Draconids 2011. Outburst
Observations by Croatian Meteor Network

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Introduction

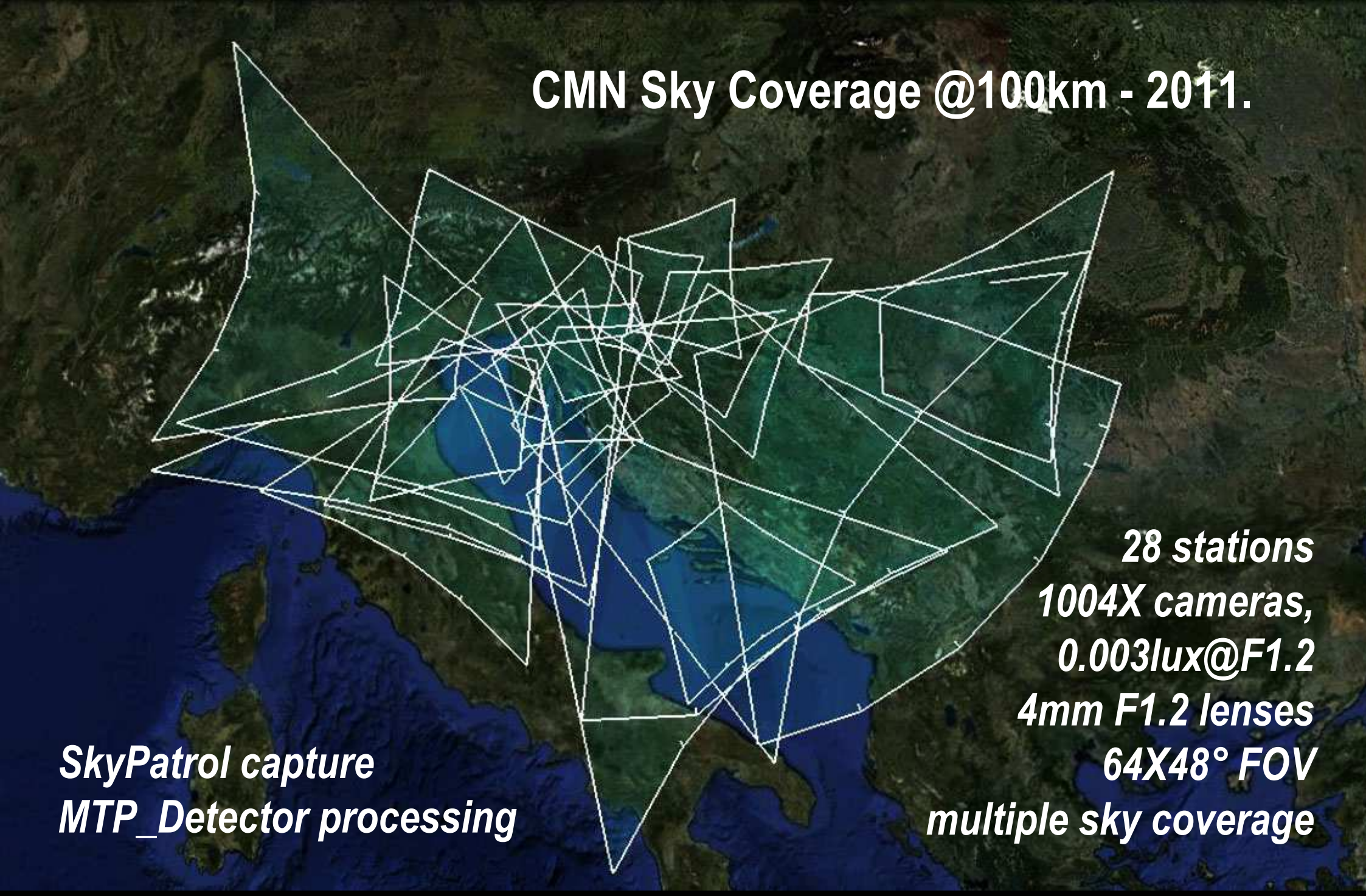
- Draconids – main body comet Giacobini-Zinner

- spectacular outbursts during past century

- 2011. outburst predicted by various authors

- variable weather condions over Croatian skies

- CMN observations – total of 88 Draconid orbits


CMN Sky Coverage @100km - 2011.
28 stations
1004X cameras,
0.003lux@F1.2
4mm F1.2 lenses
64X48° FOV
multiple sky coverage
SkyPatrol capture
MTP_Detector processing

Weather conditions during 2011. Draconids outburst

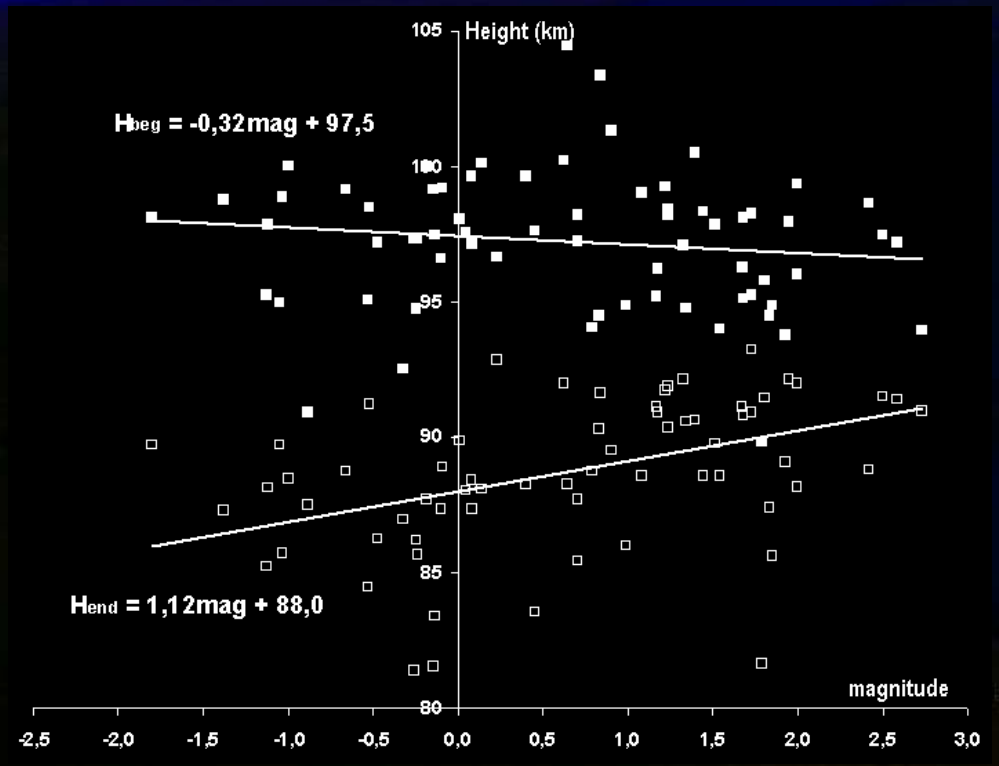
heavy storms!!!
part of CMN - clear skies
16 CMS stations contribution
5 multi-station sprite events!

2011. Draconids atmospheric trajectories

H_beg_{avg}= 98km

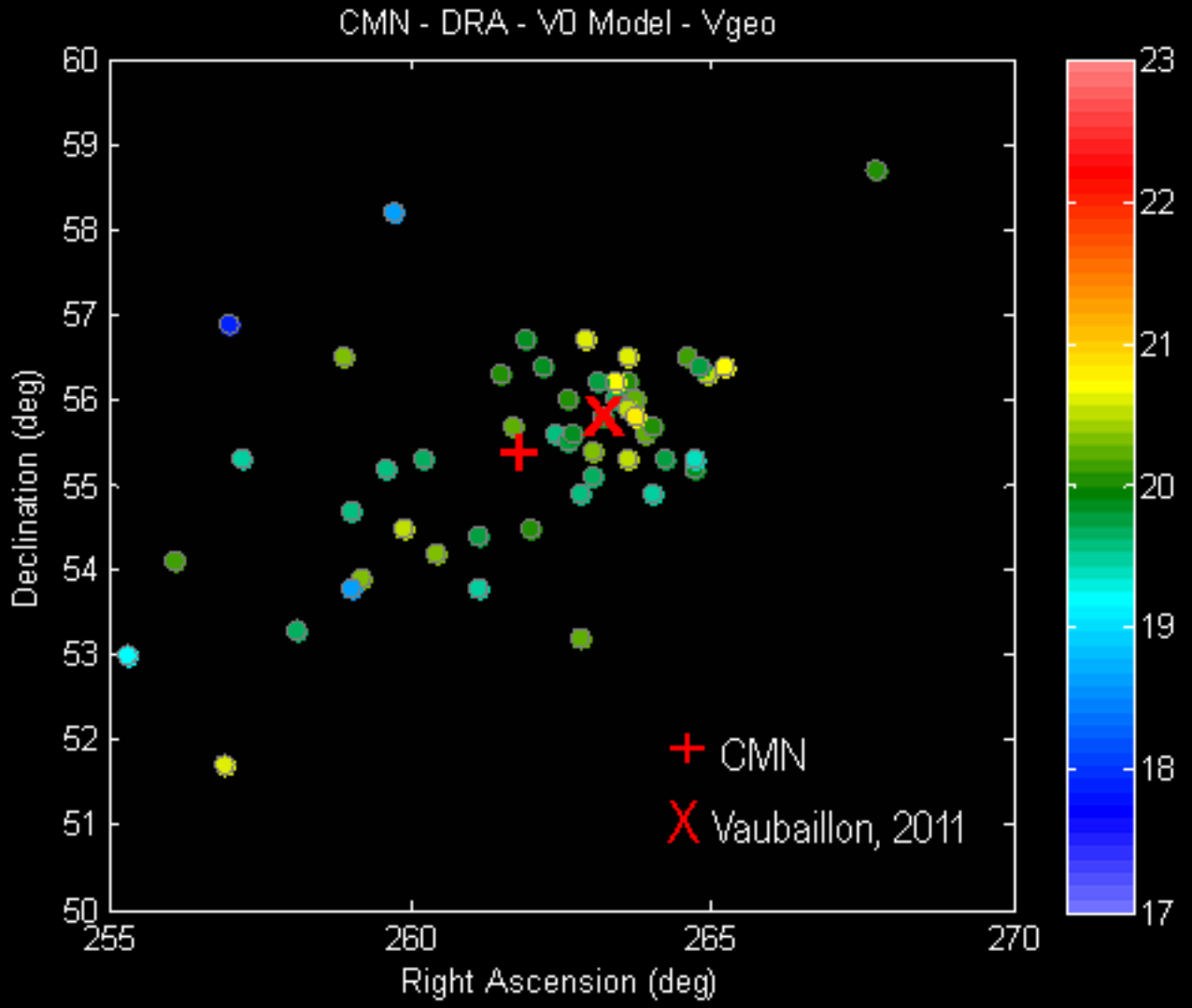
H_end_{avg}= 88km

$duration_{avg}$= 0.66sec



16 CMN stations
88 Draconid orbits
53 orbits with Qa>15°
25 meteors from 3 or more stations
automatic detections
multi-parameter fit processed

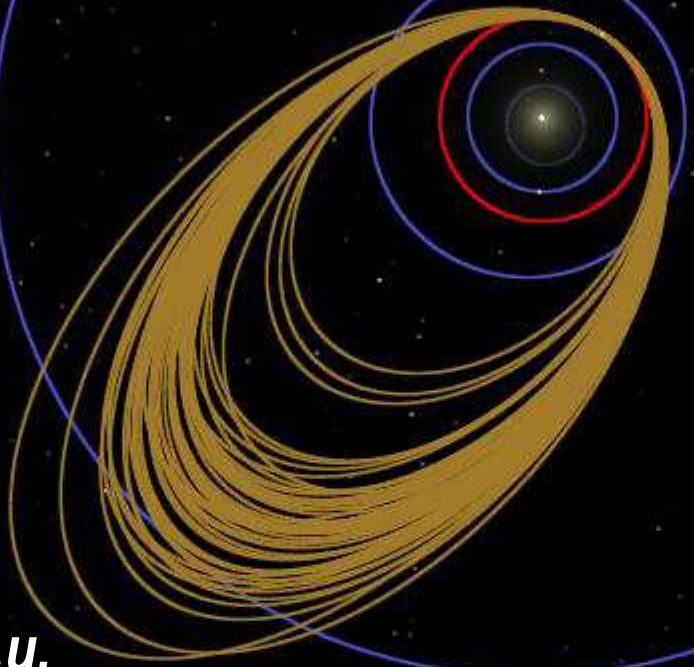
Non-decelerating trajectory model results



RA= 261.8° 2.7
Dec= 55.4° 1.2
Vgeo= 19.97km/s 0.55

Non-decelerating model results

53 meteors
Qa>15°
D_sh<0.15

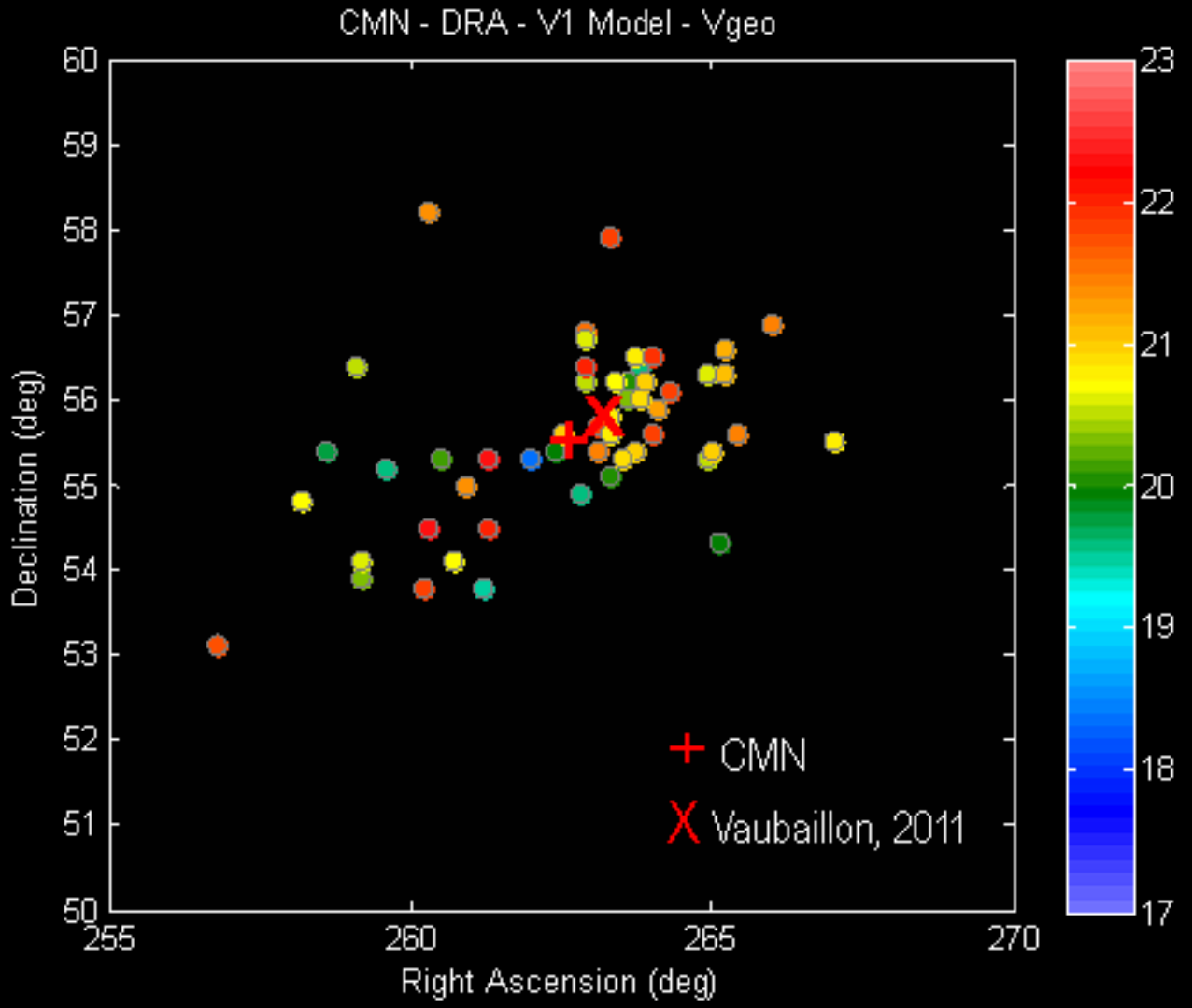


mean aphelion inside Jupiter's orbit, Q=4.9 a.u.

mean orbital elements:

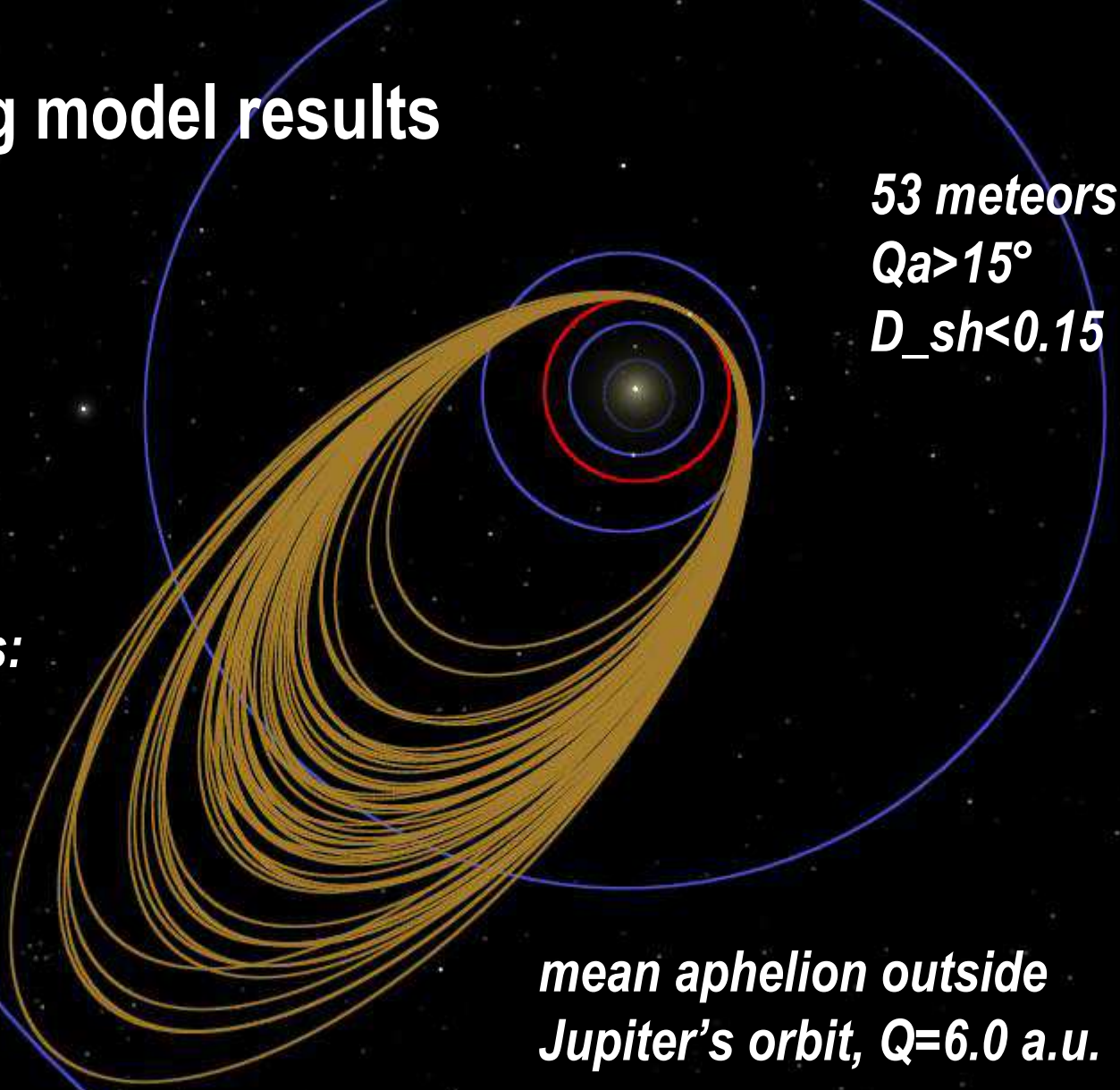
1/a= 0.339 1/a.u. 0.041	*i= 30.6° 0.7*
q= 0.995 a.u. 0.002	*peri= 172.4° 2.2*
e= 0.663 0.041	*node= 195.0° 0.1*

Linear (constant) deceleration trajectory model results



RA= 262.6° 2.2
Dec= 55.6° 1.0
Vgeo= 20.91km/s 0.81

Constant decelerating model results



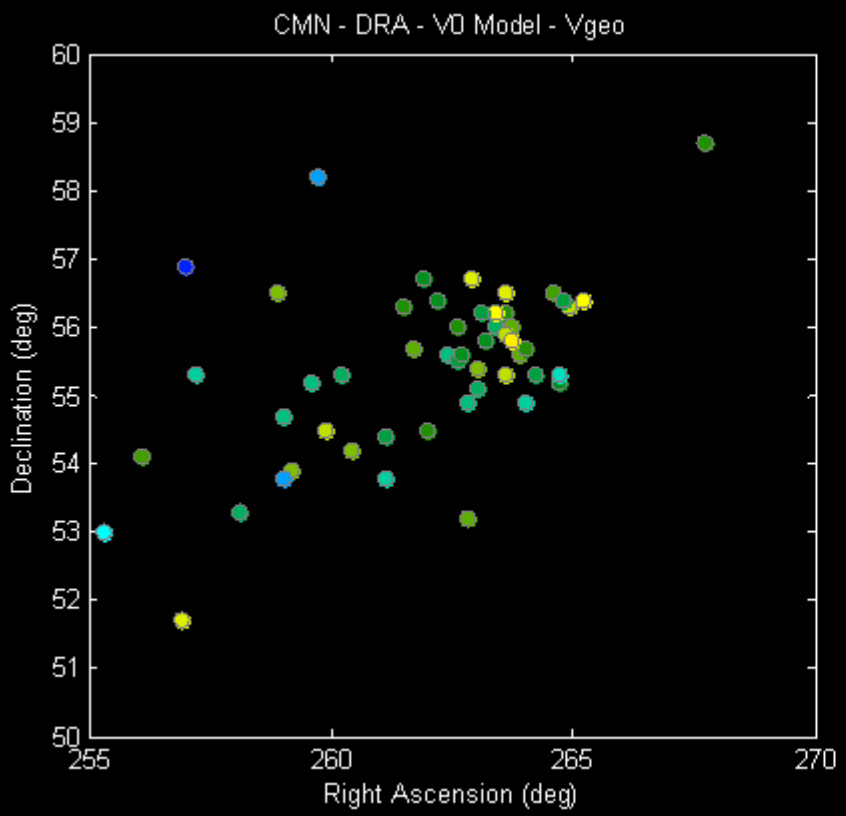
53 meteors
Qa>15°
D_sh<0.15

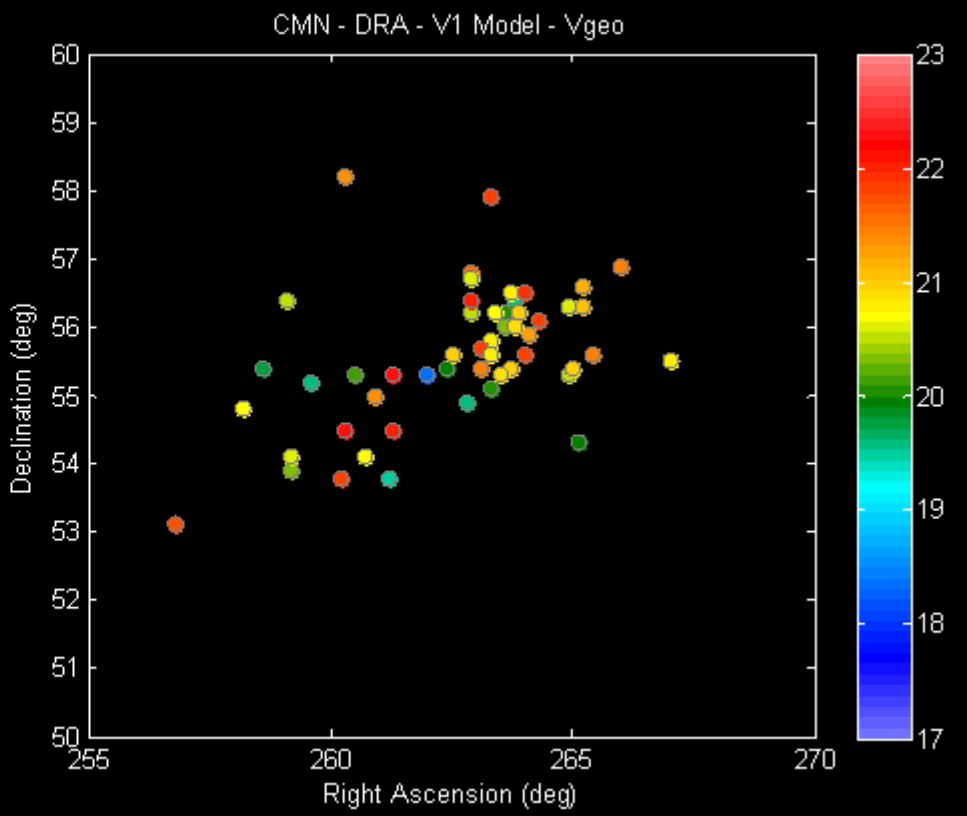
mean orbital elements:
1/a= 0.285 1/a.u. 0.048
q= 0.996 a.u. 0.002
e= 0.716 0.048

i= 31.7° 1.0
peri= 173.1° 1.7
node= 195.0° 0.1

mean aphelion outside Jupiter's orbit, Q=6.0 a.u.

Non-decelerating vs linear deceleration trajectory model

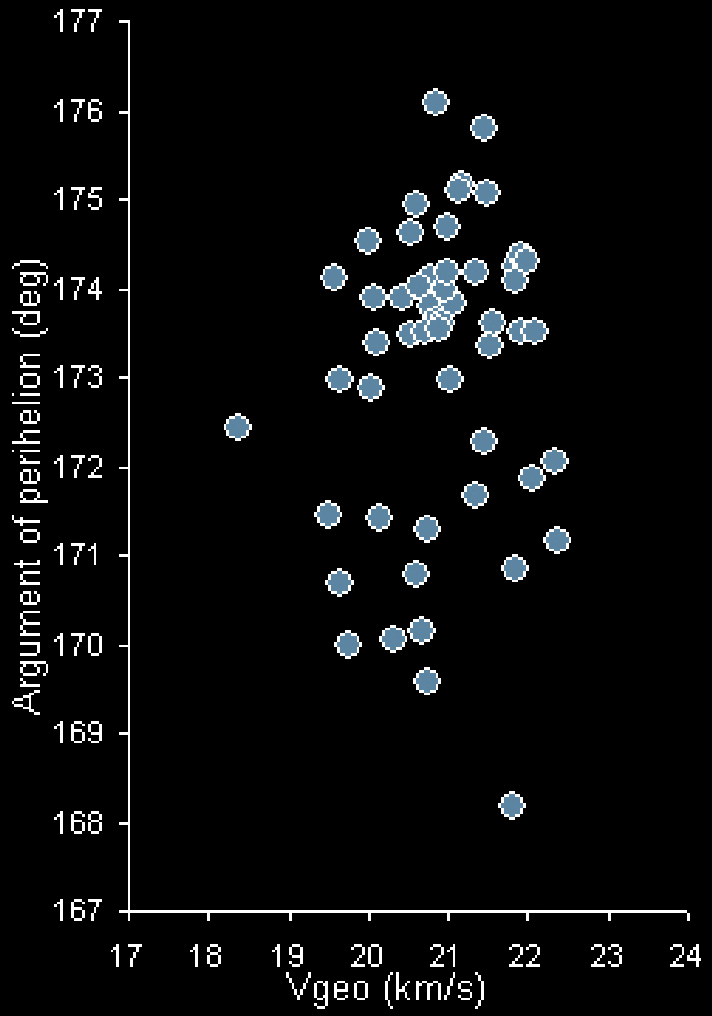


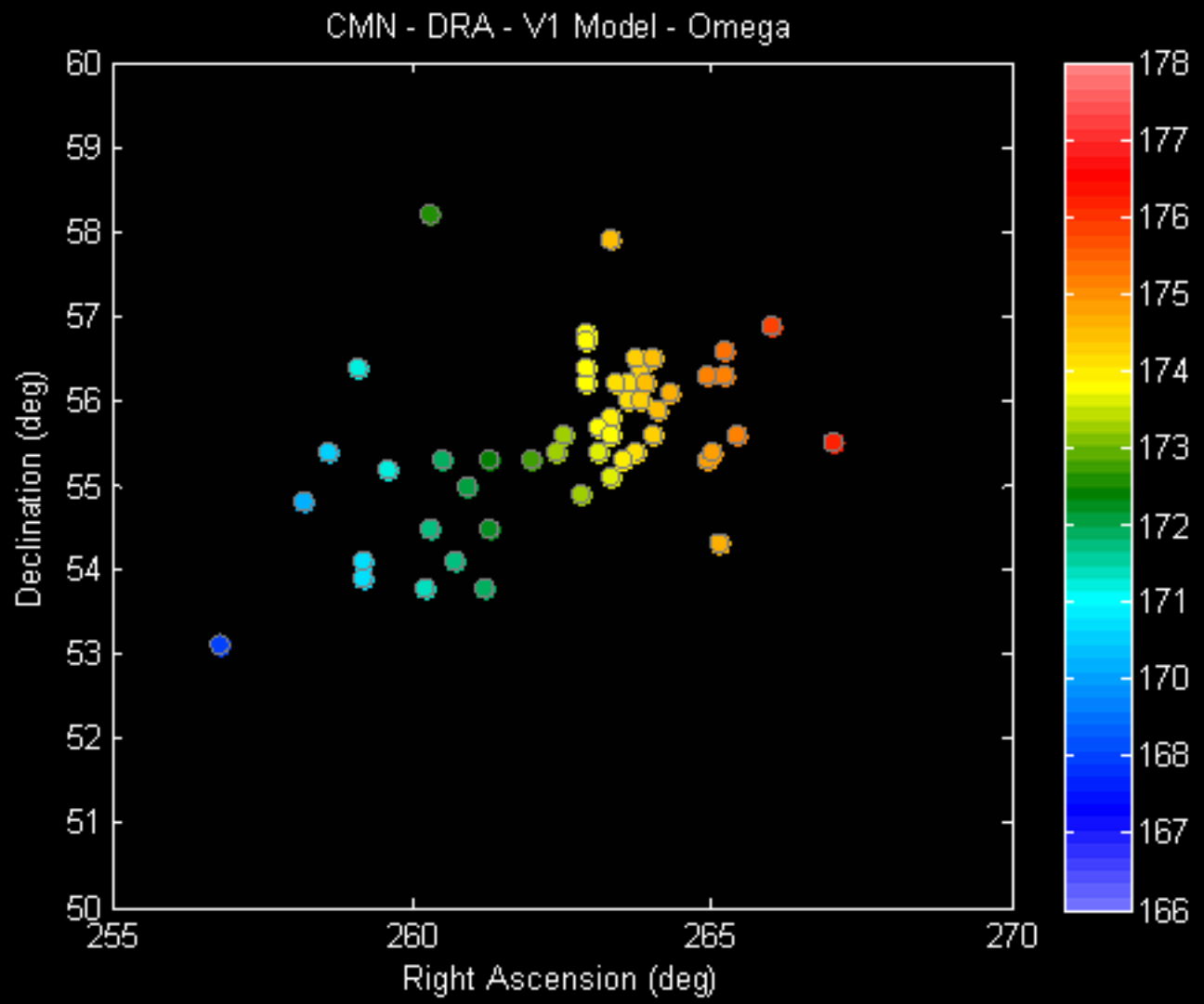


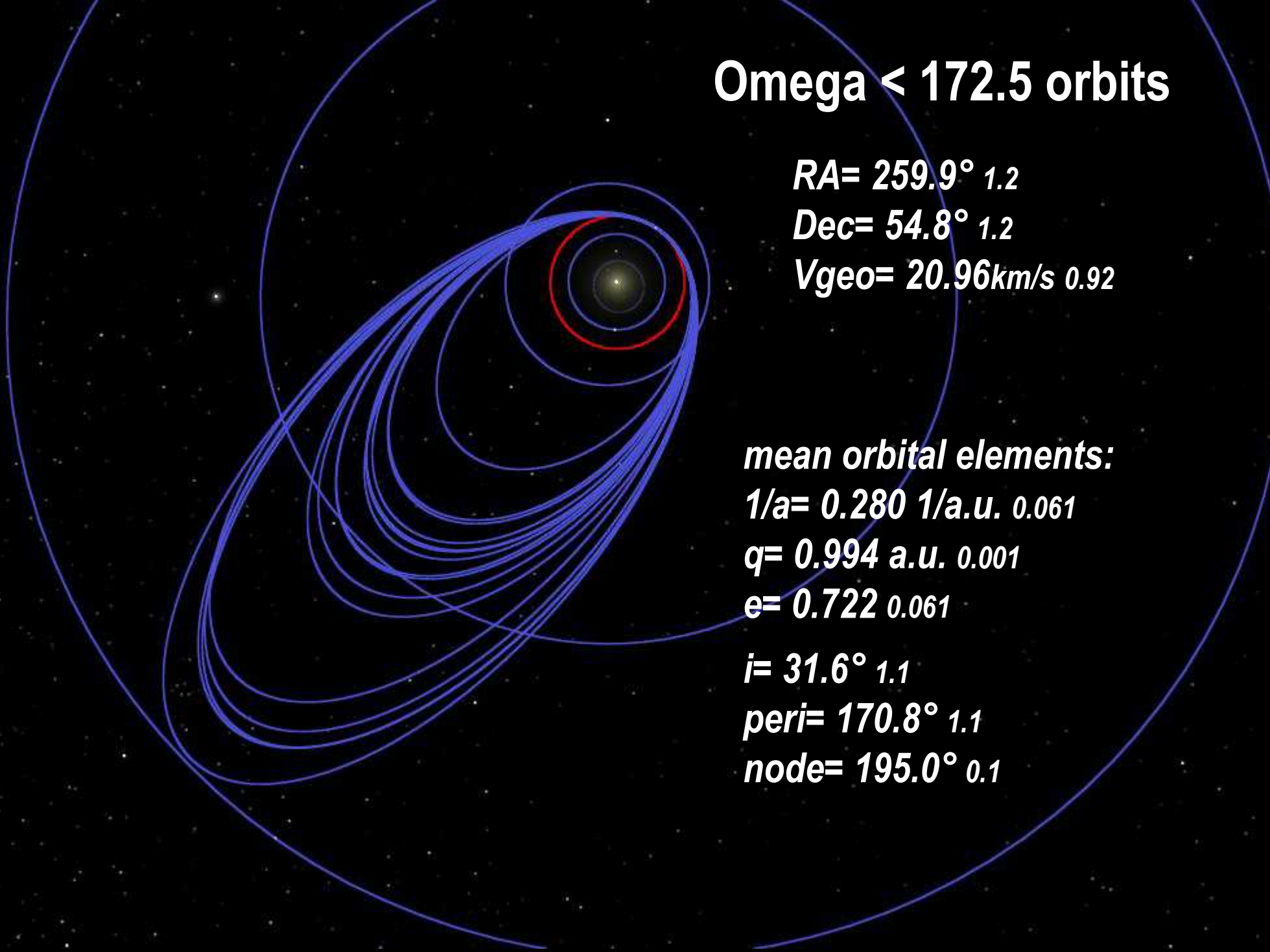
RA= 261.8° 2.7
Dec= 55.4° 1.2
Vgeo= 19.97km/s 0.55

RA= 262.6° 2.2
Dec= 55.6° 1.0
Vgeo= 20.91km/s 0.81

On argument of perihelion shift





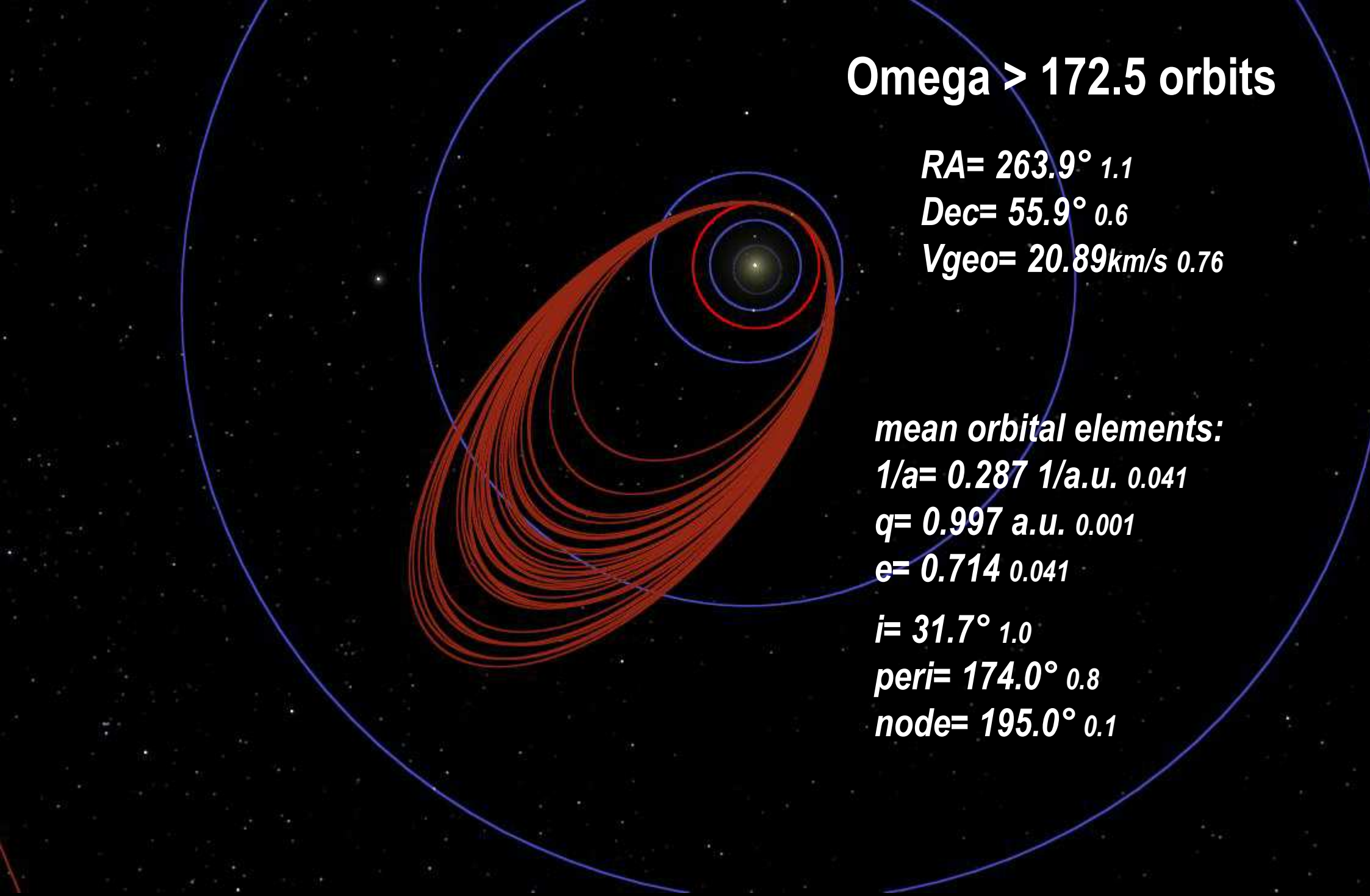


Omega < 172.5 orbits

RA= 259.9° 1.2
Dec= 54.8° 1.2
Vgeo= 20.96km/s 0.92

mean orbital elements:
1/a= 0.280 1/a.u. 0.061
q= 0.994 a.u. 0.001
e= 0.722 0.061

i= 31.6° 1.1
peri= 170.8° 1.1
node= 195.0° 0.1



Omega > 172.5 orbits

RA= 263.9° 1.1
Dec= 55.9° 0.6
Vgeo= 20.89km/s 0.76

mean orbital elements:
1/a= 0.287 1/a.u. 0.041
q= 0.997 a.u. 0.001
e= 0.714 0.041

i= 31.7° 1.0
peri= 174.0° 0.8
node= 195.0° 0.1

Important points

- results based on automatic data processing

- adding data from other networks

- manual astrometry from single video frames/fields

- appropriate deceleration model approach

- weighted multi-parameter tajectory fit?

Conclusion

- Draconid 2011. radiant postion and mean orbital data

- significant deceleration detected

- obvious argument of perihelion shift trend found

- mixed particles from two perihelion passages?

Acknowledgements

All the CMN members for their devoted work and persistence

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Thank you for your attention!

Questions?