

# High Inclination Autumn Showers from Video Meteor Network Data

*Jürgen Rendtel*  
*International Meteor Organization*  
*& Astrophysical Institute Potsdam*

*IMC 2010, Armagh*  
*2010 September 17*

## *Outline*

- Data source: IMO video network
- Well known showers (from the IAU MDC data base)
- September Perseids + Delta Aurigids: old and new
- Other minor sources from Perseus to Lynx?
- Conclusions

**Data of the IMO Video Meteor Network**

first general analysis published in WGN August 2009 (Molau & Rendtel)

→ several radiants at high inclination orbits found in Sep/Oct

(more details required)

**This analysis:**

aim: showers from the region Per-Aur-Lyn

$\lambda=150^\circ-215^\circ$  (August 23 – October 29)

sample 168.830 meteors

meteors per  $2^\circ$  bin: 1328 (at  $191^\circ$ ) to 6000 (at  $208^\circ = \text{ORI-max.}$ )

analysing routines as described in Molau & Rendtel (2009); also IMC 2009

**Other sources interfering:**

Northern Apex (unsharp „radiant“ area, approx.  $20^\circ$  size)

(orbits also close to  $180^\circ$  inclination, i.e. similar velocities)

**Most famous shower: Aurigids (206 AUR)**

Parent C/1911 N1 (Kiess)

Outburst on 2007 Sep 01, annual max. ZHR  $\approx$  7

Video rate 3.0 (max.)

Period  $156^\circ - 167^\circ$ , peak  $159^\circ$

Radiant  $93^\circ +39^\circ$ ,  $V = 67$  km/s

Meteor shower nomenclature according to the IAU Meteor Data Center (MDC)  
206 AUR (Aurigids)

**Showers from the IAU MDC data base**

228 OLY – October Lyncids

210 BAU – beta Aurigids

81 SLY – September Lyncids

<u>Shower</u>	<u>Max.</u>	<u>Period</u>	<u>Radiant</u>	<u>V<sub>inf</sub></u>	<u>VR</u>	<u>Meteors</u>
228 OLY	210°	208–215°	113 +53	61km/s	1.3	516
210 BAU	180°	179–181°	87 +49	70km/s	1.8	559
81 SLY	169°	165–173°	111 +56	59km/s	1.8	530

The MDC entry was changed according to our results for the 81 SLY

150°	AUG 23
160°	SEP 03
170°	SEP 13
180°	SEP 23
190°	OCT 03
200°	OCT 13
210°	OCT 23

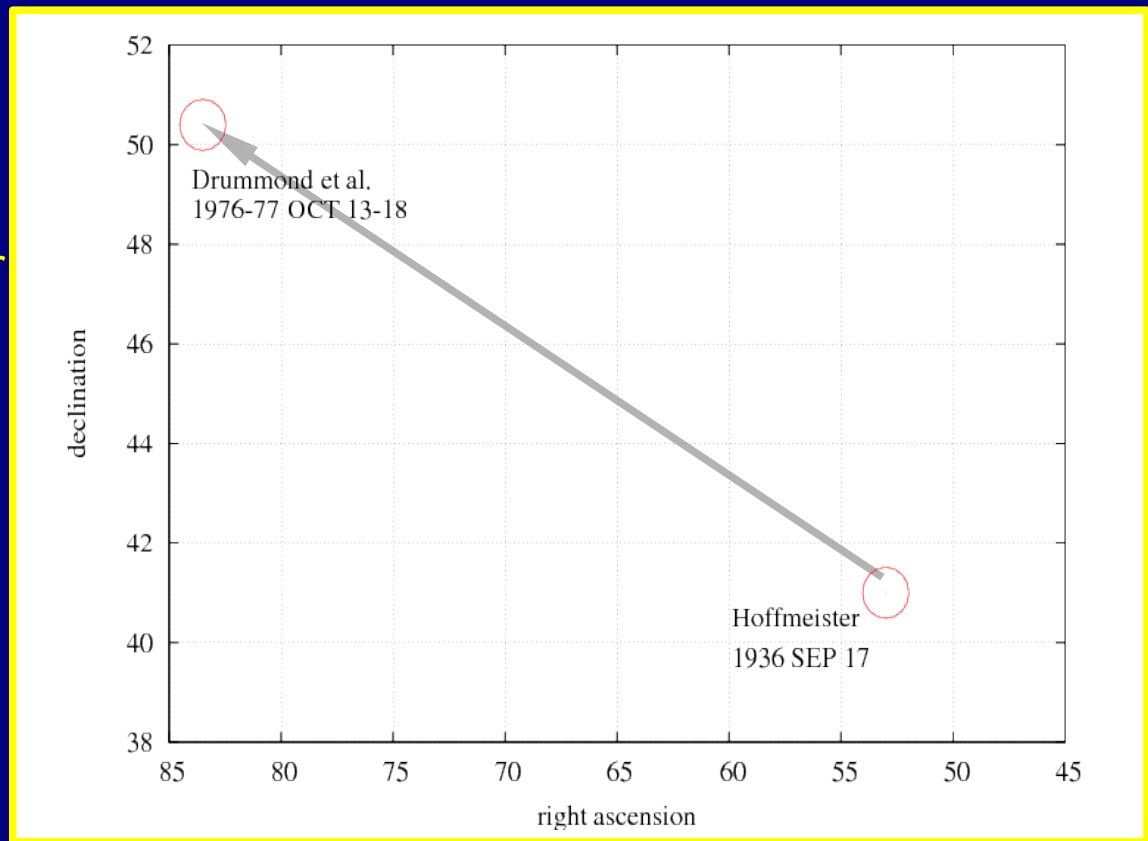
## September Perseids (208 SPE) and delta Aurigids (224 DAU)

„Origin“ of our knowledge

September Perseids: visual obs. 1936 Sep 17, only one night at Sonneberg Obs.  
(Hoffmeister 1948)

Delta Aurigids: 13 orbits 1976-77 Oct 13-18, New Mexico cameras (NASA)  
(Drummond et al. 1979)

Attempt to combine these  
30 days,  $30^\circ$  RA difference  
(fits expected drift)  
→ considered as one shower  
(Rendtel 1993)



**Indications for two separate showers**

Analysis of visual data: „activity gap“ mid-September to early October  
(Dubietis & Arlt 2002)

SPE radiant further south (declination  $37^\circ \rightarrow 39^\circ$ )  
coinciding with radiant called „September  $\varepsilon$ -Perseids“  
(different analyses, e.g. video radiant search Molau 2007)

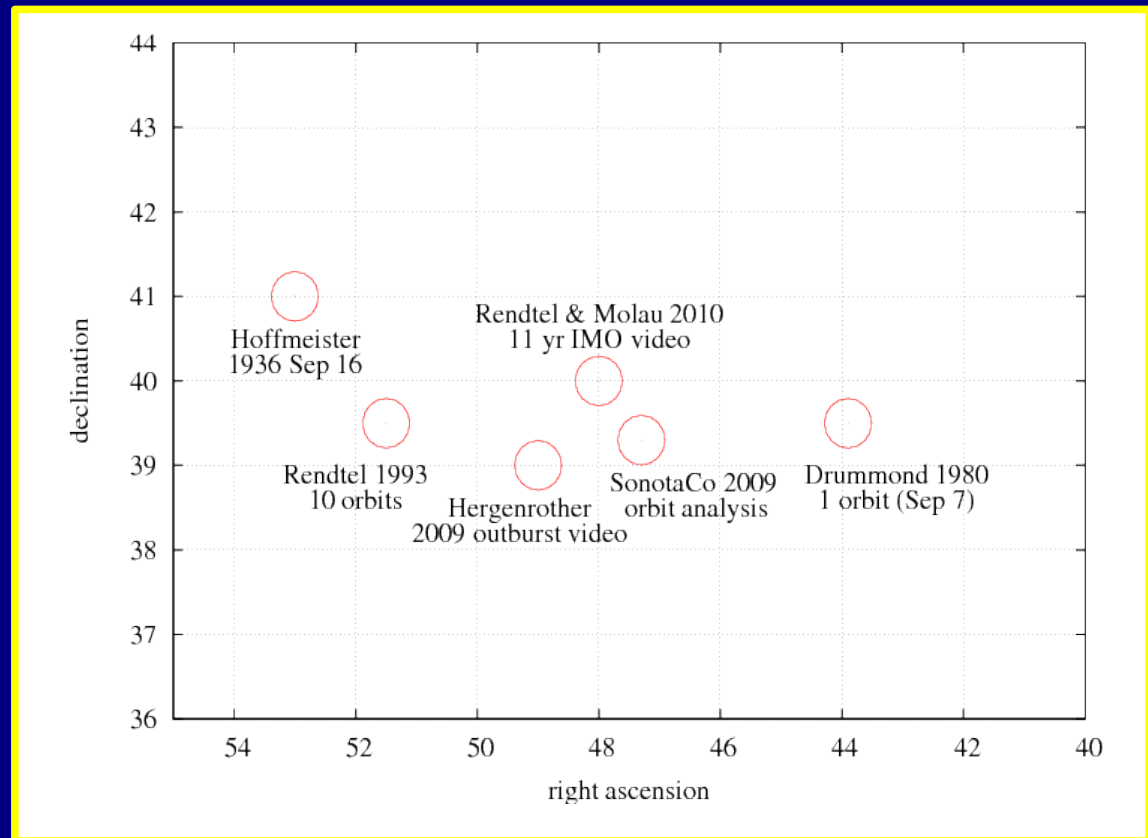
Activity outburst of the September  $\varepsilon$ -Perseids on 2008 Sep 9, around 0830 UT  
(data summary Rendtel & Molau 2010)

**September  $\epsilon$ -Perseids (208 SPE) now**

Activity outburst and annual activity – strong hint at an evolved stream resonant structure in 2008?

(duration & appearance similar to LEO 98, JBO 98, ORI 06ff)

Figure: radiant positions of SPE





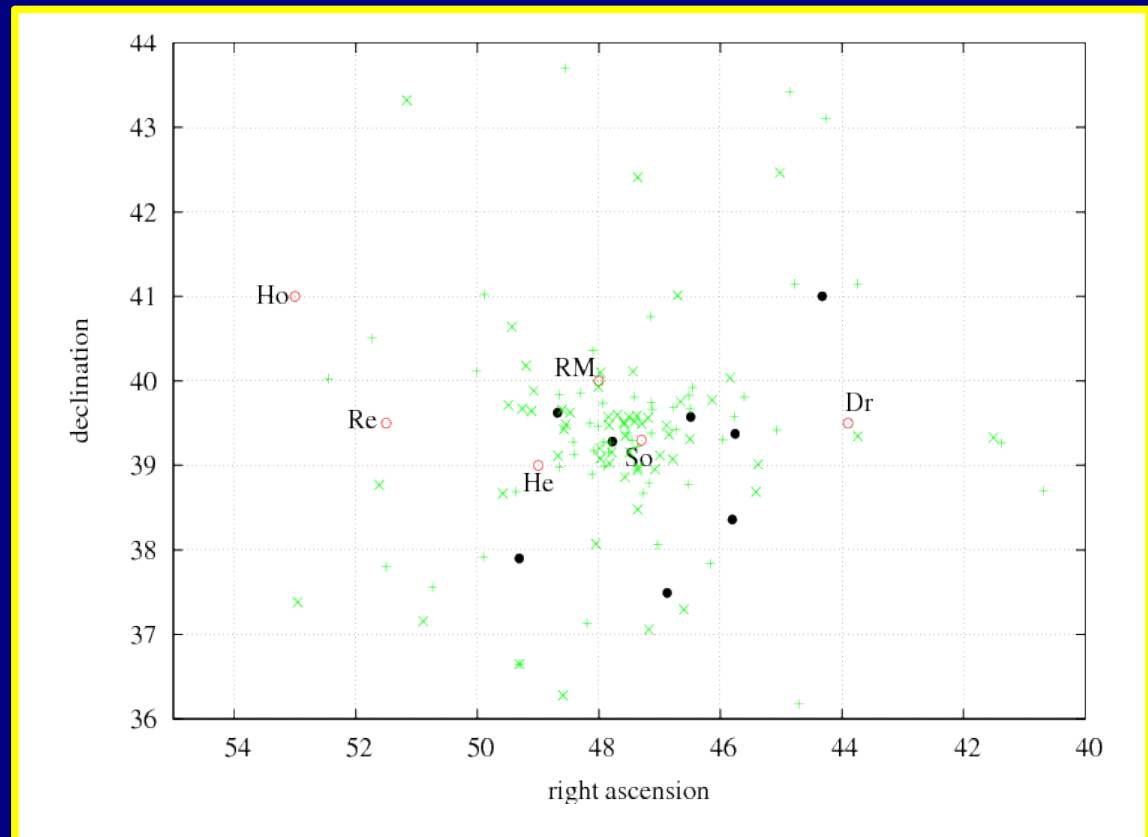
## September $\epsilon$ -Perseids (208 SPE) now

Activity outburst and annual activity – strong hint at an evolved stream resonant structure in 2008?

(duration & appearance similar to LEO 98, JBO 98, ORI 06ff)

### Figure: radiant positions of SPE

Green crosses: radiants from double station orbits  
Black dots: radiants from double station orbits  
approx 4 hours prior to the outburst 2008  
(SonotaCo data base on the net)



***δ-Aurigids (224 DAU) now***

Activity much weaker than SPE

Drummond's orbits describe stream

(gave „filaments“ based on 13 orbits)

Video Network data give weak activity (VR=1.7) in October: 196° – 203°

Radiant fits with orbital data

Occurs later than listed in previous Shower Calendars

Not related to the 208 SPE

Drummond mentioned possible parent C/1972 E1 (Bradfield) for 224 DAU

no parent candidate known for 208 SPE

**Other minor sources in the region**

Video Network data gave two further radiants in the region

424 SOL – September-October Lyncids

(naming difficult: no named stars in Lyn, and SLY + OLY already used)

Only 8 days: 165-173° VR=1.6 close to detection limit (237 meteors)

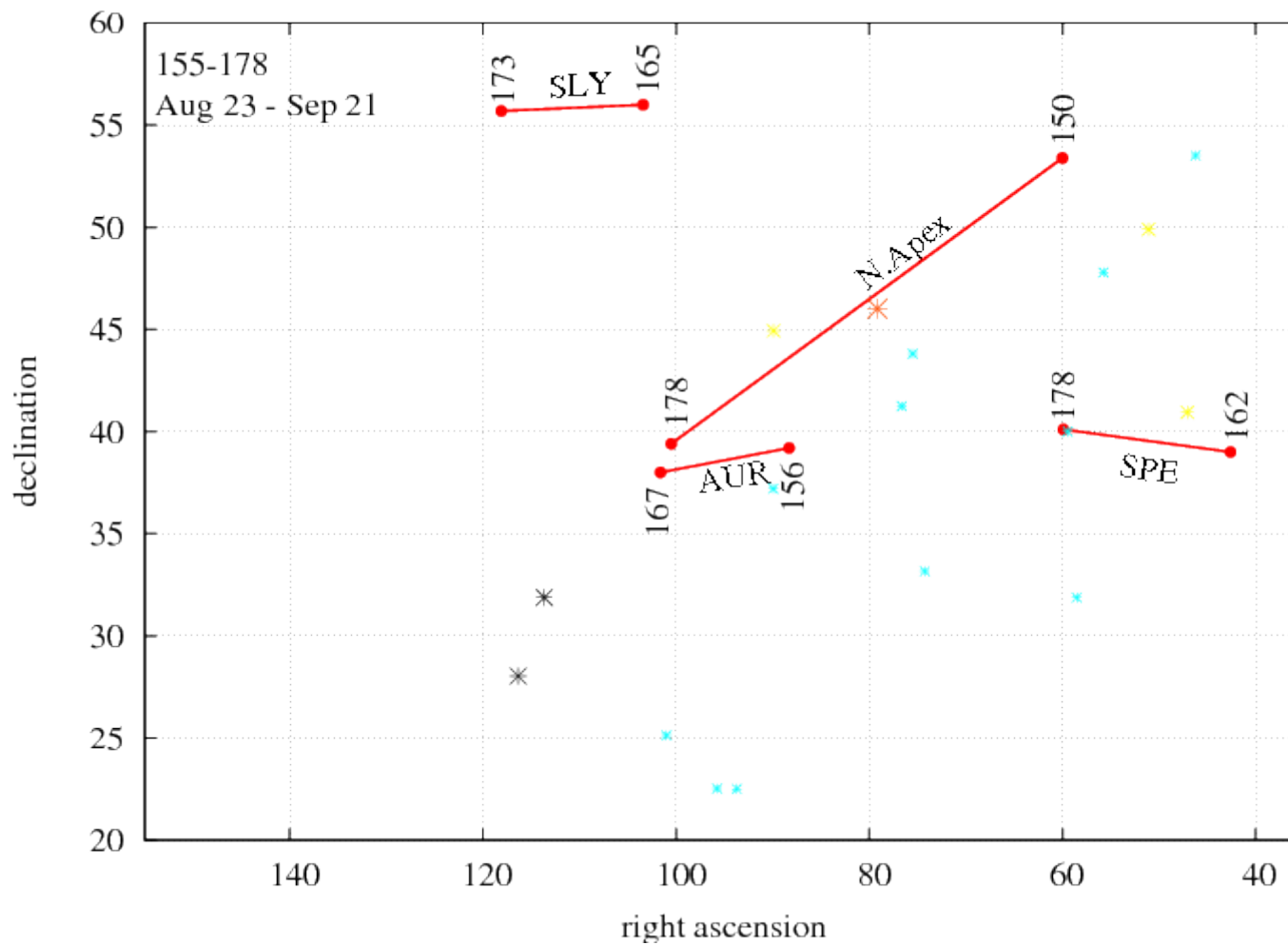
425 PSA –  $\psi$  Aurigids

Short duration shower 194-199°, VR=2.0 (stronger than 224 DAU; 602 meteors)

Next: Summary in maps

150°	AUG 23
160°	SEP 03
170°	SEP 13
180°	SEP 23
190°	OCT 03
200°	OCT 13
210°	OCT 23

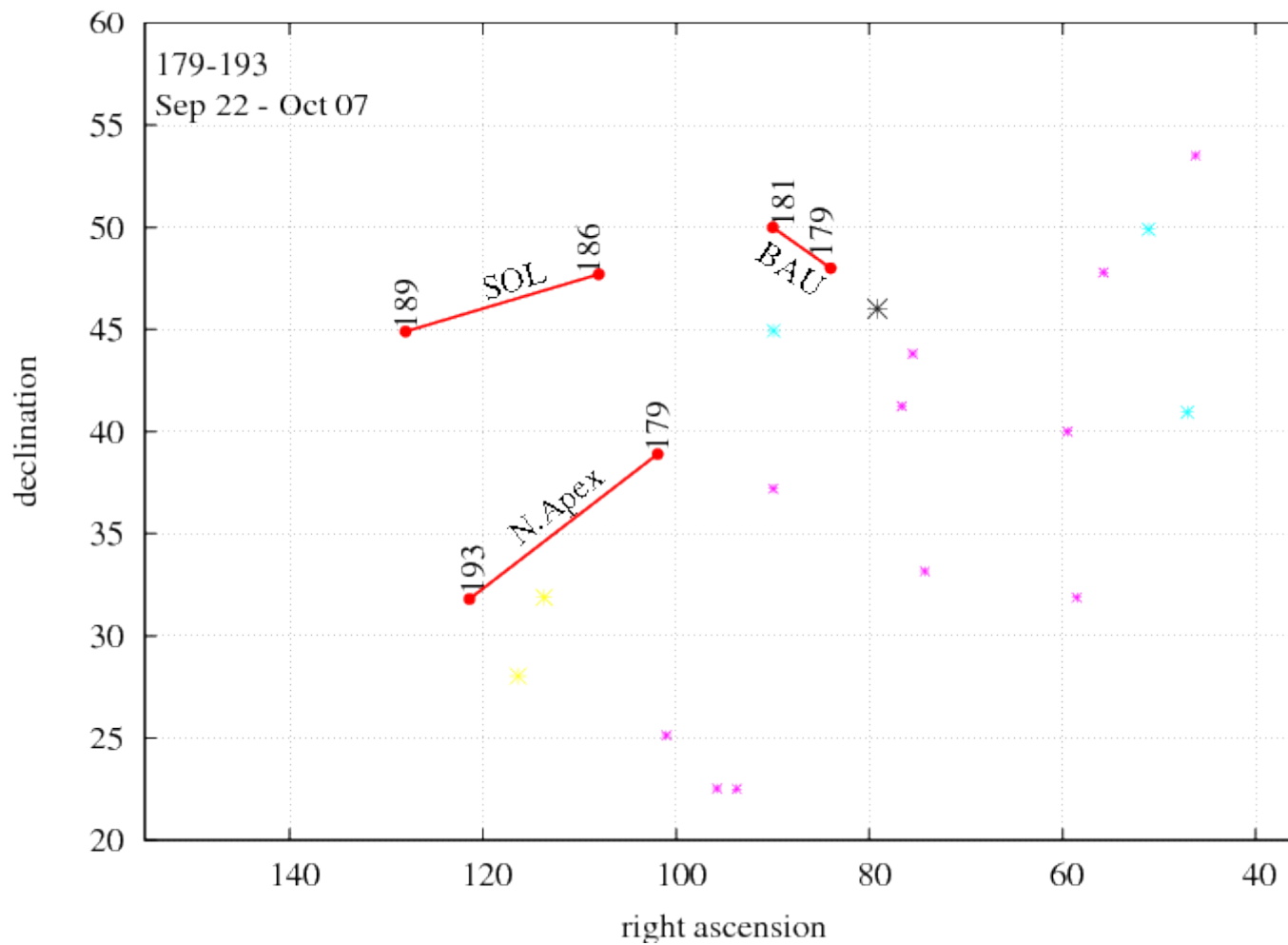
**Period 155° – 178° (Aug 23 – Sep 21)**



Strongest two sources in the region and period

150°	AUG 23
160°	SEP 03
170°	SEP 13
180°	SEP 23
190°	OCT 03
200°	OCT 13
210°	OCT 23

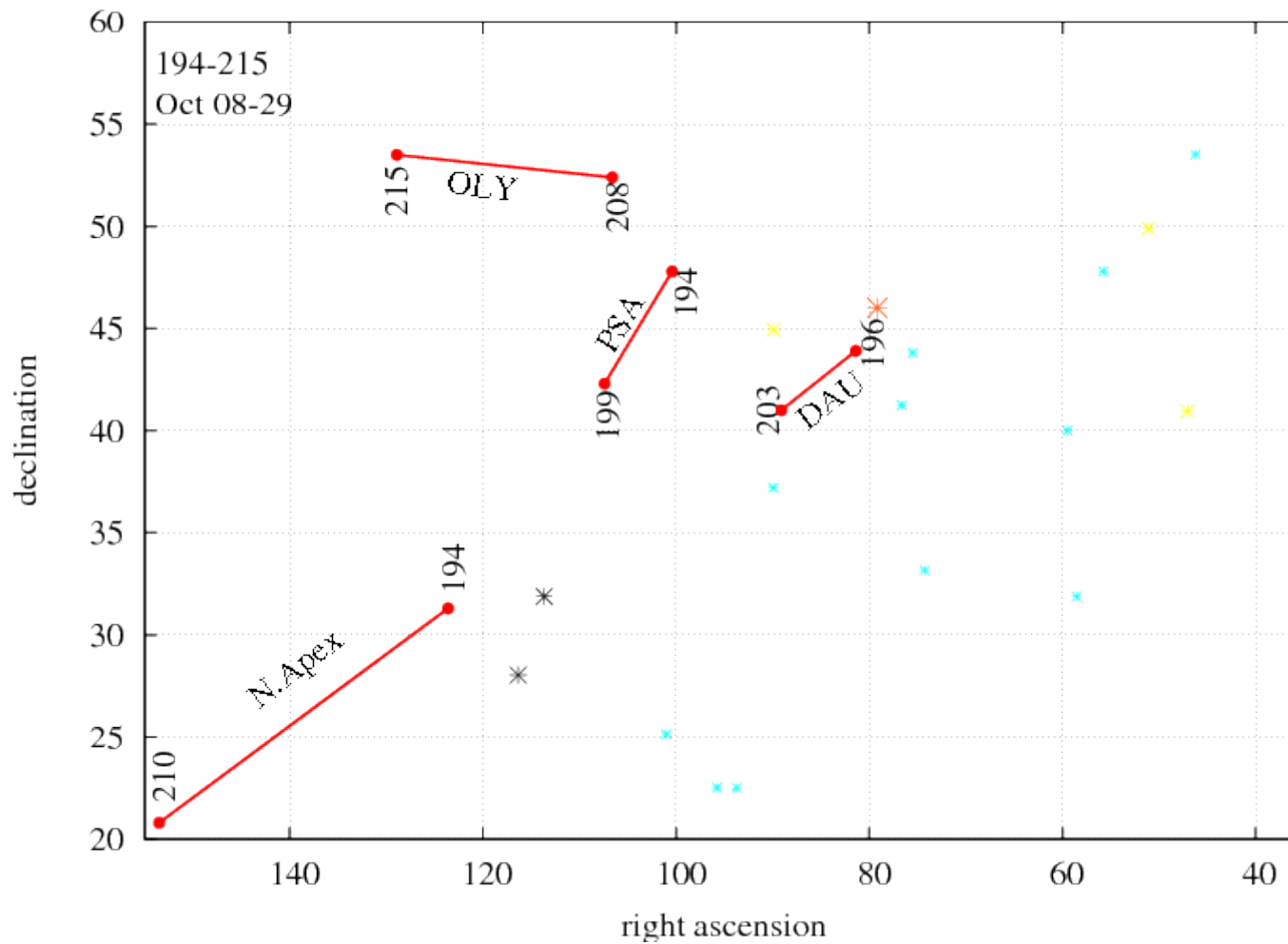
Period 179° – 193° (Sep 22 – Oct 07)



Very weak sources only

150°	AUG 23
160°	SEP 03
170°	SEP 13
180°	SEP 23
190°	OCT 03
200°	OCT 13
210°	OCT 23

**Period 194° – 215° (Oct 08 – 29)**



Very weak sources again, DAU-radiant in Auriga

150°	AUG 23
160°	SEP 03
170°	SEP 13
180°	SEP 23
190°	OCT 03
200°	OCT 13
210°	OCT 23

## Radiant summary

### 1. Eight showers found, new data in red

Shower	Max.	Period	Radiant	V <sub>inf</sub>	VR	Meteors
206 AUR	159°	156–167°	93 +39	67 km/s	3.0	1128
208 SPE	167°	162–178°	48 +40	66 km/s	3.3	1930
228 OLY	210°	208–215°	113 +53	61 km/s	1.3	516
210 BAU	180°	179–181°	87 +49	70 km/s	1.8	559
81 SLY	169°	165–173°	111 +56	59 km/s	1.8	530
424 SOL	186°	186–189°	110 +48	68 km/s	1.6	237
224 DAU	198°	196–203°	84 +44	67 km/s	1.7	744
425 PSA	199°	194–199°	107 +42	69 km/s	2.0	602

### 2. SPE and DAU separate showers

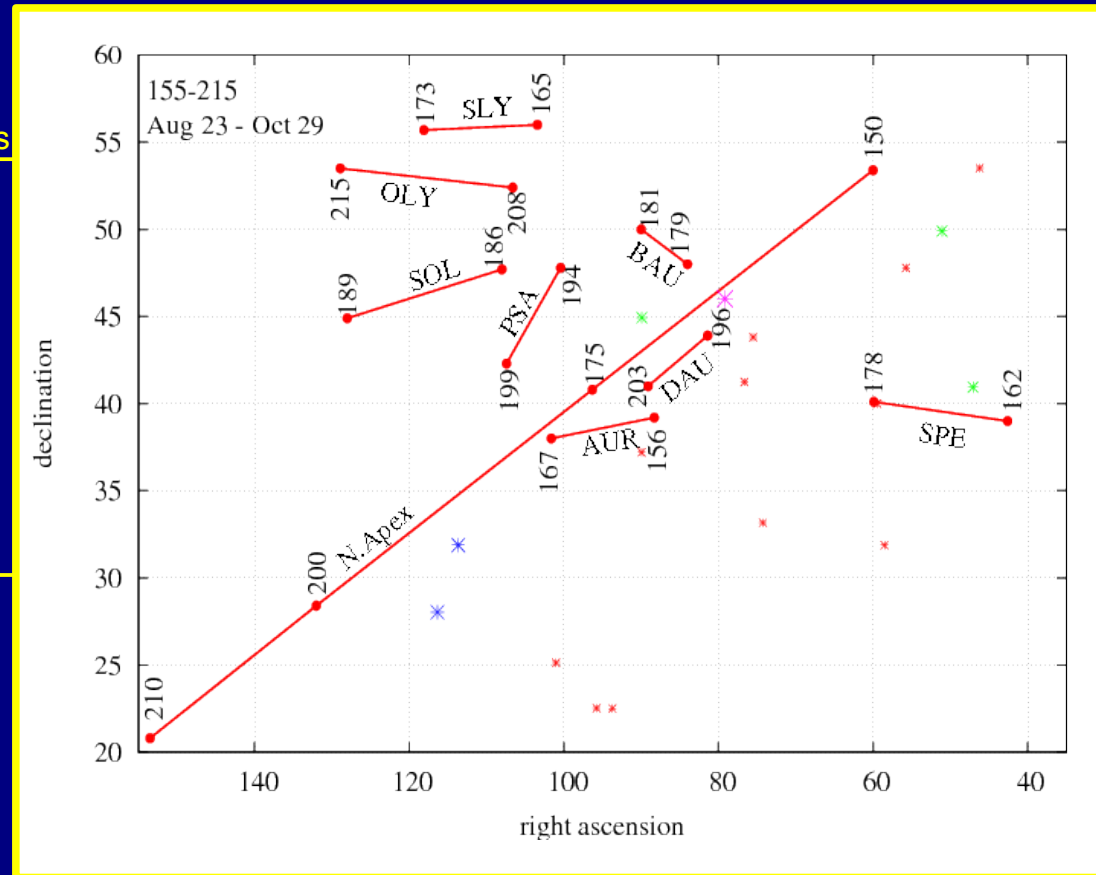
September-Perseids = September  $\epsilon$ -Perseids  
(from Hoffmeister 1936 to outburst 2008)

### 3. Series of radiant in the region:

Related origin?

Parents not (yet) known

Like group of comets (Kreutz group)



150°	AUG 23
160°	SEP 03
170°	SEP 13
180°	SEP 23
190°	OCT 03
200°	OCT 13
210°	OCT 23