

2008 OG₁₉: ¿un objeto transneptuniano parecido a Varuna?

IV Reunión sobre Ciencias Planetaria y Exploración del Sistema Solar

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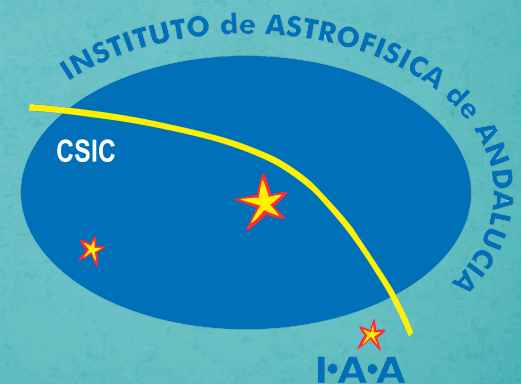
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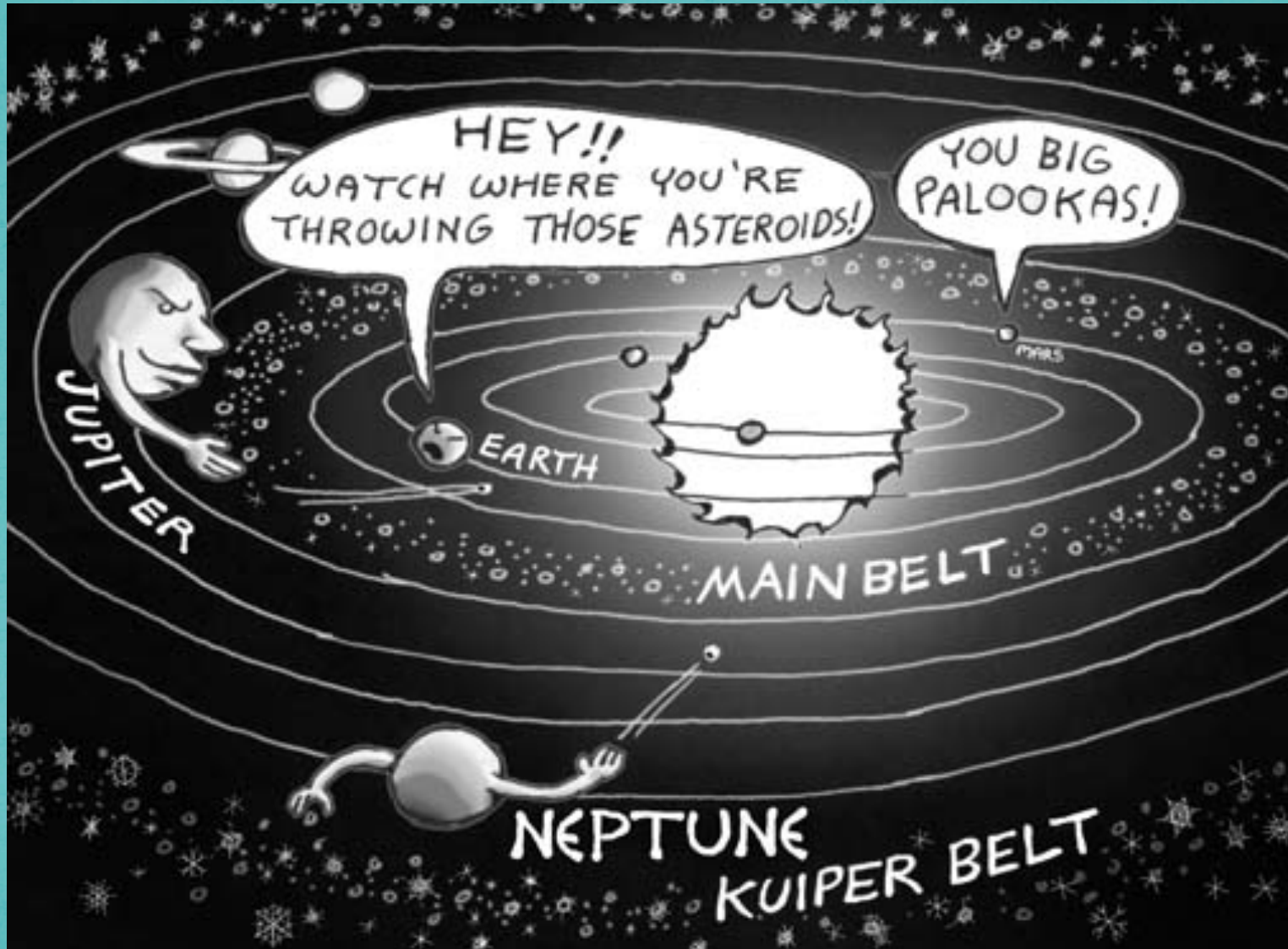


Índice

- Introducción.
- Observaciones.
- Análisis de datos y resultados.
- Magnitud absoluta.
- Interpretación.
- Conclusiones.

Introducción

<http://ancientsolarsystem.blogspot.com.es>



Observaciones...

Observatorio de Calar Alto:

- 23, 29, 30 y 31 de julio de 2014.
- Telescopio de 1.23 m.
- Cámara CCD 4kx4k DLR-MKIII.
- Tiempo de exposición entre 300 y 400 s.
- Seeing medio 1.83''.



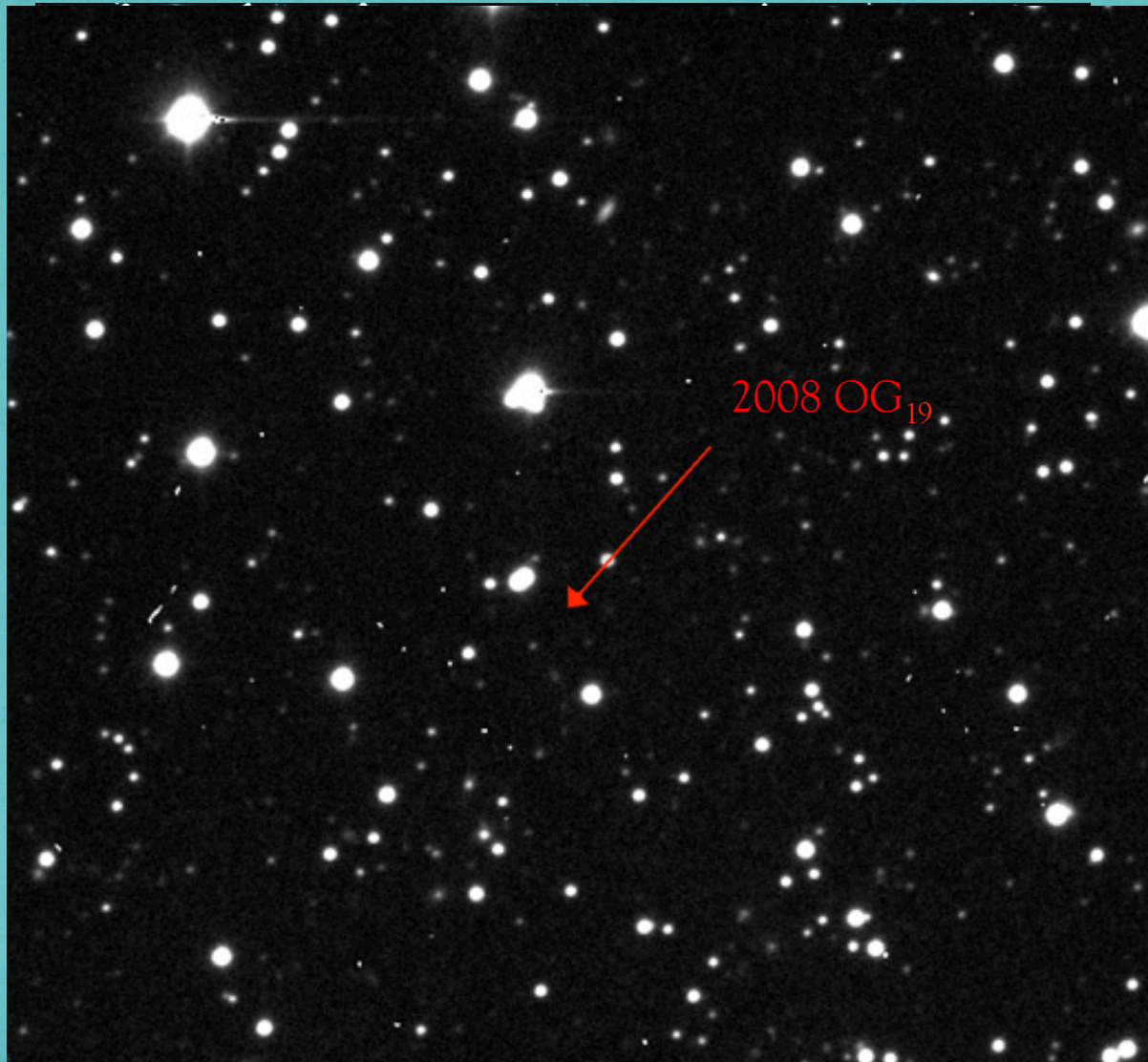


Observatorio de Sierra Nevada:

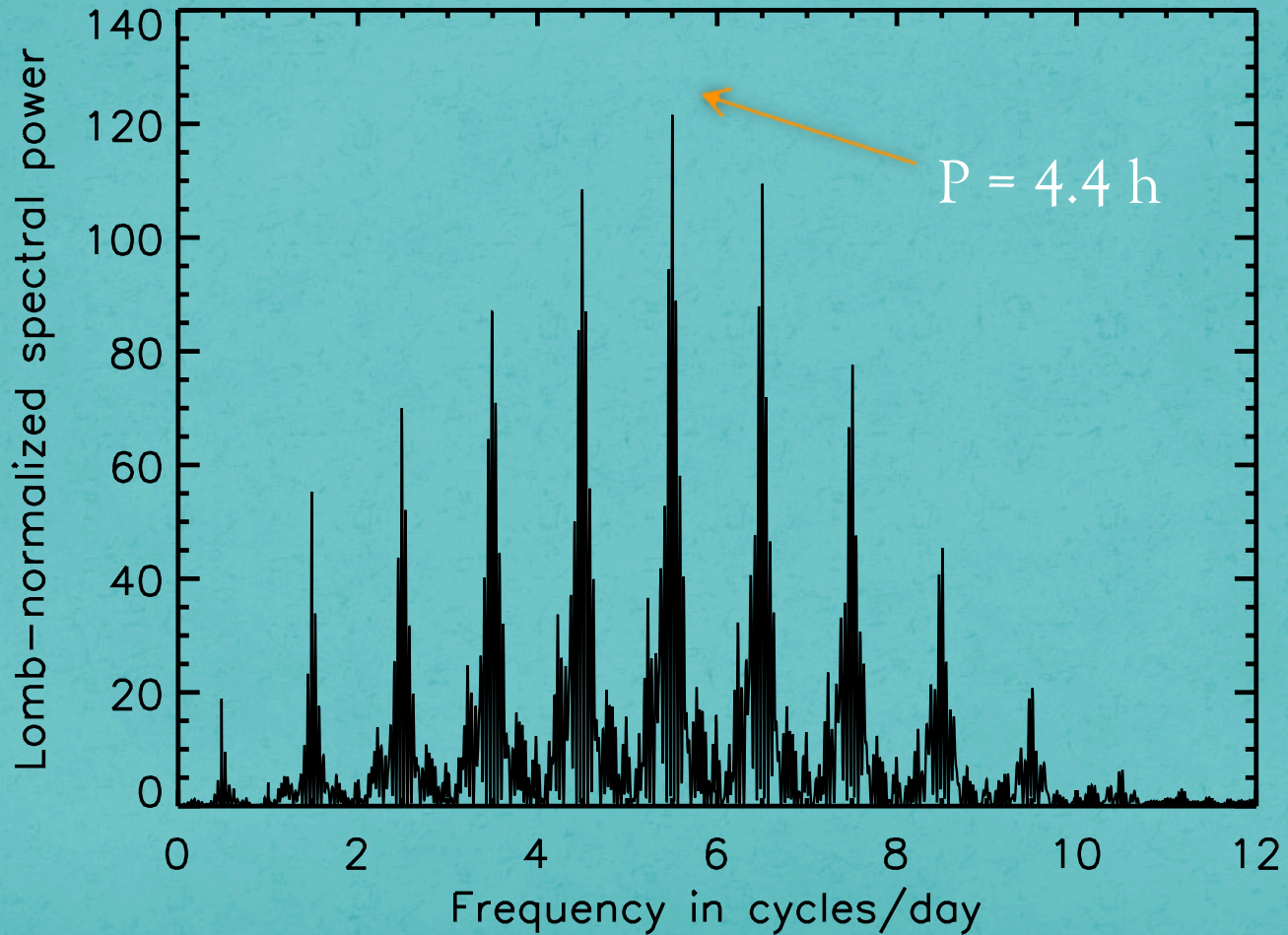
- 21, 22, 24 y 25 de agosto de 2014.
- Telescopio de 1.5 m.
- Cámara CCD 2kx2k.
- Tiempo de exposición entre 300 s.
- Seeing medio 1.77”.



Análisis de datos y resultados...

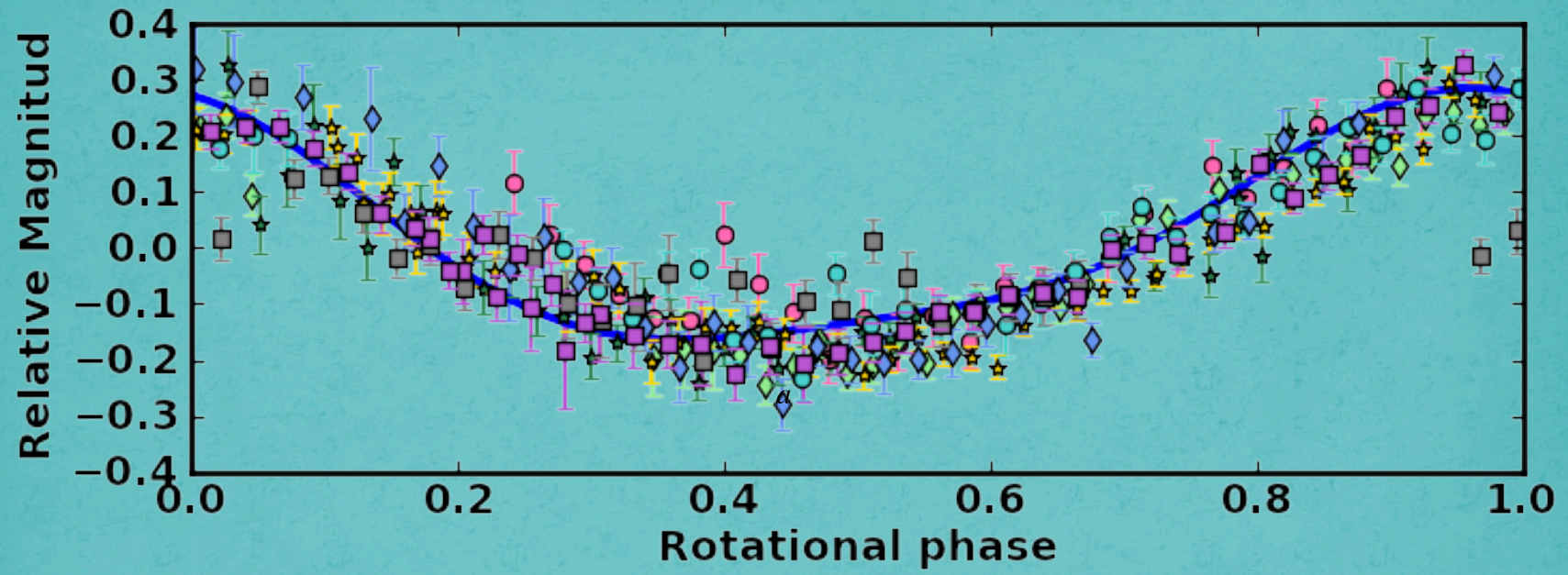


◆◆◆
Periodograma de Lomb (1976)





$P = 4.36 \text{ h}$

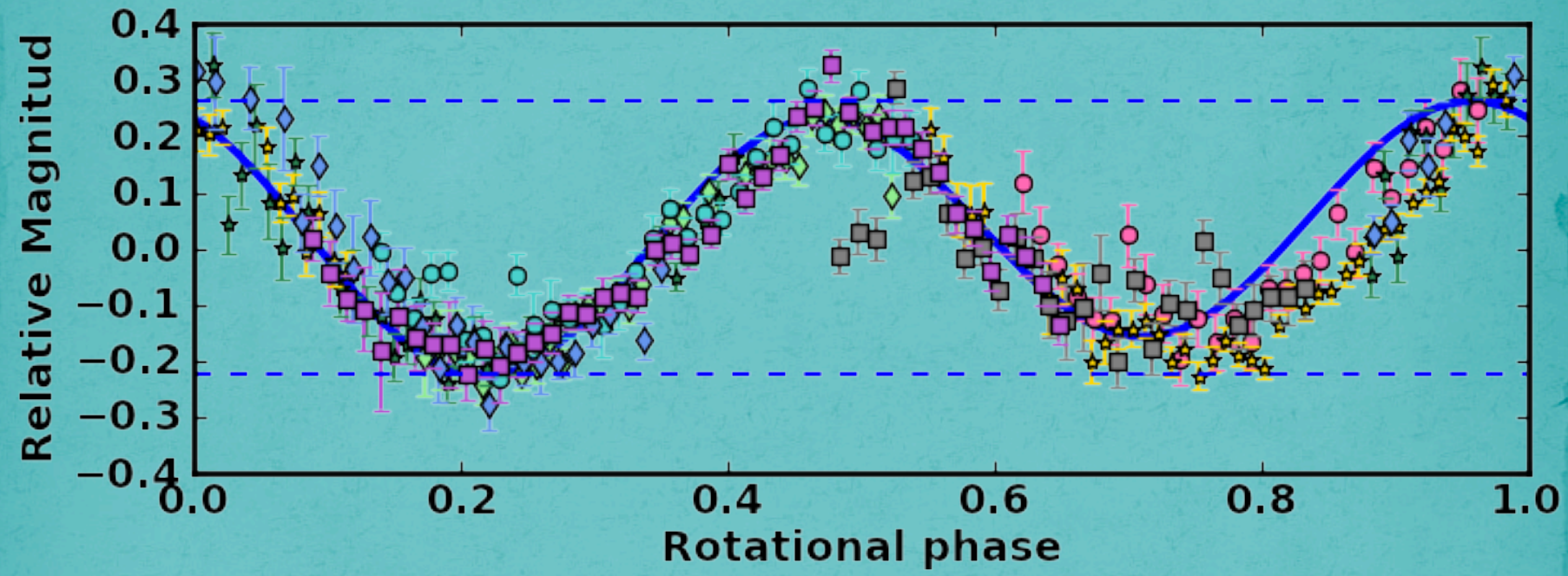


$$a_0 + a_1 \sin(2\pi f_0) + b_1 \cos(2\pi f_0) + a_2 \sin(4\pi f_0) + b_2 \cos(4\pi f_0)$$

$\Delta m = 0.45 \text{ mag}$



$P = 8.7 \text{ h}$



$\Delta m = 0.50 \text{ mag}$

Magnitud absoluta

$$H = m_{star} - \frac{5}{2} \log \left(\frac{F_{OG_{19}}}{F_{star}} \right) - n \log(r_H) - 5 \log(\Delta) + \phi(\alpha)$$

$$\phi(\alpha) = \beta\alpha = 0.3\alpha \quad \longrightarrow \quad H_R = 4.40 \text{ mag.}$$

$$D = 1329 p_R^{-1/2} 10^{-H_R/5}$$

Albedo geométrico (Santos-Sanz et al., 2012):

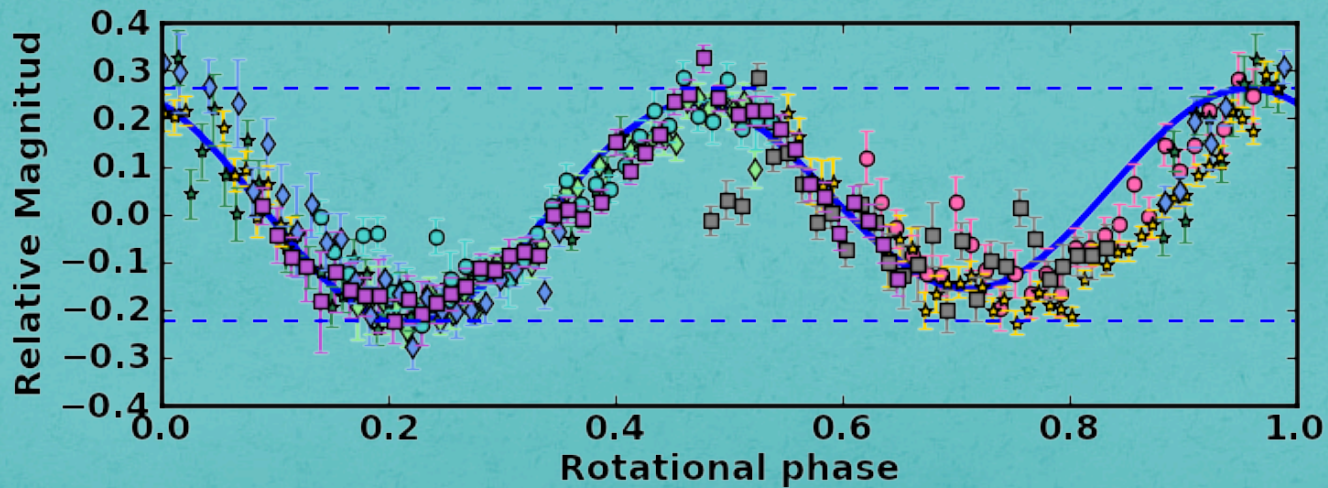
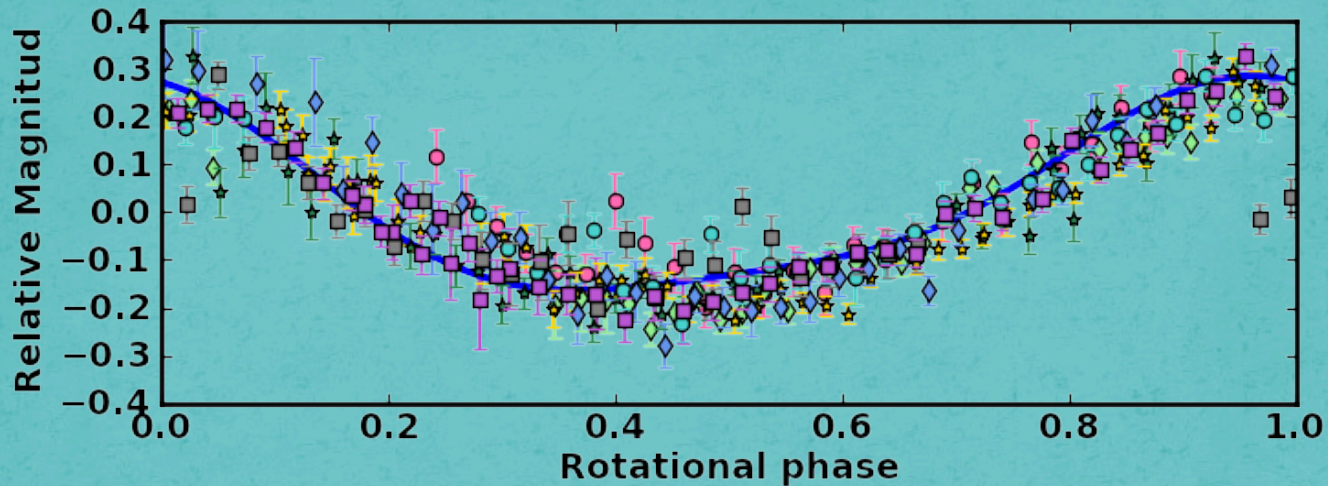
- Objetos del disco disperso cercano:

$$p_R = 8.07\% \quad \longrightarrow \quad D = 620 \text{ km.}$$

- Objetos desacoplados:

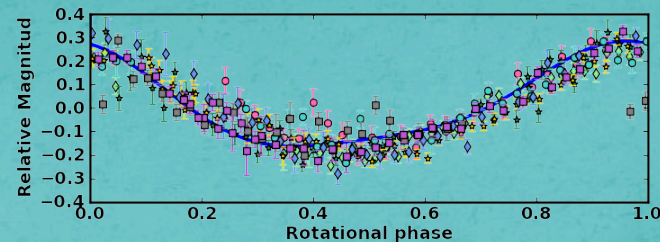
$$p_R = 19.88\% \quad \longrightarrow \quad D = 400 \text{ km.}$$

Interpretación



Modelo debido a mancha de albedo

$$P = 4.36 \text{ h}$$



$$\rho = \frac{3\pi}{GP^2} \longrightarrow \rho = 570 \text{ kg m}^{-3}$$

Chandrasekhar (1987)

$$\frac{\Omega^2}{\pi G \rho} = 1.31$$

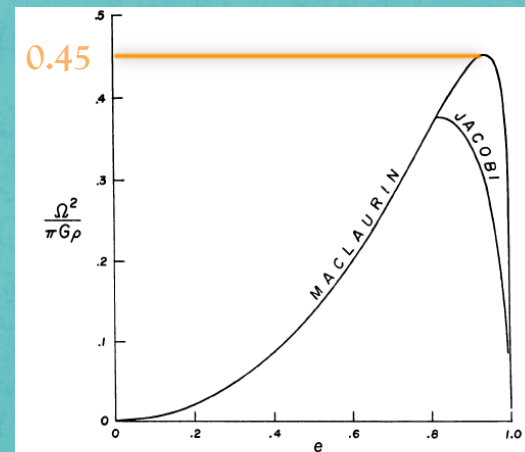
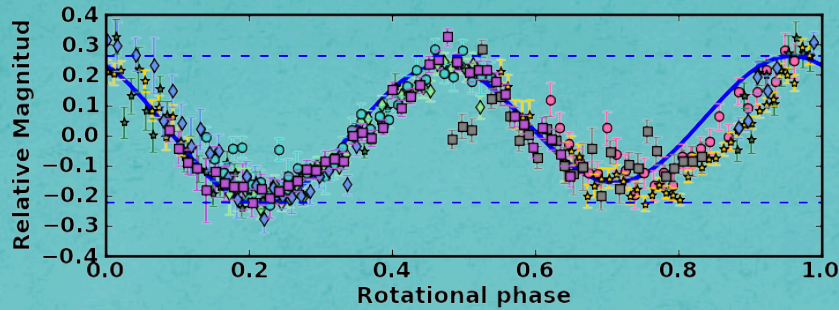


FIG. 5. The square of the angular velocity (in the unit $\pi G \rho$) along the Maclaurin and the Jacobian sequences. The abscissa, in both cases, is the eccentricity of the (1, 3)-section.

Variación rotacional debida a la forma

$P = 8.7 \text{ h}$

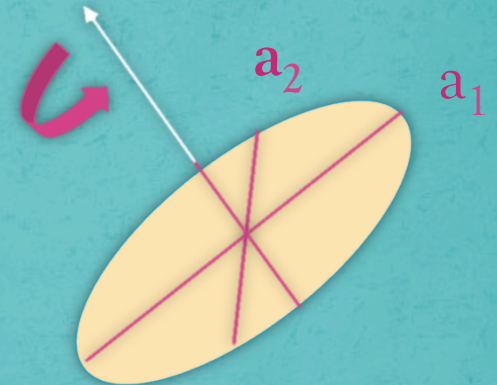


$$\frac{a_1}{a_2} = 10^{\frac{2\Delta m}{5}} = 1.57$$



$$\frac{a_2}{a_1} = 0.636 \approx 0.64$$

Chandrasekhar (1987)



$$\frac{\Omega^2}{\pi G \rho} = 0.345665$$



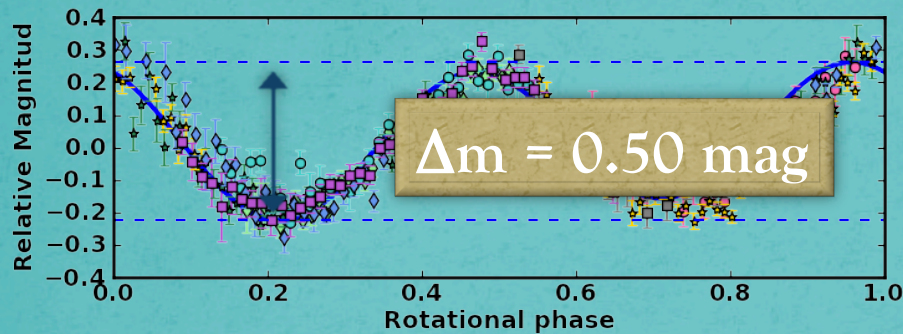
$$\rho \geq 550 \text{ kg m}^{-3}$$

a_2/a_1	a_3/a_1	$\Omega^2/(\pi G \rho)$	$L/(GM^3 \bar{a})^{\ddagger}$
1.00	0.582724	0.374230	0.303751
0.96	0.570801	0.373987	0.303959
0.92	0.558330	0.373190	0.304602
0.88	0.545263	0.371785	0.305749
0.84	0.531574	0.369697	0.307467
0.80	0.517216	0.366837	0.309837
0.76	0.502147	0.363114	0.312956
0.72	0.486322	0.358424	0.316938
0.68	0.469689	0.352819	0.321923
0.64	0.452194	0.345665	0.328081
0.60	0.433781	0.337330	0.335618
0.56	0.414386	0.327493	0.344796
0.52	0.393944	0.315989	0.355941

Conclusiones

2008 OG₁₉

P = 8.7 h



$H_R = 4.40 \text{ mag}$

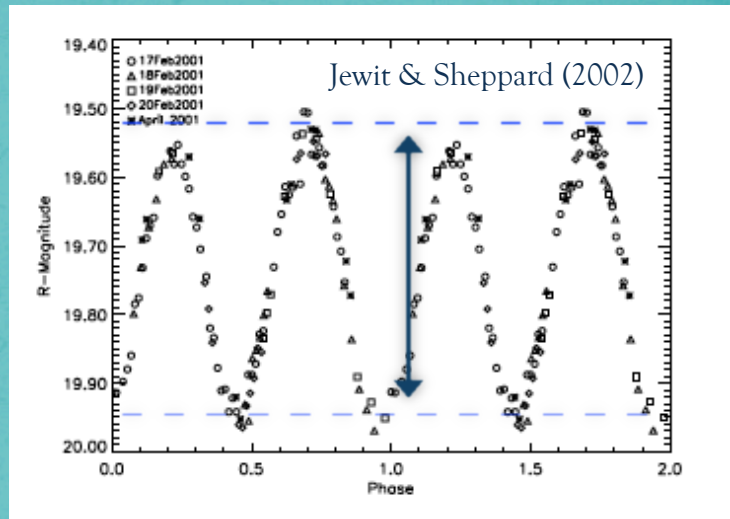
Albedo geométrico:

- Objetos del disco disperso cercano: D = 619 km.
- Objetos desacoplados: D = 394 km.

$\rho \geq 550 \text{ kg m}^{-3}$

Varuna

P = 6.34 h



$\Delta m = (0.42 \pm 0.02) \text{ mag}$

D = 900 km

$\rho \approx 1000 \text{ kg m}^{-3}$

