

# *Armagh Observatory Meteor Software and Results*

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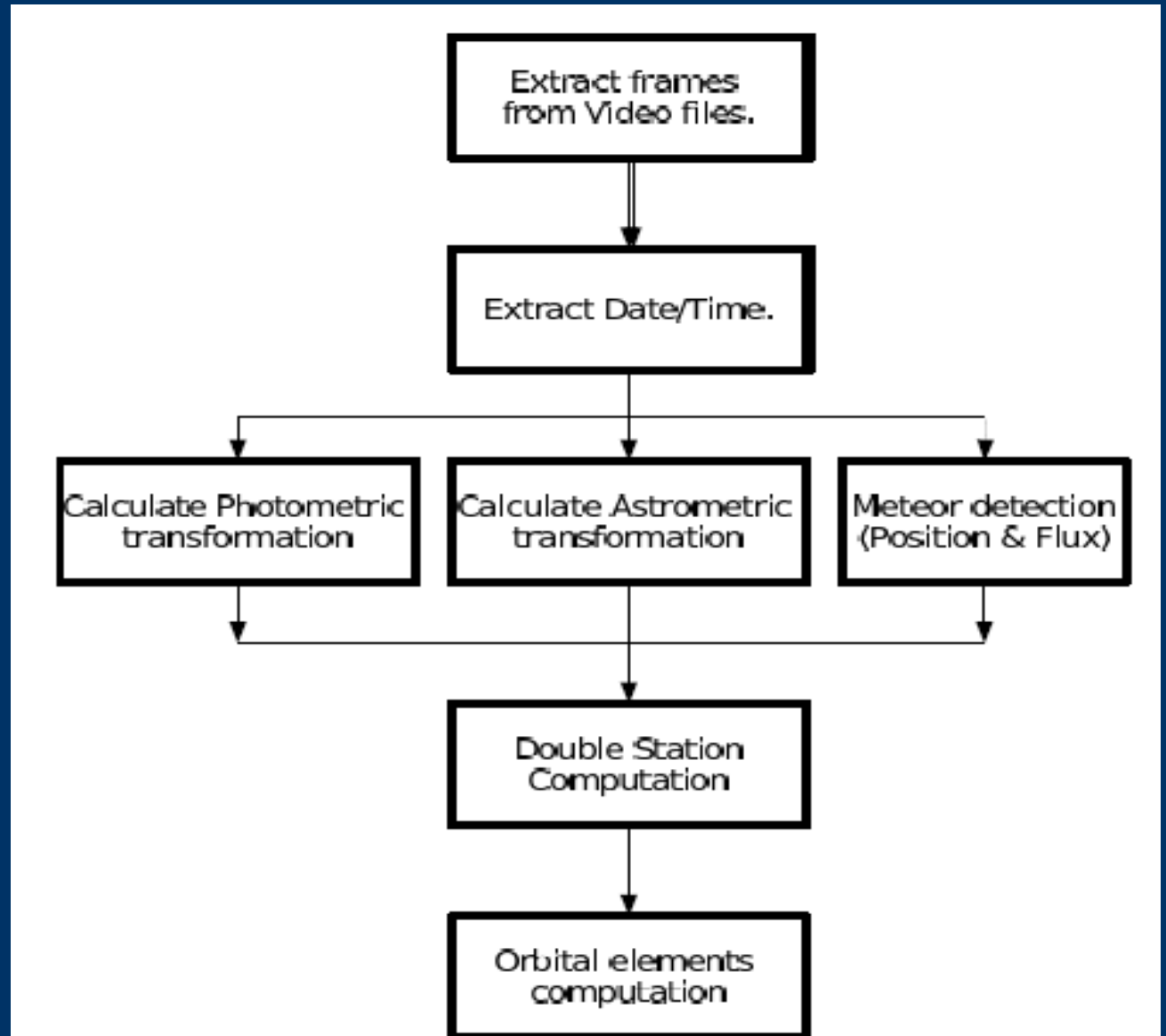
# *Armagh Observatory Meteor Cameras*



- Continue from previous talk by Tolis

# SPARVM Software

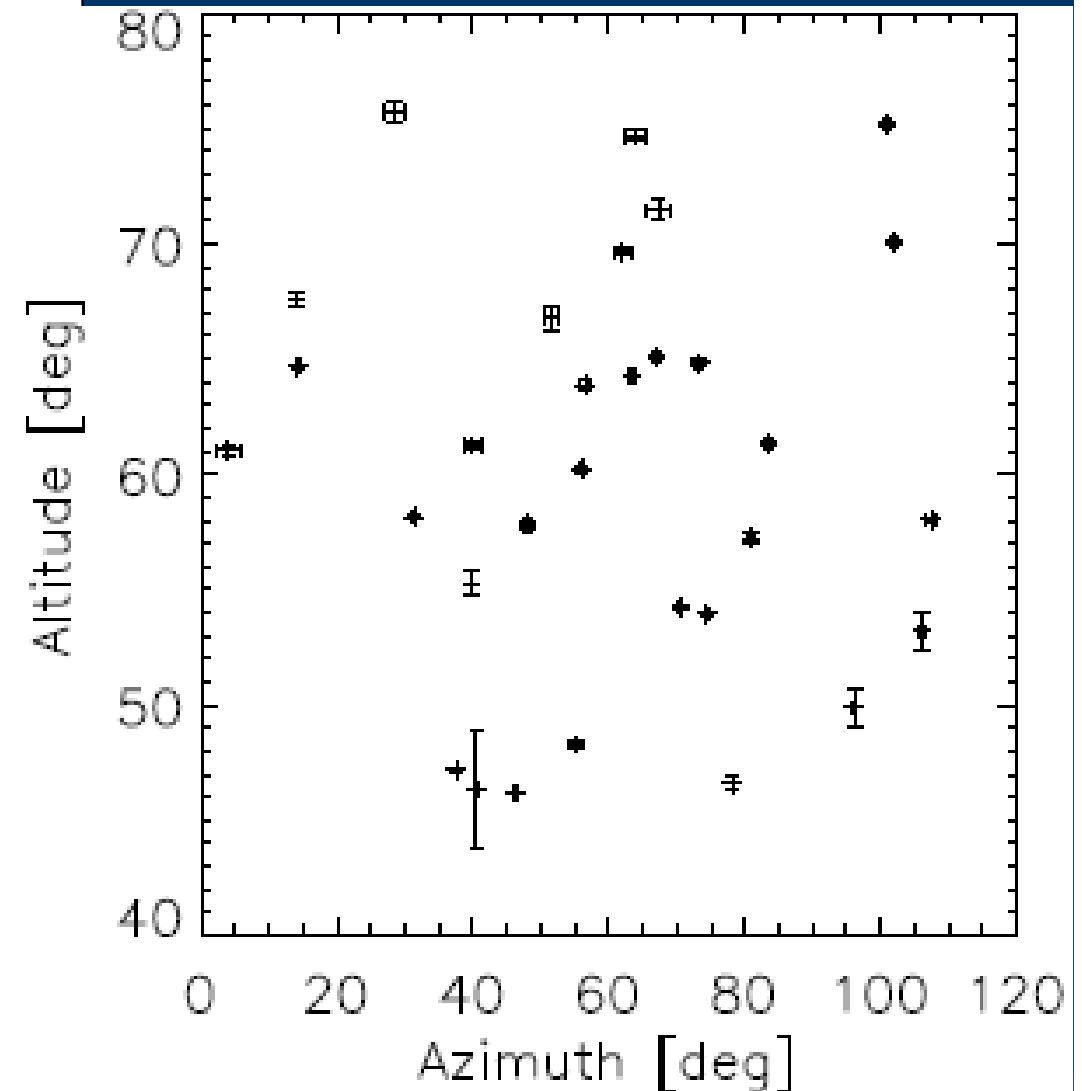
- Astrometry
- Photometry
- Meteor Position
- Double Station
- Orbital  
Computation



Date YR/MN/DY	Time HR:MIN:SEC	Number of Stars	Mean $\Delta$ Az. arc min.	Mean $\Delta$ Alt. arc. min
2005/08/14	00:10:54	35	$2.0 \pm 2.6$	$0.4 \pm 0.4$
2005/08/14	01:19:52	32	$3.2 \pm 3.5$	$1.4 \pm 1.4$
2005/08/14	01:37:29	31	$2.2 \pm 2.1$	$1.4 \pm 2.3$
2005/08/14	01:38:14	31	$3.5 \pm 3.1$	$1.7 \pm 2.8$
2005/08/14	01:44:05	37	$2.2 \pm 2.8$	$1.2 \pm 1.0$
2005/08/14	22:41:20	35	$3.0 \pm 3.5$	$1.4 \pm 2.3$
2005/08/15	01:11:44	35	$2.8 \pm 3.6$	$1.7 \pm 2.3$
2005/08/15	01:29:55	35	$2.3 \pm 2.2$	$1.6 \pm 2.6$
2005/08/15	01:37:32	38	$2.6 \pm 2.9$	$1.2 \pm 1.0$
2005/08/15	04:06:05	32	$3.6 \pm 5.3$	$2.6 \pm 2.1$

**Table 5.1:** The mean  $\Delta$ Az. and  $\Delta$ Alt. for 10 videos using a single set of transform parameters.

Fig: The errors are magnified by 10.

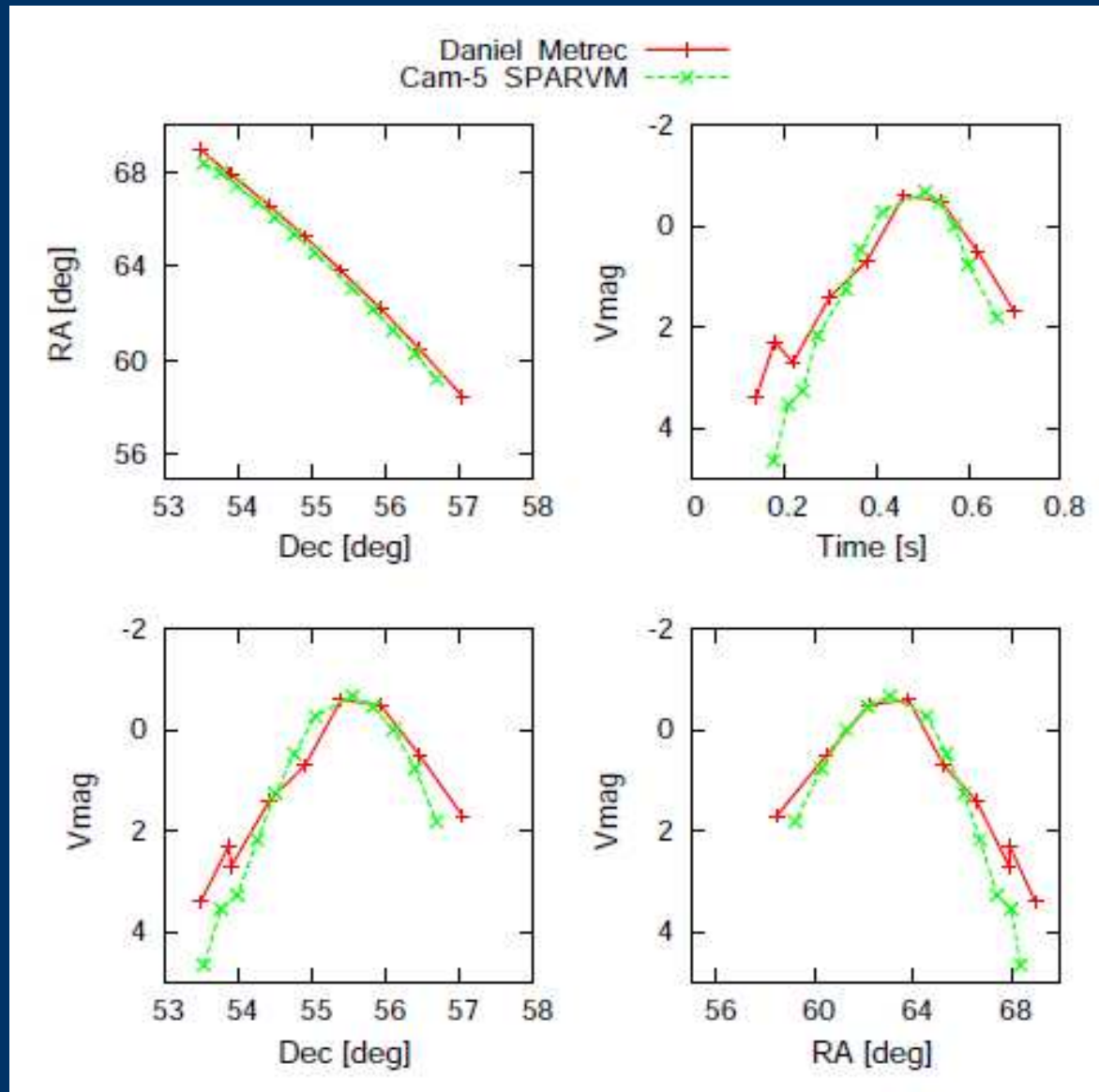


## • Astrometric Accuracy

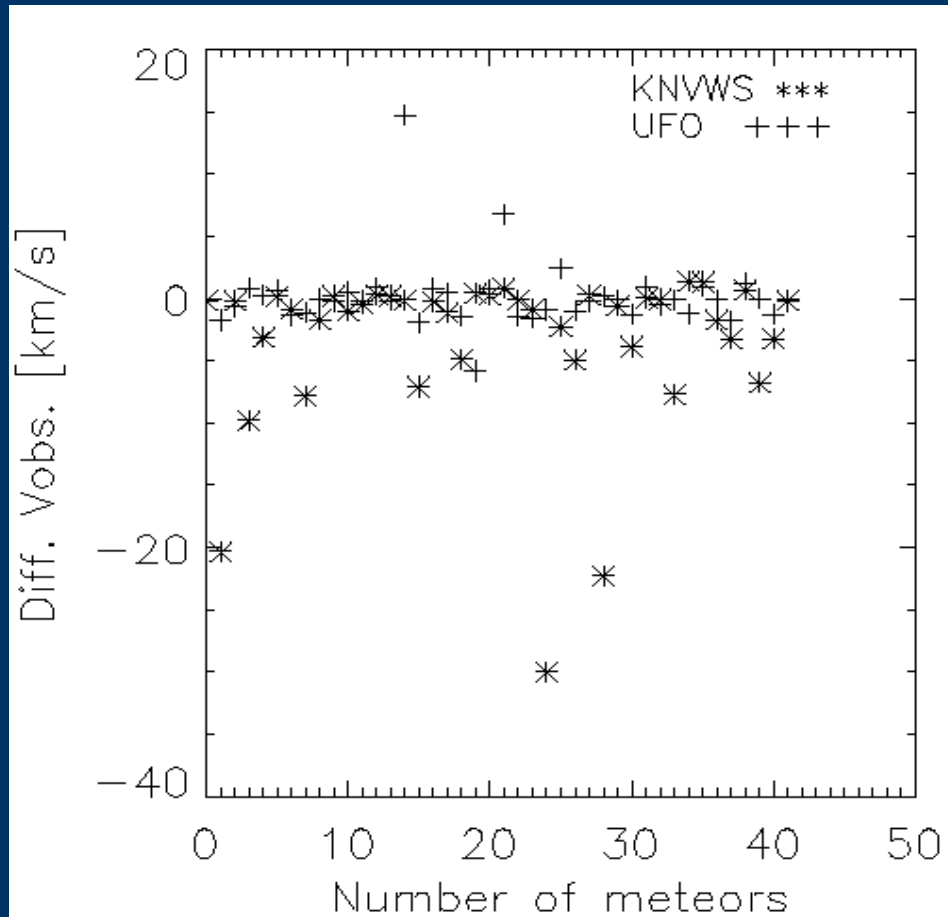
~ 3' for Azimuth

~ 2' for Altitude

# Comparison with Metrec

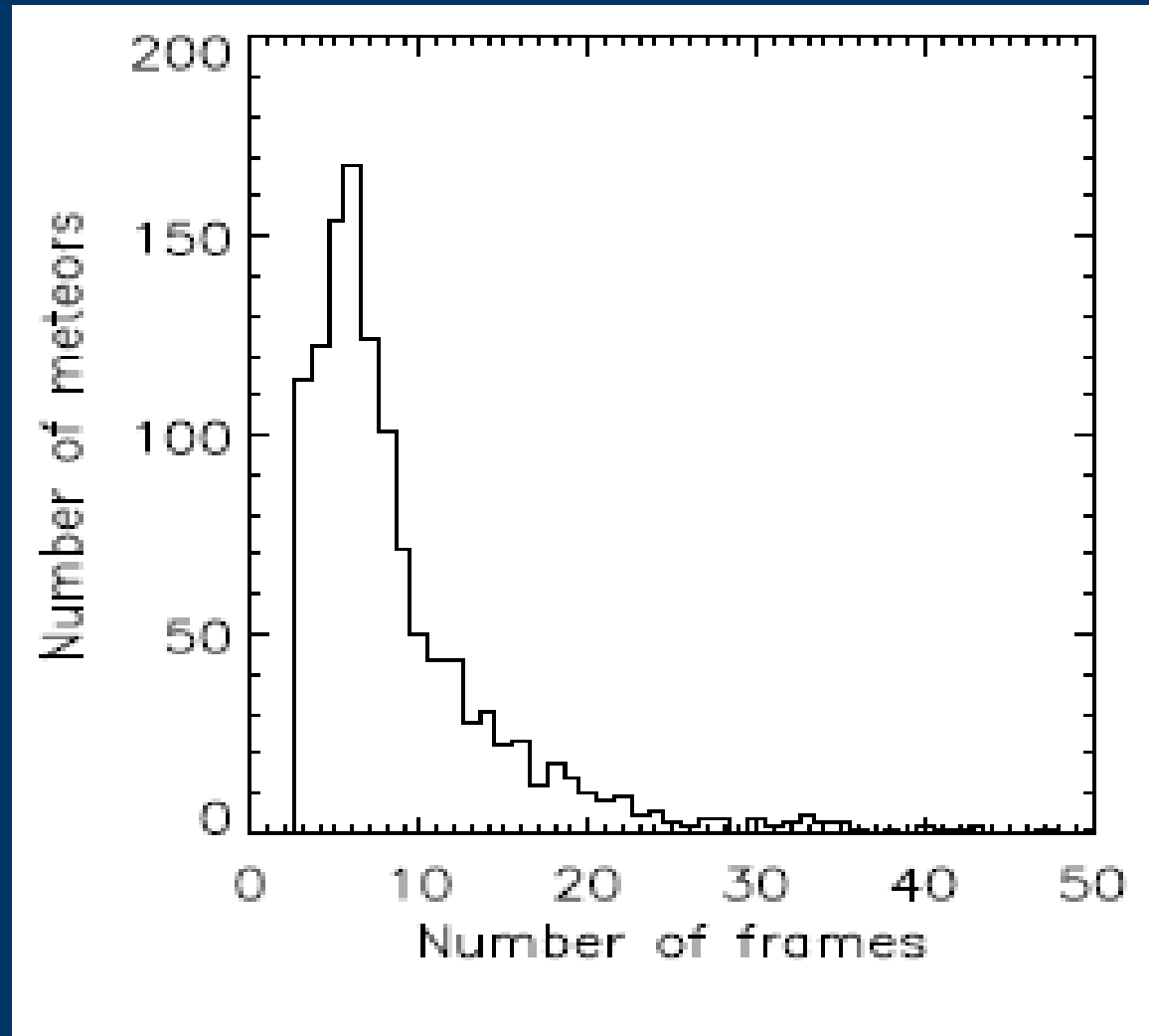


# Comparison of Double station method



	Mean	STD	Max
<b>KNVWS</b>			
R.A. (deg)	0.016	0.033	0.206
Dec. (deg)	0.022	0.068	0.433
$V_1$ (km s <sup>-1</sup> )	6.9	12.5	56.3
$V_2$ (km s <sup>-1</sup> )	0.9	2.3	14.9
$V_{obs}$ (km s <sup>-1</sup> )	3.6	6.4	29.9
<b>UFO–Orbit</b>			
R.A. (deg)	0.131	0.354	2.112
Dec. (deg)	0.269	0.740	3.875
$V_1$ (km s <sup>-1</sup> )	1.9	2.2	12.0
$V_2$ (km s <sup>-1</sup> )	1.1	3.2	17.4
$V_{obs}$ (km s <sup>-1</sup> )	1.4	2.4	14.7

## *Example from Medium angled camera*

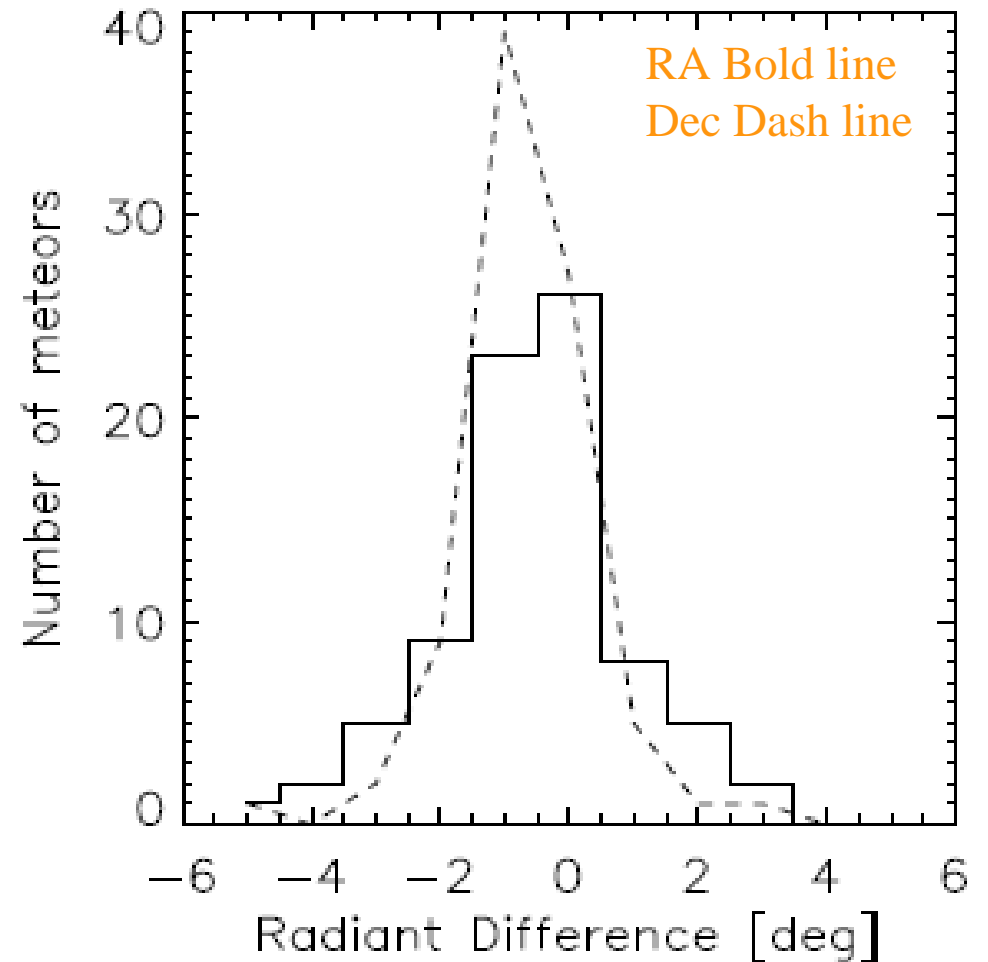
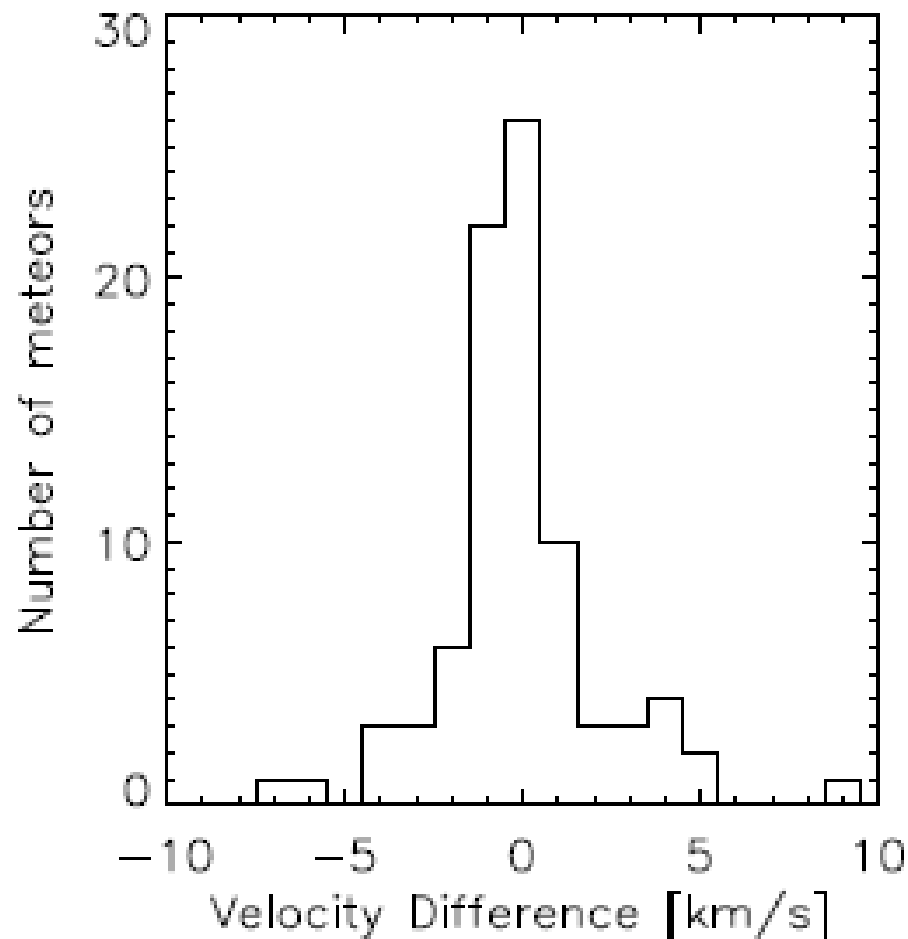


~80% of meteors last less than 0.48 sec (10 frames)

# Difference in Velocity and Radiant of the same meteor from Medium angled and wide angled camera

70/87 meteors have less than 3 km/s (median 0.9) difference in Velocity

76/87 & 83/87 have less than 3 deg. (median 0.7 & 0.4) difference in RA & Dec

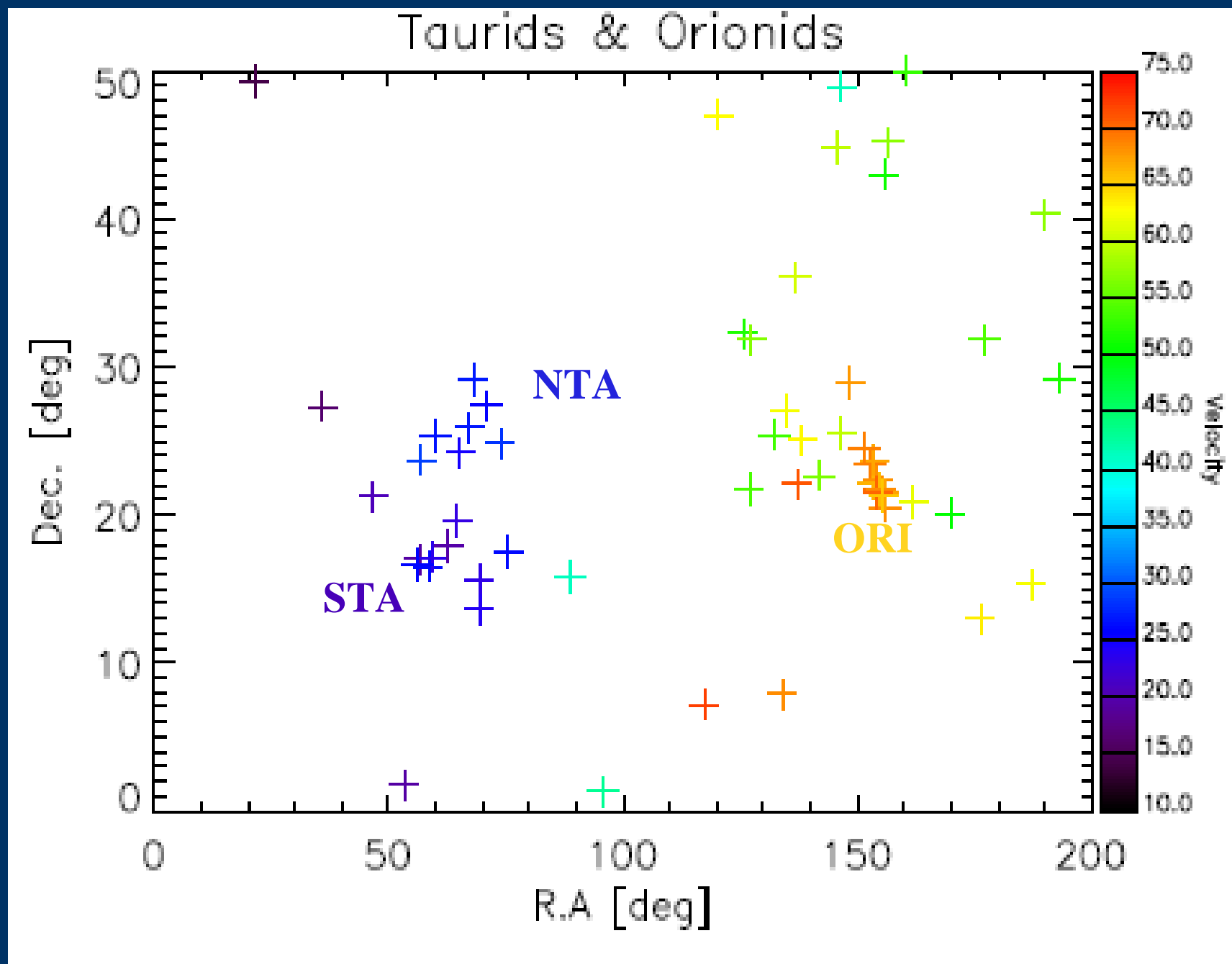


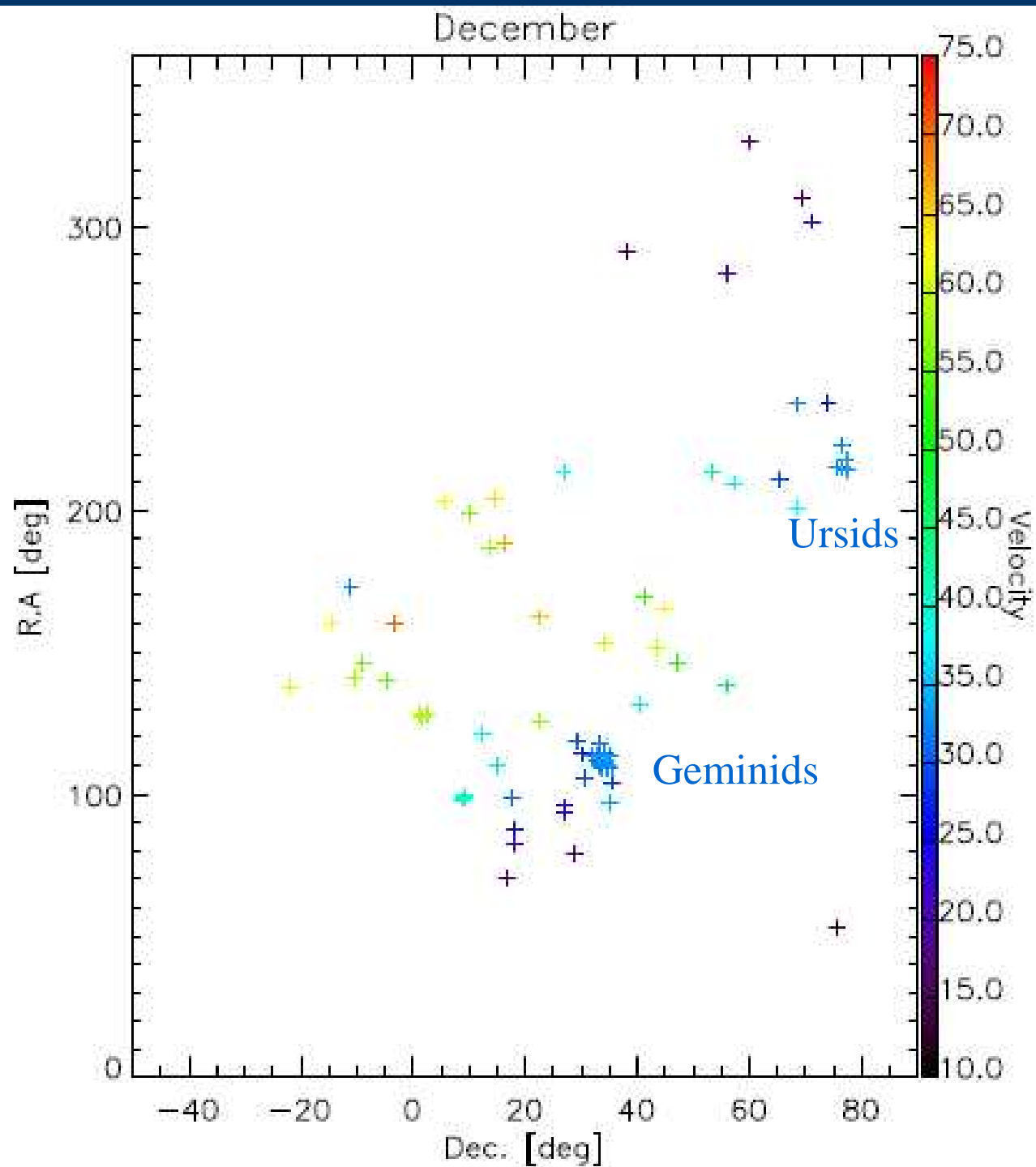


# Double Station meteor Database

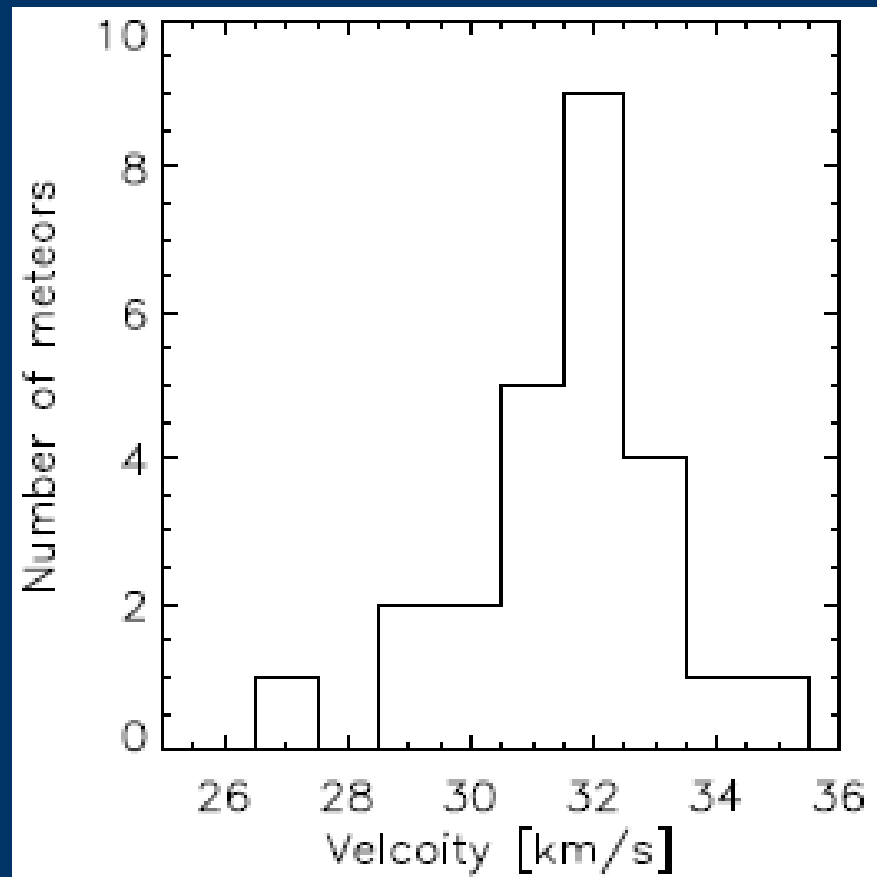
- Meteors from 2005/06/08 until 2007/12/31 (total of 6575 videos )
- 457 Double station meteors (with 235 observed by more than 1 pair of cameras)
- <http://www.arm.ac.uk/~atr/aomd/AODB.pdf>

ID	Date	Time	R.A.	Dec.	$V_{\infty}^1$	$V_{\infty}^2$	$q_0$	$a$	$e$	$i$	$\Omega$	$\omega$	$M_0$
	Y/M/D	H:M:S	deg	deg	km s <sup>-1</sup>	km s <sup>-1</sup>	AU	AU		deg	deg	deg	deg
0001	2005/06/25	23:30:19	240.15	-27.85	15.45	33.64	0.8359	-1.89	1.4414	7.11	273.46	44.73	160.70
0002	2005/06/26	00:19:03	280.80	-20.49	25.66	25.42	0.4635	2.34	0.8018	1.08	274.53	101.77	347.83
0003	2005/06/26	01:03:15	311.75	38.57	44.78	44.10	0.8433	4.20	0.7992	78.58	94.46	229.67	356.25
0004	2005/06/28	01:05:23	131.03	50.29	14.72	14.99	0.8582	2.65	0.6764	8.87	96.35	130.46	7.99
0005	2005/07/01	01:13:08	11.82	27.21	63.04	62.99	0.8549	2.91	0.7060	143.00	99.24	130.49	6.77
0006	2005/07/27	22:27:44	27.38	53.92	58.23	58.64	0.9383	11.94	0.9214	112.17	124.89	150.61	0.50
0007	2005/07/31	22:34:34	33.35	54.74	58.41	57.84	0.9269	7.32	0.8733	112.76	128.72	147.47	1.16
0008	2005/07/31	23:13:15	44.21	55.07	33.66	42.93	0.3875	0.83	0.5324	87.68	127.79	38.37	93.24
0009	2005/08/03	01:42:18	339.80	-2.30	40.73	40.62	0.0600	2.33	0.9743	19.39	130.75	334.81	351.18
0010	2005/08/06	23:20:30	41.22	55.83	55.77	57.25	0.9029	3.51	0.7429	112.28	133.54	140.49	4.36





# Geminids



	R.A. (deg)	Dec.(deg)	$V_{\infty}$ (km s <sup>-1</sup> )
Observed	111.9±1.8	+33.4±1.0	32.0±1.6
IMO	112	+33	35

	$q_0$ (AU)	$e$	$i$ (deg)	$\Omega$ (deg)	$\omega$ (deg)
Geminids	0.159±0.01	0.863±0.02	21.7±3	260.7±1	324.4±1
3200 Phaethon	0.139	0.889	22.1	265.3	322.0

# Alpha- Virginid

0021 AVB

alpha Virginids

Working shower

Activity

S. Lon

RA

DE

dRA/dSL

dDE/dSL

VG

MDI

ZHR

DFP

DT

[deg]

J2000

[km/s]

(max)

annual

28.000

179.90

-7.70

-

-

17.6

-

-

-

-

Parent body:

1998 SH2?

References:

Notes:

Help

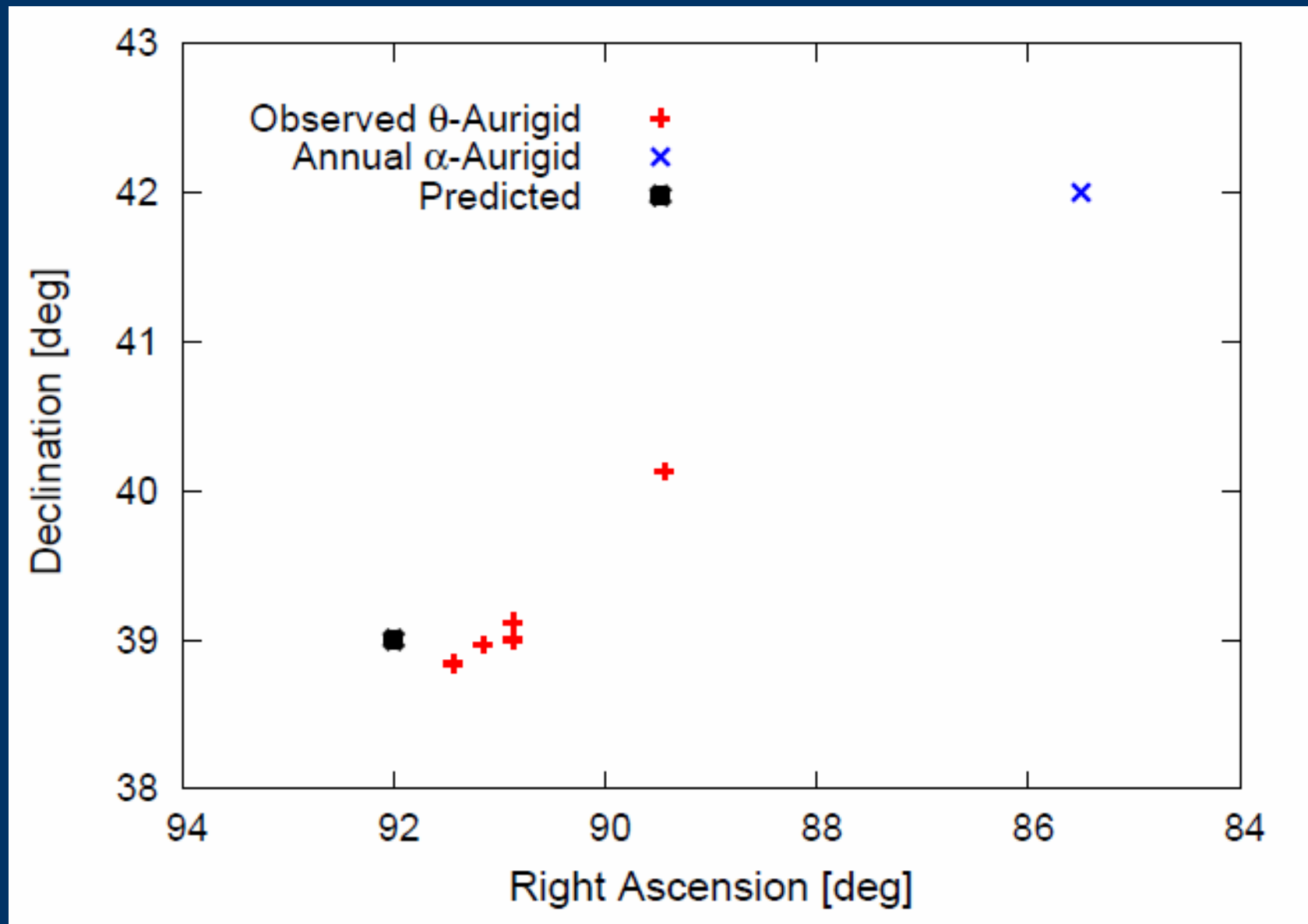
RETURN to the LIST

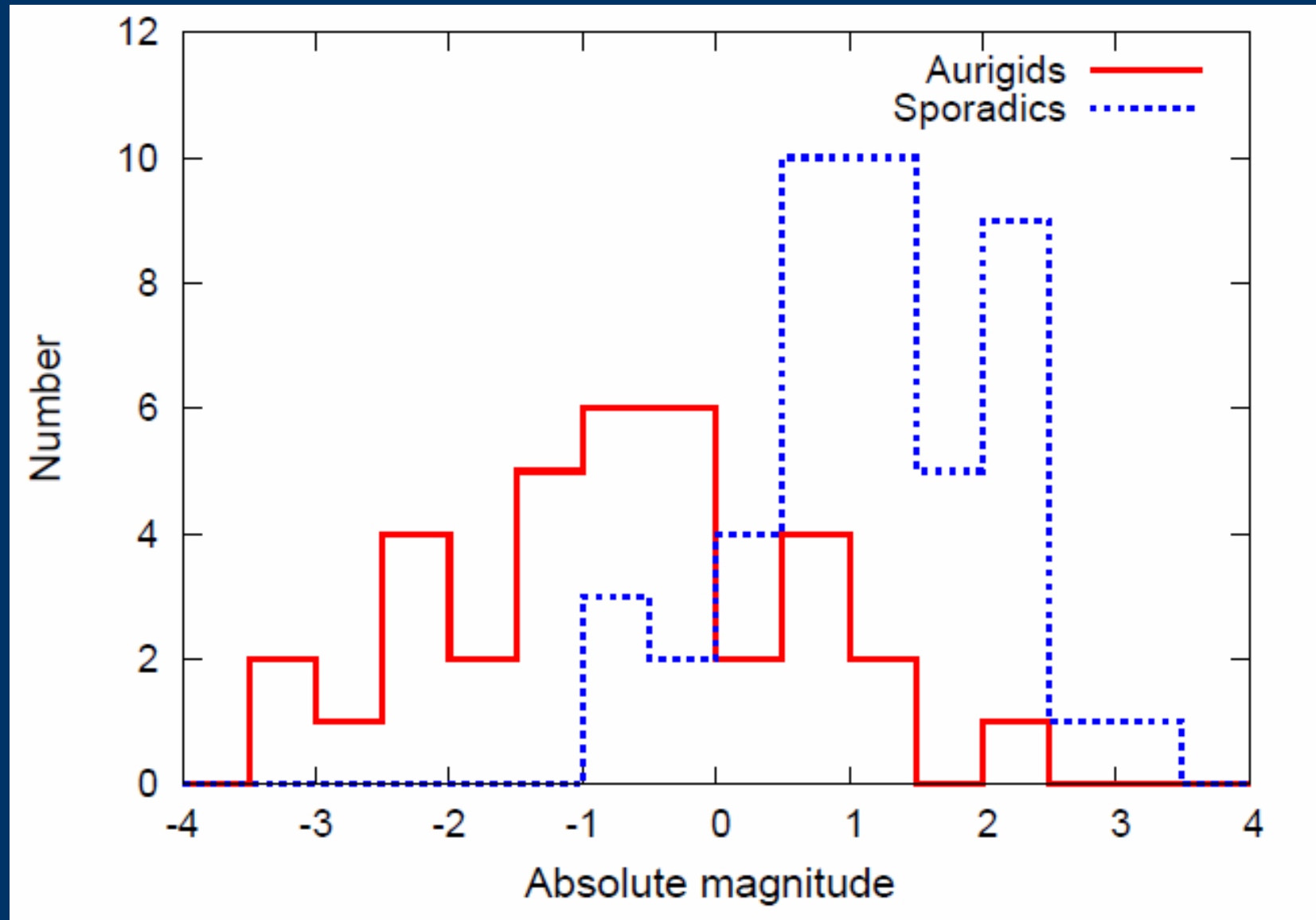
	$q_0$ (AU)	$e$	$i$ (deg)	$\Omega$ (deg)	$\omega$ (deg)
$\alpha$ -Virginid	0.7168	0.6348	0.6	14.4	254.7
1998 SH2	0.7601	0.7188	2.4	14.2	259.9

One alpha-Virginid (annual peak during 19 Apr) was recorded on 2007/04/05 at 01:00:09 UT, with radiant of R.A. 187.3 deg and Dec = 3.26 deg and  $V_{inf.} = 17.4 \pm 2.3$  km/s

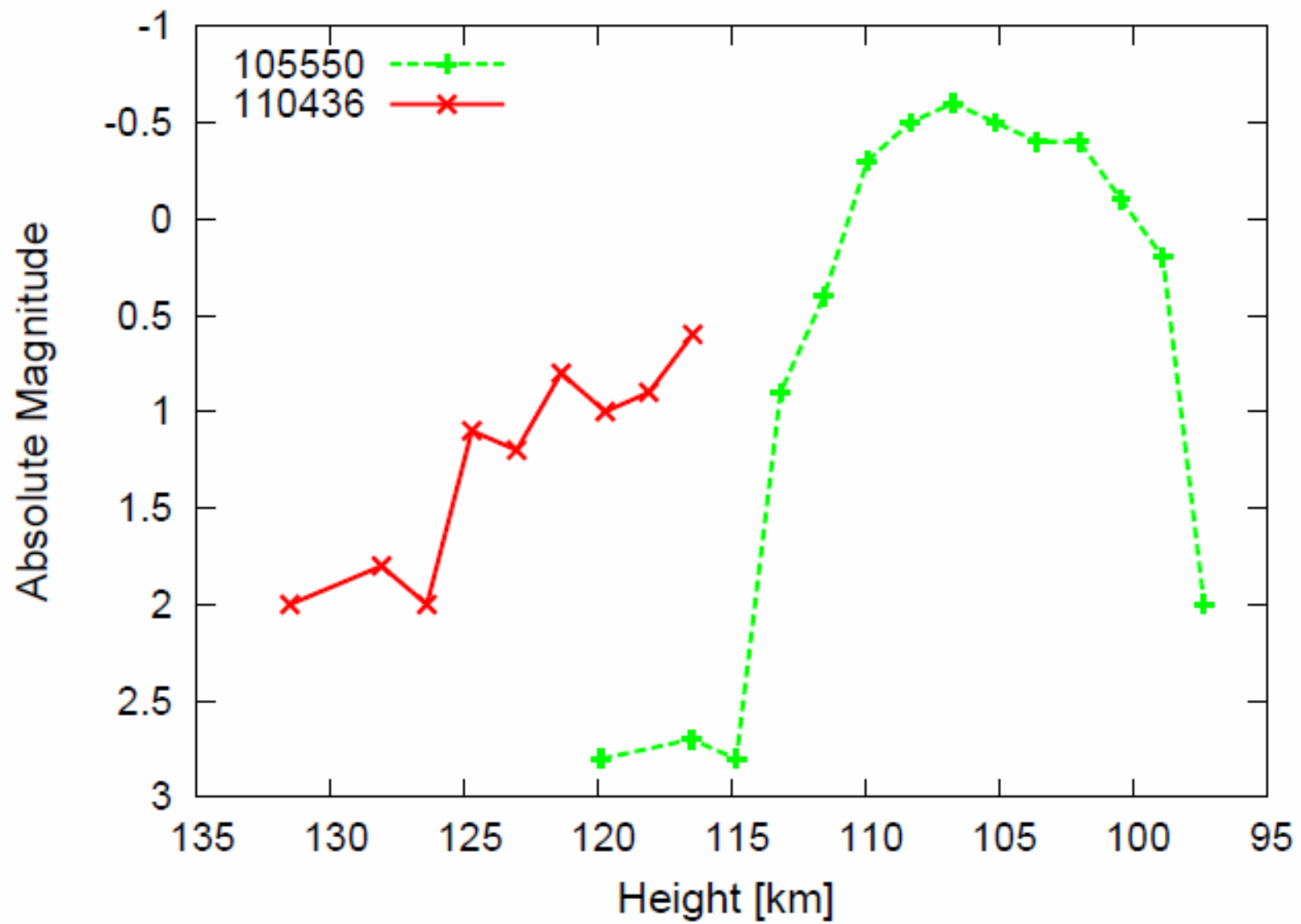
# *Usefulness of the database*

- Search for Parent objects (These meteors are in the database : sigma-Hydrids, Nov. Orionids, Dec. Leonis Minorid etc. )
- Look for Minor Showers
- Study the variability of different showers

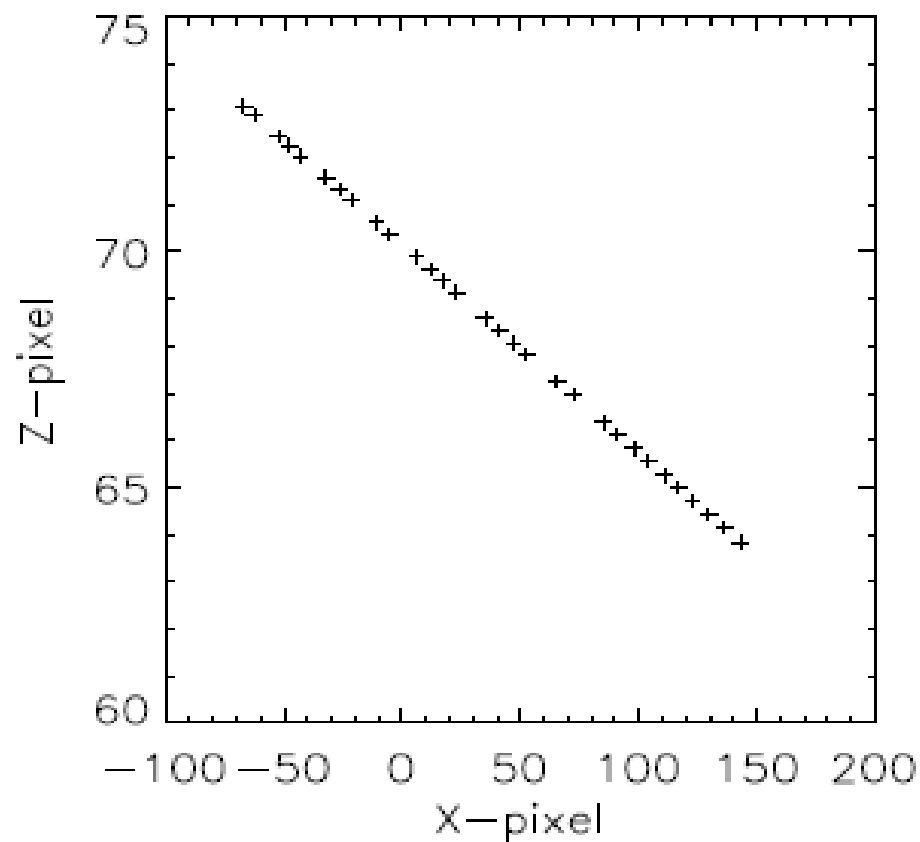
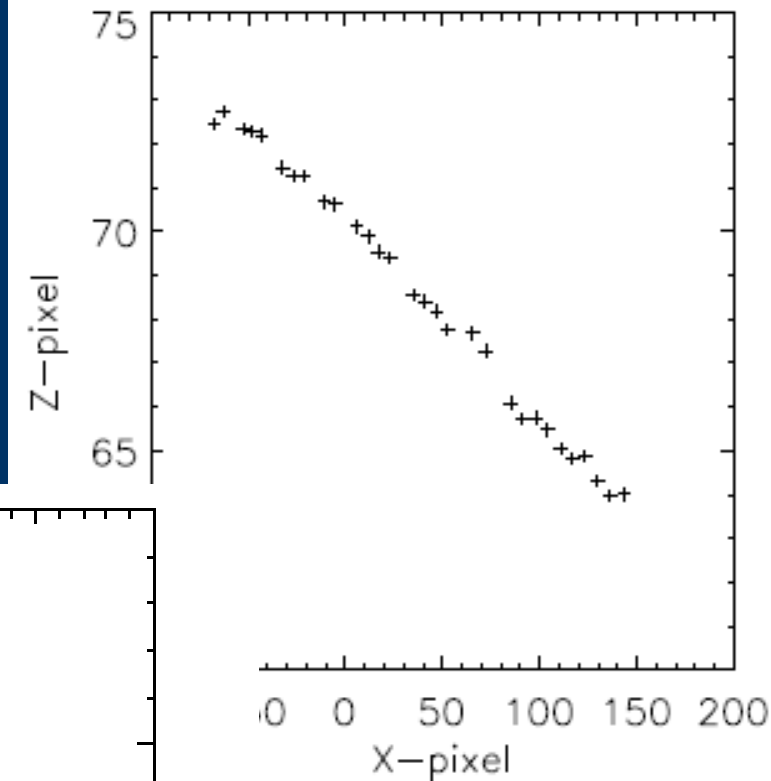
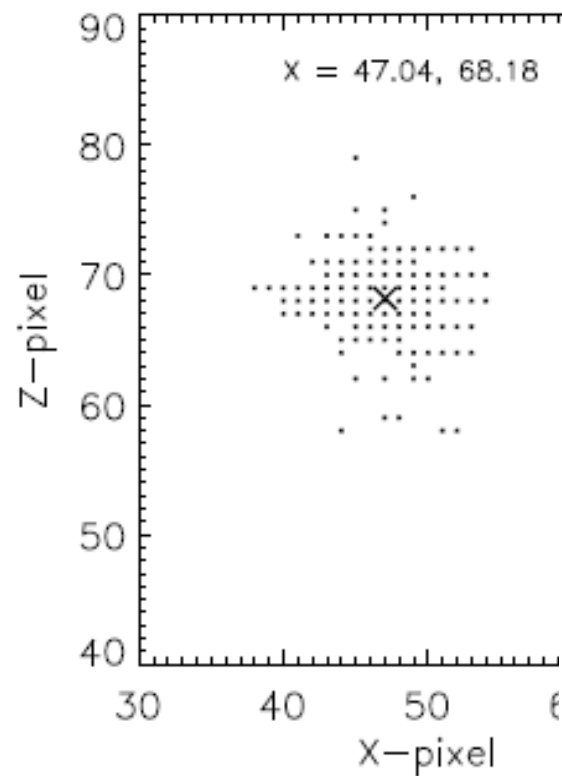




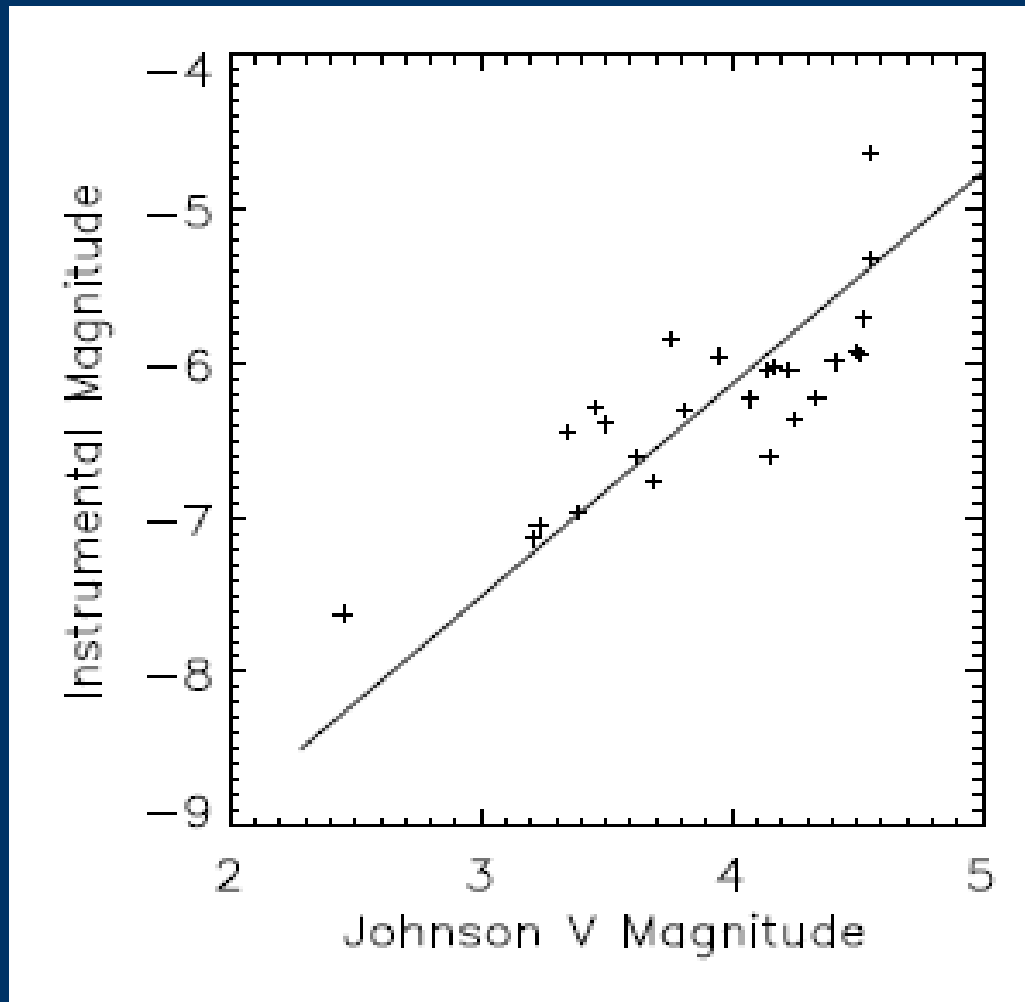




# Meteor Position Detection



# Photometry



$$V_{\text{mag}} = 8.464 + 0.7275 \cdot I_{\text{mag}}$$

STD of residuals = 0.3 mag