

KOREAN VLBI NETWORK OBSERVING APPLICATION

VLBI

TERM: 2020A

Proposal ID: 2020A-00

Received Date: 2019/ /

1. Title of proposal: A search for high-frequency calibrators within 10 degrees of the Galactic center			
2. Authors: (PI on the 1st line)			
Name	E-mail	Institution/Country	Student
Leonid Petrov	Leonid.Petrov@lpetrov.net	NASA GSFC, USA	No
Ylva Pihlstrom	ylva@unm.edu	University of the New Mexico, USA	No
Joseph Lazio	joseph.lazio@jpl.nasa.gov	JPL, USA	No
Taehyun Jung	thjung@kasi.re.kr	KASI, Korea	
Ed Fomalont	efomalon@nrao.edu	The National Radio Astronomy Observatory, USA	
*If any student is involved, please give the following information. <input type="checkbox"/> M.S. <input type="checkbox"/> Ph.D For thesis? <input type="checkbox"/> Yes <input type="checkbox"/> No			
3. Contact author:			
Name: Leonid Petrov E-mail: Leonid.Petrov@lpetrov.net Phone: +1(703)-556-8757 FAX: +XX-XXX-XXX-XXXX			
4. Staff support:			
– Observing setup: <input type="checkbox"/> None <input checked="" type="checkbox"/> Consultation <input type="checkbox"/> Extensive help			
– Post processing: <input type="checkbox"/> None <input type="checkbox"/> Consultation <input type="checkbox"/> Extensive help			
5. Proposal type:			
<input type="checkbox"/> Large project(≥100hrs) <input checked="" type="checkbox"/> Normal proposal(<100hrs)			
<input type="checkbox"/> Joint proposal <input type="checkbox"/> If joint, network name:			
<input type="checkbox"/> Resubmission Related previous/current proposal ID:			
6. Scientific categories:			
<input type="checkbox"/> Galactic <input type="checkbox"/> Extragalactic <input checked="" type="checkbox"/> Astrometry <input type="checkbox"/> Geodesy <input type="checkbox"/> Radio transient and pulsars			
<input type="checkbox"/> AGN <input type="checkbox"/> Maser <input type="checkbox"/> Galactic center <input type="checkbox"/> Star Formation <input type="checkbox"/> Evolved star			
7. Observing type:			
<input checked="" type="checkbox"/> Continuum <input type="checkbox"/> Spectral line <input type="checkbox"/> Phase referencing <input type="checkbox"/> Polarimetry			
<input type="checkbox"/> Survey <input type="checkbox"/> Multi-frequency <input type="checkbox"/> Target of opportunity			
8. Observing frequency and polarization:			
<input checked="" type="checkbox"/> 22GHz <input checked="" type="checkbox"/> 43GHz <input type="checkbox"/> 86GHz <input type="checkbox"/> 129GHz			
<input type="checkbox"/> Single polarization <input checked="" type="checkbox"/> Dual polarization			
9. Observing sessions: <input type="checkbox"/> single epoch <input checked="" type="checkbox"/> multiple epochs			
– Total time requested: <u>75 hrs</u>			
– Number of sessions: <u>15</u> ; Number of hour each: <u>5 hrs</u> ; Separation: <u>0-100 days</u>			
– Min/Max LST (HH:MM:SS): <u>15:00:00</u> – <u>20:00:00</u>			
– Preferred range of dates or dates which are NOT acceptable:			
10. Abstract (200 words max, 10 point)			
<i>Sample abstract</i>			

When your proposal is scheduled the contents of this application form (but not supporting material) will be made public.

This L^AT_EX form was generated on November 14, 2019

VLBI

Title of Proposal: A search for high-frequency calibrators within 10 degrees of the Galactic center

11. Disk usage (recording time/total time): 0.8								
12. Recording bandwidth: <input type="checkbox"/> 16MHz <input type="checkbox"/> 32MHz <input type="checkbox"/> 64MHz <input type="checkbox"/> 128MHz <input type="checkbox"/> 256MHz <input checked="" type="checkbox"/> 512MHz								
Recording rate: <input type="checkbox"/> 512Mbps <input type="checkbox"/> 1Gbps <input type="checkbox"/> 2Gbps <input type="checkbox"/> 4Gbps <input checked="" type="checkbox"/> 8Gbps								
13. Spectroscopy only (if you observe more than 4 lines, please attach the additional line information in a separate sheet.)								
Items	Line 1		Line 2		Line 3		Line 4	
transitions to be observed	SiO(J=1→0)		SiO(J=1→0)		SiO(J=1→0)		SiO(J=1→0)	
velocity range in LSR (km s ⁻¹)								
channel bandwidth (kHz)								
rest frequency (MHz)								
14. Number of sources: <input style="width:50px;" type="text" value="520"/> [If more than 8 sources, please attach separate list.]								
15. Name [order of priority]	Coordinates (J2000)		Freq. (MHz)	Band width (MHz)	Flux density		Time requested (hr)	Cal? (Y/N)
	RA (hh:mm:ss.ss)	DEC (±dd:mm:ss.ss)			total (Jy)	peak (mJy)		
Source name 1	11:22:33.1234	+11:22:33.123	22235.080	100.0000	10.00	20.00	30.0	N
Source name 2								
Source name 8								
16. Correlation setup:								
– Correlator integration time: <u>1.0</u> (default 0.2024 sec)								
– Spectral channels per 512 MHz: <u>4096</u> (default 128 channel for continuum, 512 for spectral line)								
<input checked="" type="checkbox"/> Full stokes correlation <input type="checkbox"/> Pulsar gating <input type="checkbox"/> P-cal extraction <input type="checkbox"/> Multiple phase center								
<i>If you need a special correlation setup, please briefly specify here.</i>								
17. Special requirements:								
– Sites :								
– Dates :								
– Frequencies :								
– etc :								
18. Please attach the following items written in English using TeX. The maximum number of pages is 2+1 if you requested less than 100 hours, otherwise it is 4+1. The minimum font size is 10.								
– Scientific and technical justifications								
– List of publications made by previous KVN observations								
– If you requested ToO (Target of Opportunity) observation, please include well-defined trigger criteria.								

A search for high-frequency calibrators within 10 degrees of the Galactic center

1 Introduction

Despite of enormous efforts to improve density of calibrators, it is not uncommon to hear that “there is no good calibrator just in the area where I want to observe”. This is especially true if planned observations are at high frequencies or in the difficult area. The Galactic center is one of these difficult areas. Scattering in the interstellar medium broadens a source and we lose long baselines. This makes difficult to judge whether a given source detected at 2–8 GHz will be strong enough to serve as a calibrator at 22/43 GHz. We see no other practical way to determine suitability of a given source for being used as a calibrator as to observe

There are four use cases for more calibrators within 10° of the Galactic center.

1. Use case: astrometry with stellar masers

Stellar masers and their line-of-sight velocities can be observed throughout the Milky Way, thus they can be used as probes of both structure and dynamics of the Galaxy. The stellar masers in evolved stars sample the inner Galaxy and Galactic bulge regions, in contrast to the CH_3OH and H_2O masers in star forming regions used to map out the spiral structure (the BeSSeL project, Reid et al. (2014)), while SiO masers in evolved stars. In the Bulge Asymmetries and Dynamical Evolution (BAaDE) survey (Sjouwerman et al. 2014), we are using both the VLA and ALMA to map velocities and positions of 28,000 infrared selected red giant stars in the 43 GHz and 86 GHz SiO maser transitions.

With the main BAaDE survey, the overall goal is to extract a gravitational potential to model stellar dynamics. The outcome would be greatly enhanced if, in addition to the positions and velocities, we could also supply a distance estimate. For the dynamical studies it is already a success if a distance in front or behind the Galactic center can be determined, i.e., if a distinction can be made between a co-rotating or counter-rotating orbit. As of now, very few of the BAaDE sources have accurate distances derived. Distances based on the kinematics are difficult to derive since the kinematics in the inner Galaxy is not well modeled compared to the disk structure.

2. Use case: detection of excessive scatter in positions due to non-stationarity of the gravitational field

Motion of stars in our Galaxy makes the gravitational field non-stationary. Radio waves propagating in the non-stationary gravitational field deflect and their deflection can be described as a stochastic process. Theoretical simulations based on the modern models of stellar mass function described in Larchenkova et al. (2017) predict the rms of the arc lengths of a pair of AGNs to exceed $30 \mu\text{as}$ over 5 years if a pair is located within 10° of the Galactic center. Such a jitter sets a fundamental limit in astrometric accuracy. This jitter is detectable from dedicated observations of a set of AGN pairs in the vicinity of the Galactic center compared with a set of AGN pairs in other regions taken as a reference group. We consider that VERA after its upgrade that will allow it to observe at K and Q bands simultaneously will be the most suitable instrument for this project. A positive outcome of this program, a detection of such an increase in the rms will confirm the existence of the fundamental limit in positional accuracy and will demonstrate the applicability of the stellar mass function and the models of stellar mass distribution. A negative result will mean that the used stellar mass function requires a revision.

Proposed observations will allow to determine suitable pairs for future VERA observations, determine their positions with sub-milliarcsecond accuracies, and provide their K-band images.

3. Use case: Use case: astrometry of pulsars close to the Galactic Center

Additional calibrators are also indispensable in assessing the contributions of millisecond pulsars versus dark matter annihilation to the *Fermi* Galactic Center γ -ray excess. Analysis of *Fermi*/LAT data have revealed an excess of γ -ray emission in the inner few degrees of the Galaxy. Early interpretations of this excess attributed it to a decay channel (or channels) of dark matter particles. More recent interpretations have tended to favor an interpretation of the unresolved emission of millisecond pulsars, an interpretation strengthened by the fact that globular clusters can show a similar emission due to millisecond pulsars. An obvious test of these two hypotheses is to identify millisecond pulsars toward

the inner Galaxy, a test that has motivated searches at a number of current and future telescopes including the VLA, the 70 m Deep Space Network Deep Space Station-43, and MeerKAT.

However, even the identification of additional millisecond pulsars toward the inner Galaxy would not be sufficient to conclude that they are responsible for the γ -ray excess — millisecond pulsars toward the inner Galaxy could be foreground objects. The traditional approach of using a pulsar’s dispersion measure (DM) as a proxy for its distance could be particularly problematic toward the inner Galaxy due to interstellar structures that are either poorly represented or missing entirely from the existing models. Consequently, astrometric measurements toward any candidate millisecond pulsars toward the inner Galaxy, particularly distance constraints, will likely be a necessary step toward resolving the explanation of the *Fermi* γ -ray excess. The proposed project to expand the number of calibrators toward the inner Galaxy will improve future efforts to obtain precision millisecond pulsar astrometry.

4. Use case: more calibrators for ALMA

Getting new calibrators for ALMA will greatly facilitate observations of targets in the Galactic Center region. The calibrator density in this area is especially because of scattering, large number of galactic sources, and avoidance of this difficult area in prior surveys. **Ed, can you elaborate more?**

These projects mentioned above are pending for the lack of appropriate calibrators. The purpose of the proposed observations is to lift this road block.

2 Proposed observations

The list of candidate sources has two parts: a) 99 objects detected with VLBI at 2–8 GHz but never observed at 22/43 GHz; b) 418 sources from the NVSS brighter 200 mJy that have never been observed with VLBI.

We propose to observe both lists with the KVN at 22/43 GHz simultaneously in 2 scans for 3 minutes each. Assuming SEFD 1300 Jy at K-band and 2000 Jy at Q band and doubling sensitivity because we have to observe at 15–30° above the horizon, we expect we will be able to detect sources brighter 40 mJy at K band and 60 mJy at Q band recording at 4+4 GBps mode. Counting time for slewing and calibration, we request 75 hours in total in 15 blocks of 5 hours each centered around right ascension 17^h45^m.

We will process the KVN data in a similar way as we processed K-band EVN experiment EP066 Petrov (2011).

3 Expected outcome

We will evaluate the correlated flux density of detected sources and estimate source positions with accuracies 5–20 mas. The proposed observations will be used for contribution to the next edition of the Radio Fundamental Catalogue and as a separate 24 GHz position catalogue. The images will be publicly available at the Astrogeo VLBI FITS image database¹. The final results of the proposed observations will be publicly available within 90 days of observations of the last segment at the project web site and then will be published in the referred journal.

References

- Larchenkova, T.I.; Lutovinov, A.A.; Lyskova, N.S., (2017) ApJ, 835, 51L, 2017.
Petrov L., 2011, MNRAS, 419, 1097–1105.
Reid, M. J., Menten, K. M., Brunthaler, A., et al., 2014, ApJ, 783, 130.
Sjouwerman, L. O., Pihlström, Y. M., Claussen, M. J., et al., in “Why Galaxies Care about AGB Stars III: A Closer Look in Space and Time”, 2015, 497, 499.

¹Available at http://astrogeo.org/vlbi_images

Technical justification for “A search for high-frequency calibrators within 10 degrees of the Galactoc center”

We propose to observe at 22 GHz and 43 GHz, dual-pole mode with 2 IFs 0.512 GHz each and the aggregate bit rate 8 Gbps. The central frequency is selected to have the best sensitivity.

We will need so-called ANT-files with a priori model computed by the correlator. The correlator output will be analyzed with NASA software PIMA and Psolve.

According to the EVN sensitivity calculator, $1\text{-}\sigma$ noise level at a given baseline and recording 4 Gbps per band is 3 mJy at K-band and 4.5 mJy at Q-band (SEFD 1300 and 2000 Jy respectively). Considering a reliable detection is achieved at the $\text{SNR} > 6$, we get a detection limit from these computations 20 and 30 mJy respectively. Since our targets are at declinations $[-38^\circ, -20^\circ]$, the contribution of the atmosphere will reduce the sensitivity, and we expect conservatively to reach a detection limit 40 and 60 mJy respectively.

The list of 517 target sources “A search for high-frequency calibrators within 10 degrees of the Galactoc center”

J1701–2954	1657–298	17:01:09.86	-29:54:40.5
J1703–2641	1659–266	17:03:02.73	-26:41:45.2
J1703–2915	1700–291	17:03:53.74	-29:15:38.9
J1704–2444	1701–246	17:04:52.40	-24:44:53.9
J1705–2445	1702–246	17:05:10.23	-24:45:28.2
J1705–3219	1702–322	17:05:41.50	-32:19:24.8
J1706–2947	1703–297	17:06:27.54	-29:47:39.6
J1707–2840	1704–286	17:07:12.84	-28:40:47.3
J1707–3030	1704–304	17:07:45.91	-30:30:46.8
J1708–2901	1705–289	17:08:49.68	-29:01:44.2
J1709–2642	1706–266	17:09:09.22	-26:42:18.8
J1710–3528	1707–354	17:10:52.12	-35:28:14.4
J1710–3529	1706–354	17:10:03.35	-35:29:45.2
J1711–3338	1708–335	17:11:48.99	-33:38:41.1
J1712–2313	1709–231	17:12:29.96	-23:13:19.7
J1712–3514	1708–351	17:12:05.14	-35:14:34.3
J1713–2501	1710–249	17:13:11.93	-25:01:26.4
J1713–2503	1710–24A	17:13:19.17	-25:03:23.0
J1713–3111	1710–311	17:13:51.73	-31:11:44.4
J1713–3139	1709–315	17:13:09.53	-31:39:11.9
J1713–3418	1709–342	17:13:09.94	-34:18:29.4
J1714–2514	1711–251	17:14:47.85	-25:14:35.1
J1714–2648	1711–267	17:14:32.41	-26:48:15.4
J1714–3345	1710–337	17:14:05.55	-33:45:39.7
J1714–3549	1711–357	17:14:31.78	-35:49:15.0
J1715–2913	1711–291	17:15:06.92	-29:13:07.3
J1716–2920	1713–292	17:16:12.52	-29:20:20.1
J1716–3216	1713–322	17:16:38.03	-32:16:10.7
J1716–3348	1713–337	17:16:30.70	-33:48:22.1
J1716–3418	1713–342	17:16:23.69	-34:18:15.0
J1717–3342	1714–336	17:17:36.03	-33:42:08.8
J1717–3442	1714–346	17:17:29.74	-34:42:47.3
J1718–2535	1715–255	17:18:48.84	-25:35:49.6
J1718–3001	1714–299	17:18:03.07	-30:01:58.0
J1718–3056	1714–308	17:18:05.15	-30:56:16.2
J1719–3354	1716–338	17:19:34.38	-33:54:50.4
J1719–3557	1716–359	17:19:53.59	-35:57:13.0
J1719–3603	1716–360	17:19:43.37	-36:03:15.6
J1719–3604	1716–36A	17:19:31.71	-36:04:28.9
J1719–3606	1716–36B	17:19:27.53	-36:06:01.8
J1719–3608	1716–36C	17:19:58.11	-36:08:14.0
J1719–3658	1716–369	17:19:50.46	-36:58:00.8
J1719–3708	1716–370	17:19:59.97	-37:08:49.1
J1719–3710	1716–371	17:19:27.10	-37:10:51.7
J1720–2135	1717–215	17:20:44.85	-21:35:39.3
J1720–2258	1717–229	17:20:43.56	-22:58:24.8
J1720–2339	1717–236	17:20:53.80	-23:39:39.4
J1720–2859	1717–289	17:20:58.63	-28:59:58.9
J1720–3535	1717–355	17:20:32.96	-35:35:47.0
J1720–3543	1717–356	17:20:36.64	-35:43:20.1

J1720-3545	1717-357	17:20:29.55	-35:45:33.2
J1720-3546	1717-35A	17:20:51.12	-35:46:03.7
J1720-3549	1717-35B	17:20:44.15	-35:49:17.3
J1720-3551	1717-358	17:20:31.95	-35:51:23.1
J1720-3552	1717-35C	17:20:21.80	-35:52:47.7
J1720-355A	1717-35D	17:20:21.80	-35:52:48.1
J1720-3554	1716-358	17:20:19.07	-35:54:53.6
J1720-3556	1716-35A	17:20:00.76	-35:56:15.8
J1720-3602	1717-359	17:20:55.01	-36:02:27.3
J1720-3605	1717-360	17:20:34.44	-36:05:23.1
J1720-3606	1716-360	17:20:00.91	-36:06:06.5
J1720-3607	1717-360	17:20:23.11	-36:07:48.1
J1720-3610	1717-361	17:20:41.65	-36:10:09.5
J1720-3615	1717-362	17:20:37.48	-36:15:09.6
J1720-3625	1717-363	17:20:31.09	-36:25:08.1
J1720-3717	1717-372	17:20:57.96	-37:17:05.5
J1721-3551	1717-358	17:21:18.22	-35:51:21.6
J1721-355A	1718-358	17:21:42.87	-35:51:55.1
J1721-3555	1718-35A	17:21:28.53	-35:55:53.1
J1721-3556	1718-359	17:21:23.35	-35:56:59.6
J1721-3559	1718-35B	17:21:27.10	-35:59:38.9
J1721-3602	1718-35C	17:21:38.22	-36:02:19.3
J1721-3603	1717-360	17:21:00.20	-36:03:53.5
J1721-3605	1718-360	17:21:44.57	-36:05:55.5
J1721-3608	1717-360	17:21:01.88	-36:08:27.4
J1721-3611	1718-361	17:21:27.27	-36:11:11.2
J1721-3613	1717-361	17:21:15.38	-36:13:46.0
J1721-3614	1718-362	17:21:23.14	-36:14:59.5
J1721-3615	1718-36A	17:21:29.03	-36:15:32.4
J1721-3616	1718-36B	17:21:37.84	-36:16:55.8
J1721-3618	1717-362	17:21:19.15	-36:18:06.8
J1721-3620	1718-362	17:21:27.89	-36:20:21.4
J1721-3622	1718-363	17:21:44.46	-36:22:58.0
J1721-3628	1717-364	17:21:19.10	-36:28:32.3
J1721-3725	1717-373	17:21:01.05	-37:25:50.8
J1721-3727	1717-374	17:21:06.59	-37:27:02.0
J1721-3730	1717-37A	17:21:07.85	-37:30:48.2
J1721-3734	1718-375	17:21:37.36	-37:34:26.9
J1722-3554	1718-358	17:22:00.50	-35:54:33.1
J1722-3604	1718-360	17:22:14.71	-36:04:26.5
J1722-3609	1718-361	17:22:16.64	-36:09:12.8
J1722-3612	1719-361	17:22:35.93	-36:12:15.4
J1722-3717	1719-372	17:22:34.68	-37:17:44.3
J1723-2016	1720-202	17:23:31.64	-20:16:23.2
J1723-3445	1720-347	17:23:27.74	-34:45:08.5
J1723-3543	1720-356	17:23:56.90	-35:43:40.7
J1723-3553	1720-358	17:23:23.07	-35:53:41.9
J1723-355A	1720-35A	17:23:28.65	-35:53:14.3
J1723-3555	1720-35B	17:23:23.64	-35:55:15.1
J1724-3409	1721-341	17:24:44.68	-34:09:12.3

J1724-3410	1721-34A	17:24:45.08	-34:10:32.4
J1724-3426	1720-343	17:24:05.17	-34:26:23.7
J1724-3430	1720-344	17:24:08.91	-34:30:05.1
J1724-3435	1720-345	17:24:07.68	-34:35:04.3
J1724-3456	1721-349	17:24:29.71	-34:56:57.6
J1724-3552	1720-358	17:24:02.04	-35:52:56.0
J1724-3652	1721-368	17:24:37.09	-36:52:01.2
J1725-2036	1722-205	17:25:50.06	-20:36:43.0
J1725-3150	1722-318	17:25:35.46	-31:50:40.7
J1725-3311	1721-331	17:25:12.37	-33:11:45.6
J1725-3316	1721-332	17:25:10.53	-33:16:13.7
J1725-3319	1721-33A	17:25:09.96	-33:19:40.9
J1725-3323	1721-333	17:25:09.55	-33:23:53.9
J1725-3326	1721-334	17:25:08.13	-33:26:48.4
J1725-3333	1721-335	17:25:02.69	-33:33:33.7
J1725-3337	1721-33B	17:25:04.27	-33:37:49.5
J1725-3412	1721-341	17:25:00.86	-34:12:25.7
J1725-3421	1722-343	17:25:35.42	-34:21:40.3
J1725-342A	1722-34A	17:25:40.37	-34:21:52.1
J1725-3422	1722-34B	17:25:26.94	-34:22:59.8
J1725-3424	1722-34C	17:25:43.92	-34:24:28.4
J1725-3621	1722-363	17:25:31.86	-36:21:49.4
J1725-362A	1722-36A	17:25:33.73	-36:21:44.3
J1726-3322	1722-333	17:26:10.71	-33:22:07.7
J1726-3334	1722-335	17:26:09.95	-33:34:00.4
J1726-3501	1723-349	17:26:24.38	-35:01:41.6
J1727-3505	1724-350	17:27:36.18	-35:05:52.8
J1727-3506	1724-35A	17:27:50.47	-35:06:23.0
J1727-3508	1724-35B	17:27:34.87	-35:08:22.9
J1727-3516	1724-352	17:27:30.86	-35:16:16.6
J1727-3632	1724-365	17:27:31.50	-36:32:48.3
J1727-3648	1724-367	17:27:36.02	-36:48:27.1
J1728-2252	1725-228	17:28:47.32	-22:52:34.6
J1728-3338	1725-335	17:28:18.99	-33:38:09.6
J1728-3349	1725-337	17:28:23.04	-33:49:43.0
J1728-3350	1724-338	17:28:11.72	-33:50:55.1
J1728-335A	1725-338	17:28:37.84	-33:50:35.6
J1728-3352	1725-33A	17:28:26.39	-33:52:23.5
J1728-3401	1725-339	17:28:22.46	-34:01:02.5
J1728-3407	1725-340	17:28:21.76	-34:07:11.0
J1728-3635	1725-365	17:28:59.92	-36:35:36.9
J1729-3118	1726-312	17:29:43.41	-31:18:03.5
J1729-3350	1726-337	17:29:48.72	-33:50:10.9
J1729-3352	1726-338	17:29:50.19	-33:52:45.9
J1729-3353	1726-33A	17:29:41.14	-33:53:57.7
J1729-3407	1726-340	17:29:48.63	-34:07:12.3
J1729-3408	1726-34A	17:29:33.91	-34:08:18.3
J1729-3422	1726-343	17:29:39.47	-34:22:05.0
J1729-3423	1726-34B	17:29:24.81	-34:23:30.6
J1729-342A	1726-34C	17:29:25.66	-34:23:44.6

J1729-3434	1725-345	17:29:15.52	-34:34:33.4
J1729-3436	1726-345	17:29:21.42	-34:36:24.6
J1729-3437	1726-34D	17:29:30.55	-34:37:40.3
J1729-3633	1725-365	17:29:01.09	-36:33:52.6
J1729-3635	1725-36A	17:29:08.63	-36:35:07.7
J1729-3639	1725-366	17:29:20.64	-36:39:14.9
J1729-3640	1725-36B	17:29:17.62	-36:40:08.5
J1729-3643	1726-366	17:29:43.01	-36:43:49.9
J1730-2128	1727-214	17:30:42.73	-21:28:22.4
J1730-2130	1727-21A	17:30:37.31	-21:30:25.8
J1730-213A	1727-21B	17:30:43.09	-21:30:17.1
J1730-3310	1727-331	17:30:26.67	-33:10:31.5
J1730-3311	1727-33A	17:30:23.54	-33:11:12.9
J1730-3314	1726-331	17:30:14.51	-33:14:09.6
J1730-3335	1726-335	17:30:04.04	-33:35:53.9
J1730-3408	1727-341	17:30:58.50	-34:08:23.8
J1730-3421	1726-343	17:30:13.95	-34:21:15.6
J1730-3441	1727-346	17:30:28.56	-34:41:44.6
J1730-3442	1727-34A	17:30:31.05	-34:42:29.3
J1731-2640	1728-266	17:31:33.17	-26:40:15.2
J1731-2719	1728-272	17:31:49.02	-27:19:28.6
J1731-3003	1728-300	17:31:46.85	-30:03:09.0
J1731-3302	1728-330	17:31:41.92	-33:02:24.7
J1731-3318	1728-332	17:31:20.81	-33:18:40.6
J1731-3333	1728-335	17:31:28.99	-33:33:51.6
J1731-3334	1728-33A	17:31:25.86	-33:34:51.7
J1731-3335	1728-33B	17:31:31.78	-33:35:26.2
J1731-3338	1728-336	17:31:31.81	-33:38:13.6
J1731-3351	1728-338	17:31:18.21	-33:51:09.0
J1731-3352	1727-338	17:31:07.28	-33:52:54.2
J1731-3353	1728-338	17:31:19.29	-33:53:11.9
J1732-2235	1729-225	17:32:52.94	-22:35:11.6
J1732-2855	1728-288	17:32:03.83	-28:55:16.5
J1732-3304	1729-330	17:32:38.92	-33:04:55.5
J1732-3330	1728-334	17:32:06.16	-33:30:45.0
J1732-3535	1729-355	17:32:30.00	-35:35:34.9
J1733-3122	1730-313	17:33:45.56	-31:22:45.6
J1733-3146	1730-317	17:33:38.86	-31:46:05.3
J1733-3251	1730-328	17:33:39.30	-32:51:22.3
J1733-3254	1730-32A	17:33:39.13	-32:54:00.6
J1733-3256	1730-329	17:33:34.54	-32:56:40.1
J1733-3257	1730-32B	17:33:27.07	-32:57:39.8
J1733-3258	1729-329	17:33:11.73	-32:58:24.8
J1733-3308	1730-331	17:33:28.27	-33:08:22.5
J1733-3722	1729-373	17:33:15.19	-37:22:32.4
J1734-2932	1731-295	17:34:50.14	-29:32:32.2
J1734-3032	1730-305	17:34:10.20	-30:32:41.3
J1735-2510	1732-251	17:35:24.91	-25:10:36.4
J1735-2939	1732-296	17:35:21.97	-29:39:26.2
J1735-3236	1731-325	17:35:10.98	-32:36:13.4

J1736-2737	1733-275	17:36:10.18	-27:37:20.2
J1736-3142	1733-316	17:36:51.57	-31:42:54.5
J1736-3331	1732-335	17:36:15.07	-33:31:59.9
J1736-3400	1733-339	17:36:57.82	-34:00:30.5
J1736-3427	1733-344	17:36:37.31	-34:27:38.6
J1737-2247	1734-227	17:37:13.04	-22:47:34.5
J1737-2546	1734-257	17:37:53.21	-25:46:42.2
J1737-3131	1734-314	17:37:43.80	-31:31:16.5
J1737-3553	1734-358	17:37:27.56	-35:53:25.2
J1738-2010	1735-201	17:38:33.39	-20:10:59.5
J1738-2044	1735-207	17:38:11.71	-20:44:10.9
J1738-2624	1734-263	17:38:06.06	-26:24:43.4
J1739-3417	1735-342	17:39:13.40	-34:17:51.5
J1739-3614	1735-362	17:39:01.76	-36:14:05.9
J1740-2929	1737-294	17:40:54.52	-29:29:50.3
J1740-3056	1737-309	17:40:19.61	-30:56:29.7
J1740-3057	1737-30A	17:40:31.06	-30:57:37.3
J1740-3058	1736-309	17:40:12.65	-30:58:45.5
J1740-305A	1737-309	17:40:24.31	-30:58:16.5
J1740-3059	1737-30B	17:40:21.59	-30:59:41.6
J1741-1959	1738-199	17:41:41.89	-19:59:20.6
J1741-2537	1738-256	17:41:54.45	-25:37:43.4
J1741-3043	1738-307	17:41:23.30	-30:43:32.9
J1741-3050	1738-308	17:41:48.50	-30:50:35.7
J1741-3123	1738-313	17:41:26.34	-31:23:29.7
J1741-3730	1738-374	17:41:30.96	-37:30:18.1
J1742-2956	1739-299	17:42:28.19	-29:56:13.3
J1742-3009	1739-301	17:42:28.62	-30:09:21.0
J1742-3341	1738-336	17:42:03.69	-33:41:34.4
J1742-3435	1739-345	17:42:20.59	-34:35:15.6
J1743-2846	1740-287	17:43:23.13	-28:46:10.2
J1743-2855	1740-289	17:43:49.27	-28:55:23.4
J1743-2856	1740-28A	17:43:53.48	-28:56:27.8
J1743-285A	1740-28B	17:43:57.85	-28:56:42.1
J1743-2857	1740-28C	17:43:29.52	-28:57:29.1
J1743-285B	1740-28D	17:43:46.98	-28:57:29.8
J1743-2858	1740-28E	17:43:57.39	-28:58:40.4
J1743-2900	1740-28F	17:43:26.27	-29:00:18.8
J1743-3058	1740-309	17:43:17.89	-30:58:18.7
J1743-3526	1739-354	17:43:06.88	-35:26:38.9
J1744-2843	1741-287	17:44:38.47	-28:43:40.5
J1744-2845	1741-28A	17:44:47.68	-28:45:08.2
J1744-2846	1741-28B	17:44:37.44	-28:46:29.6
J1744-2848	1741-28C	17:44:47.07	-28:48:10.1
J1744-2849	1741-288	17:44:15.75	-28:49:26.4
J1744-2853	1741-28D	17:44:32.61	-28:53:40.8
J1744-2855	1741-289	17:44:27.57	-28:55:51.3
J1744-2858	1741-28E	17:44:26.59	-28:58:21.8
J1744-2900	1741-28F	17:44:21.93	-29:00:28.6
J1744-2927	1741-294	17:44:36.36	-29:27:59.9

J1744-2941	1741-296	17:44:55.20	-29:41:12.0
J1744-3036	1741-305	17:44:34.62	-30:36:02.4
J1744-3116	1741-312	17:44:23.58	-31:16:36.3
J1745-2609	1742-261	17:45:54.36	-26:09:57.8
J1745-2820	1742-283	17:45:52.50	-28:20:26.3
J1745-2852	1742-288	17:45:45.12	-28:52:39.5
J1745-2858	1742-289	17:45:46.11	-28:58:28.3
J1745-2900	1742-28A	17:45:40.04	-29:00:28.2
J1745-2901	1742-290	17:45:39.25	-29:01:24.4
J1745-2903	1742-29A	17:45:43.44	-29:03:02.6
J1745-2905	1742-29B	17:45:42.05	-29:05:25.4
J1745-3151	1741-318	17:45:13.22	-31:51:04.8
J1745-3345	1742-337	17:45:36.40	-33:45:49.2
J1746-2809	1743-281	17:46:45.00	-28:09:51.0
J1746-2832	1743-285	17:46:59.93	-28:32:01.0
J1746-2851	1743-288	17:46:18.86	-28:51:54.0
J1746-2852	1743-28A	17:46:32.49	-28:52:48.7
J1746-2900	1743-289	17:46:39.77	-29:00:42.9
J1746-2906	1743-290	17:46:59.37	-29:06:21.3
J1746-2915	1743-292	17:46:18.68	-29:15:26.1
J1746-2916	1743-29A	17:46:48.63	-29:16:43.8
J1746-2917	1743-29B	17:46:20.65	-29:17:48.6
J1746-2921	1743-293	17:46:22.09	-29:21:12.3
J1747-1919	1744-193	17:47:16.09	-19:19:54.9
J1747-2813	1744-282	17:47:28.13	-28:13:22.6
J1747-2816	1744-28A	17:47:23.45	-28:16:12.7
J1747-2818	1744-28B	17:47:14.43	-28:18:13.7
J1747-2822	1744-283	17:47:20.40	-28:22:52.0
J1747-282A	1744-28C	17:47:25.36	-28:22:09.8
J1747-282B	1744-28D	17:47:44.26	-28:22:00.9
J1747-2825	1744-284	17:47:20.75	-28:25:33.1
J1747-2831	1744-285	17:47:52.14	-28:31:17.5
J1747-2833	1743-285	17:47:00.43	-28:33:06.8
J1747-283A	1744-285	17:47:45.70	-28:33:02.3
J1747-2835	1744-28E	17:47:44.44	-28:35:53.8
J1747-2838	1744-286	17:47:50.46	-28:38:03.2
J1747-2840	1744-28F	17:47:50.53	-28:40:07.0
J1747-2900	1743-289	17:47:04.59	-29:00:46.9
J1747-2902	1744-290	17:47:11.66	-29:02:10.0
J1747-2903	1743-290	17:47:04.07	-29:03:17.4
J1747-2904	1744-290	17:47:15.29	-29:04:13.0
J1747-2908	1744-291	17:47:53.05	-29:08:26.3
J1747-2910	1744-29A	17:47:59.11	-29:10:37.5
J1747-2911	1744-29B	17:47:45.62	-29:11:00.5
J1747-2913	1744-292	17:47:45.33	-29:13:05.3
J1747-2916	1744-29C	17:47:45.32	-29:16:39.0
J1747-2918	1744-29D	17:47:48.03	-29:18:20.7
J1747-2921	1744-293	17:47:30.63	-29:21:57.8
J1747-2924	1744-29E	17:47:29.53	-29:24:32.8
J1747-2925	1744-294	17:47:21.09	-29:25:48.3

J1747-2958	1743-299	17:47:09.38	-29:58:02.7
J1747-295A	1744-299	17:47:13.02	-29:58:01.8
J1747-3123	1744-313	17:47:48.62	-31:23:15.2
J1747-3723	1744-373	17:47:51.20	-37:23:26.2
J1748-2252	1745-228	17:48:32.51	-22:52:11.8
J1748-2335	1745-235	17:48:38.98	-23:35:20.4
J1748-2759	1745-279	17:48:38.39	-27:59:51.8
J1748-2801	1745-280	17:48:18.47	-28:01:18.3
J1748-280A	1745-28A	17:48:41.41	-28:01:38.3
J1748-2805	1745-28B	17:48:41.14	-28:05:30.1
J1748-2806	1744-280	17:48:05.33	-28:06:05.5
J1748-2807	1745-281	17:48:36.51	-28:07:54.4
J1748-2808	1744-281	17:48:04.79	-28:08:34.5
J1748-280B	1745-281	17:48:12.79	-28:08:24.1
J1748-2813	1745-282	17:48:12.00	-28:13:07.5
J1748-2815	1745-28C	17:48:59.74	-28:15:40.7
J1748-2821	1744-283	17:48:00.77	-28:21:50.8
J1748-282A	1745-283	17:48:47.47	-28:21:21.0
J1748-2822	1745-28D	17:48:12.61	-28:22:25.4
J1748-2823	1745-28E	17:48:48.76	-28:23:43.8
J1748-2825	1744-284	17:48:04.23	-28:25:09.5
J1748-282B	1745-284	17:48:48.57	-28:25:05.9
J1748-2830	1745-28F	17:48:25.60	-28:30:08.9
J1748-283A	1745-28G	17:48:33.79	-28:30:17.9
J1748-283B	1745-28H	17:48:39.00	-28:30:34.4
J1748-283C	1745-28I	17:48:42.83	-28:30:31.8
J1748-2839	1745-286	17:48:11.40	-28:39:51.6
J1748-2842	1745-28J	17:48:58.66	-28:42:32.1
J1748-2855	1744-289	17:48:01.39	-28:55:43.6
J1748-2857	1744-28G	17:48:08.93	-28:57:02.9
J1748-2903	1744-290	17:48:00.34	-29:03:35.5
J1748-2907	1745-291	17:48:45.68	-29:07:39.4
J1748-2911	1744-291	17:48:10.41	-29:11:33.1
J1748-2912	1745-291	17:48:14.30	-29:12:18.8
J1748-2913	1744-292	17:48:03.90	-29:13:38.7
J1748-2915	1744-29F	17:48:06.48	-29:15:56.1
J1748-3241	1745-326	17:48:31.65	-32:41:02.6
J1748-3600	1745-359	17:48:49.12	-36:00:30.2
J1748-3651	1745-368	17:48:39.64	-36:51:46.2
J1748-365A	1745-36A	17:48:35.59	-36:51:21.9
J1748-365B	1745-36B	17:48:40.79	-36:51:50.1
J1748-3806	1745-380	17:48:34.80	-38:06:47.9
J1749-2326	1746-234	17:49:40.21	-23:26:21.4
J1749-2653	1746-268	17:49:58.18	-26:53:42.6
J1749-2815	1745-282	17:49:05.30	-28:15:06.4
J1749-2823	1746-283	17:49:34.21	-28:23:45.6
J1749-2830	1746-284	17:49:11.56	-28:30:15.4
J1749-2845	1746-287	17:49:28.59	-28:45:10.8
J1749-2846	1746-28A	17:49:26.21	-28:46:58.0
J1749-2852	1746-288	17:49:24.66	-28:52:16.0

J1749-2902	1746-290	17:49:32.06	-29:02:03.8
J1749-2923	1745-293	17:49:07.25	-29:23:45.8
J1749-3824	1746-383	17:49:41.14	-38:24:01.4
J1750-1949	1747-198	17:50:42.41	-19:49:37.4
J1750-2650	1746-268	17:50:00.54	-26:50:24.3
J1750-265A	1747-268	17:50:07.92	-26:50:35.1
J1750-2853	1747-288	17:50:23.95	-28:53:09.0
J1750-2854	1747-28A	17:50:14.00	-28:54:20.1
J1750-2916	1746-292	17:50:00.66	-29:16:52.9
J1751-2352	1748-238	17:51:04.00	-23:52:15.5
J1751-2524	1748-253	17:51:51.26	-25:24:00.1
J1751-3235	1747-325	17:51:14.07	-32:35:38.8
J1752-2336	1749-235	17:52:06.63	-23:36:25.7
J1752-2956	1749-299	17:52:33.11	-29:56:44.9
J1752-3001	1749-300	17:52:30.95	-30:01:06.7
J1752-3745	1749-377	17:52:54.39	-37:45:25.6
J1752-3800	1749-379	17:52:29.32	-38:00:04.6
J1753-1934	1750-195	17:53:00.05	-19:34:38.8
J1753-2607	1750-261	17:53:07.62	-26:07:28.6
J1753-260A	1750-26A	17:53:41.23	-26:07:06.7
J1753-2610	1750-26B	17:53:37.97	-26:10:51.1
J1753-3326	1749-334	17:53:08.67	-33:26:37.9
J1754-2046	1751-207	17:54:58.32	-20:46:30.2
J1754-2207	1751-221	17:54:51.49	-22:07:42.9
J1754-2352	1751-238	17:54:27.37	-23:52:33.8
J1754-3031	1751-305	17:54:56.82	-30:31:43.7
J1755-2504	1752-250	17:55:19.06	-25:04:38.9
J1755-2508	1752-251	17:55:12.54	-25:08:40.5
J1756-2348	1753-238	17:56:51.21	-23:48:42.4
J1756-2503	1753-250	17:56:36.40	-25:03:41.6
J1756-2807	1753-281	17:56:49.66	-28:07:37.7
J1756-3122	1753-313	17:56:22.56	-31:22:15.9
J1756-3454	1753-349	17:56:59.94	-34:54:22.7
J1757-2239	1754-226	17:57:27.72	-22:39:01.9
J1757-2241	1754-22A	17:57:28.88	-22:41:32.5
J1757-2324	1754-234	17:57:35.66	-23:24:37.6
J1757-2328	1754-23A	17:57:17.23	-23:28:22.6
J1757-232A	1754-23B	17:57:29.26	-23:28:11.5
J1757-2349	1753-238	17:57:02.43	-23:49:07.4
J1757-2416	1754-242	17:57:23.09	-24:16:25.8
J1757-2820	1754-283	17:57:38.09	-28:20:07.3
J1757-3719	1753-373	17:57:09.06	-37:19:19.4
J1758-2341	1755-236	17:58:11.22	-23:41:21.1
J1758-2343	1755-237	17:58:23.02	-23:43:12.1
J1758-3029	1755-304	17:58:22.65	-30:29:15.8
J1759-2310	1756-231	17:59:48.39	-23:10:09.7
J1759-2313	1756-232	17:59:53.44	-23:13:21.3
J1759-2318	1756-233	17:59:51.34	-23:18:53.5
J1759-2321	1756-23A	17:59:31.06	-23:21:22.4
J1759-2322	1756-23B	17:59:50.38	-23:22:59.0

J1759-2329	1756-234	17:59:05.47	-23:29:01.3
J1759-3448	1756-348	17:59:42.89	-34:48:59.1
J1759-3450	1756-34A	17:59:54.22	-34:50:23.6
J1800-2107	1757-211	18:00:44.62	-21:07:36.7
J1800-2309	1757-231	18:00:17.88	-23:09:20.8
J1800-230A	1757-23A	18:00:27.60	-23:09:40.4
J1800-2320	1757-233	18:00:49.63	-23:20:25.6
J1800-2321	1757-23B	18:00:49.65	-23:21:51.3
J1800-2325	1757-234	18:00:14.86	-23:25:38.5
J1800-2328	1757-23C	18:00:18.79	-23:28:32.2
J1800-2404	1757-240	18:00:31.09	-24:04:08.9
J1800-240A	1757-24A	18:00:41.47	-24:04:11.0
J1800-2406	1757-241	18:00:30.79	-24:06:54.7
J1800-3204	1757-320	18:00:20.02	-32:04:43.1
J1801-2056	1758-209	18:01:39.14	-20:56:42.1
J1801-2214	1758-222	18:01:43.55	-22:14:28.8
J1801-2307	1758-231	18:01:09.46	-23:07:29.9
J1801-2319	1758-233	18:01:49.44	-23:19:00.8
J1801-2325	1758-234	18:01:34.10	-23:25:49.5
J1801-232A	1758-23A	18:01:39.49	-23:25:53.8
J1801-2327	1758-23B	18:01:38.17	-23:27:38.4
J1801-2451	1758-248	18:01:04.83	-24:51:30.6
J1801-2610	1758-261	18:01:45.15	-26:10:30.8
J1802-2149	1759-218	18:02:55.13	-21:49:51.8
J1802-2728	1759-274	18:02:49.50	-27:28:04.2
J1802-2729	1759-27A	18:02:20.99	-27:29:55.9
J1803-2030	1800-205	18:03:23.72	-20:30:17.2
J1803-2421	1800-243	18:03:44.83	-24:21:16.0
J1803-2423	1800-24A	18:03:38.74	-24:23:01.5
J1803-2456	1800-249	18:03:59.29	-24:56:43.4
J1803-2748	1800-278	18:03:16.99	-27:48:14.0
J1803-2947	1800-297	18:03:56.67	-29:47:16.7
J1804-2421	1801-243	18:04:26.36	-24:21:06.4
J1804-3017	1800-302	18:04:06.87	-30:17:35.5
J1804-3724	1801-374	18:04:32.31	-37:24:43.6
J1804-3756	1801-379	18:04:39.07	-37:56:01.1
J1805-2100	1802-210	18:05:45.56	-21:00:03.3
J1805-2120	1802-213	18:05:32.85	-21:20:59.4
J1805-2126	1802-214	18:05:11.46	-21:26:58.5
J1805-212A	1802-21A	18:05:22.38	-21:26:37.1
J1805-2129	1802-215	18:05:17.01	-21:29:50.3
J1805-2138	1802-216	18:05:50.58	-21:38:43.8
J1805-2141	1802-217	18:05:49.33	-21:41:48.5
J1805-2142	1802-21B	18:05:39.13	-21:42:58.0
J1805-2147	1802-21C	18:05:50.71	-21:47:36.9
J1805-2151	1802-218	18:05:41.96	-21:51:47.5
J1805-2152	1802-21D	18:05:27.28	-21:52:31.8
J1805-2201	1802-220	18:05:22.32	-22:01:03.7
J1805-2207	1802-221	18:05:53.55	-22:07:33.6
J1805-2210	1802-22A	18:05:58.27	-22:10:50.4

J1805-2410	1802-241	18:05:37.10	-24:10:19.6
J1805-2412	1802-242	18:05:40.27	-24:12:39.0
J1805-2425	1802-244	18:05:26.16	-24:25:26.0
J1805-2431	1802-245	18:05:14.27	-24:31:13.8
J1805-2512	1802-252	18:05:23.55	-25:12:38.8
J1805-2609	1801-261	18:05:00.60	-26:09:56.2
J1805-3220	1802-323	18:05:37.42	-32:20:33.9
J1806-2112	1803-212	18:06:20.03	-21:12:22.5
J1806-2126	1803-214	18:06:36.58	-21:26:12.0
J1806-2127	1803-21A	18:06:11.52	-21:27:13.0
J1806-2129	1803-21B	18:06:36.28	-21:29:08.5
J1806-2130	1803-215	18:06:02.35	-21:30:22.1
J1806-2134	1803-21C	18:06:29.33	-21:34:08.6
J1806-2152	1803-218	18:06:43.52	-21:52:19.3
J1806-2159	1803-220	18:06:18.38	-21:59:46.5
J1806-2405	1803-240	18:06:30.99	-24:05:11.5
J1806-2439	1802-246	18:06:01.69	-24:39:06.0
J1807-2308	1804-231	18:07:15.26	-23:08:44.1
J1807-2511	1804-252	18:07:57.48	-25:11:39.9
J1807-2903	1803-290	18:07:10.79	-29:03:56.6
J1807-3202	1804-320	18:07:29.85	-32:02:33.8
J1807-3516	1804-352	18:07:25.66	-35:16:08.7
J1807-3621	1803-363	18:07:17.94	-36:21:19.3
J1808-2124	1805-214	18:08:06.85	-21:24:45.1
J1808-2555	1805-259	18:08:17.08	-25:55:07.5
J1808-3233	1805-325	18:08:22.60	-32:33:57.6
J1809-2412	1806-242	18:09:30.64	-24:12:28.5
J1809-3025	1806-304	18:09:53.52	-30:25:21.3
J1809-3337	1806-336	18:09:22.06	-33:37:07.1
J1810-3503	1806-350	18:10:00.12	-35:03:43.1
J1811-2055	1808-209	18:11:06.79	-20:55:03.3
J1811-2319	1808-233	18:11:02.81	-23:19:27.9
J1811-2635	1807-265	18:11:05.91	-26:35:15.8
J1811-2759	1808-280	18:11:20.15	-27:59:46.2
J1811-2923	1808-293	18:11:55.39	-29:23:10.8
J1812-2552	1809-258	18:12:45.58	-25:52:37.8
J1812-3132	1809-315	18:12:15.59	-31:32:56.7
J1812-3458	1808-349	18:12:17.33	-34:58:02.2
J1812-3533	1809-355	18:12:36.58	-35:33:00.2
J1812-3540	1808-356	18:12:06.27	-35:40:11.3
J1813-2823	1810-283	18:13:13.70	-28:23:07.1
J1813-3649	1809-368	18:13:07.24	-36:49:35.6
J1814-2906	1811-291	18:14:36.09	-29:06:54.7
J1814-3416	1811-342	18:14:27.74	-34:16:27.2
J1815-2713	1812-272	18:15:10.63	-27:13:03.8
J1816-2409	1813-241	18:16:47.93	-24:09:44.8
J1816-3052	1812-308	18:16:12.24	-30:52:08.0
J1816-3314	1813-332	18:16:34.27	-33:14:06.0
J1817-2335	1813-236	18:17:01.74	-23:35:20.6

J1817-2659	1814-270	18:17:32.54	-26:59:23.0
J1818-3237	1814-326	18:18:06.06	-32:37:10.7
J1819-2453	1816-249	18:19:15.09	-24:53:46.8
J1819-2742	1816-277	18:19:47.10	-27:42:57.0
J1821-2432	1818-245	18:21:15.48	-24:32:10.0
J1821-3323	1818-334	18:21:43.08	-33:23:59.7
J1821-3458	1818-349	18:21:21.39	-34:58:04.4
J1822-2430	1819-245	18:22:21.05	-24:30:01.3
J1822-2559	1818-260	18:22:02.19	-25:59:03.7
J1822-3509	1819-351	18:22:29.25	-35:09:07.5
J1823-2354	1820-239	18:23:59.76	-23:54:23.2
J1823-2726	1820-274	18:23:19.65	-27:26:26.4
J1823-2834	1820-285	18:23:41.75	-28:34:13.5
J1823-2839	1820-286	18:23:58.44	-28:39:17.9
J1823-3454	1820-349	18:23:38.59	-34:54:12.0
J1824-3242	1821-327	18:24:54.18	-32:42:57.5
J1824-324A	1821-32A	18:24:57.34	-32:42:59.6
J1829-3204	1825-321	18:29:00.78	-32:04:09.6