575	-1.003	-0.012	11.643	-0.245	-0.074	-16.402	-0.202
4	10	48	51.117	52.131	-1.006	-0.008	11.641	-0.226	-0.094	-16.440	-0.124
5	10	52	47.676	48.686	-1.008	-0.002	11.656	-0.208	-0.096	-16.478	-0.026
6	10	56	44.235	45.241	-1.010	+0.004	11.691	-0.190	-0.078	-16.517	+0.071
7	11	0	40.793	41.797	-1.013	+0.009	11.744	-0.173	-0.040	-16.557	+0.145
8	11	4	37.347	38.352	-1.015	+0.011	11.808	-0.156	+0.008	-16.598	+0.174
9	11	8	33.899	34.907	-1.018	+0.009	11.870	-0.140	+0.056	-16.639	+0.150
10	11	12	30.447	31.463	-1.020	+0.005	11.918	-0.125	+0.090	-16.681	+0.078
11	11	16	26.994	28.018	-1.023	-0.001	11.941	-0.110	+0.099	-16.723	-0.016
12	11	20	23.542	24.574	-1.025	-0.006	11.937	-0.096	+0.083	-16.766	-0.102
13	11	24	20.091	21.129	-1.028	-0.009	11.913	-0.083	+0.047	-16.809	-0.152
14	11	28	16.644	17.684	-1.031	-0.009	11.879	-0.070	+0.002	-16.852	-0.152
15	11	32	13.200	14.240	-1.033	-0.006	11.848	-0.058	-0.040	-16.896	-0.105
16	11	36	9.757	10.795	-1.036	-0.002	11.829	-0.046	-0.069	-16.940	-0.025
17	11	40	6.316	7.350	-1.039	+0.004	11.827	-0.036	-0.081	-16.984	+0.069
18	11	44	2.874	3.906	-1.042	+0.009	11.842	-0.026	-0.075	-17.028	+0.155
19	11	47	59.430	60.461	-1.044	+0.013	11.871	-0.016	-0.054	-17.073	+0.219
20	11	51	55.985	57.016	-1.047	+0.015	11.909	-0.008	-0.023	-17.117	+0.250
21	11	55	52.537	53.572	-1.050	+0.015	11.951	0.001	+0.012	-17.161	+0.245
22	11	59	49.087	50.127	-1.052	+0.012	11.989	0.008	+0.044	-17.206	+0.203

TEMPO SIDERAL, OBLIQUIDADE DA ECLÍPTICA E NUTAÇÃO, 2020
O HORA TEMPO UNIVERSAL

5 F

DATA	TEMPO SIDERAL				EQ. EQUIN.		OBLIQ.	NUT. OBLIQ.		NUT. LONG.	
H	APARENTE				PERÍODO	PERÍODO	ECLIP.	PERÍODO	PERÍODO	PERÍODO	PERÍODO
O TU	MÉDIO				LONGO	CURTO	G ' 23 26	LONGO	CURTO	LONGO	CURTO
	H	M	S	S	S	S	"	"	"	"	"
MAR. 22	11	59	49.087	50.127	-1.052	+0.012	11.989	0.008	+0.044	-17.206	+0.203
23	12	3	45.636	46.683	-1.055	+0.008	12.020	0.015	+0.069	-17.250	+0.132
24	12	7	42.183	43.238	-1.058	+0.003	12.038	0.021	+0.082	-17.294	+0.043
25	12	11	38.730	39.793	-1.060	-0.003	12.041	0.026	+0.081	-17.337	-0.052
26	12	15	35.277	36.349	-1.063	-0.009	12.030	0.031	+0.066	-17.381	-0.140
27	12	19	31.826	32.904	-1.066	-0.013	12.005	0.035	+0.040	-17.424	-0.207
28	12	23	28.376	29.459	-1.068	-0.015	11.973	0.038	+0.005	-17.467	-0.245
29	12	27	24.929	26.015	-1.071	-0.015	11.937	0.041	-0.032	-17.509	-0.247
30	12	31	21.484	22.570	-1.074	-0.013	11.905	0.044	-0.066	-17.551	-0.213
31	12	35	18.040	19.125	-1.076	-0.009	11.882	0.045	-0.089	-17.592	-0.147
ABR. 1	12	39	14.599	15.681	-1.079	-0.004	11.874	0.046	-0.097	-17.633	-0.061
2	12	43	11.157	12.236	-1.081	+0.002	11.884	0.047	-0.086	-17.673	+0.032
3	12	47	7.715	8.792	-1.083	+0.007	11.912	0.046	-0.057	-17.712	+0.109
4	12	51	4.271	5.347	-1.086	+0.009	11.953	0.046	-0.013	-17.751	+0.153
5	12	55	0.823	1.902	-1.088	+0.009	11.999	0.044	+0.036	-17.789	+0.148
6	12	58	57.373	58.458	-1.090	+0.006	12.037	0.043	+0.076	-17.826	+0.094
7	13	2	53.921	55.013	-1.093	+0.000	12.055	0.040	+0.097	-17.862	+0.005
8	13	6	50.468	51.568	-1.095	-0.005	12.045	0.037	+0.093	-17.897	-0.089
9	13	10	47.017	48.124	-1.097	-0.010	12.011	0.034	+0.063	-17.932	-0.158
10	13	14	43.569	44.679	-1.099	-0.011	11.962	0.030	+0.019	-17.965	-0.177
11	13	18	40.125	41.235	-1.101	-0.009	11.910	0.026	-0.027	-17.998	-0.143
12	13	22	36.683	37.790	-1.103	-0.004	11.868	0.021	-0.064	-18.029	-0.065
13	13	26	33.243	34.345	-1.105	+0.002	11.843	0.016	-0.082	-18.060	+0.036
14	13	30	29.802	30.901	-1.106	+0.008	11.837	0.010	-0.081	-18.089	+0.135
15	13	34	26.361	27.456	-1.108	+0.013	11.848	0.004	-0.062	-18.117	+0.214
16	13	38	22.917	24.011	-1.110	+0.016	11.871	-0.002	-0.032	-18.144	+0.258
17	13	42	19.471	20.567	-1.111	+0.016	11.898	-0.009	+0.003	-18.170	+0.264
18	13	46	16.023	17.122	-1.113	+0.014	11.924	-0.016	+0.038	-18.194	+0.231
19	13	50	12.573	13.677	-1.114	+0.010	11.943	-0.024	+0.065	-18.218	+0.166
20	13	54	9.122	10.233	-1.116	+0.005	11.951	-0.032	+0.082	-18.240	+0.079
21	13	58	5.670	6.788	-1.117	-0.001	11.944	-0.040	+0.085	-18.261	-0.017
22	14	2	2.219	3.344	-1.118	-0.007	11.923	-0.048	+0.074	-18.280	-0.108
23	14	5	58.769	59.899	-1.119	-0.011	11.889	-0.057	+0.049	-18.298	-0.183
24	14	9	55.320	56.454	-1.120	-0.014	11.845	-0.066	+0.016	-18.315	-0.229
25	14	13	51.874	53.010	-1.121	-0.015	11.797	-0.075	-0.022	-18.330	-0.240
26	14	17	48.430	49.565	-1.122	-0.013	11.751	-0.084	-0.057	-18.345	-0.214
27	14	21	44.988	46.120	-1.123	-0.009	11.714	-0.093	-0.083	-18.357	-0.155
28	14	25	41.548	42.676	-1.124	-0.005	11.691	-0.103	-0.096	-18.369	-0.074
29	14	29	38.108	39.231	-1.124	+0.001	11.686	-0.113	-0.090	-18.378	+0.014
30	14	33	34.667	35.786	-1.125	+0.006	11.698	-0.122	-0.067	-18.387	+0.092
MAIO 1	14	37	31.225	32.342	-1.125	+0.009	11.726	-0.132	-0.028	-18.394	+0.142
2	14	41	27.781	28.897	-1.125	+0.009	11.760	-0.142	+0.018	-18.400	+0.149

DATA H O TU	TEMPO SIDERAL				EQ. EQUIN. PERÍODO		OBLIQ. ECLIP. G ' 23 26 "	NUT. OBLIQ. PERÍODO		NUT. LONG. PERÍODO		
	APARENTE			MÉDIO	LONGO	CURTO		LONGO	CURTO	LONGO	CURTO	
	H	M	S	S		S						S
MAIO	1	14	37	31.225	32.342	-1.125	+0.009	11.726	-0.132	-0.028	-18.394	+0.142
	2	14	41	27.781	28.897	-1.125	+0.009	11.760	-0.142	+0.018	-18.400	+0.149
	3	14	45	24.334	25.453	-1.126	+0.007	11.792	-0.152	+0.061	-18.404	+0.109
	4	14	49	20.884	22.008	-1.126	+0.002	11.810	-0.162	+0.090	-18.407	+0.030
	5	14	53	17.433	18.563	-1.126	-0.004	11.805	-0.172	+0.096	-18.408	-0.067
	6	14	57	13.983	15.119	-1.126	-0.009	11.774	-0.182	+0.077	-18.408	-0.152
	7	15	1	10.536	11.674	-1.126	-0.012	11.724	-0.192	+0.038	-18.407	-0.196
	8	15	5	7.092	8.229	-1.126	-0.011	11.665	-0.202	-0.010	-18.404	-0.184
	9	15	9	3.652	4.785	-1.125	-0.007	11.611	-0.212	-0.053	-18.399	-0.120
	10	15	13	0.214	1.340	-1.125	-0.001	11.573	-0.222	-0.080	-18.394	-0.020
	11	15	16	56.776	57.896	-1.125	+0.006	11.556	-0.231	-0.086	-18.387	+0.090
	12	15	20	53.338	54.451	-1.124	+0.011	11.559	-0.241	-0.073	-18.378	+0.185
	13	15	24	49.898	51.006	-1.124	+0.015	11.576	-0.250	-0.045	-18.368	+0.248
	14	15	28	46.455	47.562	-1.123	+0.017	11.602	-0.259	-0.009	-18.357	+0.271
	15	15	32	43.010	44.117	-1.122	+0.015	11.628	-0.268	+0.028	-18.345	+0.251
	16	15	36	39.563	40.672	-1.121	+0.012	11.650	-0.276	+0.059	-18.331	+0.195
	17	15	40	36.114	37.228	-1.120	+0.007	11.661	-0.285	+0.080	-18.316	+0.113
	18	15	44	32.665	33.783	-1.119	+0.001	11.658	-0.293	+0.087	-18.299	+0.018
	19	15	48	29.216	30.338	-1.118	-0.005	11.642	-0.301	+0.079	-18.282	-0.077
	20	15	52	25.767	26.894	-1.117	-0.010	11.611	-0.308	+0.058	-18.263	-0.158
	21	15	56	22.320	23.449	-1.116	-0.013	11.571	-0.316	+0.026	-18.243	-0.213
	22	16	0	18.876	20.005	-1.115	-0.014	11.525	-0.323	-0.011	-18.222	-0.233
	23	16	4	15.434	16.560	-1.113	-0.013	11.481	-0.329	-0.048	-18.199	-0.216
	24	16	8	11.994	13.115	-1.112	-0.010	11.443	-0.336	-0.078	-18.176	-0.163
	25	16	12	8.555	9.671	-1.110	-0.005	11.420	-0.341	-0.094	-18.151	-0.083
	26	16	16	5.118	6.226	-1.109	+0.000	11.415	-0.347	-0.093	-18.125	+0.006
	27	16	20	1.680	2.781	-1.107	+0.005	11.428	-0.352	-0.073	-18.098	+0.088
	28	16	23	58.240	59.337	-1.105	+0.009	11.457	-0.357	-0.038	-18.071	+0.144
	29	16	27	54.798	55.892	-1.104	+0.010	11.495	-0.361	+0.006	-18.042	+0.159
	30	16	31	51.354	52.447	-1.102	+0.008	11.533	-0.364	+0.049	-18.012	+0.129
31	16	35	47.907	49.003	-1.100	+0.004	11.561	-0.368	+0.081	-17.982	+0.059	
JUN.	1	16	39	44.458	45.558	-1.098	-0.002	11.570	-0.371	+0.095	-17.950	-0.036
	2	16	43	41.010	42.114	-1.096	-0.008	11.557	-0.373	+0.084	-17.918	-0.129
	3	16	47	37.563	38.669	-1.094	-0.012	11.522	-0.375	+0.053	-17.885	-0.192
	4	16	51	34.120	35.224	-1.092	-0.013	11.474	-0.376	+0.008	-17.851	-0.206
	5	16	55	30.680	31.780	-1.090	-0.010	11.426	-0.377	-0.038	-17.817	-0.165
	6	16	59	27.243	28.335	-1.088	-0.005	11.390	-0.377	-0.073	-17.781	-0.078
	7	17	3	23.807	24.890	-1.085	+0.002	11.373	-0.377	-0.089	-17.746	+0.032
	8	17	7	20.371	21.446	-1.083	+0.008	11.379	-0.376	-0.083	-17.709	+0.139
	9	17	11	16.934	18.001	-1.081	+0.013	11.403	-0.374	-0.059	-17.672	+0.220
	10	17	15	13.494	14.557	-1.079	+0.016	11.439	-0.372	-0.024	-17.635	+0.261
	11	17	19	10.051	11.112	-1.076	+0.016	11.479	-0.370	+0.015	-17.597	+0.259

TEMPO SIDERAL, OBLIQUIDADE DA ECLÍPTICA E NUTAÇÃO, 2020
O HORA TEMPO UNIVERSAL

7 F

DATA	TEMPO SIDERAL				EQ. EQUIN.		OBLIQ.	NUT. OBLIQ.		NUT. LONG.	
H	APARENTE				PERÍODO	PERÍODO	ECLIP.	PERÍODO	PERÍODO	PERÍODO	PERÍODO
0 TU	MÉDIO				LONGO	CURTO	G ' 23 26	LONGO	CURTO	LONGO	CURTO
	H	M	S	S	S	S	"	"	"	"	"
JUN. 11	17	19	10.051	11.112	-1.076	+0.016	11.479	-0.370	+0.015	-17.597	+0.259
12	17	23	6.606	7.667	-1.074	+0.013	11.515	-0.367	+0.050	-17.558	+0.216
13	17	27	3.160	4.223	-1.072	+0.009	11.543	-0.363	+0.075	-17.520	+0.142
14	17	30	59.712	60.778	-1.069	+0.003	11.558	-0.359	+0.087	-17.481	+0.049
15	17	34	56.264	57.333	-1.067	-0.003	11.558	-0.354	+0.084	-17.441	-0.047
16	17	38	52.816	53.889	-1.064	-0.008	11.545	-0.348	+0.066	-17.402	-0.134
17	17	42	49.370	50.444	-1.062	-0.012	11.521	-0.342	+0.037	-17.362	-0.198
18	17	46	45.926	46.999	-1.060	-0.014	11.490	-0.336	+0.001	-17.322	-0.229
19	17	50	42.484	43.555	-1.057	-0.014	11.458	-0.328	-0.037	-17.282	-0.223
20	17	54	39.045	40.110	-1.055	-0.011	11.431	-0.321	-0.070	-17.242	-0.179
21	17	58	35.607	36.666	-1.052	-0.006	11.418	-0.312	-0.091	-17.201	-0.103
22	18	2	32.171	33.221	-1.050	-0.001	11.421	-0.303	-0.095	-17.161	-0.011
23	18	6	28.734	29.776	-1.047	+0.005	11.445	-0.293	-0.080	-17.121	+0.079
24	18	10	25.296	26.332	-1.045	+0.009	11.487	-0.283	-0.047	-17.081	+0.146
25	18	14	21.855	22.887	-1.042	+0.011	11.539	-0.272	-0.004	-17.041	+0.173
26	18	18	18.412	19.442	-1.040	+0.009	11.594	-0.261	+0.040	-17.002	+0.154
27	18	22	14.966	15.998	-1.038	+0.006	11.640	-0.249	+0.076	-16.962	+0.091
28	18	26	11.518	12.553	-1.035	-0.000	11.669	-0.236	+0.093	-16.923	-0.000
29	18	30	8.070	9.108	-1.033	-0.006	11.676	-0.223	+0.089	-16.885	-0.096
30	18	34	4.623	5.664	-1.030	-0.010	11.663	-0.209	+0.063	-16.846	-0.170
JUL. 1	18	38	1.179	2.219	-1.028	-0.012	11.635	-0.195	+0.022	-16.808	-0.203
2	18	41	57.738	58.775	-1.026	-0.011	11.604	-0.180	-0.023	-16.771	-0.183
3	18	45	54.299	55.330	-1.024	-0.007	11.579	-0.164	-0.062	-16.734	-0.115
4	18	49	50.863	51.885	-1.021	-0.001	11.571	-0.148	-0.085	-16.697	-0.015
5	18	53	47.427	48.441	-1.019	+0.006	11.584	-0.131	-0.088	-16.662	+0.093
6	18	57	43.990	44.996	-1.017	+0.011	11.617	-0.114	-0.070	-16.626	+0.185
7	19	1	40.551	41.551	-1.015	+0.015	11.665	-0.097	-0.038	-16.592	+0.242
8	19	5	37.110	38.107	-1.013	+0.016	11.721	-0.078	+0.000	-16.558	+0.257
9	19	9	33.665	34.662	-1.011	+0.014	11.775	-0.060	+0.038	-16.525	+0.228
10	19	13	30.219	31.218	-1.009	+0.010	11.823	-0.041	+0.067	-16.493	+0.164
11	19	17	26.771	27.773	-1.007	+0.005	11.858	-0.021	+0.084	-16.461	+0.077
12	19	21	23.322	24.328	-1.005	-0.001	11.879	-0.001	+0.086	-16.430	-0.020
13	19	25	19.874	20.884	-1.003	-0.007	11.885	0.020	+0.073	-16.401	-0.111
14	19	29	16.426	17.439	-1.001	-0.011	11.879	0.041	+0.047	-16.372	-0.183
15	19	33	12.981	13.994	-1.000	-0.014	11.865	0.062	+0.013	-16.344	-0.226
16	19	37	9.537	10.550	-0.998	-0.014	11.847	0.084	-0.025	-16.317	-0.233
17	19	41	6.096	7.105	-0.996	-0.012	11.833	0.106	-0.060	-16.291	-0.201
18	19	45	2.657	3.660	-0.995	-0.008	11.829	0.129	-0.086	-16.266	-0.135
19	19	48	59.220	60.216	-0.993	-0.003	11.840	0.152	-0.096	-16.242	-0.045
20	19	52	55.782	56.771	-0.992	+0.003	11.871	0.175	-0.088	-16.220	+0.050
21	19	56	52.344	53.327	-0.991	+0.008	11.922	0.199	-0.059	-16.198	+0.131
22	20	0	48.903	49.882	-0.990	+0.011	11.987	0.223	-0.017	-16.178	+0.176

8 F TEMPO SIDERAL, OBLIQUIDADE DA ECLÍPTICA E NUTAÇÃO, 2020
0 HORA TEMPO UNIVERSAL

DATA	TEMPO SIDERAL				EQ. EQUIN.		OBLIQ.	NUT. OBLIQ.		NUT. LONG.	
H	APARENTE				PERÍODO	PERÍODO	ECLIP.	PERÍODO	PERÍODO	PERÍODO	PERÍODO
0 TU	MÉDIO				LONGO	CURTO	G ' 23 26	LONGO	CURTO	LONGO	CURTO
	H	M	S	S	S	S	"	"	"	"	"
JUL. 22	20	0	48.903	49.882	-0.990	+0.011	11.987	0.223	-.017	-16.178	+.176
23	20	4	45.459	46.437	-0.988	+0.011	12.057	0.247	+.030	-16.158	+.173
24	20	8	42.013	42.993	-0.987	+0.007	12.120	0.272	+.070	-16.140	+.121
25	20	12	38.564	39.548	-0.986	+0.002	12.167	0.297	+.093	-16.124	+.035
26	20	16	35.114	36.103	-0.985	-.004	12.191	0.322	+.093	-16.108	-.062
27	20	20	31.666	32.659	-0.984	-.009	12.193	0.347	+.072	-16.094	-.143
28	20	24	28.219	29.214	-0.984	-.011	12.179	0.373	+.034	-16.081	-.186
29	20	28	24.776	25.769	-0.983	-.011	12.159	0.398	-.011	-16.069	-.181
30	20	32	21.335	22.325	-0.982	-.008	12.143	0.424	-.052	-16.058	-.127
31	20	36	17.896	18.880	-0.982	-.002	12.140	0.451	-.079	-16.049	-.039
AGO. 1	20	40	14.458	15.436	-0.981	+0.004	12.157	0.477	-.088	-16.041	+.064
2	20	44	11.020	11.991	-0.981	+0.010	12.193	0.503	-.077	-16.035	+.159
3	20	48	7.580	8.546	-0.980	+0.014	12.246	0.530	-.049	-16.030	+.226
4	20	52	4.137	5.102	-0.980	+0.015	12.308	0.556	-.012	-16.026	+.253
5	20	56	0.691	1.657	-0.980	+0.015	12.372	0.583	+.026	-16.023	+.238
6	20	59	57.244	58.212	-0.980	+0.011	12.430	0.609	+.059	-16.022	+.184
7	21	3	53.794	54.768	-0.980	+0.006	12.476	0.636	+.080	-16.023	+.103
8	21	7	50.343	51.323	-0.980	+0.000	12.509	0.663	+.087	-16.024	+.007
9	21	11	46.893	47.879	-0.980	-.005	12.526	0.689	+.078	-16.027	-.087
10	21	15	43.443	44.434	-0.981	-.010	12.529	0.716	+.056	-16.032	-.167
11	21	19	39.995	40.989	-0.981	-.013	12.522	0.743	+.024	-16.037	-.221
12	21	23	36.549	37.545	-0.981	-.015	12.510	0.769	-.013	-16.044	-.240
13	21	27	33.104	34.100	-0.982	-.014	12.499	0.795	-.049	-16.053	-.223
14	21	31	29.662	30.655	-0.982	-.010	12.494	0.822	-.079	-16.063	-.170
15	21	35	26.222	27.211	-0.983	-.005	12.503	0.848	-.095	-16.074	-.089
16	21	39	22.782	23.766	-0.984	+0.000	12.528	0.874	-.094	-16.086	+.005
17	21	43	19.342	20.321	-0.985	+0.006	12.574	0.899	-.073	-16.100	+.095
18	21	47	15.901	16.877	-0.986	+0.010	12.637	0.925	-.035	-16.115	+.157
19	21	51	12.456	13.432	-0.987	+0.011	12.709	0.950	+.013	-16.131	+.175
20	21	55	9.008	9.988	-0.988	+0.009	12.778	0.975	+.059	-16.149	+.141
21	21	59	5.558	6.543	-0.989	+0.004	12.833	1.000	+.090	-16.168	+.065
22	22	3	2.106	3.098	-0.990	-.002	12.865	1.025	+.099	-16.188	-.031
23	22	6	58.655	59.654	-0.991	-.007	12.871	1.049	+.082	-16.209	-.119
24	22	10	55.206	56.209	-0.993	-.011	12.858	1.073	+.046	-16.232	-.172
25	22	14	51.759	52.764	-0.994	-.011	12.834	1.097	+.000	-16.255	-.176
26	22	18	48.316	49.320	-0.996	-.008	12.813	1.120	-.043	-16.280	-.131
27	22	22	44.875	45.875	-0.997	-.003	12.804	1.143	-.074	-16.306	-.048
28	22	26	41.435	42.430	-0.999	+0.003	12.812	1.165	-.087	-16.333	+.052
29	22	30	37.994	38.986	-1.001	+0.009	12.840	1.188	-.080	-16.361	+.147
30	22	34	34.552	35.541	-1.003	+0.013	12.884	1.209	-.056	-16.390	+.220
31	22	38	31.108	32.097	-1.004	+0.016	12.939	1.231	-.022	-16.420	+.256
SET. 1	22	42	27.661	28.652	-1.006	+0.015	12.996	1.251	+.017	-16.451	+.251

TEMPO SIDERAL, OBLIQUIDADE DA ECLÍPTICA E NUTAÇÃO, 2020
O HORA TEMPO UNIVERSAL

9 F

DATA H O TU	TEMPO SIDERAL				EQ. EQUIN. PERÍODO		OBLIQ. ECLIP. G ' 23 26 "	NUT. OBLIQ. PERÍODO		NUT. LONG. PERÍODO		
	APARENTE		MÉDIO	LONGO	CURTO	LONGO		CURTO	LONGO	CURTO		
	H	M	S								S	S
SET.	1	22	42	27.661	28.652	-1.006	+0.015	12.996	1.251	+0.017	-16.451	+0.251
	2	22	46	24.212	25.207	-1.008	+0.013	13.050	1.272	+0.051	-16.483	+0.206
	3	22	50	20.760	21.763	-1.010	+0.008	13.093	1.292	+0.076	-16.516	+0.131
	4	22	54	17.308	18.318	-1.012	+0.002	13.123	1.311	+0.087	-16.549	+0.037
	5	22	58	13.855	14.873	-1.014	-0.004	13.136	1.330	+0.083	-16.584	-0.059
	6	23	2	10.403	11.429	-1.017	-0.009	13.135	1.349	+0.065	-16.619	-0.145
	7	23	6	6.953	7.984	-1.019	-0.013	13.122	1.366	+0.035	-16.655	-0.208
	8	23	10	3.504	4.540	-1.021	-0.015	13.102	1.384	-0.001	-16.691	-0.239
	9	23	14	0.057	1.095	-1.023	-0.014	13.080	1.401	-0.038	-16.729	-0.235
	10	23	17	56.613	57.650	-1.026	-0.012	13.063	1.417	-0.070	-16.767	-0.196
	11	23	21	53.170	54.206	-1.028	-0.008	13.056	1.432	-0.091	-16.805	-0.128
	12	23	25	49.728	50.761	-1.030	-0.002	13.065	1.447	-0.097	-16.844	-0.040
	13	23	29	46.287	47.316	-1.033	+0.003	13.091	1.462	-0.084	-16.884	+0.049
	14	23	33	42.844	43.872	-1.035	+0.007	13.135	1.476	-0.053	-16.924	+0.122
	15	23	37	39.399	40.427	-1.038	+0.010	13.192	1.489	-0.008	-16.964	+0.158
	16	23	41	35.951	36.982	-1.040	+0.009	13.252	1.502	+0.041	-17.005	+0.146
	17	23	45	32.500	33.538	-1.043	+0.005	13.302	1.514	+0.080	-17.045	+0.086
	18	23	49	29.048	30.093	-1.045	-0.000	13.331	1.525	+0.100	-17.087	-0.006
	19	23	53	25.595	26.649	-1.048	-0.006	13.334	1.536	+0.093	-17.128	-0.101
	20	23	57	22.143	23.204	-1.050	-0.010	13.311	1.546	+0.061	-17.170	-0.168
	21	0	1	18.695	19.759	-1.053	-0.011	13.274	1.556	+0.015	-17.211	-0.186
	22	0	5	15.250	16.315	-1.055	-0.009	13.234	1.565	-0.032	-17.253	-0.148
	23	0	9	11.808	12.870	-1.058	-0.004	13.205	1.573	-0.068	-17.295	-0.067
	24	0	13	8.367	9.425	-1.060	+0.002	13.193	1.580	-0.086	-17.336	+0.038
	25	0	17	4.926	5.981	-1.063	+0.009	13.201	1.587	-0.084	-17.378	+0.140
	26	0	21	1.484	2.536	-1.065	+0.014	13.227	1.594	-0.063	-17.419	+0.221
	27	0	24	58.040	59.091	-1.068	+0.016	13.265	1.599	-0.030	-17.460	+0.266
	28	0	28	54.593	55.647	-1.070	+0.017	13.307	1.604	+0.009	-17.501	+0.270
	29	0	32	51.144	52.202	-1.073	+0.014	13.346	1.609	+0.045	-17.542	+0.233
	30	0	36	47.692	48.758	-1.075	+0.010	13.376	1.613	+0.072	-17.582	+0.163
OUT.	1	0	40	44.240	45.313	-1.078	+0.004	13.393	1.616	+0.087	-17.622	+0.072
	2	0	44	40.786	41.868	-1.080	-0.002	13.394	1.618	+0.087	-17.661	-0.026
	3	0	48	37.334	38.424	-1.083	-0.007	13.380	1.620	+0.072	-17.700	-0.116
	4	0	52	33.883	34.979	-1.085	-0.011	13.353	1.621	+0.045	-17.738	-0.187
	5	0	56	30.433	31.534	-1.087	-0.014	13.317	1.622	+0.010	-17.776	-0.228
	6	1	0	26.986	28.090	-1.090	-0.014	13.278	1.622	-0.028	-17.813	-0.235
	7	1	4	23.541	24.645	-1.092	-0.013	13.242	1.622	-0.062	-17.849	-0.207
	8	1	8	20.097	21.201	-1.094	-0.009	13.215	1.621	-0.086	-17.885	-0.149
	9	1	12	16.655	17.756	-1.096	-0.004	13.202	1.619	-0.097	-17.920	-0.071
	10	1	16	13.214	14.311	-1.098	+0.001	13.205	1.617	-0.090	-17.953	+0.013
	11	1	20	9.772	10.867	-1.100	+0.005	13.225	1.614	-0.066	-17.986	+0.088
	12	1	24	6.328	7.422	-1.102	+0.008	13.259	1.611	-0.027	-18.019	+0.135

TEMPO SIDERAL, OBLIQUIDADE DA ECLÍPTICA E NUTAÇÃO, 2020
O HORA TEMPO UNIVERSAL

DATA	TEMPO SIDERAL				EQ. EQUIN.		OBLIQ.	NUT. OBLIQ.		NUT. LONG.	
H	APARENTE		MÉDIO		LONGO	CURTO	ECLIP.	LONGO	CURTO	LONGO	CURTO
O TU							G ' 23 26				
	H	M	S	S	S	S	"	"	"	"	"
OUT. 12	1	24	6.328	7.422	-1.102	+0.008	13.259	1.611	-.027	-18.019	+0.135
13	1	28	2.882	3.977	-1.104	+0.009	13.301	1.607	+0.020	-18.050	+0.140
14	1	31	59.433	60.533	-1.106	+0.006	13.340	1.602	+0.064	-18.080	+0.098
15	1	35	55.981	57.088	-1.108	+0.001	13.363	1.598	+0.093	-18.109	+0.016
16	1	39	52.529	53.643	-1.109	-.005	13.361	1.592	+0.098	-18.137	-.083
17	1	43	49.078	50.199	-1.111	-.010	13.332	1.586	+0.077	-18.164	-.166
18	1	47	45.629	46.754	-1.113	-.013	13.283	1.580	+0.035	-18.189	-.205
19	1	51	42.184	43.310	-1.114	-.011	13.225	1.574	-.016	-18.214	-.185
20	1	55	38.743	39.865	-1.115	-.007	13.173	1.566	-.059	-18.237	-.110
21	1	59	35.303	36.420	-1.117	-.000	13.138	1.559	-.086	-18.259	-.001
22	2	3	31.865	32.976	-1.118	+0.007	13.125	1.551	-.089	-18.280	+0.115
23	2	7	28.425	29.531	-1.119	+0.013	13.132	1.543	-.072	-18.299	+0.212
24	2	11	24.983	26.086	-1.120	+0.017	13.155	1.534	-.040	-18.317	+0.272
25	2	15	21.538	22.642	-1.121	+0.018	13.184	1.525	-.001	-18.333	+0.288
26	2	19	18.091	19.197	-1.122	+0.016	13.211	1.516	+0.037	-18.348	+0.261
27	2	23	14.641	15.752	-1.123	+0.012	13.231	1.507	+0.068	-18.362	+0.198
28	2	27	11.191	12.308	-1.124	+0.007	13.239	1.497	+0.087	-18.374	+0.111
29	2	31	7.739	8.863	-1.125	+0.001	13.232	1.487	+0.091	-18.384	+0.012
30	2	35	4.288	5.419	-1.125	-.005	13.209	1.477	+0.079	-18.393	-.082
31	2	39	0.839	1.974	-1.126	-.010	13.173	1.467	+0.055	-18.401	-.160
NOV. 1	2	42	57.391	58.529	-1.126	-.013	13.127	1.456	+0.021	-18.407	-.210
2	2	46	53.945	55.085	-1.126	-.014	13.077	1.445	-.017	-18.411	-.226
3	2	50	50.501	51.640	-1.126	-.013	13.029	1.434	-.053	-18.414	-.207
4	2	54	47.059	48.195	-1.126	-.010	12.989	1.423	-.080	-18.415	-.156
5	2	58	43.619	44.751	-1.126	-.005	12.963	1.412	-.095	-18.415	-.084
6	3	2	40.180	41.306	-1.126	-.000	12.952	1.401	-.093	-18.413	-.003
7	3	6	36.740	37.862	-1.126	+0.004	12.958	1.390	-.074	-18.409	+0.071
8	3	10	33.299	34.417	-1.126	+0.007	12.980	1.379	-.040	-18.404	+0.122
9	3	14	29.855	30.972	-1.125	+0.008	13.011	1.368	+0.003	-18.397	+0.137
10	3	18	26.409	27.528	-1.125	+0.007	13.043	1.357	+0.047	-18.389	+0.108
11	3	22	22.961	24.083	-1.124	+0.002	13.065	1.346	+0.082	-18.379	+0.038
12	3	26	19.511	20.638	-1.123	-.004	13.068	1.335	+0.097	-18.367	-.058
13	3	30	16.062	17.194	-1.123	-.009	13.046	1.324	+0.087	-18.354	-.154
14	3	34	12.614	13.749	-1.122	-.013	13.000	1.314	+0.053	-18.339	-.217
15	3	38	9.170	10.304	-1.121	-.014	12.940	1.303	+0.005	-18.322	-.224
16	3	42	5.730	6.860	-1.120	-.010	12.879	1.293	-.044	-18.304	-.170
17	3	46	2.293	3.415	-1.118	-.004	12.832	1.283	-.080	-18.285	-.067
18	3	49	58.857	59.971	-1.117	+0.004	12.808	1.273	-.094	-18.264	+0.058
19	3	53	55.421	56.526	-1.116	+0.011	12.807	1.264	-.084	-18.241	+0.174
20	3	57	51.983	53.081	-1.114	+0.016	12.826	1.254	-.054	-18.217	+0.257
21	4	1	48.542	49.637	-1.113	+0.018	12.855	1.245	-.015	-18.191	+0.294
22	4	5	45.098	46.192	-1.111	+0.017	12.886	1.237	+0.026	-18.164	+0.282

TEMPO SIDERAL, OBLIQUIDADE DA ECLÍPTICA E NUTAÇÃO, 2020
O HORA TEMPO UNIVERSAL

11 F

DATA	TEMPO SIDERAL				EQ. EQUIN.		OBLIQ.	NUT. OBLIQ.		NUT. LONG.	
H	APARENTE				PERÍODO	PERÍODO	ECLIP.	PERÍODO	PERÍODO	PERÍODO	PERÍODO
O TU	MÉDIO				LONGO	CURTO	G ' 23 26	LONGO	CURTO	LONGO	CURTO
	H	M	S	S	S	S	"	"	"	"	"
NOV. 22	4	5	45.098	46.192	-1.111	+0.017	12.886	1.237	+0.026	-18.164	+0.282
23	4	9	41.652	42.747	-1.109	+0.014	12.911	1.228	+0.061	-18.136	+0.230
24	4	13	38.204	39.303	-1.107	+0.009	12.925	1.220	+0.084	-18.106	+0.147
25	4	17	34.756	35.858	-1.106	+0.003	12.924	1.213	+0.093	-18.075	+0.050
26	4	21	31.307	32.413	-1.104	-0.003	12.909	1.205	+0.085	-18.042	-0.047
27	4	25	27.859	28.969	-1.101	-0.008	12.879	1.199	+0.064	-18.008	-0.131
28	4	29	24.413	25.524	-1.099	-0.012	12.840	1.192	+0.032	-17.973	-0.189
29	4	33	20.969	22.080	-1.097	-0.013	12.795	1.187	-0.006	-17.937	-0.215
30	4	37	17.528	18.635	-1.095	-0.012	12.751	1.181	-0.043	-17.899	-0.204
DEZ. 1	4	41	14.088	15.190	-1.092	-0.010	12.714	1.176	-0.074	-17.860	-0.160
2	4	45	10.650	11.746	-1.090	-0.006	12.690	1.172	-0.092	-17.820	-0.090
3	4	49	7.213	8.301	-1.088	-0.001	12.683	1.168	-0.095	-17.779	-0.009
4	4	53	3.776	4.856	-1.085	+0.004	12.693	1.165	-0.080	-17.738	+0.068
5	4	57	0.337	1.412	-1.082	+0.008	12.720	1.162	-0.049	-17.695	+0.125
6	5	0	56.896	57.967	-1.080	+0.009	12.757	1.160	-0.008	-17.651	+0.146
7	5	4	53.453	54.523	-1.077	+0.008	12.798	1.159	+0.035	-17.606	+0.126
8	5	8	50.008	51.078	-1.074	+0.004	12.832	1.158	+0.072	-17.561	+0.065
9	5	12	46.560	47.633	-1.071	-0.002	12.852	1.158	+0.093	-17.514	-0.025
10	5	16	43.113	44.189	-1.068	-0.008	12.849	1.158	+0.091	-17.467	-0.125
11	5	20	39.666	40.744	-1.066	-0.013	12.824	1.159	+0.066	-17.420	-0.205
12	5	24	36.222	37.299	-1.063	-0.015	12.782	1.161	+0.024	-17.371	-0.241
13	5	28	32.782	33.855	-1.060	-0.013	12.733	1.163	-0.026	-17.323	-0.216
14	5	32	29.345	30.410	-1.057	-0.008	12.692	1.166	-0.069	-17.273	-0.135
15	5	36	25.911	26.965	-1.054	-0.001	12.671	1.170	-0.093	-17.224	-0.016
16	5	40	22.477	23.521	-1.050	+0.007	12.674	1.174	-0.093	-17.173	+0.111
17	5	44	19.042	20.076	-1.047	+0.013	12.700	1.179	-0.070	-17.123	+0.215
18	5	48	15.604	16.632	-1.044	+0.017	12.742	1.185	-0.032	-17.072	+0.277
19	5	52	12.163	13.187	-1.041	+0.018	12.791	1.192	+0.011	-17.021	+0.287
20	5	56	8.720	9.742	-1.038	+0.015	12.836	1.199	+0.050	-16.970	+0.251
21	6	0	5.274	6.298	-1.035	+0.011	12.871	1.207	+0.078	-16.919	+0.178
22	6	4	1.826	2.853	-1.032	+0.005	12.892	1.215	+0.092	-16.867	+0.084
23	6	7	58.379	59.408	-1.029	-0.001	12.898	1.225	+0.090	-16.816	-0.015
24	6	11	54.932	55.964	-1.025	-0.006	12.889	1.235	+0.072	-16.765	-0.104
25	6	15	51.486	52.519	-1.022	-0.010	12.869	1.245	+0.043	-16.714	-0.171
26	6	19	48.043	49.074	-1.019	-0.013	12.843	1.257	+0.006	-16.663	-0.206
27	6	23	44.601	45.630	-1.016	-0.013	12.815	1.269	-0.032	-16.612	-0.206
28	6	27	41.162	42.185	-1.013	-0.010	12.793	1.282	-0.065	-16.562	-0.170
29	6	31	37.724	38.741	-1.010	-0.006	12.783	1.295	-0.088	-16.512	-0.105
30	6	35	34.288	35.296	-1.007	-0.001	12.788	1.309	-0.096	-16.463	-0.022
31	6	39	30.851	31.851	-1.004	+0.004	12.812	1.324	-0.085	-16.414	+0.061
32	6	43	27.413	28.407	-1.001	+0.008	12.854	1.340	-0.058	-16.365	+0.127