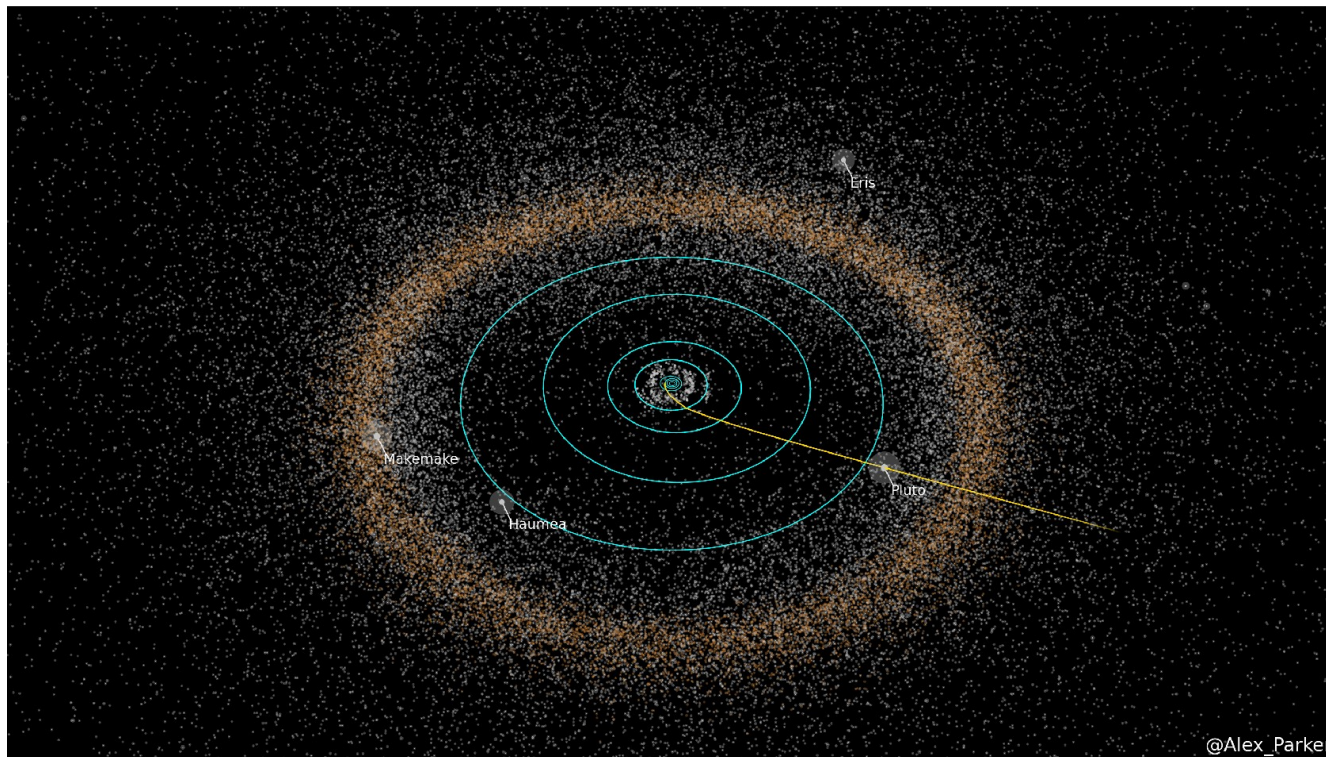


Asteroids: astrometry, photometry, dynamics, survey modelling

Jean-Marc Petit (UTINAM / Besançon)



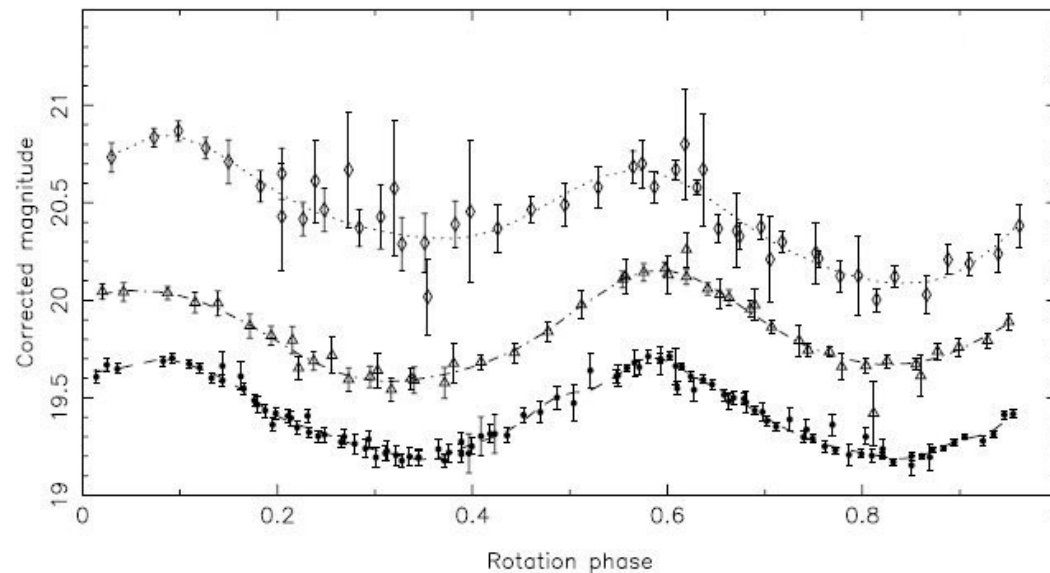


A variety of informations/data

- Photometry: time series, ...
- Astrometry: time series, ...
- Dynamics
- Survey description

Photometry

- **Flux** as a function of time, filter, other circumstances ...
- Gives **physical properties**: lightcurve, phase function, colors, ...



- Heterogeneous time description (date, JD, MJD)
- Corrections for observation distance (apparent/absolute mag, light travel time)

Données photométriques :

MJD (corrige pour Delta=0 UA)	Magnitude absolue	écart-type	Filtre	Angle de phase (deg.)	Ref. Obs.
52025.8969	9.423	0.039	R	2.81	2
52025.9108	9.518	0.039	R	2.81	2
52025.9162	9.530	0.038	R	2.81	2
52025.9216	9.542	0.039	R	2.81	2
52025.9270	9.531	0.037	R	2.81	2
52025.9325	9.475	0.039	R	2.81	2
52025.9463	9.458	0.038	R	2.81	2
52025.9517	9.451	0.037	R	2.81	2
52025.9572	9.534	0.038	R	2.81	2
52025.9626	9.595	0.038	R	2.81	2
52025.9680	9.602	0.037	R	2.81	2
52291.5574	9.791	0.055	R	3.31	17
52291.5747	9.832	0.058	R	3.31	17
52291.5844	9.633	0.067	R	3.31	17
52303.1029	8.823	0.095	R	2.87	2
52303.1360	8.756	0.090	R	2.86	2
52303.1607	9.066	0.102	R	2.86	2
52303.1857	9.091	0.096	R	2.86	2
52303.2082	9.101	0.091	R	2.86	2
52303.2349	9.193	0.106	R	2.86	2
52303.2626	9.098	0.095	R	2.86	2
52304.0969	8.837	0.098	R	2.82	2
52304.1152	8.833	0.089	R	2.82	2
52304.1561	8.957	0.091	R	2.82	2
52304.1849	8.997	0.088	R	2.82	2
52304.2136	9.340	0.122	R	2.81	2
52351.1686	9.148	0.104	R	0.10	2
52351.1790	8.956	0.102	R	0.10	2
52351.2148	9.018	0.104	R	0.10	2
52351.2248	8.999	0.105	R	0.10	2

Sélectionner un objet : 1977 UB (2060) Chiron

Informations désirées :

- Données photométriques
- Période et amplitude de la courbe de lumière

Choisir le filtre : NB : NF Signifie aucun filtre

U	B	V	g	R	r	I	i	z	J	H	K	NF	Tous
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Période désirée pour les informations (année, mois, jour) :

entre -- et --

JD ou MJD ?

- JD
- MJD
- UT

MJD corrigé pour prendre en compte le temps de trajet de la lumière ?

- Non
- Oui (distance géocentrique de référence pour corriger le JD/MJD : 0 UA)

Magnitude apparente ou absolue ?

- Apparente
- Absolue

Angle de phase requis ?

- Oui
- Non

Photometry

- Derived data: periods, lightcurve amplitude, shape

Informations disponibles concernant la courbe de lumière :			
Période (heures)	Amplitude (mag.)	Référence pour la période	Référence pour l'amplitude
26.802 hr (double peak assumed)	0.24 (R)	P. Rousselot, J.M. Petit, F. Poulet, A. Sergeev, 2005, "Photometric study of Centaur (60558) 2000-EC ₉₈ and Trans-Neptunian Object (55637) 2002 UX25 at different phase angles', Icarus 176, 478-491	P. Rousselot, J.M. Petit, F. Poulet, A. Sergeev, 2005, "Photometric study of Centaur (60558) 2000-EC ₉₈ and Trans-Neptunian Object (55637) 2002 UX25 at different phase angles', Icarus 176, 478-491

- Provenance

Ref. Obs.	Observateur	Mesureur	Observatoire	Télescope	Instrument	Article(s) scientifique(s)	Commentaires
2	Rousselot P. / Poulet F.	Rousselot P.	809 (La Silla)	1.54-m (Danish) / T3.60-m / NTT	DFOSC / EFOSC 2 / SUSI 2	Rousselot P., Petit J.-M., Poulet F., Sergeev A., 2005, Photometry study of Centaur (60558) 2000EC98 and trans-neptunian object (55637) 2002 UX25 at different phase angles, Icarus 176, 478-491	
17	Bauer et al.	Bauer et al.	568 (Mauna Kea)	2.2-m	Tek 2048 CCD camera	Bauer, J.M., Meech, K.J., Fernandez, Y.R., Pittichova, J., Hainaut, O.R., Boehnhardt, H., Delsanti, A.C., 2003, "Physical survey of 24 Centaurs with visible photometry", Icarus 166, 195-211	



Astrometry

- MPC typical information

```

o5s68 * C2015 09 09.37654 00 18 59.870+05 39 49.19 21.8 r 568
o5s68 C2015 09 09.42092 00 18 59.742+05 39 48.40 21.8 r 568
o5s68 C2015 09 09.46188 00 18 59.624+05 39 47.66 21.7 r 568
o5s68 bC2015 09 18.44074 00 18 33.499+05 36 59.72 22.0 w 568
o5s68 dC2015 09 18.48843 00 18 33.358+05 36 58.84 21.9 w 568
o5s68 C2015 10 08.32880 00 17 33.726+05 30 17.99 21.9 w 568
o5s68 C2015 10 08.38143 00 17 33.565+05 30 16.90 21.9 w 568
o5s68 C2015 10 09.29850 00 17 30.846+05 29 57.98 21.9 w 568
o5s68 bC2015 11 10.41160 00 16 07.017+05 19 40.44 22.1 w 568
o5s68 C2015 12 08.22307 00 15 27.458+05 13 41.47 22.0 w 568
o5s68 SC2016 02 04.21904 00 16 25.995+05 16 04.93 568
o5s68 bC2016 02 04.22299 00 16 26.007+05 16 04.99 22.0 r 568
o5s68 bC2016 02 04.22679 00 16 26.028+05 16 04.96 22.6 g 568
o5s68 VC2016 02 05.21589 00 16 28.569+05 16 18.09 23.0 g 568
o5s68 bC2016 02 05.21880 00 16 28.572+05 16 18.63 23.0 g 568
o5s68 C2016 02 06.21934 00 16 31.226+05 16 31.90 22.5 g 568
o5s68 bC2016 02 07.21905 00 16 33.904+05 16 45.82 21.9 r 568
o5s68 bC2016 06 05.61595 00 22 51.598+05 56 39.02 21.7 r 568
o5s68 C2016 06 07.61302 00 22 54.749+05 57 03.70 21.9 r 568
o5s68 C2016 06 08.57085 00 22 56.189+05 57 15.13 21.8 r 568
o5s68 IC2016 09 05.51473 00 21 38.844+05 51 51.26 21.9 w 568
o5s68 C2016 09 07.45495 00 21 33.426+05 51 17.24 21.9 w 568
o5s68 C2016 09 07.50041 00 21 33.294+05 51 16.47 22.0 w 568
o5s68 C2016 09 26.52978 00 20 36.970+05 45 10.76 21.8 w 568
o5s68 C2016 10 27.22137 00 19 07.632+05 34 44.92 21.7 r 568
o5s68 C2016 10 27.22642 00 19 07.612+05 34 44.75 24.0 u 568
o5s68 C2016 10 27.23948 00 19 07.587+05 34 44.44 23.9 u 568
o5s68 dC2016 10 27.24376 00 19 07.585+05 34 44.39 23.8 u 568
o5s68 dC2016 10 27.24803 00 19 07.555+05 34 44.43 23.6 u 568
o5s68 dC2016 10 27.26087 00 19 07.522+05 34 44.37 23.8 u 568
o5s68 C2016 10 27.26515 00 19 07.511+05 34 43.85 24.1 u 568
o5s68 dC2016 10 27.26943 00 19 07.488+05 34 44.23 23.8 u 568
o5s68 C2016 10 27.27370 00 19 07.486+05 34 43.98 23.9 u 568
o5s68 C2016 10 27.27798 00 19 07.483+05 34 43.71 24.0 u 568
o5s68 C2016 10 27.28226 00 19 07.471+05 34 43.91 24.3 u 568
o5s68 C2016 10 27.28731 00 19 07.452+05 34 43.69 21.7 r 568
o5s68 C2016 10 30.31559 00 18 59.672+05 33 45.68 21.9 w 568
o5s68 C2016 10 30.32250 00 18 59.653+05 33 45.55 21.9 w 568
o5s68 C2016 10 30.33074 00 18 59.636+05 33 45.43 21.9 w 568
o5s68 bC2016 10 30.36086 00 18 59.555+05 33 44.85 21.9 w 568
o5s68 bC2016 10 30.36491 00 18 59.548+05 33 44.74 22.0 w 568
o5s68 C2016 11 02.25398 00 18 52.421+05 32 50.84 21.9 w 568
o5s68 C2016 11 02.27635 00 18 52.364+05 32 50.45 22.0 w 568
o5s68 C2016 11 03.26914 00 18 49.979+05 32 32.25 21.9 w 568
o5s68 C2016 11 03.28100 00 18 49.950+05 32 32.04 21.9 w 568
o5s68 C2016 11 03.32171 00 18 49.851+05 32 31.27 22.0 w 568
o5s68 C2016 11 03.33353 00 18 49.821+05 32 31.12 22.0 w 568
o5s68 C2016 12 24.21957 00 17 50.974+05 23 00.64 22.0 w 568
o5s68 C2017 01 02.22032 00 17 55.920+05 22 54.64 22.1 w 568
o5s68 C2017 01 26.21403 00 18 32.190+05 25 12.79 21.5 w 568
o5s68 C2017 09 16.53726 00 23 40.428+05 59 48.12 21.8 w 568
o5s68 C2017 09 22.49098 00 23 22.480+05 57 51.08 21.8 w 568
o5s68 C2017 11 22.35711 00 20 42.796+05 38 32.60 21.9 w 568

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o5s68.mpc All (1,0) (Text Fill)



Astrometry

• Survey internal information

015BS1N3	*	C2015	09	09.37654	00	18	59.870+05	39	49.19	21.8	r	568	20150909	568_1	20160710	1000400000	0	1832034p37	015BS1N3	Y	64.04	1616.54	0.20	2	21.77	0.01	% great IQ
015BS1N3		C2015	09	09.42092	00	18	59.742+05	39	48.40	21.8	r	568	20150909	568_1	20160710	1000400000	0	1832044p37	015BS1N3	Y	54.49	1623.79	0.20	2	21.77	0.01	%
015BS1N3		C2015	09	09.46188	00	18	59.624+05	39	47.66	21.7	r	568	20150909	568_1	20160710	1000400000	0	1832054p37	015BS1N3	Y	45.98	1629.65	0.20	2	21.73	0.01	%
BtmpSSX	bc	C2015	09	18.44074	00	18	33.499+05	36	59.72	22.0	w	568	20150623	568_1	20170621	0000400000	0	1833683p37	015BS1N3	Yb	1008.39	1265.45	0.05	4	21.95	0.01	%
BtmpSSX	dc	C2015	09	18.48843	00	18	33.358+05	36	58.84	21.9	w	568	20150623	568_1	20170621	0000400000	0	1833692p37	015BS1N3	Yd	995.18	1271.14	0.04	4	21.93	0.01	%
BtmpSSX		C2015	10	08.32880	00	17	33.726+05	30	17.99	21.9	w	568	20150623	568_1	20170621	0000400000	0	1836554p17	015BS1N3	Y	1117.45	492.47	0.05	4	21.87	0.01	%
BtmpSSX		C2015	10	08.38143	00	17	33.565+05	30	16.90	21.9	w	568	20150623	568_1	20170621	0000400000	0	1836564p17	015BS1N3	Y	1098.01	498.44	0.04	4	21.91	0.01	% need mkpsf
BtmpSSX		C2015	10	09.29850	00	17	30.846+05	29	57.98	21.9	w	568	20150623	568_1	20170621	0000400000	0	1836725p17	015BS1N3	Y	1228.35	932.31	0.07	4	21.86	0.01	% need mkpsf
BtmpSSX	bc	C2015	11	10.41160	00	16	07.017+05	19	40.44	22.1	w	568	20150623	568_1	20170621	0000400000	0	1846587p06	015BS1N3	Yb	125.45	4471.54	0.06	4	22.06	0.01	% need mkpsf
BtmpSSX		C2015	12	08.22307	00	15	27.458+05	13	41.47	22.0	w	568	20150623	568_1	20170621	0000400000	0	1851270p06	015BS1N3	Y	1597.40	4169.21	0.04	4	22.04	0.01	% good IQ
BtmpSSX		2016	02	03.21536	00	16	23.445+05	15	51.85	23.0	g	568	20150623	568_1	20160710	0000400000	0	1891272p13	015BS1N3	Z	942.30	2366.50	0.20	0	-----	----	% too faint
BtmpSSX	SC	C2016	02	04.21904	00	16	25.995+05	16	04.93	23.0	g	568	20150623	568_1	20170621	0000400000	0	1891512p13	015BS1N3	ZS	938.94	2367.39	0.20	4	-----	----	% hvy fringing
BtmpSSX	bc	C2016	02	04.22299	00	16	26.007+05	16	04.99	22.0	r	568	20150623	568_1	20170621	0000400000	0	1891513p13	015BS1N3	Yb	940.26	2366.64	0.08	4	21.98	0.06	%
BtmpSSX	bc	C2016	02	04.22679	00	16	26.028+05	16	04.96	22.6	g	568	20150623	568_1	20170621	0000400000	0	1891514p13	015BS1N3	Yb	943.95	2366.09	0.12	4	22.61	0.07	%
BtmpSSX		2016	02	05.21300	00	16	28.578+05	16	18.13	23.0	g	568	20150623	568_1	20160710	0000400000	0	1891669p13	015BS1N3	Z	939.70	2369.00	0.20	0	-----	----	% not visible
BtmpSSX	VC	C2016	02	05.21589	00	16	28.569+05	16	18.09	23.0	g	568	20150623	568_1	20170621	0000400000	0	1891670p13	015BS1N3	YV	938.41	2369.50	0.31	4	22.98	0.22	% bad IQ
BtmpSSX	bc	C2016	02	05.21880	00	16	28.572+05	16	18.63	23.0	g	568	20150623	568_1	20170621	0000400000	0	1891671p13	015BS1N3	Yb	938.71	2366.42	0.26	4	21.89	0.18	%
BtmpSSX		C2016	02	06.21934	00	16	31.226+05	16	31.90	22.5	g	568	20150623	568_1	20170621	0000400000	0	1891921p13	015BS1N3	Y	936.34	2370.20	0.06	4	22.46	0.05	%
BtmpSSX		2016	02	07.21397	00	16	33.895+05	16	45.75	21.9	w	568	20150623	568_1	20160710	0000400000	0	1892275p13	015BS1N3	Z	929.30	2373.20	0.20	0	-----	----	% bad fringing
BtmpSSX	bc	C2016	02	07.21905	00	16	33.904+05	16	45.82	21.9	r	568	20150623	568_1	20170621	0000400000	0	1892276p13	015BS1N3	Yb	930.47	2372.17	0.06	4	21.86	0.05	%
BtmpSSX	bc	C2016	06	05.61595	00	22	51.598+05	56	39.02	21.7	r	568	20160605	568_1	20170621	0000400000	0	1937970p13	015BS1N3	Yb	1109.31	2297.84	0.12	4	21.73	0.08	% faint
BtmpSSX		C2016	06	07.61302	00	22	54.749+05	57	03.70	21.9	r	568	20160605	568_1	20170621	0000400000	0	1938402p13	015BS1N3	Y	1118.40	2297.38	0.03	4	21.89	0.03	%
BtmpSSX		C2016	06	08.57085	00	22	56.189+05	57	15.13	21.8	r	568	20160605	568_1	20170621	0000400000	0	1938628p13	015BS1N3	Y	1113.99	2301.40	0.03	4	21.82	0.02	%
o5s68	IC	C2016	09	05.51473	00	21	38.844+05	51	51.26	21.9	w	568	20150623	568_1	20170621	0000400000	0	2000515p37	015BS1N3	YI	1211.50	4157.35	0.04	4	21.91	0.01	%
o5s68		C2016	09	07.45495	00	21	33.426+05	51	17.24	21.9	w	568	20150623	568_1	20170621	0000400000	0	2000860p37	015BS1N3	Y	1319.44	4114.41	0.05	4	21.90	0.01	%
o5s68		C2016	09	07.50041	00	21	33.294+05	51	16.47	22.0	w	568	20150623	568_1	20170621	0000400000	0	2000871p37	015BS1N3	Y	1313.12	4119.73	0.04	4	21.96	0.01	%
o5s68		C2016	09	26.52978	00	20	36.970+05	45	10.76	21.8	w	568	20150623	568_1	20170621	0000400000	0	2006120p39	015BS1N3	Y	1159.06	2355.34	0.07	4	21.85	0.01	%
o5s68		C2016	10	27.22137	00	19	07.632+05	34	44.92	21.7	r	568	20150623	568_1	20170621	0000400000	0	2010206p24	015BS1N3	Y	1125.92	2024.17	0.04	4	21.68	0.02	%
o5s68		C2016	10	27.22642	00	19	07.612+05	34	44.75	24.0	u	568	20150623	568_1	20170621	0000400000	0	2010207p24	015BS1N3	Y	1133.13	2019.93	0.18	4	23.95	0.15	%
o5s68		2016	10	27.23088	00	19	07.605+05	34	44.72	23.9	u	568	20150623	568_1	20161117	0000400000	0	2010208p24	015BS1N3	Z	1132.90	2019.10	0.20	0	-----	----	% bit diffuse
o5s68		2016	10	27.23520	00	19	07.592+05	34	44.64	23.9	u	568	20150623	568_1	20161117	0000400000	0	2010209p24	015BS1N3	Z	1133.40	2018.20	0.20	0	-----	----	% bit diffuse
o5s68		C2016	10	27.23948	00	19	07.587+05	34	44.44	23.8	u	568	20150623	568_1	20170621	0000400000	0	2010210p24	015BS1N3	Y	1133.50	2017.57	0.13	4	23.91	0.12	%
o5s68	dc	C2016	10	27.24376	00	19	07.585+05	34	44.39	23.8	u	568	20150623	568_1	20170621	0000400000	0	2010211p24	015BS1N3	Yd	1132.75	2017.09	0.14	4	23.84	0.12	%
o5s68	dc	C2016	10	27.24803	00	19	07.555+05	34	44.43	23.6	u	568	20150623	568_1	20170621	0000400000	0	2010212p24	015BS1N3	Yd	1134.93	2017.23	0.12	4	23.59	0.09	%
o5s68		2016	10	27.25232	00	19	07.547+05	34	44.31	23.9	u	568	20150623	568_1	20161117	0000400000	0	2010213p24	015BS1N3	Z	1135.10	2015.60	0.20	0	-----	----	% bit diffuse
o5s68		2016	10	27.25600	00	19	07.535+05	34	44.23	23.9	u	568	20150623	568_1	20161117	0000400000	0	2010214p24	015BS1N3	Z	1135.10	2015.00	0.20	0	-----	----	% v diffuse
o5s68	dc	C2016	10	27.26087	00	19	07.522+05	34	44.37	23.8	u	568	20150623	568_1	20170621	0000400000	0	2010215p24	015BS1N3	Yd	1136.16	2015.98	0.18	4	23.79	0.13	%
o5s68		C2016	10	27.26515	00	19	07.511+05	34	43.85	24.1	u	568	20150623	568_1	20170621	0000400000	0	2010216p24	015BS1N3	Y	1136.42	2012.93	0.15	4	24.11	0.14	%
o5s68	dc	C2016	10	27.26943	00	19	07.488+05	34	44.23	23.8	u	568	20150623	568_1	20170621	0000400000	0	2010217p24	015BS1N3	Yd	1137.53	2014.74	0.10	4	23.76	0.09	%
o5s68		C2016	10	27.27370	00	19	07.486+05	34	43.98	23.9	u	568	20150623	568_1	20170621	0000400000	0	2010218p24	015BS1N3	Y	1137.52	2013.26	0.11	4	23.86	0.10	%
o5s68		C2016	10	27.27798	00	19	07.483+05	34	43.71	24.0	u	568	20150623	568_1	20170621	0000400000	0	2010219p24	015BS1N3	Y	1137.13	2011.51	0.11	4	24.04	0.11	%
o5s68		C2016	10	27.28226	00	19	07.471+05	34	43.91	24.3	u	568	20150623	568_1	20170621	0000400000	0	2010220p24	015BS1N3	Y	1137.69	2012.51	0.14	4	24.27	0.14	%
o5s68		C2016	10	27.28731	00	19	07.452+05	34	43.69	21.7	r	568	20150623	568_1	20170621	0000400000	0	2010221p24	015BS1N3	Y	1137.52	2014.39	0.03	4	21.68	0.02	%
o5s68		C2016	10	30.31559	00	18	59.672+05	33	45.68	21.9	w	568	20150623	568_1	20170621	0000400000	0	2010643p05	015BS1N3	Y	1475.51	759.44	0.04	4	21.90	0.01	%
o5s68		C2016	10	30.32250	00	18	59.653+05	33	45.55	21.9	w	568	20150623	568_1	20170621	0000400000	0	2010644p05	015BS1N3	Y	1473.92	760.39	0.04	4	21.94	0.02	%
o5s68		C2016	10	30.33074	00	18	59.636+05	33	45.43	21.9	w	568	20150623	568_1	20170621	0000400000											



Dynamics

```
# File: All_Surveys_v11.detections
```

#	cl	p	j	k	sh	object	mag	e_mag	Filt	Hsur	dist	e_dist	Nobs	time	av_xres	av_yres	max_x	max_y	a	e_a	e	e_e	i	e_i	Omega	e_Omega	omega	e_omega	tperi	e_tperi	RAdeg	DEdeg	JD	rate	MPC
sca	x	-1	-1	S		03e01	21.50	0.087	r	7.73	23.291	0.000	43	2.1956	0.051	0.042	0.115	0.169	34.417216	0.0080	0.589600	0.000133	7.711	0.000	32.982	0.000	275.189	0.003	62220.957	0.559	213.148	-13.587	2456386.92978	4.87	K02GG6G
res	N	3	2	S		03e02	23.34	0.140	r	8.32	31.080	0.001	32	3.2522	0.047	0.052	0.187	0.134	39.440179	0.0041	0.228123	0.000131	13.468	0.000	35.741	0.000	152.551	0.047	52153.805	6.812	213.839	-13.500	2456386.94170	3.73	K13G07H
res	N	3	2	S		03e03	23.72	0.109	r	8.70	31.131	0.000	29	4.1449	0.092	0.052	0.195	0.207	33.334897	0.0052	0.256758	0.000153	3.866	0.000	31.386	0.001	136.792	0.022	49608.799	2.481	211.891	-13.064	2456386.91785	3.68	K13G07E
res	N	3	2	S		03e04	23.39	0.163	r	8.25	32.136	0.000	29	3.1756	0.059	0.050	0.253	0.320	39.495980	0.0043	0.266711	0.000188	16.873	0.000	42.491	0.000	230.926	0.036	65131.641	3.559	214.699	-11.658	2456391.88210	3.72	K13G07J
res	N	2	1	S		03e05	22.69	0.066	r	7.42	33.001	0.001	31	2.1187	0.044	0.047	0.139	0.093	47.744356	0.0099	0.344105	0.000246	6.660	0.001	219.318	0.000	35.600	0.060	62234.242	8.108	216.271	-14.536	2456391.88613	3.40	K13G06W
res	N	3	2	S		03e06	24.03	0.309	r	8.59	34.357	0.001	36	2.0422	0.110	0.103	0.432	0.463	39.258556	0.0083	0.199499	0.000505	10.440	0.001	44.493	0.000	235.115	0.091	66946.358	10.054	217.397	-13.633	2456391.90177	3.27	K13G07L
res	N	3	2	S		03e07	24.06	0.162	r	8.52	35.160	0.001	25	1.3764	0.097	0.102	0.425	0.453	39.333143	0.0184	0.135343	0.001629	2.392	0.001	96.067	0.023	74.042	0.699	47992.924	118.516	212.643	-10.849	2456386.93770	3.51	K13G07G
res	N	3	2	S		03e08	24.02	0.130	r	8.45	35.413	0.001	34	4.2867	0.069	0.071	0.235	0.230	39.371591	0.0028	0.103683	0.000078	6.942	0.000	204.436	0.000	352.259	0.091	53206.618	18.199	210.956	-11.526	2456386.90980	3.41	K13G07D
res	N	5	2	S		03e09	22.94	0.051	r	7.32	35.765	0.001	38	2.1189	0.059	0.058	0.268	0.329	55.536335	0.0202	0.414113	0.000368	10.877	0.001	221.020	0.000	43.984	0.055	64191.070	6.648	216.853	-15.028	2456391.89790	3.24	K13G06Y
cla	i	-1	-1	S		03e10	23.73	0.187	r	8.00	36.716	0.001	31	2.1218	0.085	0.089	0.267	0.443	38.767733	0.0054	0.060340	0.000502	24.276	0.001	39.138	0.000	148.883	0.692	49771.082	146.803	216.728	-14.223	2456391.89790	3.36	K13G06D
sca	x	-1	-1	S		03e11	23.60	0.098	r	7.86	36.851	0.001	33	4.1367	0.083	0.166	0.160	0.253	86.736041	0.0210	0.609305	0.000107	18.362	0.000	213.926	0.000	36.549	0.014	62736.013	1.897	210.617	-12.965	2456386.90583	3.23	K13G06Z
res	N	3	2	S		03e12	23.90	0.134	r	8.11	37.246	0.001	37	1.9632	0.101	0.109	0.319	0.350	39.556760	0.0107	0.156867	0.000795	14.679	0.001	35.789	0.000	101.826	0.063	41302.828	3.468	212.805	-12.830	2456386.92978	3.18	K13G07F
res	N	16	9	IH		03e13	23.72	0.113	r	7.86	37.877	0.001	34	4.2869	0.114	0.162	0.220	0.378	44.118257	0.0041	0.167468	0.000149	8.318	0.000	49.169	0.001	125.890	0.055	48297.846	10.310	212.216	-10.496	2456386.92583	3.12	K13G06E
cla	m	-1	-1	S		03e15	23.86	0.150	r	7.87	39.055	0.001	27	1.8894	0.105	0.097	0.245	0.263	43.932301	0.0050	0.113549	0.000268	5.420	0.001	57.011	0.004	146.669	0.485	53218.946	112.418	216.041	-12.328	2456391.89399	3.18	K13G08D
cla	m	-1	-1	S		03e16	23.47	0.142	r	7.44	39.491	0.001	27	2.1218	0.057	0.064	0.238	0.142	43.865613	0.0052	0.099767	0.000084	2.595	0.000	95.871	0.018	120.985	0.660	56797.205	157.995	214.076	-11.197	2456391.87047	3.08	K13G07S
cla	m	-1	-1	IH		03e17	24.00	0.140	r	7.85	40.609	0.001	34	4.2242	0.114	0.078	0.336	0.277	41.097734	0.0032	0.034898	0.000250	7.451	0.000	216.046	0.000	288.779	0.114	38169.437	24.570	214.917	-13.830	2456391.87434	2.96	K13G06V
cla	m	-1	-1	S		03e18	23.87	0.164	r	7.69	40.693	0.001	28	4.2269	0.099	0.088	0.310	0.238	41.441841	0.0060	0.048136	0.000484	21.116	0.001	212.131	0.000	288.248	0.071	37078.442	14.629	215.455	-12.182	2456386.93939	3.04	K13G07Z
res	N	7	4	S		03e19	23.40	0.098	r	7.20	41.042	0.001	28	4.1532	0.105	0.080	0.211	0.240	43.646726	0.0035	0.076386	0.000202	1.645	0.000	198.739	0.005	55.544	0.029	66883.277	55.024	211.186	-12.217	2456386.90583	2.96	K13G06E
cla	m	-1	-1	S		03e20PD	23.09	0.215	r	6.82	41.568	0.001	54	15.9186	0.119	0.042	0.251	0.170	43.237058	0.0034	0.039489	0.000059	1.171	0.000	56.758	0.002	171.769	0.027	59766.814	7.205	214.170	-13.232	2456386.94170	2.81	K01F15K
cla	m	-1	-1	S		03e21	23.40	0.093	r	7.12	41.693	0.001	32	4.1367	0.061	0.056	0.306	0.212	45.865486	0.0075	0.131261	0.000302	2.848	0.000	98.464	0.007	69.726	0.070	43035.565	13.225	213.386	-10.854	2456386.93770	2.97	K13G07N
cla	m	-1	-1	S		03e22	22.97	0.093	r	6.70	41.715	0.001	39	4.1394	0.069	0.058	0.447	0.319	44.094947	0.0045	0.065052	0.000187	2.761	0.000	72.401	0.006	103.055	0.174	46932.472	43.600	210.436	-10.419	2456386.91383	2.96	K13G07M
cla	m	-1	-1	S		03e23PD	23.37	0.077	r	7.09	41.814	0.001	60	16.1754	0.052	0.049	0.234	0.374	46.446625	0.0030	0.118084	0.000041	10.636	0.000	205.775	0.000	334.492	0.015	47161.112	3.775	215.042	-11.853	2456391.88210	2.97	K01F15O
cla	m	-1	-1	S		03e24	24.00	0.136	r	7.72	41.902	0.001	27	4.2240	0.107	0.065	0.382	0.167	42.628182	0.0044	0.043771	0.000384	4.226	0.001	51.358	0.002	233.421	0.777	74671.818	63.932	213.800	-12.325	2456391.86658	2.99	K13G07R
cla	m	-1	-1	S		03e25	23.59	0.087	r	7.30	41.923	0.001	36	4.2212	0.086	0.091	0.259	0.418	44.842049	0.0032	0.074731	0.000127	4.972	0.001	35.735	0.000	212.512	0.192	64701.440	49.230	214.713	-13.957	2456391.87434	2.89	K13G07U
cla	m	-1	-1	S		03e26	23.83	0.233	r	7.52	42.097	0.001	39	3.9127	0.102	0.099	0.454	0.270	43.799008	0.0033	0.045284	0.000128	3.900	0.001	63.412	0.004	185.788	0.305	65067.729	80.608	215.699	-12.322	2456391.89399	2.90	K13G08A
cla	m	-1	-1	S		03e27PD	23.10	0.099	r	6.77	42.409	0.001	40	12.9479	0.053	0.045	0.153	0.161	44.152710	0.0035	0.044212	0.000052	2.822	0.000	65.606	0.001	121.499	0.064	48772.219	17.194	213.626	-11.944	2456391.87047	2.89	K04E95U
cla	m	-1	-1	S		03e28	23.17	0.096	r	6.82	42.646	0.001	44	4.2899	0.096	0.065	0.352	0.302	43.288981	0.0030	0.058764	0.000413	4.129	0.001	51.114	0.002	241.132	0.133	77210.436	24.929	212.178	-11.653	2456391.89004	3.04	K13G07X
cla	m	-1	-1	S		03e29	23.46	0.080	r	7.09	42.702	0.001	34	2.2118	0.085	0.076	0.303	0.444	41.419708	0.0064	0.091296	0.000858	29.251	0.001	35.399	0.000	290.966	0.225	84741.207	64.711	211.019	-10.619	2456386.91383	2.94	K13G07O
cla	m	-1	-1	S		03e30PD	22.99	0.054	r	6.59	43.007	0.001	37	9.9634	0.054	0.076	0.120	0.159	45.258061	0.0038	0.057267	0.000052	2.633	0.000	169.302	0.003	15.405	0.101	47718.231	27.424	214.789	-11.817	2456391.88210	2.86	K13E99M
cla	m	-1	-1	S		03e31	23.55	0.134	r	7.10	43.514	0.001	30	4.2213	0.111	0.098	0.345	0.375	44.593403	0.0067	0.105970	0.000372	2.294	0.001	25.267	0.003	108.593	0.036	34984.304	11.929	214.553	-14.305	2456391.87434	2.76	K13G07T
cla	m	-1	-1	S		03e32	23.52	0.144	r	7.02	43.926	0.001	33	3.2466	0.099	0.076	0.242	0.269	42.894224	0.0030	0.050571	0.000662	3.022	0.001	83.338	0.012	254.744	0.384	89382.086	110.002	216.017	-11.950	2456391.89399	2.71	K13G08C
cla	m	-1	-1	S		03e34PD	23.57	0.102	r	7.05	44.130	0.001	37	12.0659	0.074	0.069	0.241	0.188	44.044874	0.0033	0.018631	0.000048	0.551	0.000	175.792	0.015	305.610	0.174	28265.330	54.126	216.590	-14.088	2456391.89790	2.75	K13G08B
cla	m	-1	-1	S		03e35	23.48	0.133	r	6.94	44.369	0.001	19	3.3013	0.139	0.098	0.401	0.243	43.709752	0.0047	0.025461	0.000833	1.748	0.000	141.558	0.025	199.513	1.210	93059.736</						

Dynamics

File: All_Surveys_v11.detections

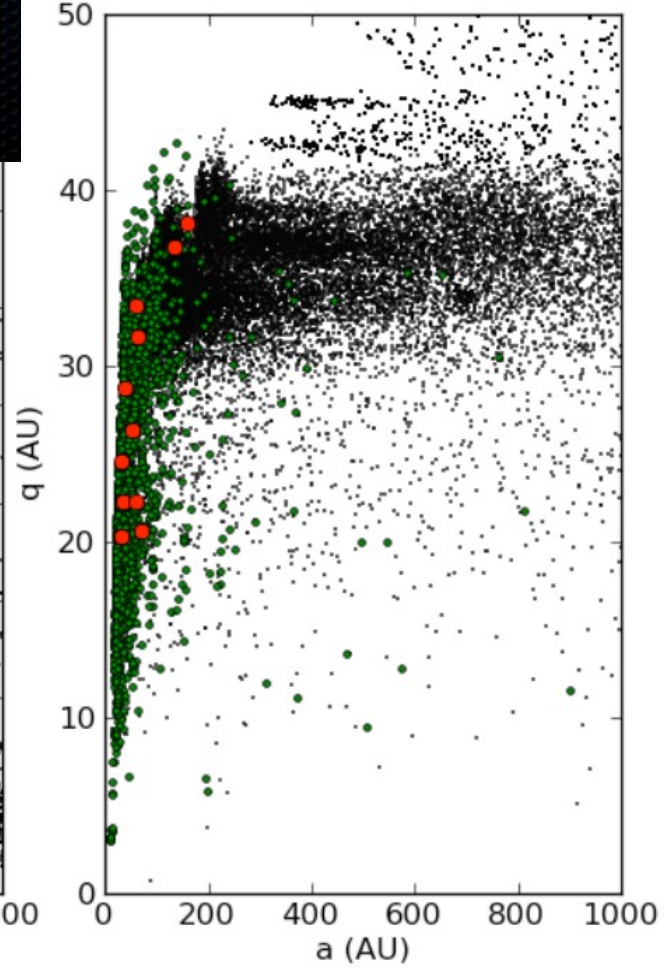
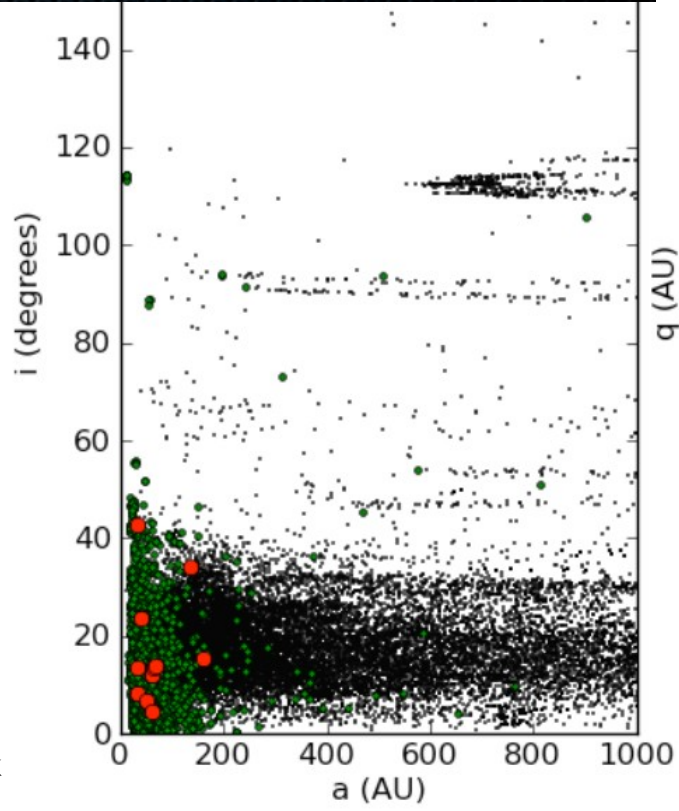
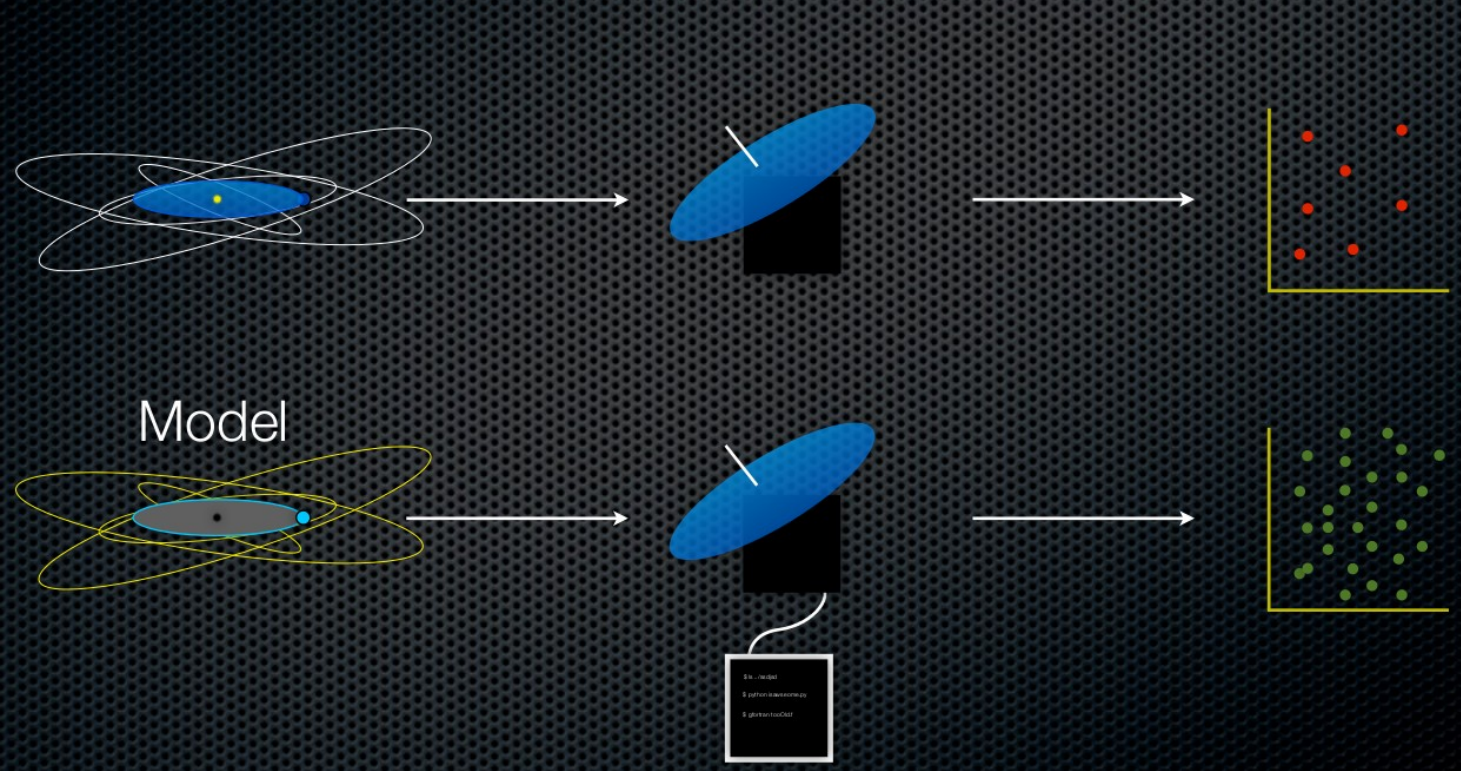
```
#
# cl p j k sh object mag e_mag Filt Hsur dist e_dist Nobs time av_xres av_yres max_x max_y a e_a
sca x -1 -1 S o3e01 21.50 0.087 r 7.73 23.291 0.000 43 2.1956 0.051 0.042 0.115 0.169 34.417216 0.0080
res N 3 2 S o3e02 23.34 0.140 r 8.32 31.080 0.001 32 3.2522 0.047 0.052 0.187 0.134 39.440179 0.0041
res N 3 2 S o3e03 23.72 0.109 r 8.70 31.131 0.000 29 4.1449 0.092 0.052 0.195 0.207 39.334897 0.0052
res N 3 2 S o3e04 23.39 0.163 r 8.25 32.136 0.000 29 3.1756 0.059 0.050 0.253 0.320 39.495980 0.0043
res N 2 1 S o3e05 22.69 0.066 r 7.42 33.001 0.001 31 2.1187 0.044 0.047 0.139 0.093 47.744356 0.0099
res N 3 2 S o3e06 24.03 0.309 r 8.59 34.357 0.001 36 2.0422 0.110 0.103 0.432 0.463 39.258556 0.0083
res N 3 2 S o3e07 24.06 0.162 r 8.52 35.160 0.001 25 1.3764 0.097 0.102 0.425 0.453 39.333143 0.0184
res N 3 2 S o3e08 24.02 0.130 r 8.45 35.413 0.001 34 4.2867 0.069 0.071 0.235 0.230 39.371591 0.0028
res N 5 2 S o3e09 22.04 0.051 r 7.32 35.765 0.001 38 2.1180 0.050 0.058 0.268 0.320 55.536335 0.0202
```

```
e e_e i e_i Omega e_Omega omega e_omega tperi e_tperi RAdeg DEdeg JD rate MPC
0.589600 0.000133 7.711 0.000 32.982 0.000 275.189 0.003 62220.957 0.559 213.148 -13.587 2456386.92978 4.87 K02GG6G
0.228123 0.000131 13.468 0.000 35.741 0.000 152.551 0.047 52153.805 6.812 213.839 -13.500 2456386.94170 3.73 K13GD7H
0.256758 0.000153 3.866 0.000 31.386 0.001 136.792 0.022 49608.799 2.481 211.891 -13.064 2456386.91785 3.68 K13GD7E
0.266711 0.000188 16.873 0.000 42.491 0.000 230.926 0.036 65131.641 3.559 214.699 -11.658 2456391.88210 3.72 K13GD7J
0.344105 0.000246 6.660 0.001 219.318 0.000 35.600 0.060 62234.242 8.108 216.271 -14.536 2456391.88613 3.40 K13GD6W
0.199499 0.000505 10.440 0.001 44.493 0.000 235.115 0.091 66946.358 10.054 217.397 -13.633 2456391.90177 3.27 K13GD7L
0.135343 0.001629 2.392 0.001 96.067 0.023 74.042 0.699 47992.924 118.516 212.643 -10.849 2456386.93770 3.51 K13GD7G
0.103683 0.000078 6.942 0.000 204.436 0.000 352.259 0.091 53206.618 18.199 210.956 -11.526 2456386.90980 3.41 K13GD7D
0.414113 0.000368 10.877 0.001 221.020 0.000 43.984 0.055 64191.070 6.648 216.853 -15.028 2456391.89790 3.24 K13GD6Y
0.060340 0.000502 24.276 0.001 39.138 0.000 148.883 0.692 49771.082 146.803 216.728 -14.223 2456391.89790 3.36 K13GD6O
```



Survey Simulator





```
# This is the OSSOS survey description file.
#
# All lines starting with '#' are ignored, so they are used for comments
#
# 2013B-L block
#
poly 8 00:52:55.81 +03:43:49.1 2456596.72735 0.9151 500 2013BL.eff
-3.5 -2.743222
-3.5 0.256778
3.5 2.743222
3.5 -0.256778
0.5 -1.322397
0.5 -0.322397
-0.5 -0.677603
-0.5 -1.677603
#
# 2014B-H block
#
poly 4 01:35:14.39 +13:28:25.3 2456952.77017 0.9103 500 2014BH.eff
-3.5 -2.700361
-3.5 0.299639
3.5 2.670528
3.5 -0.329472
#
# mailla block
#
4.887 1.990 01:51:08.00 +15:51:48.0 2455860.843750 0.916 500 mailla.eff
4.922 1.990 01:51:08.00 +13:54:00.0 2455858.963195 0.912 500 mailla.eff
1.993 2.984 01:41:01.70 +28:10:00.0 2456220.904167 0.907 500 ma12ha.eff
1.993 2.984 01:49:58.30 +28:10:00.0 2456221.947917 0.907 500 ma12ha.eff
```

U: --- pointings.list<2021> All (31,0) (Text Fill)



```
# This is an efficiency file with analytic function
#
# All lines starting with '#' are ignored, so they are used for comments.
#
# The parameters are given using a "<key> = <value(s)> pair, one per line.
# Some <keys> can only appear after a previous <key> had a specific value.
#
# See README.format and/or Template.eff for a description of the format of this
# file.
#
rate_cut= 0.50  15.00  -23.00  30.00
#
mag_error= 0.03 0.11 23.5 -0.12 24.5 -0.6
#
phot_frac= 0.013 0.152 0.835
#
track_frac= 1.0 25.35 -5.00
#
filter= r
#
rates= 0.50 2.50
function= square
square_param= 0.852392793      1.68104991E-02  24.5213051      0.148857504
# Goodness of fit (reduced chi^2):  1.086
#
# Limiting magnitude of the block
mag_lim= 24.45
#
rates= 2.50 8.00
function= square
square_param= 0.888259053      1.33343311E-02  24.4792595      0.145277739
# Goodness of fit (reduced chi^2):  2.910
#
# Limiting magnitude of the block
#mag_lim= 24.45
mag_lim= 24.46
#
rates= 8.00 12.00
function= square
square_param= 0.884100020      9.23251361E-03  24.3310623      0.160950899
# Goodness of fit (reduced chi^2):  0.689
#
# Limiting magnitude of the block
#mag_lim= 24.32
mag_lim= 24.22
#
rates= 12.00 15.00
function= square
square_param= 0.868348002      1.05533712E-02  24.2242832      0.154411465
# Goodness of fit (reduced chi^2):  0.761
#
# Limiting magnitude of the block
#mag_lim= 24.20
mag_lim= 24.10
#
```