Draconid meteor storms

David Asher (Armagh Obs.) and Duncan Steel (Univ. NSW)

International Meteor Conference
Sibiu
2011 September 16th

Can we believe Jérémie?

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IMO-News

Date: Wed, 09 Sep 1998 15:08:00 METDST
From: Juergen Rendtel <jrendtel@aip.de>
Subject: Draconid information

This mail might be of interest for all meteor observers:

> Dear Mr. Rendtel,
>   I send you a brief message about results of my investigations
> on Draconids. Could you please accept this information and spread it around
> colleagues.
>   Sincerely yours,
>   E.A. Reznikov,
>   South Ural University
>
> The numerical investigation of the motion of meteoroids ejected from the
> nucleus of the comet Giacobini-Zinner is carried out. Calculations have shown
> that the ejected particles should be observed on October 8, 1998.
> The calculated time of a maximum is October 8.55 UT. The radiant of the
> meteor shower has a right ascention 17.5 hours and a declination 56 degrees.

способ, индексом 2 - второй.

Из данных, приведенных в табл. 6, следует, что разница в -0,00053 а.е. может быть легко устранена, следовательно, 8 октября 1998 г. ожидается довольно интенсивный поток Драконид. Расчетное время максимума интенсивности - 13 ч 20 мин.

Как видно из рис. 4, прогноз на 2005 г. неблагоприятный. В 2012 г., возможно, будет наблюдаться слабый поток неярких метеоров. Поток может быть образован частицами, выброшенными из перигелия 1959 г. со скоростью около +39 м/с, причем эти частицы в 1992 г. должны иметь тесное сближение с Землей. Расчетный момент прохождения узла - 2456209,2 JD (2012.10.08,7), расстояние между частицами и Землей +0,0014 а.е. Вычисления должны быть уточнены с использованием точных значений координат больших планет.

На 2018 г. прогноз неблагоприятный, хотя частицы, выброшен -

Reznikov (Trudy Kazan. Gor. Astron. Obs. 53)

Mikiya Sato

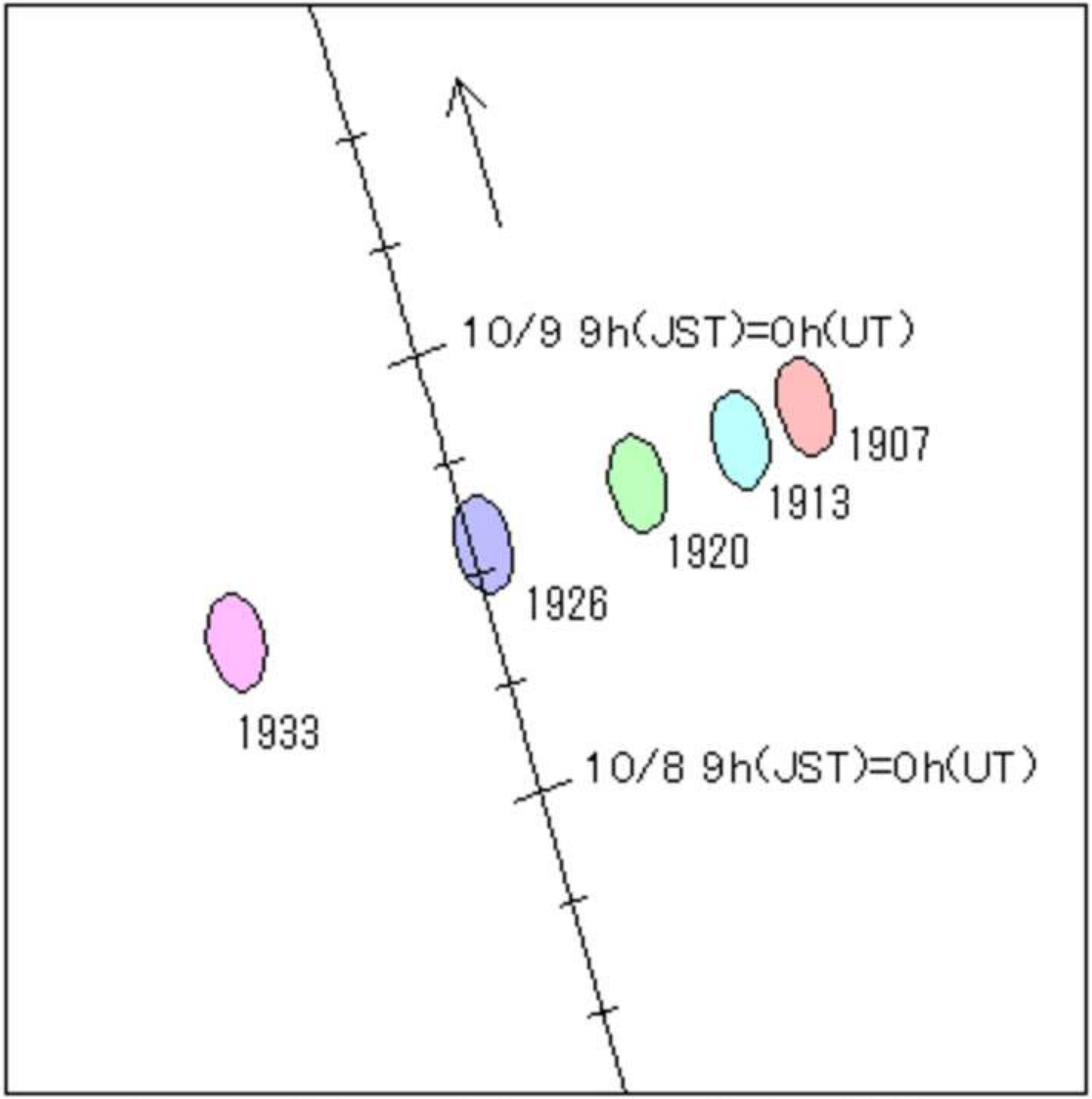


Fig. 2 The position of trails in 1998.

Draconids

Summary of 1998 Draconid Outburst Observations

Rainer Arlt

The observations of the 1998 Draconids are summarized based on the reports of visual and radio observers. Regular observations of 87 observers, who recorded 1920 Draconids in 190 observing hours, were collected. The peak time was found to be at $\lambda_\odot = 195\overset{\circ}{.}075 \pm 0\overset{\circ}{.}010$ (October 8, 1998, $13^{h}10^{m} \pm 15^{m}$ UT) with ZHR $= 720 \pm 90$. The population index of $r \approx 3.0$ is higher than for many annual major meteor showers; no clear r-profile could be derived. The outburst occurred about 8 hours before the nodal longitude of the comet, 4 hours more than in 1985. The order of magnitude of the maximum activity as well as the high population index make the 1998 outburst comparable to that of 1985.

Giacobinids Returned in the Japanese Sky: Video and Photographic Observations

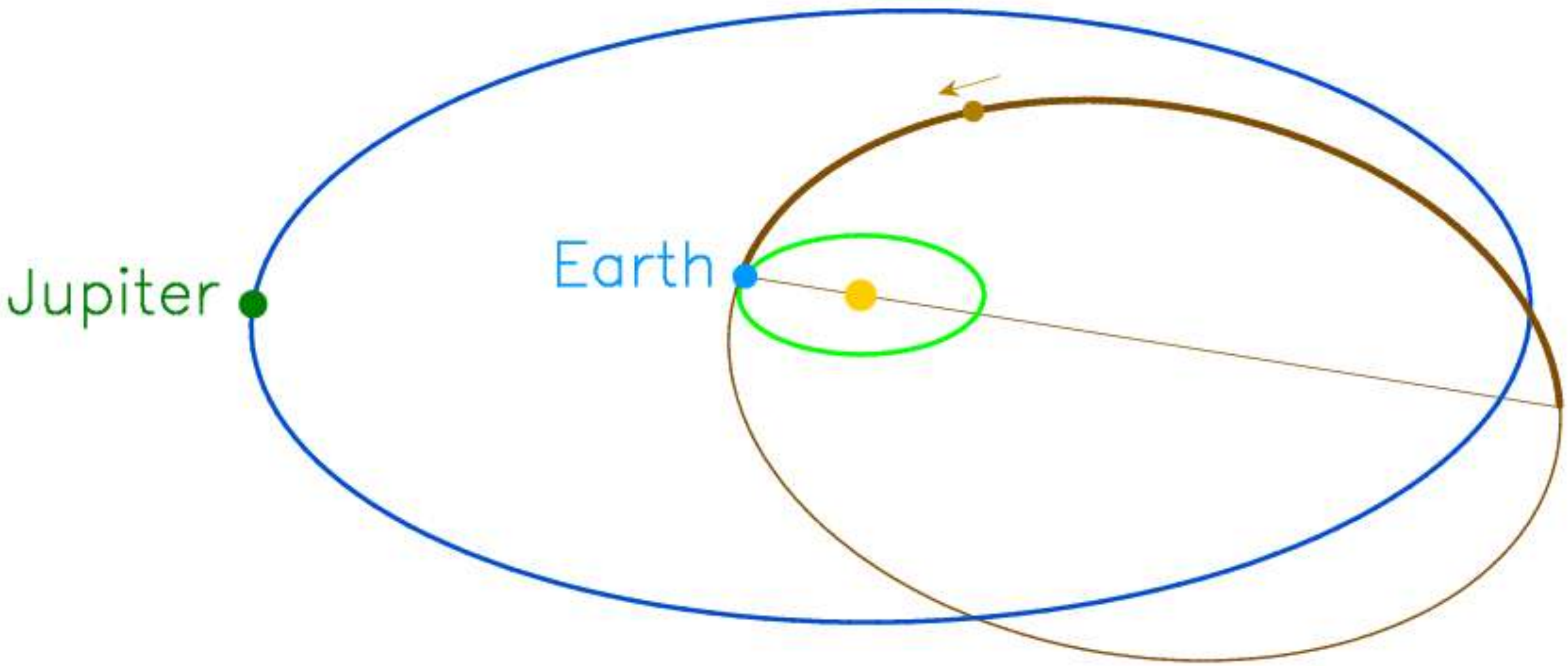
Masahiro Koseki, Kaoru Teranishi, Junpei Shiba, and Yusuke Sekiguchi

The Giacobinids had an outburst on October 8, 1998, at $13^{h}10^{m}$ UT and reached video rates of about five per minute. This is about the same rate as seen by visual observers. The Giacobinids are rich in faint meteors when compared with other major streams, and their meteoroids are fragile.


N.A.Sharp/NOAO/AURA/NSF

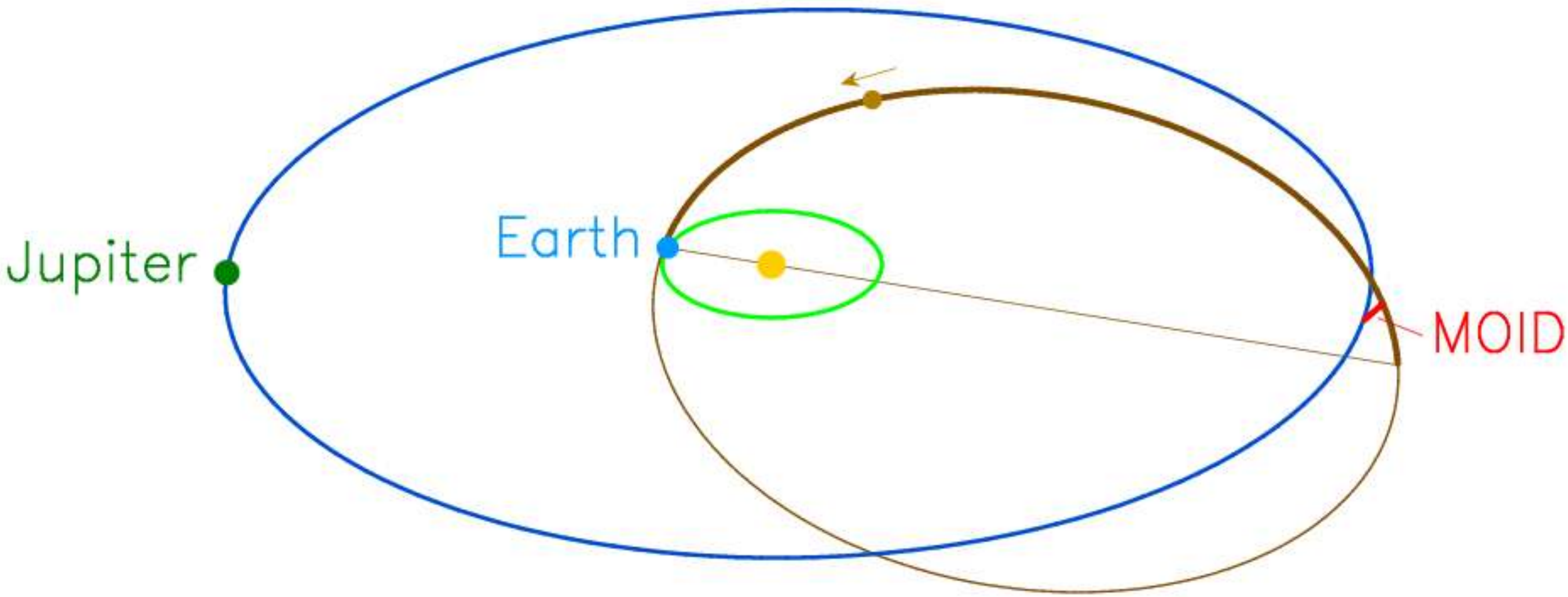
21P/Giacobini–Zinner

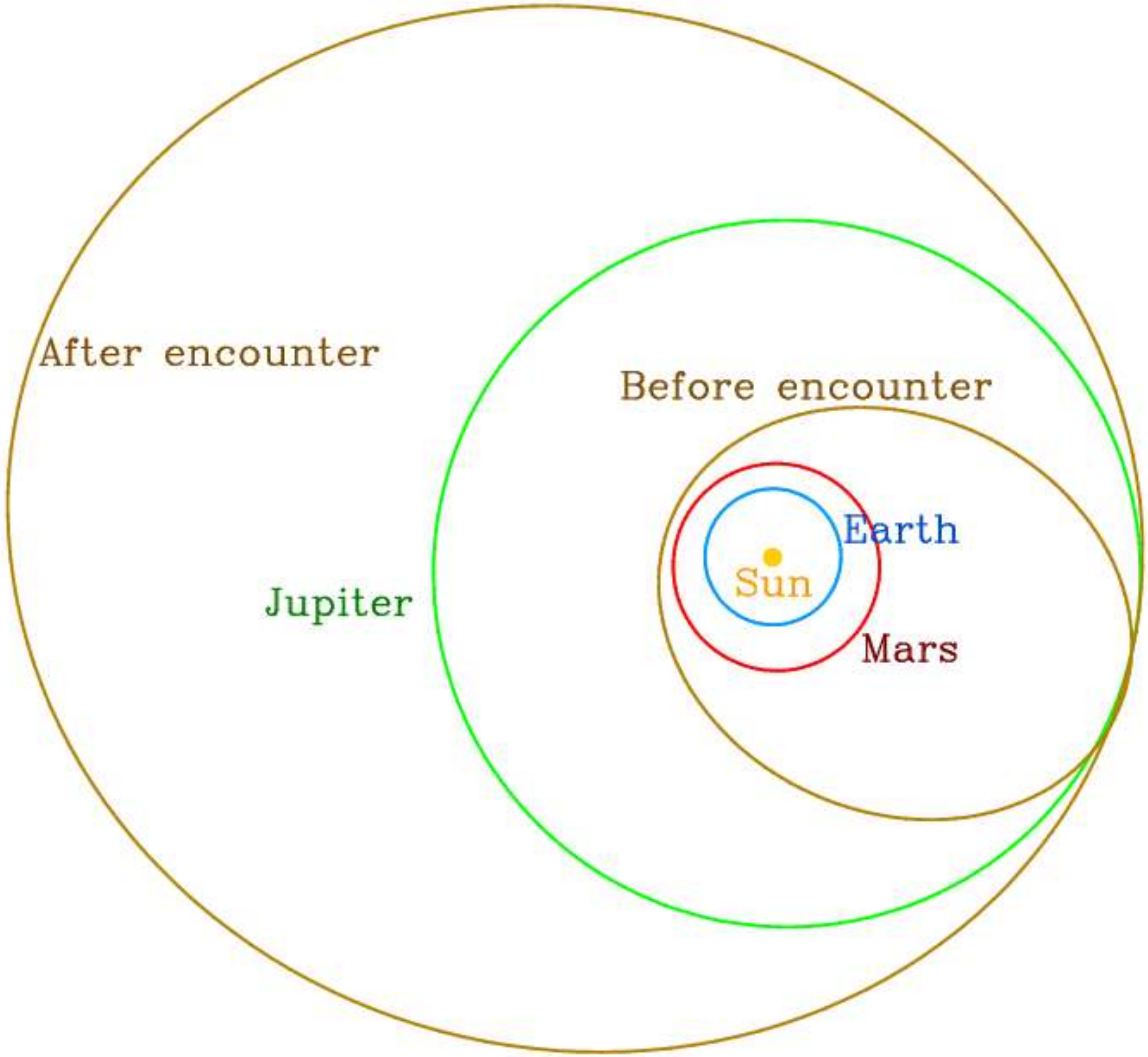
2011 Oct 8



21P/Giacobini–Zinner

2011 Oct 8





Perihelion–aphelion interchange due to jovian encounter

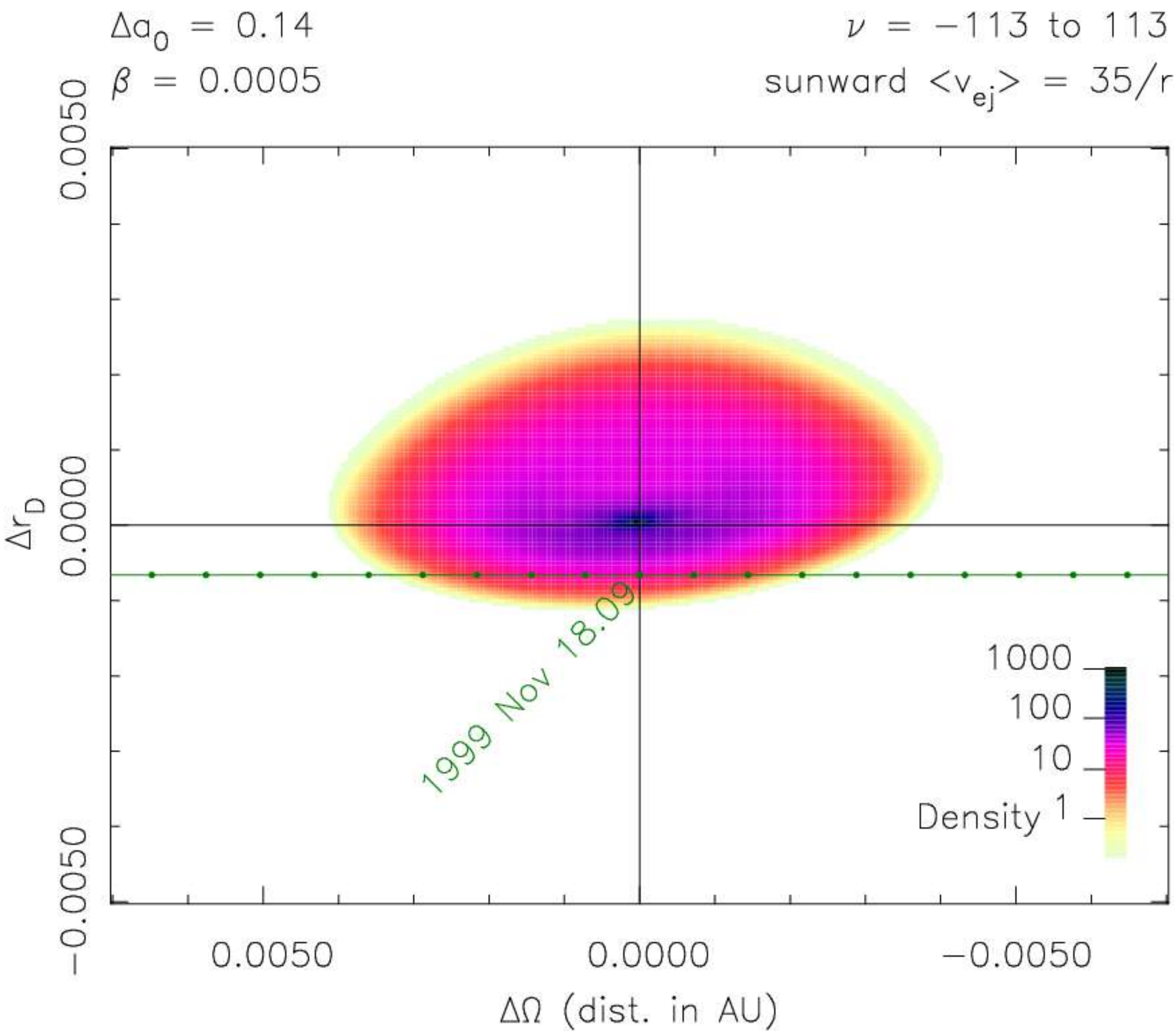
Problems:

Don't know comet orbit with high precision before the 1900 return

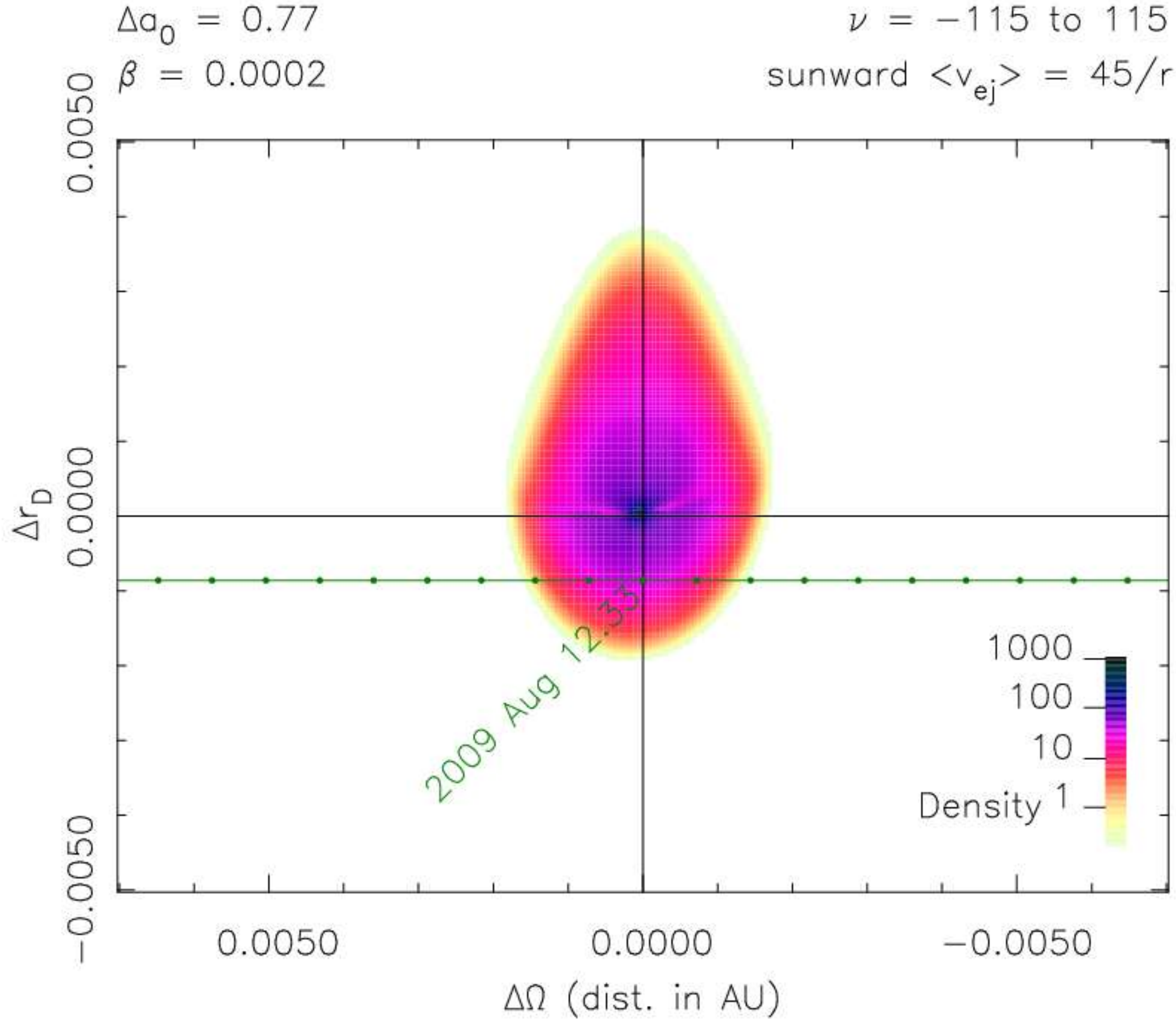
Don't know how comet's activity has varied (but see Watanabe & Sato 2008)

Multiple trails contribute to past storms
$\Rightarrow$ hard to calibrate

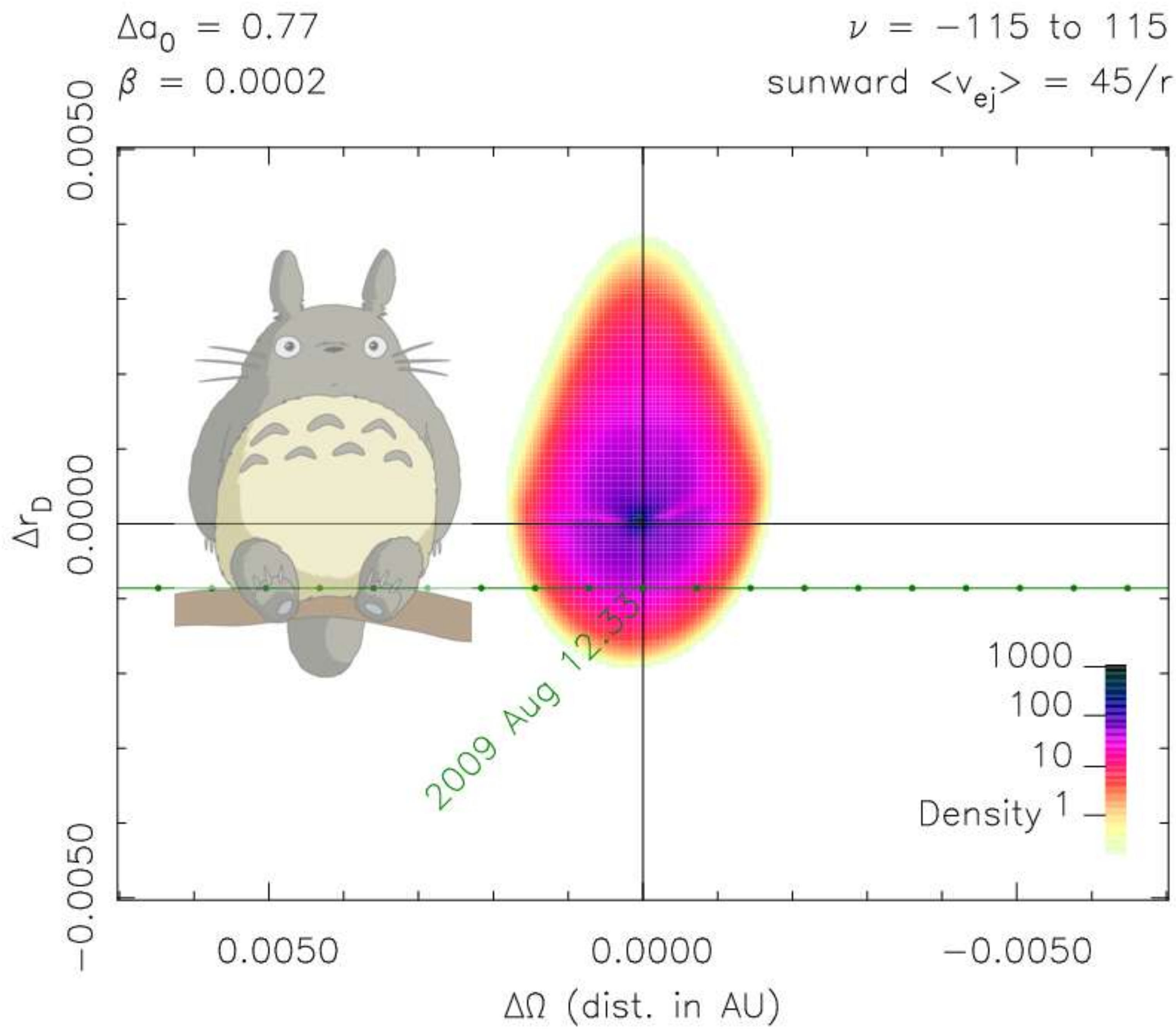
Moon



$\Delta a_0 = 0.14$
$\beta = 0.0005$
$\nu = -113$ to 113
sunward $\langle v_{ej} \rangle = 35/r$
0.0050
0.0000
−0.0050
Δr_D
0.0050
0.0000
−0.0050
$\Delta\Omega$ (dist. in AU)
1999 Nov 18.09
1000
100
10
Density 1



Δa_0 = 0.77
β = 0.0002
ν = −115 to 115
sunward $\langle v_{ej} \rangle$ = 45/r
0.0050
0.0000
−0.0050
Δr_D
2009 Aug 12.33
1000
100
10
Density 1
0.0050
0.0000
−0.0050
ΔΩ (dist. in AU)



$\Delta a_0 = 0.77$
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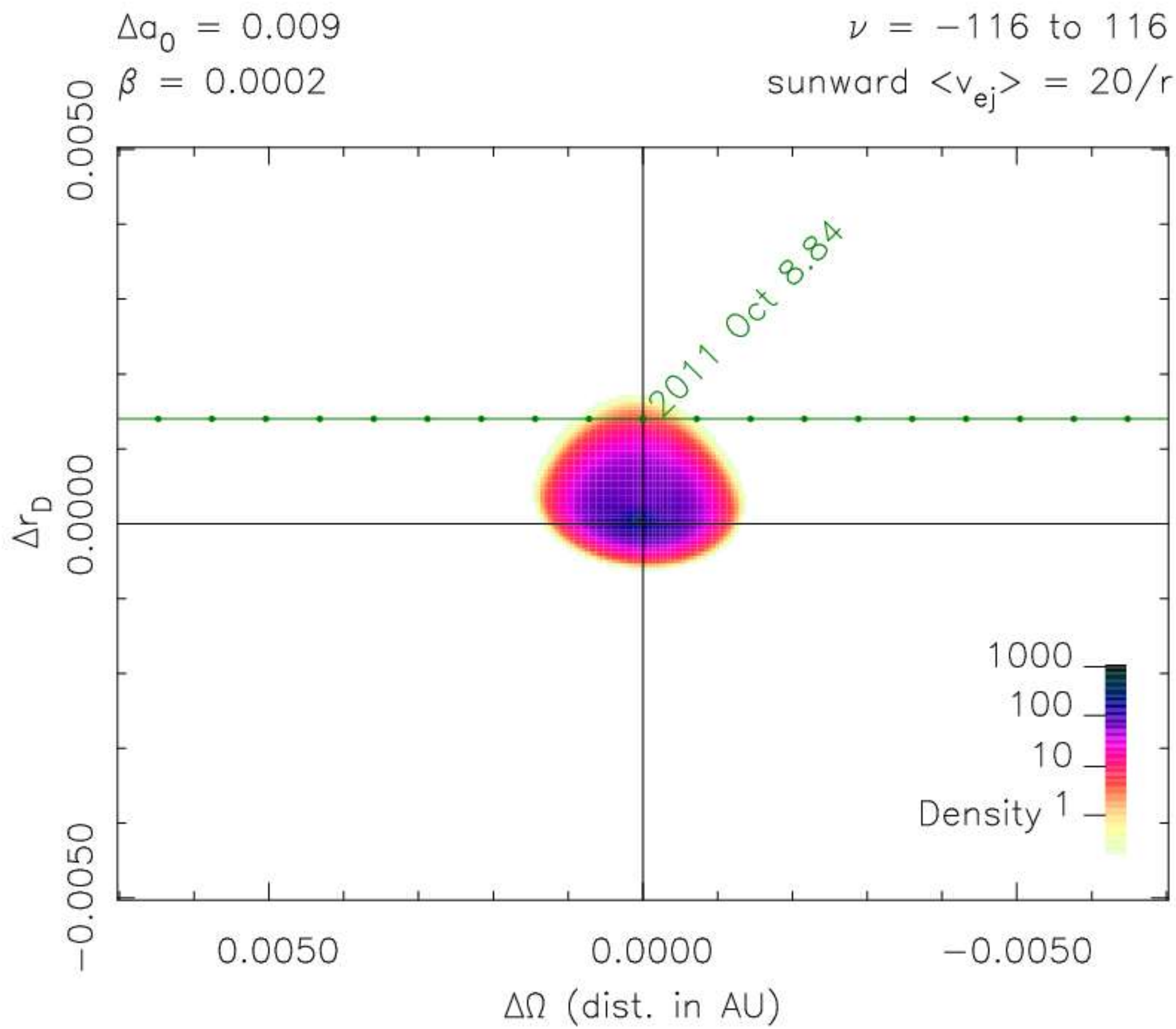
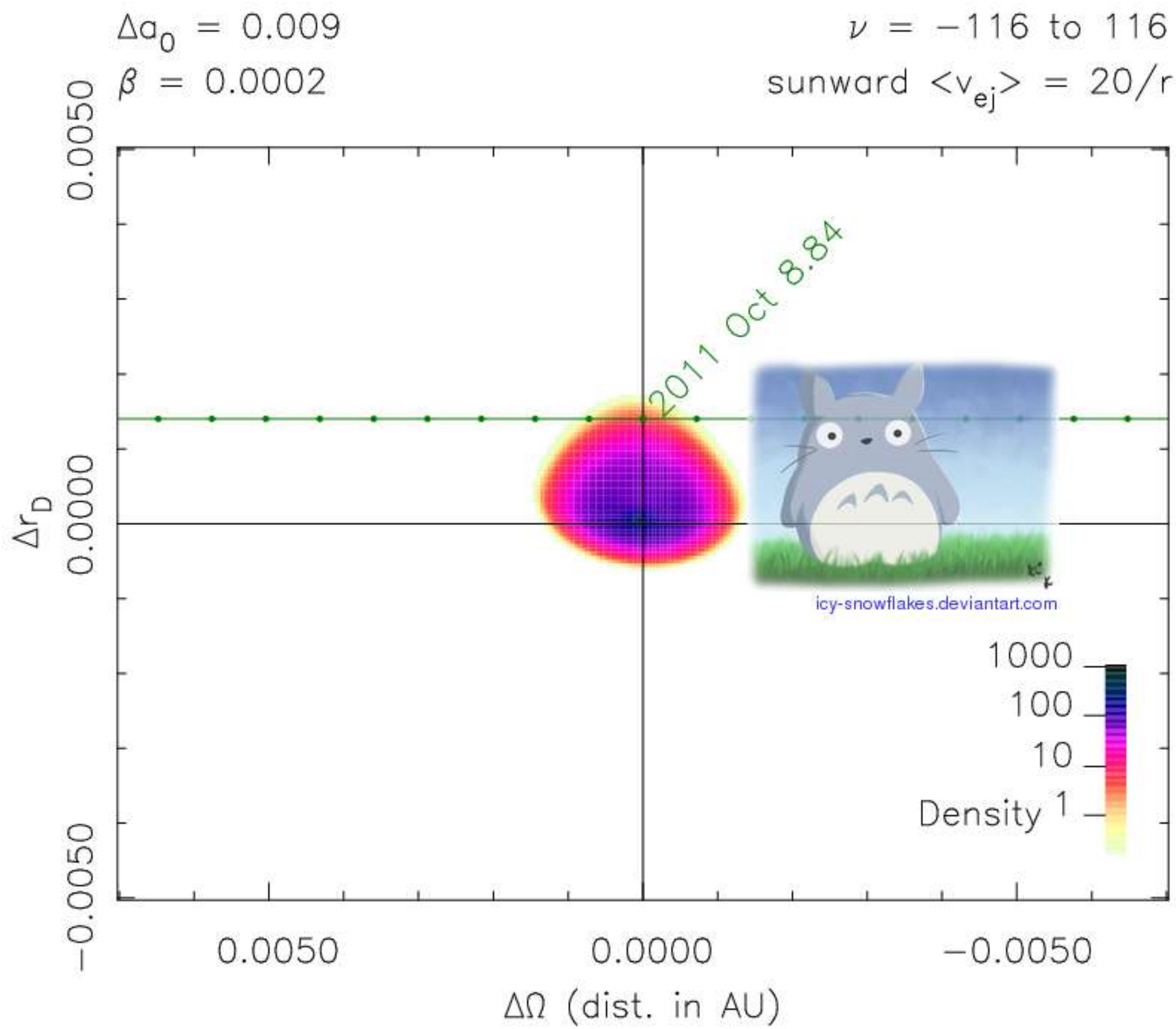
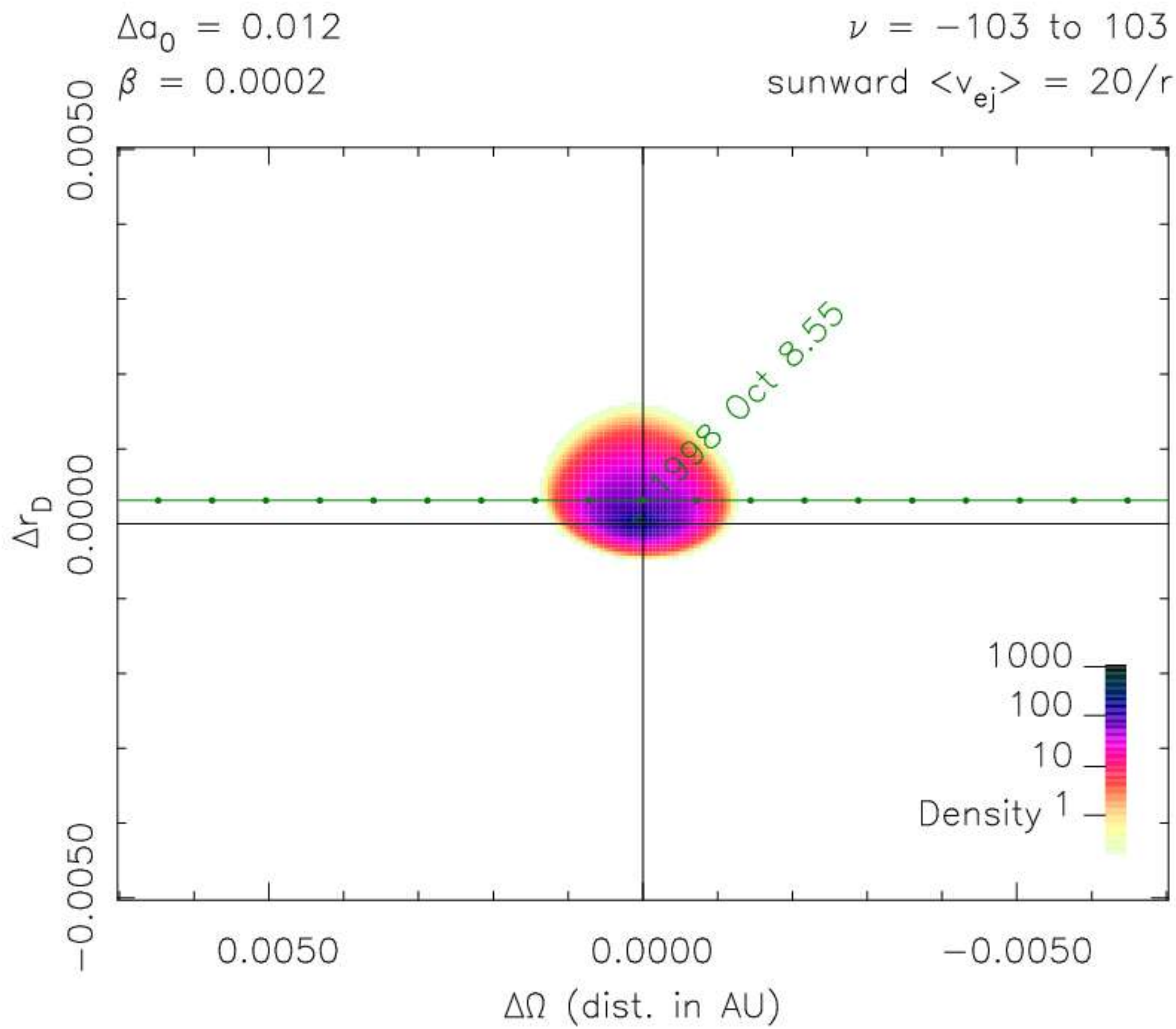
sunward $\langle v_{ej} \rangle = 45/r$
0.0050
0.0000
−0.0050
Δr_D
2009 Aug 12.33
1000
100
10
Density 1
0.0050
0.0000
−0.0050
ΔΩ (dist. in AU)



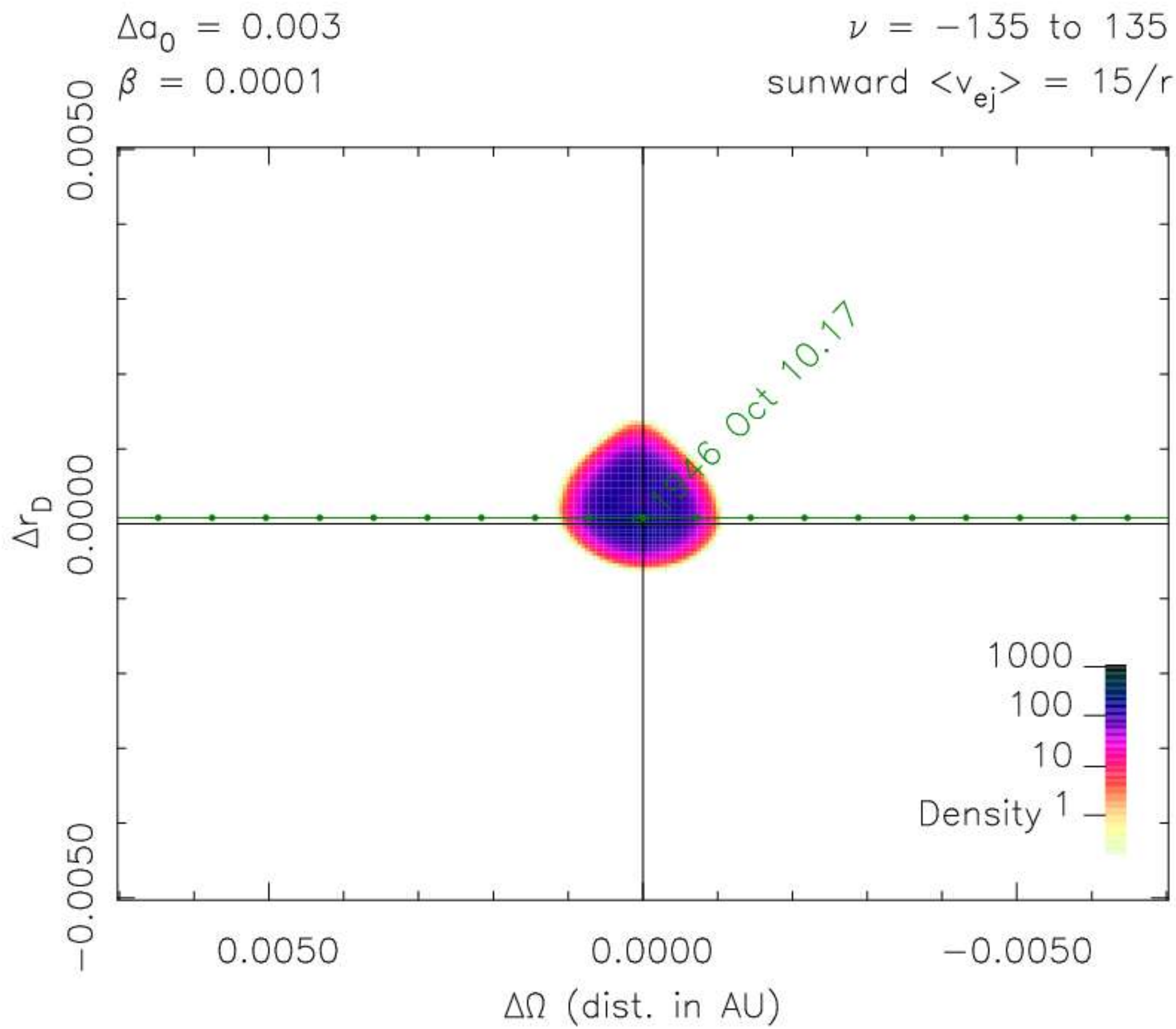
Δa0 = 0.009
β = 0.0002
ν = −116 to 116
sunward <vej> = 20/r
2011 Oct 8.84
1000
100
10
Density 1
ΔrD
0.0050
0.0000
−0.0050
ΔΩ (dist. in AU)



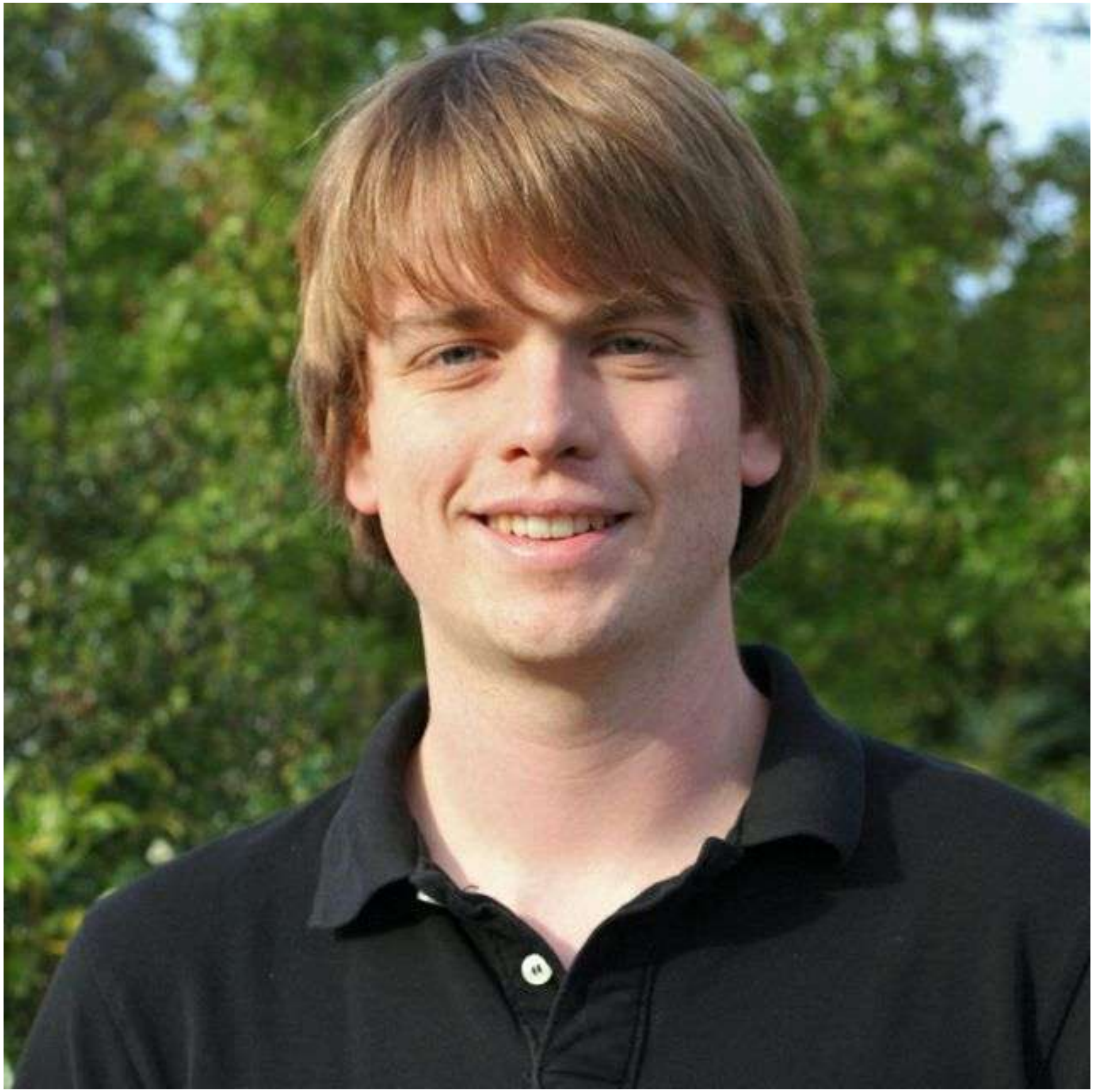
Δa_0 = 0.009
β = 0.0002
ν = −116 to 116
sunward $\langle v_{ej} \rangle$ = 20/r
0.0050
Δr_D
0.0000
−0.0050
2011 Oct 8.84
icy-snowflakes.deviantart.com
1000
100
10
Density 1
0.0050
0.0000
−0.0050
$\Delta\Omega$ (dist. in AU)



Δa0 = 0.012
β = 0.0002
ν = −103 to 103
sunward <vej> = 20/r
1998 Oct 8.55
1000
100
10
Density 1
0.0050
0.0000
−0.0050
0.0050
0.0000
−0.0050
ΔrD
ΔΩ (dist. in AU)



Δa0 = 0.003
β = 0.0001
ν = −135 to 135
sunward <vej> = 15/r
1946 Oct 10.17
1000
100
10
Density 1
0.0050
0.0000
−0.0050
ΔrD
ΔΩ (dist. in AU)

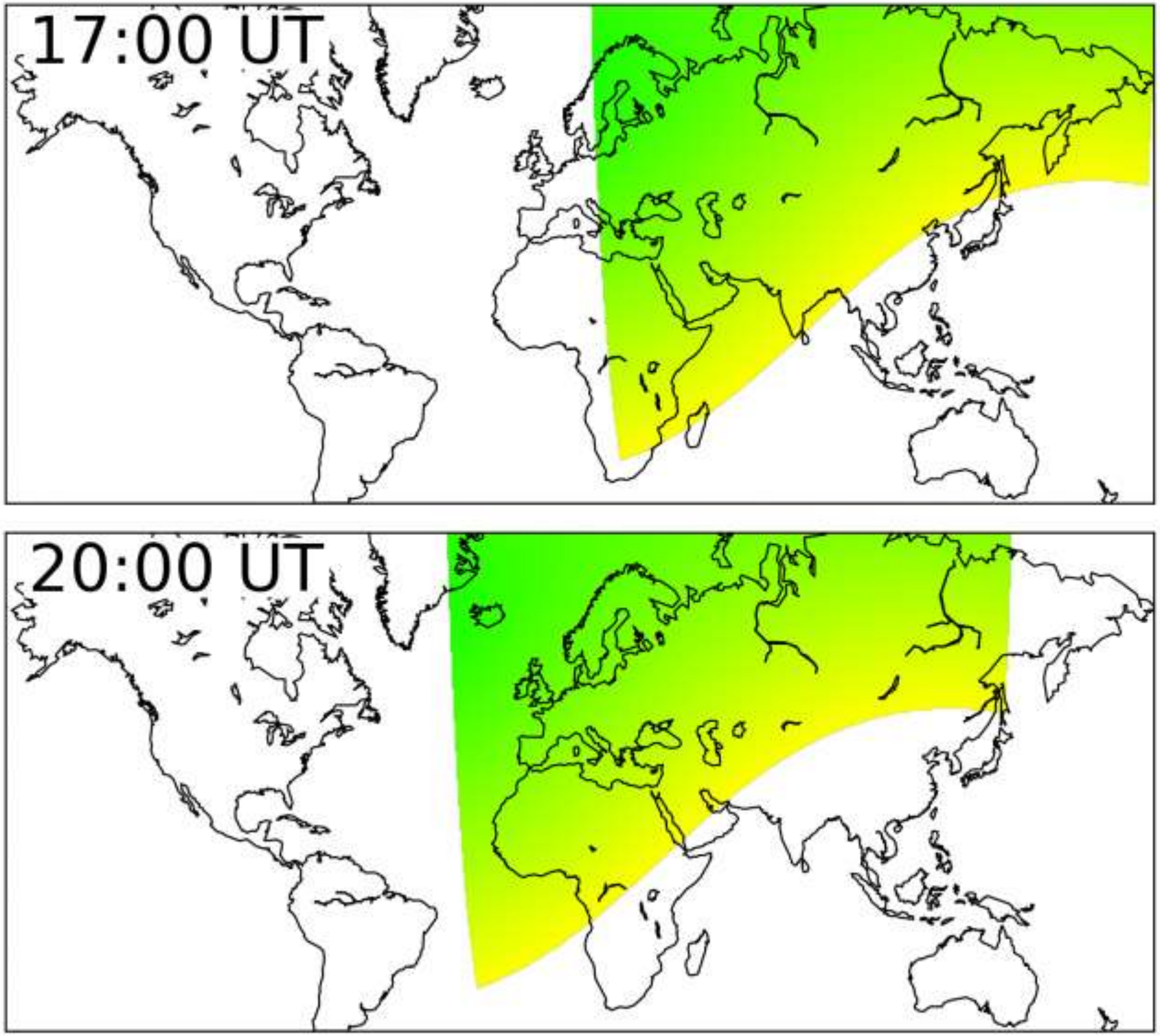


We may evaluate $\bar{v}$ numerically from equation (28), Paper I, and express equation (9*a*) numerically from solar-system data as previously for a cometary density of $\rho_c = 1$ gm cm^{-3} and a particle density of $\rho_s = 4$ gm cm^{-3}. If the particle radius s is expressed in centimeters, the cometary radius R_c in kilometers, and the solar distance r in A.U., then we find the velocity of ejection for meteoritic particles to be

$$V_\infty = \left(\frac{1}{n\,s\,r^{9/4}} - 0.052 R_c\right)^{1/2} R_c^{1/2} \times 328 \text{ cm sec}^{-1} . \tag{9b}$$

IMO website

Geert Barentsen



Vaubaillon/IMCCE