

Charged Particle Modification of Surfaces in  
The Outer Solar System

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Voyager reflectance spectra data have indicated clear leading/trailing differences in the albedo of the icy Galilean and Saturnian satellites. For the Galilean satellites, these have been analyzed by Nelson, et al. and, more recently, by McEwen. They have described the longitudinal dependence of this data and attempted to interpret this in terms of plasma and meteorite modification of the surface. Primary attention has been paid to Europa at which the leading/trailing differences are the largest.

Recently we have reanalyzed this data extracting the single grain (particle) albedo,  $w$ , and constructing the Espat-function,  $W=(1-w)/w$  from this. Because  $w$  is near unity,  $W \sim 2 \alpha D$  where  $\alpha$  is the absorption coefficient and  $D$  the grain size. In doing so we find a direct comparison to the longitudinal plasma bombardment flux for the first time (see figure). This occurs primarily in the UV and is probably due to an asorption associated with implanted S, as the UV band of Voyager overlaps the IUE data of Lane et al. We also can now unravel the relative importance of grain size effects and implant impurity effects.

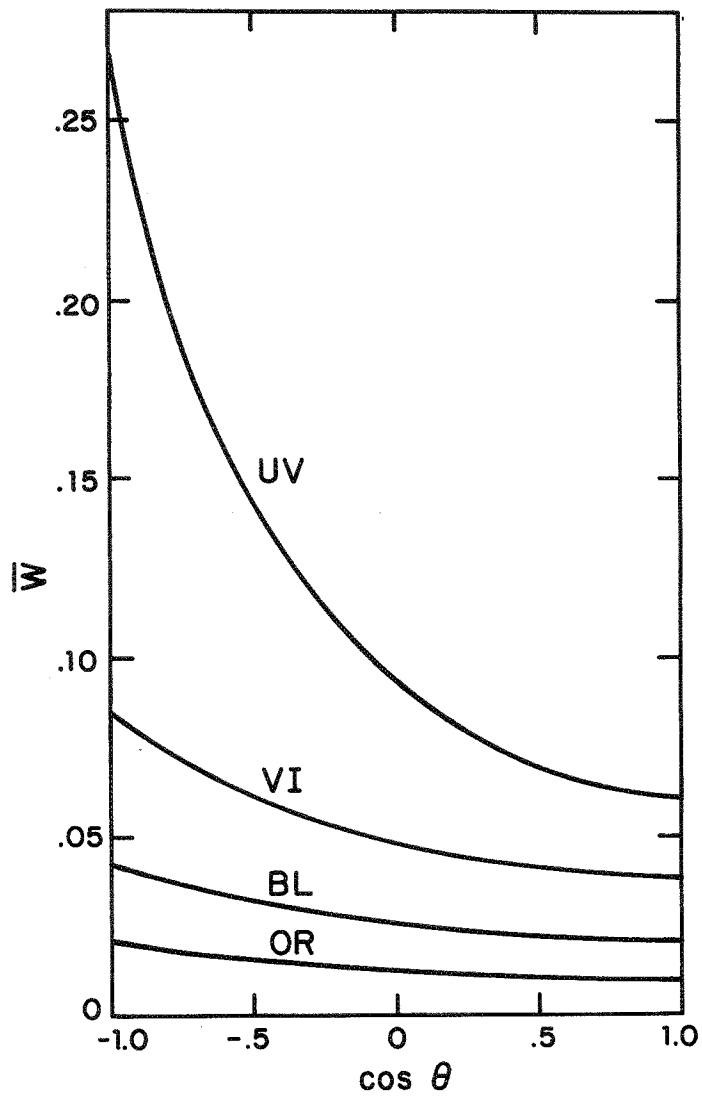
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Clarke, R.N., et al. *Icarus* 56 (1983) 233

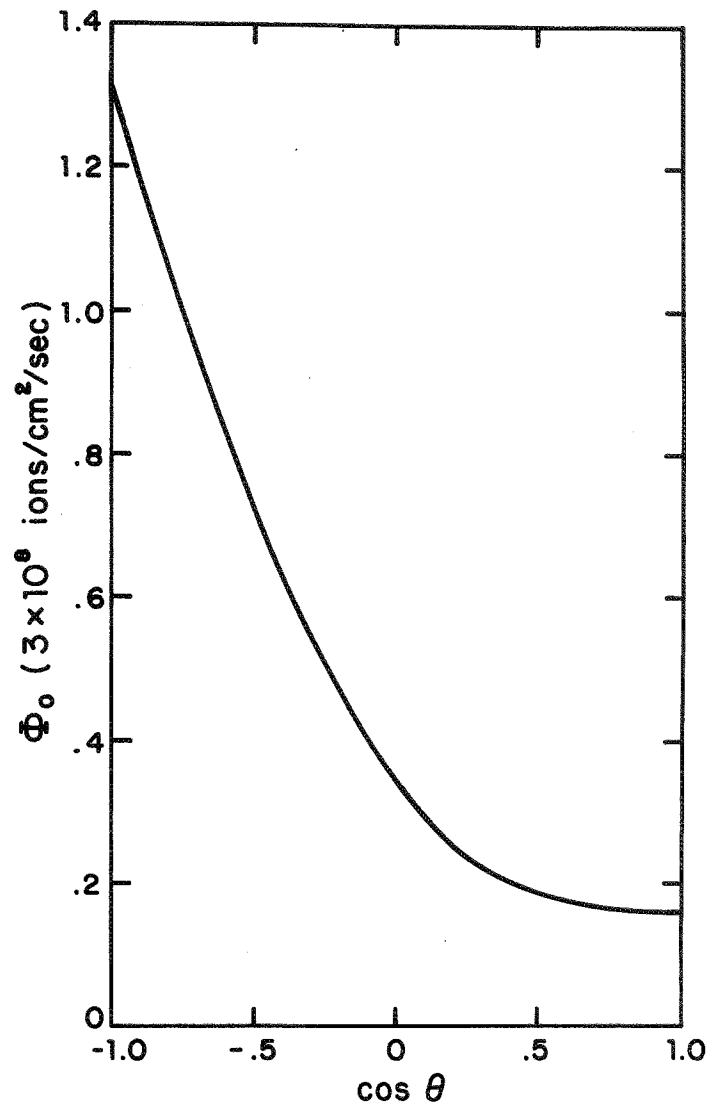
Lowe A.L. et al. *Nature* 292 (1981) 38.

McEwen, A.S. *Icarus* (in press) (1986).

Nelson, M. et al. *Icarus* 65 (1986) 129



Smoothed values of Espar Function  
vs. cosine of longitude from apex  
of motion



Equatorial Flux of sulfur ions  
bombarding Europa vs. longitude