A PRE-GALILEO VIEW OF THE ASTEROID 29 AMPHITRITE

M.A. Barucci and M. Fulchignoni, Istituto di Astrofisica Spaziale Reparto di Planetologia, Viale dell'Università 11 Roma, Italy.

The Galileo mission will include a fly-by of the asteroid 29 Amphitrite during its cruise to Jupiter. Our today knowledge of this asteroid is sumarized in table I. The observational data, obtained by photometry and IR spectral reflectance, are widely discussed in recent literature (cfr. the references quoted in the table)

Table I - 29 Amphitrite data

Type	S	(1,4)	V(1,0)	$6^{m}.19$	(3)
Diameter	199 km	(1)	B-V	$0^{m}.811$	(3)
Synodic Period	$5^{h}.390$	(3)	U-B	$0^{m}.406$	(3)
Polarimetric Albedo	0.152	(7)	Phase coeff.	0.030mag/°	(3)
Visual Albedo	0.147	(8)	Max amplitude	$0^{m}.13$	(2,5)
Composition (from IR spectra): pyroxene, metal (6)					

A general agreement exists on a biaxial shape (a/b = 1.13), which gives a reasonable fit to the amplitudes observed for Amphitrite lightcurves. With this assumption Zappalà and Knezevic (12) determined the following pole coordinates: $\lambda=142°$, $\beta=50°$ or $\lambda=308°$, $\beta=40°$. In literature the lightcurves of 29 Amphitrite in 1962 (2), 1965 (5), 1970 (3), 1972 (3), 1977 (9), 1978 (10), 1982 (11) oppositions are reported. The lightcurves exhibit a non univocal behaviour, displaying one maximun and one minimum (1970), two maxima and two minima (1982) and many (>3) maxima and minima (in the other oppositions). Van Houten-Groenveld et al. (5) suggest a pyramidal shape for Amphitrite, but, as outlined by Tedesco and Sother (3) and by Zappalà and Knezevic (12), the explanation of the Amphitrite's complex lightcurves is a difficult task on the basis of the available data. Lupishko et al. (15) include 29 Amphitrite in their list of asteroids with the greatest differences in brightness between opposite sides, suggesting some surface heterogeneity.

Waiting the Galileo mission data to have the solution of this puzzle (or at least some substantial indication), we try to interpret the available data on the basis of laboratory simulations carried out by the System for Asteroid Model (SAM) described by Barucci et al. (13).

We discuss the results obtained using a biaxial ellipsoid model with a/b=1.104 which, due to the scattering, gives an amplitude of the lightcurve of 0.13 mag for equatorial view (14). The model was made by wood and coated with a dusty mixture of chalk and carbon black, whose albedo is in the range of the observed albedo values of the S type asteroids.

We carried out three types of experiments in order to reproduce the observed lightcurves:

i) varying the surface albedo of the model;

ii) varying the shape of the model (cutting or "biting" the biaxial ellipsoid);

iii) combining the effects of i) and ii).

The use of the obtained results allows us to suggest various possible shapes and surface morphologies of 29 Amphitrite.

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