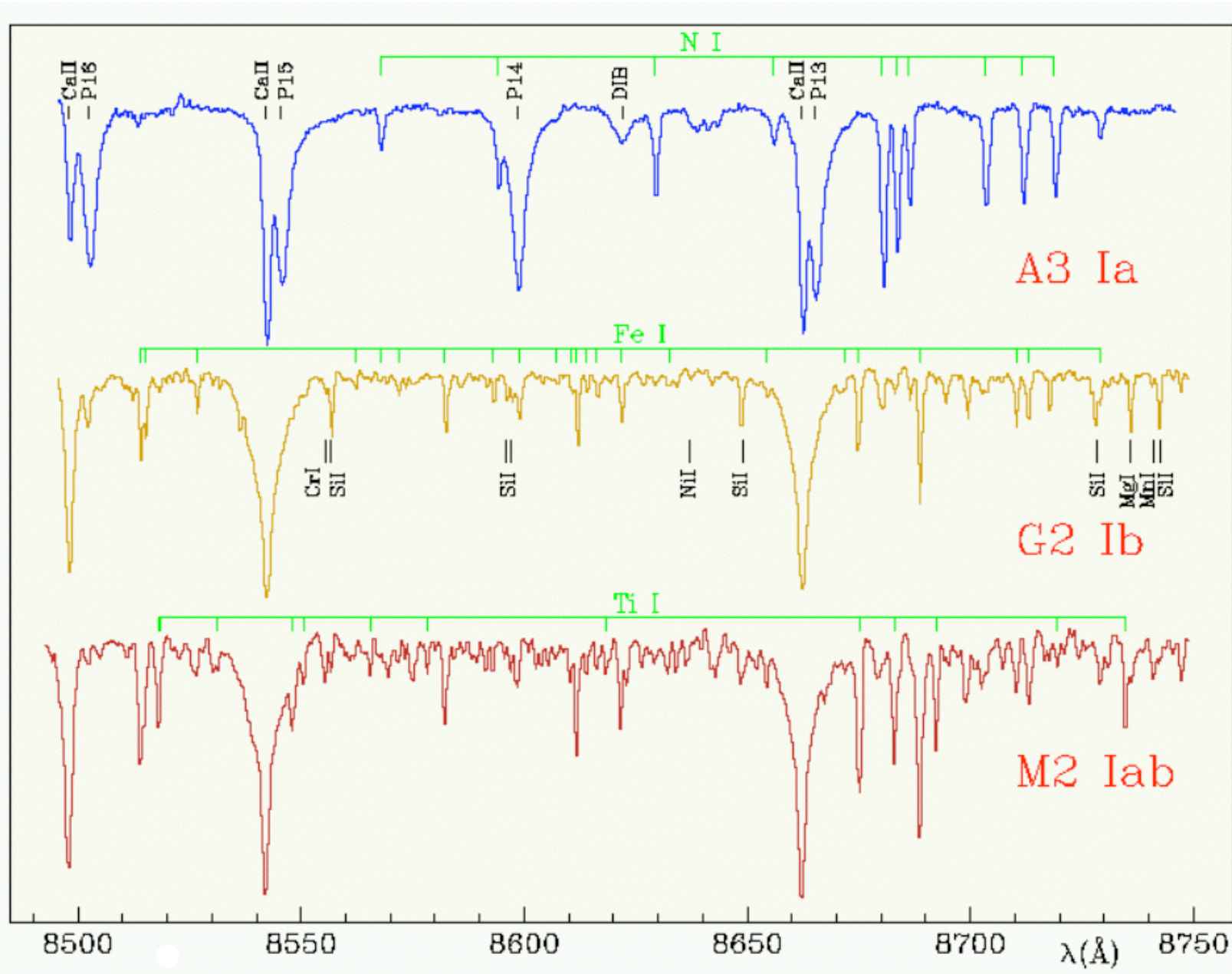


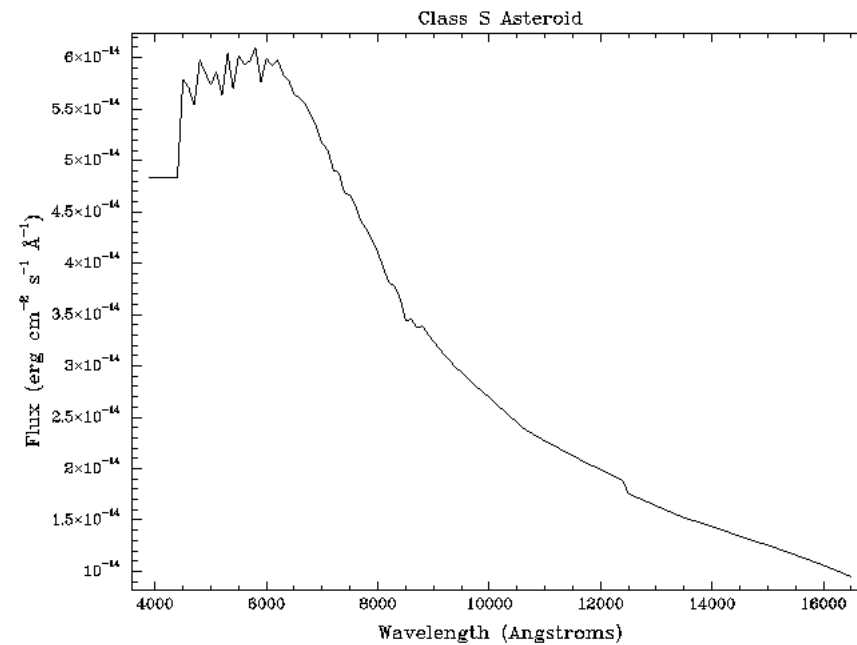
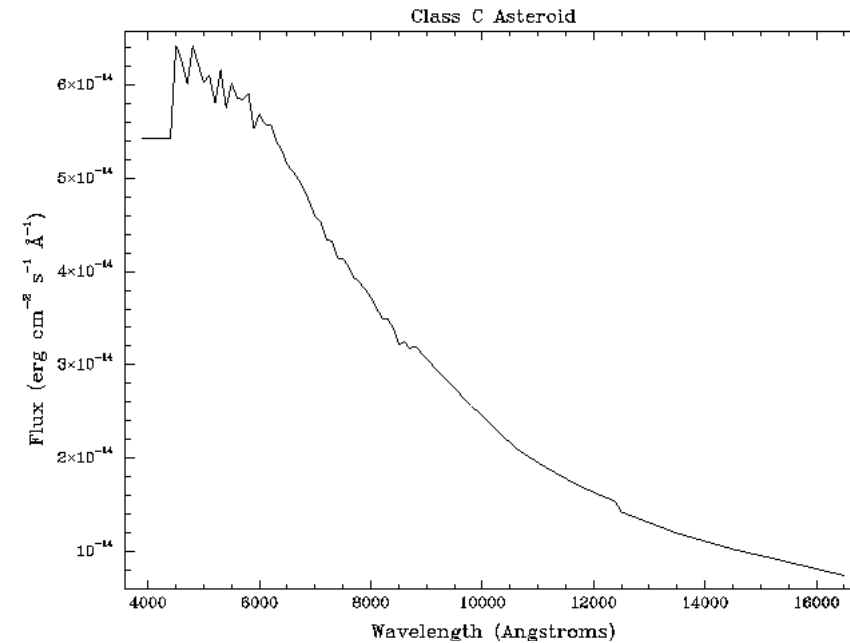
Asteroids 4 □-calibration

Toma_Zwitter

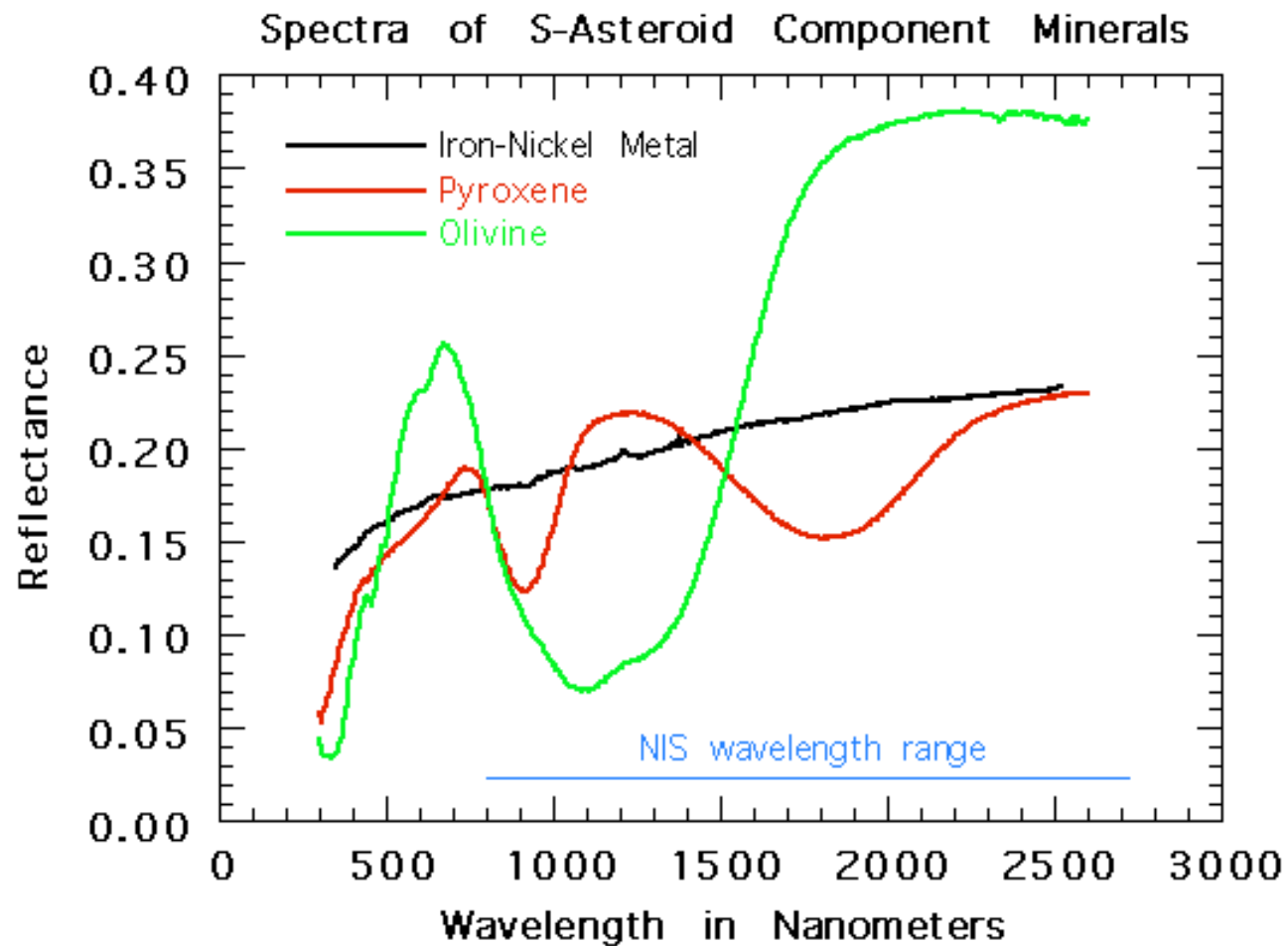
RV-VI (MSSL, june 03)



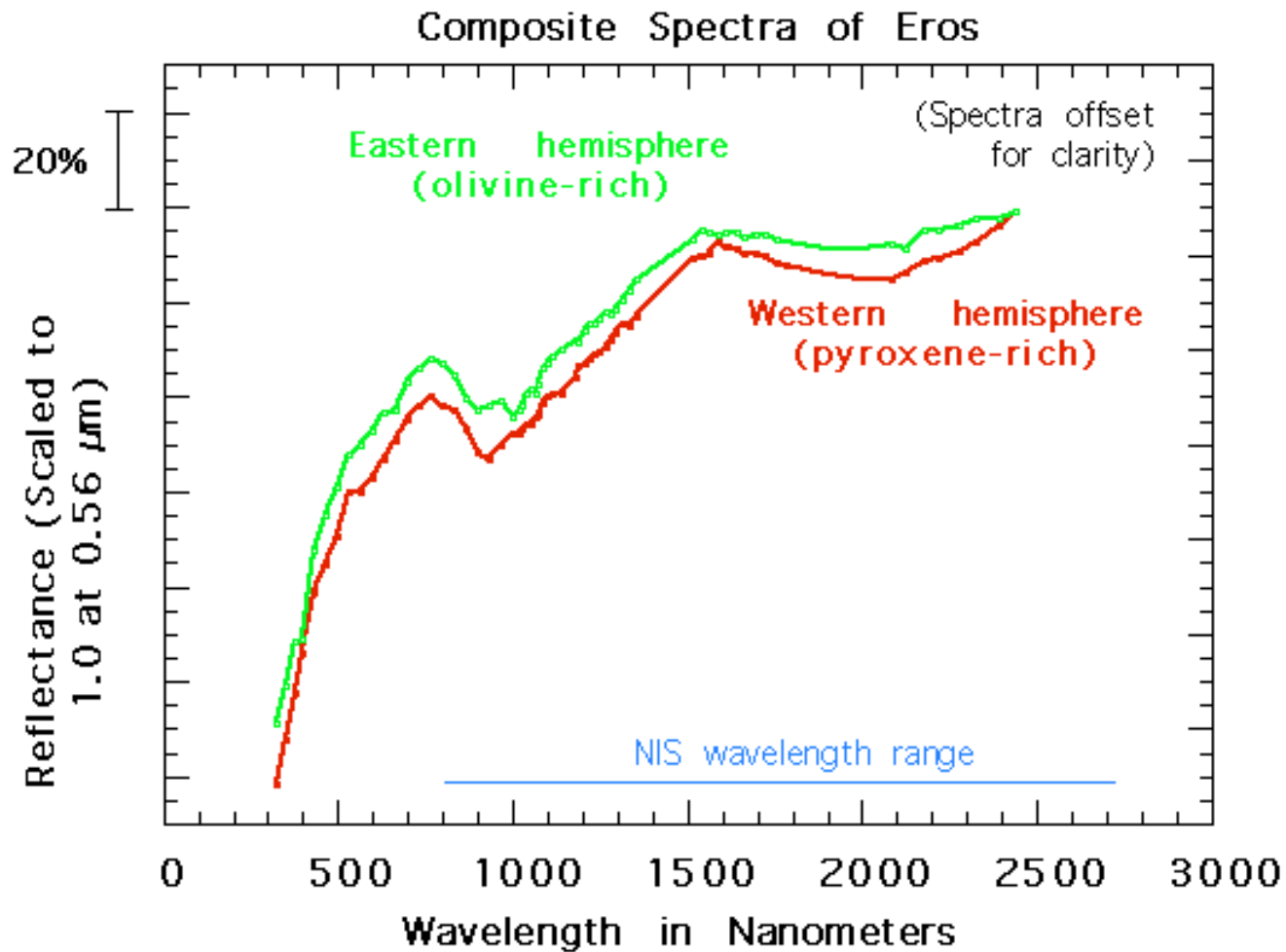
The asteroid spectra
are quite blue,...



...depend on composition,...



... and can be variable in time.



- altogether some 10^5 bodies with \sim Solar spectrum.
- most brighter ones ($V < 15$):
 - were observed in many (~ 30) oppositions.
 - have positions known to < 1 arcsec.
- with a proper motion ~ 30 arcsec/hour, this corresponds to a time error of 120 sec.
- if $\Delta v_r \sim 30 \text{ km s}^{-1}$ in ~ 3 months, we have in 120 seconds only an error of $\sim 0.5 \text{ m/s}$.

Are asteroids
bright enough?

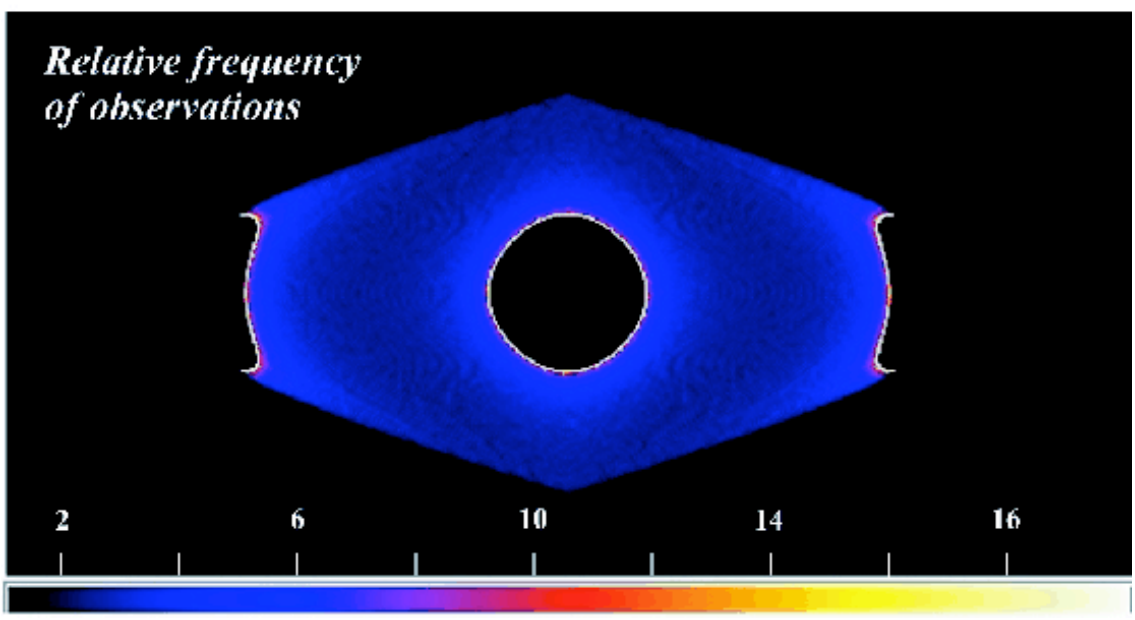
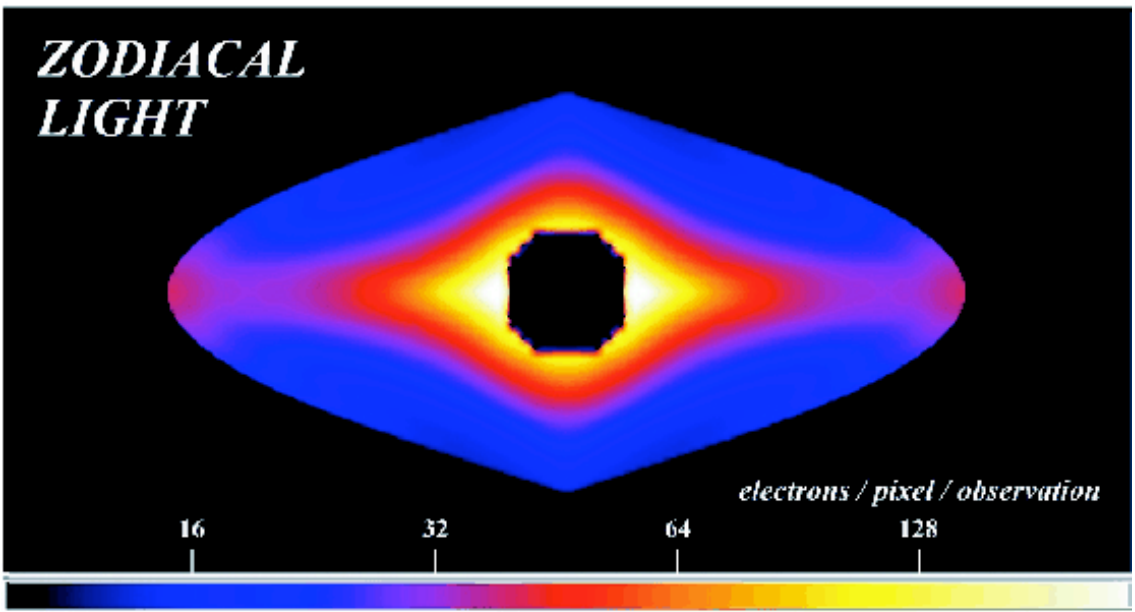
THE MIDDLE SOLAR SYSTEM

This animation shows the motion of the middle part of the solar system over a two-year time period. The sun is at the center and the orbits of the planets Mercury, Venus, Earth, Mars and Jupiter are shown in light blue (the locations of each planet are shown as large crossed circles). Comets are shown as blue squares (numbered periodic comets are filled squares, other comets are outline squares). Main-belt minor planets are displayed as green circles, near-Earth minor planets are shown as red circles.

The individual frames were generated on an OpenVMS system, using the PGLOT graphics library. The animation was put together on a RISC OS 4.03 system using !InterGif.

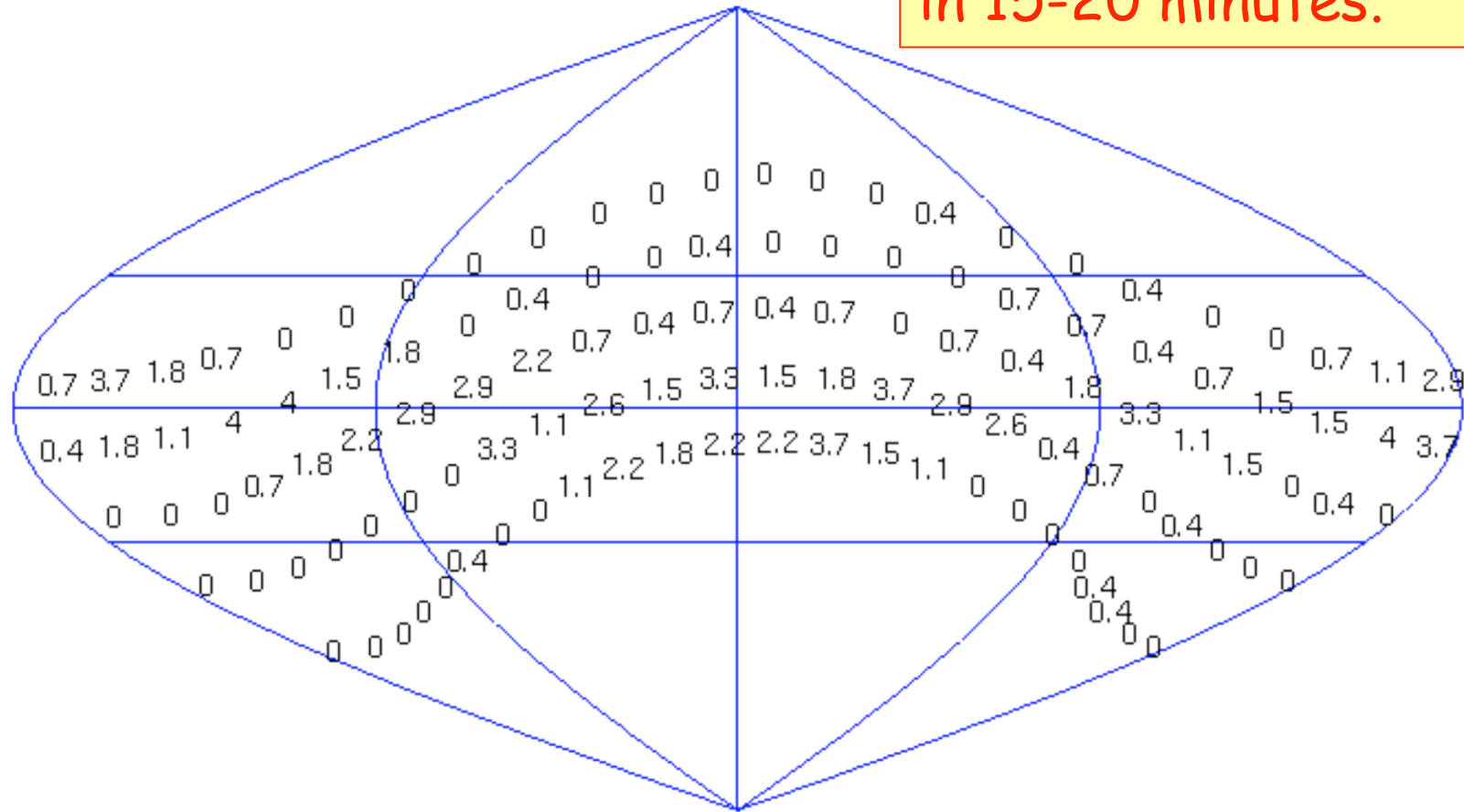
a typical object list from the MPC site

#	Object designation	R.A.			Decl.			V	Offsets		Motion/hr		Orbit
		h	m	s	°	'	"		R.A.	Decl.	R.A.	Decl.	
(358)	Apollonia	00	01	09.9	+00	58	19	14.6	17.5E	58.3N	39+	15+	39o
(73)	Klytia	23	59	33.2	-01	20	44	14.3	6.7W	80.7S	39+	17+	38o
(194)	Prokne	23	58	19.5	+02	57	27	11.9	25.1W	177.4N	65+	10+	48o
(760)	Massinga	23	47	24.4	+01	09	43	14.7	188.9W	69.7N	18+	13+	31o
(305)	Gordonia	00	02	24.2	+03	29	26	15.0	36.0E	209.4N	30+	13+	41o
(489)	Comacina	23	42	48.3	+00	22	40	14.4	257.9W	22.7N	28+	7+	31o
(359)	Georgia	00	17	06.1	-01	35	58	13.7	256.5E	96.0S	51+	24+	32o
(379)	Huenna	00	16	25.9	+02	05	26	14.1	246.5E	125.4N	48+	19+	56o
(202)	Chryseis	00	15	01.8	-02	47	06	13.6	225.4E	167.1S	32+	7+	49o
(245)	Vera	01	00	36.0	+01	47	24	13.1	9.0E	107.4N	53+	20+	44o
(2)	Pallas	01	05	15.7	+03	06	05	10.1	78.9E	186.1N	44+	1+	90o
(487)	Venetia	00	45	47.0	-03	16	12	13.3	213.2W	196.2S	52+	13+	40o
(130)	Elektra	01	58	01.2	-01	49	36	12.4	29.7W	109.6S	65+	7+	42o
(618)	Elfriede	02	13	29.2	-01	37	59	14.2	202.3E	98.0S	50+	11+	34o
121P/	Shoemaker-Holt 2	01	56	52.9	-04	37	05	9.7	46.8W	277.1S	40+	9+	cmt
41P/	Tuttle-Giacobini K	01	48	51.8	+03	47	41	14.0	167.1W	227.7N	22+	5+	cmt
(183)	Istria	04	02	55.5	+02	49	32	13.9	43.9E	169.5N	96+	15+	25o
(480)	Hansa	09	09	55.7	-03	06	45	13.8	148.9E	186.7S	55+	3-	39o
(393)	Lampetia	09	06	33.1	+04	26	35	14.9	98.3E	266.6N	35+	2-	37o
(89)	Julia	10	02	50.7	+01	08	43	12.4	42.7E	68.7N	33+	11-	49o
(478)	Tergeste	10	11	40.3	-00	41	02	13.6	175.1E	41.0S	41+	4-	40o
(426)	Hippo	10	06	20.5	-03	35	12	13.6	95.1E	215.2S	42+	14-	35o
(476)	Hedwig	10	18	35.4	-00	38	27	13.9	278.8E	38.5S	38+	9-	42o
(266)	Aline	09	41	33.5	+01	17	29	14.8	276.6W	77.5N	39+	4-	38o
(88)	Thisbe	10	55	38.5	+00	58	41	12.7	65.4W	58.7N	26+	7-	57o
	C/2000_H1 (LINEAR)	11	08	40.5	+00	13	26	14.6	130.1E	13.4N	2-	1-	cmt



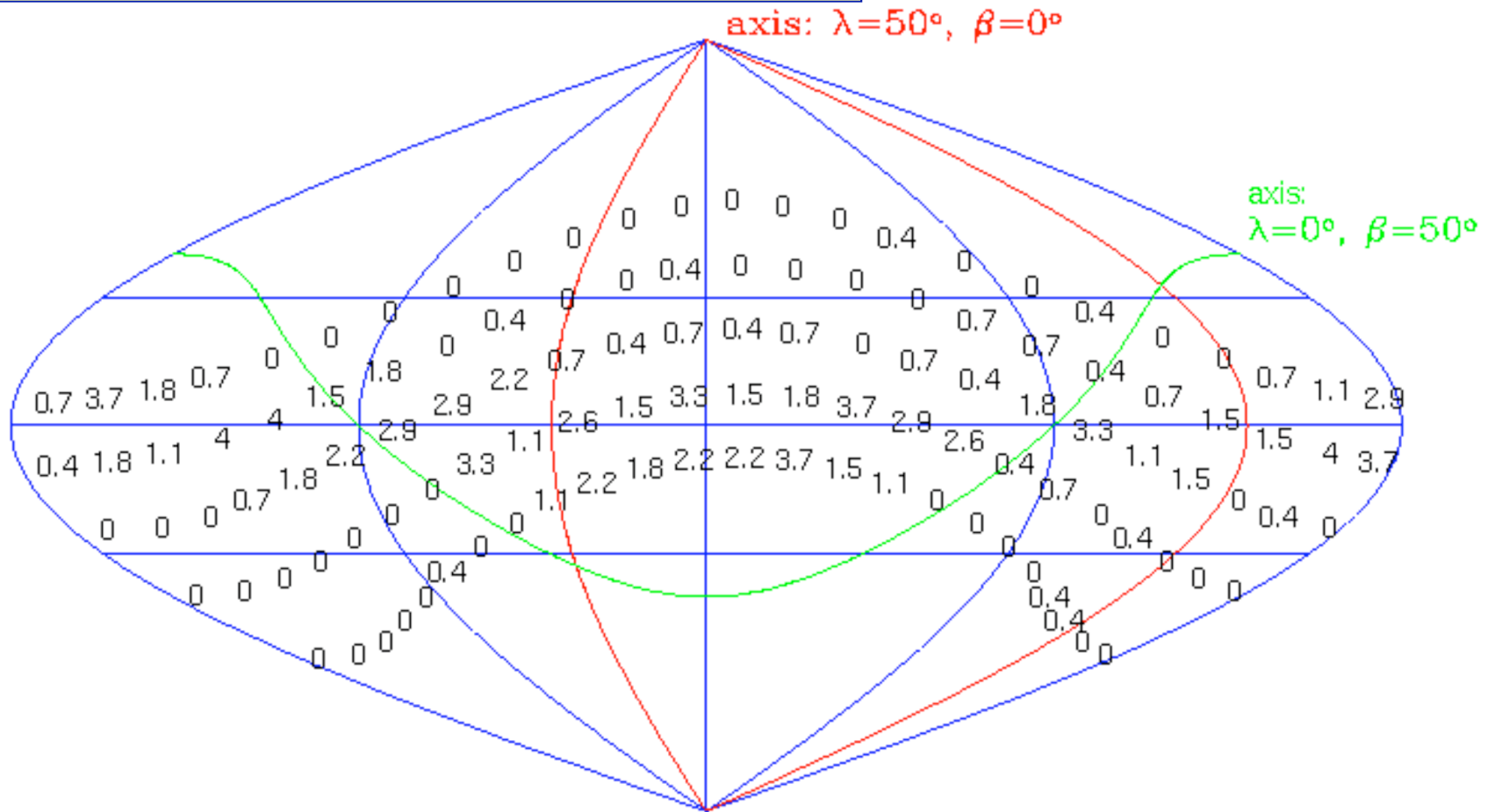
Asteroids and comets ($V < 15$).
Situation 9-jun-2003 at 18^h GMT

Number of bodies
passing the RVS-FOV
in 15-20 minutes.



ecliptic coordinates centered
on the anti-Sun direction.

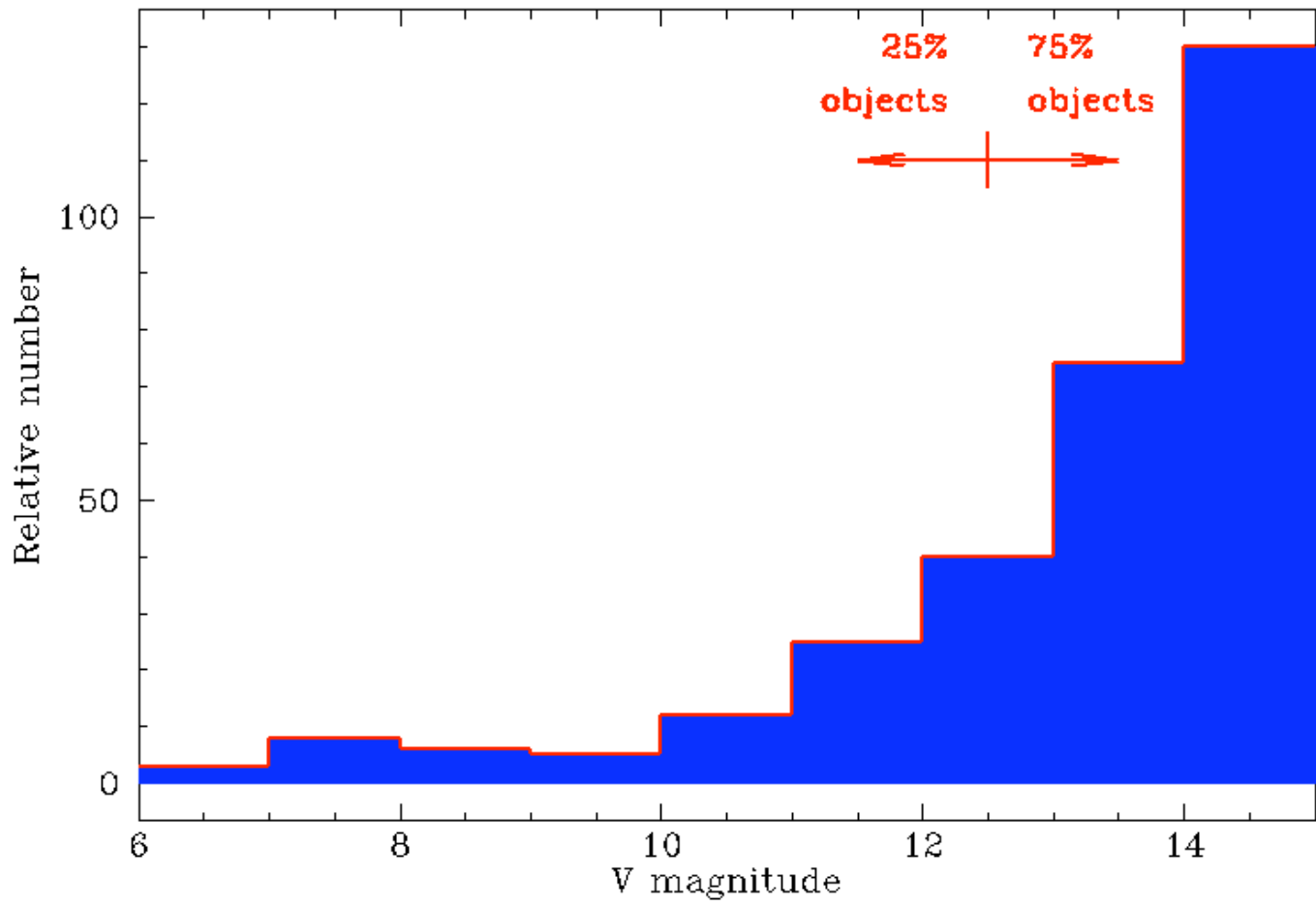
Asteroids and comets ($V < 15$).
 Situation 9-jun-2003 at 18^h GMT



Some 5-8 asteroids
 per 6-h revolution.

ecliptic coordinates centered
 on the anti-Sun direction.

This was for $V < 15$. What if $V < 12.5$ is needed?



Conclusions:

- objects concentrated only around the ecliptic plane and moving;
- radial velocity accurately predictable (no problems with pulsations, binaries etc. as for stars);
- radial velocity errors for asteroids are negligible;
- their Solar spectrum features many lines useful for □ calibration;
- if we choose $V < 15$ we get 5-8 asteroids per 6-hour revolution (from ~4000 objects on the sky);
- if we require $V < 12.5$ only 1-2 asteroids will be observed each 6 hours (from ~1000 objects on the sky).

so minor planets & comets are promising candidates for radial velocity standards.