



Supporting Online Material for

Enceladus: Cosmic Graffiti Artist Caught in the Act

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Table S1. Satellite orbital radii a , mean diameters d , previously estimated mean visual geometric albedos p (V -band) and those measured by HST’s WFPC2 in the F555W filter ($0.55 \mu\text{m}$) at true opposition, corrected for each satellite’s lightcurve (Table S2).

Satellite	a (R_S)	d (km)	Previous p	This work p
Janus	2.51	179	0.38 ± 0.07 ($S1$)	0.71 ± 0.02
Epimetheus	2.51	113	0.34 ± 0.04 ($S1$)	0.73 ± 0.03
Mimas	3.08	397	0.69 ± 0.05 ($S2$)	0.962 ± 0.004
Enceladus	3.95	504	1.41 ± 0.03 ($S3$)	1.375 ± 0.008
Tethys	4.89	1066	0.80 ± 0.15 ($S4$)	1.229 ± 0.005
Calypso*	4.89	19	0.9 ± 0.15 ($S5$)	1.34 ± 0.10
Dione	6.26	1123	0.55 ± 0.15 ($S4$)	0.998 ± 0.004
Helene*	6.26	32	0.6 ± 0.15 ($S5$)	1.67 ± 0.20
Rhea	8.74	1529	0.65 ± 0.05 ($S6$)	0.949 ± 0.003

*Provisional p only; no lightcurve available.

Table S2. V -band rotational light curve data for the saturnian satellites. The correction for rotational variation in albedo can be approximated by $(A/2) \cos(\theta_{\text{Opp}} - \theta_{\text{max}})$.

Satellite	Total Amplitude (magnitudes) A	Sub- \oplus Longitude [†] at Opposition $\theta_{\text{Opp}}(^{\circ})$	Longitude [†] of Light curve max. $\theta_{\text{max}}(^{\circ})$
Janus	0.28	44	270
Epimetheus	0.21	311	270
Mimas	0.1	147	270
Enceladus	0.076	14	278
Tethys	0.1	340	90
Calypso*	–	291	–
Dione	0.46	220	90
Helene*	–	297	–
Rhea	0.26	133	90

*No lightcurves are currently available for these Lagrangian moons.

[†]Longitudes are measured west of the IAU-designated prime meridian for each satellite.

Supporting references

- S1. F. Poulet, E. Karkoshka, B. Sicardy *J. Geophys. Res.* **104**, 24,095 (1999).
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- S6. A. Verbiscer, J. Veverka *Icarus* **82**, 336 (1989).

Supporting Figure

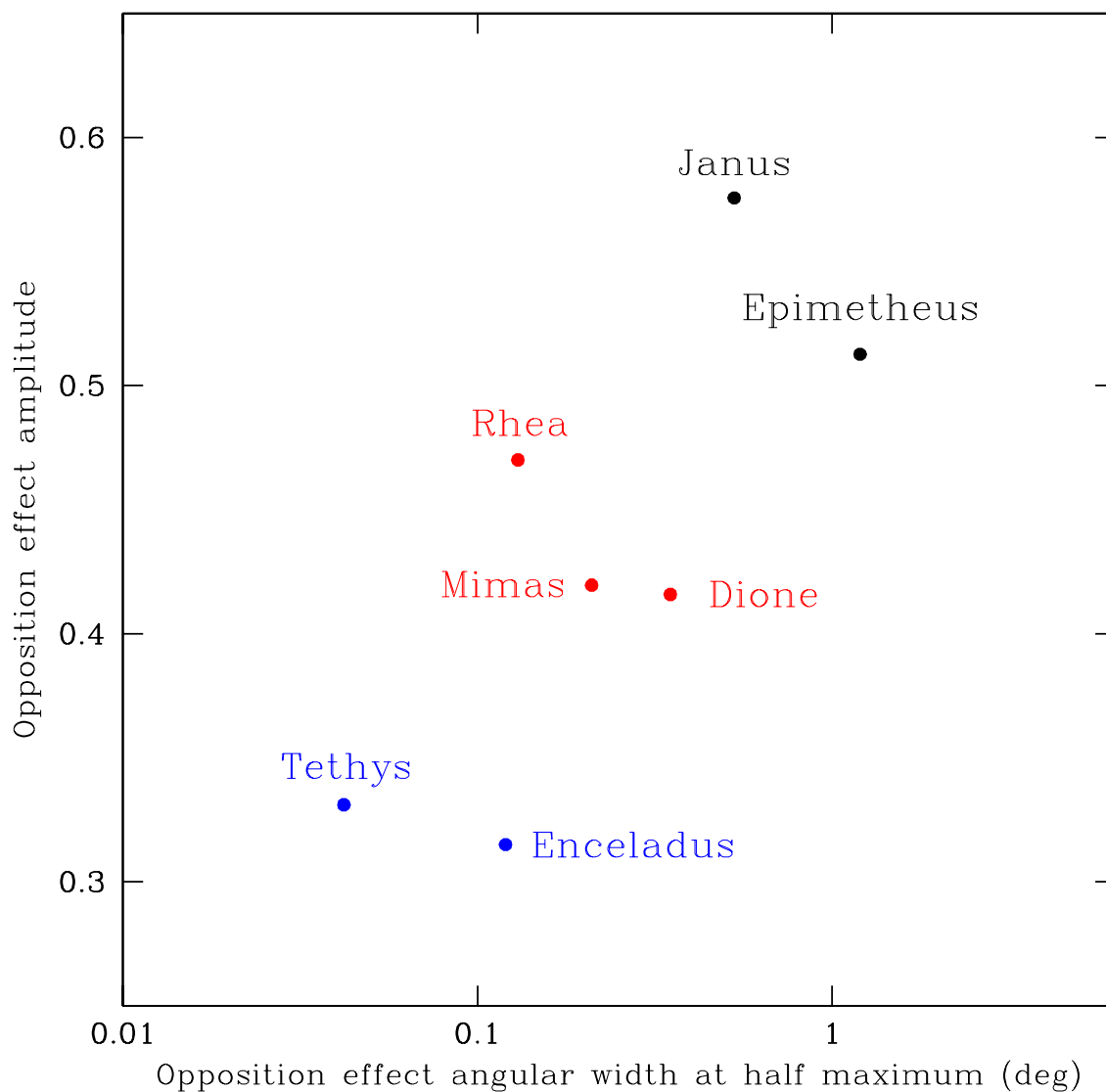


Figure S1. The opposition effect (OE) amplitude vs. its angular width at half maximum reveals the same correlation evident in Fig. 1. Three groupings emerge with similar amplitudes and widths: Tethys and Enceladus (blue); Mimas, Dione, and Rhea (red); and Janus and Epimetheus (black). This correlation suggests that regolith microtexture and granularity within these groupings are similar and can be related to their orbital positions relative to or within the E-ring.