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 Saturian 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 α 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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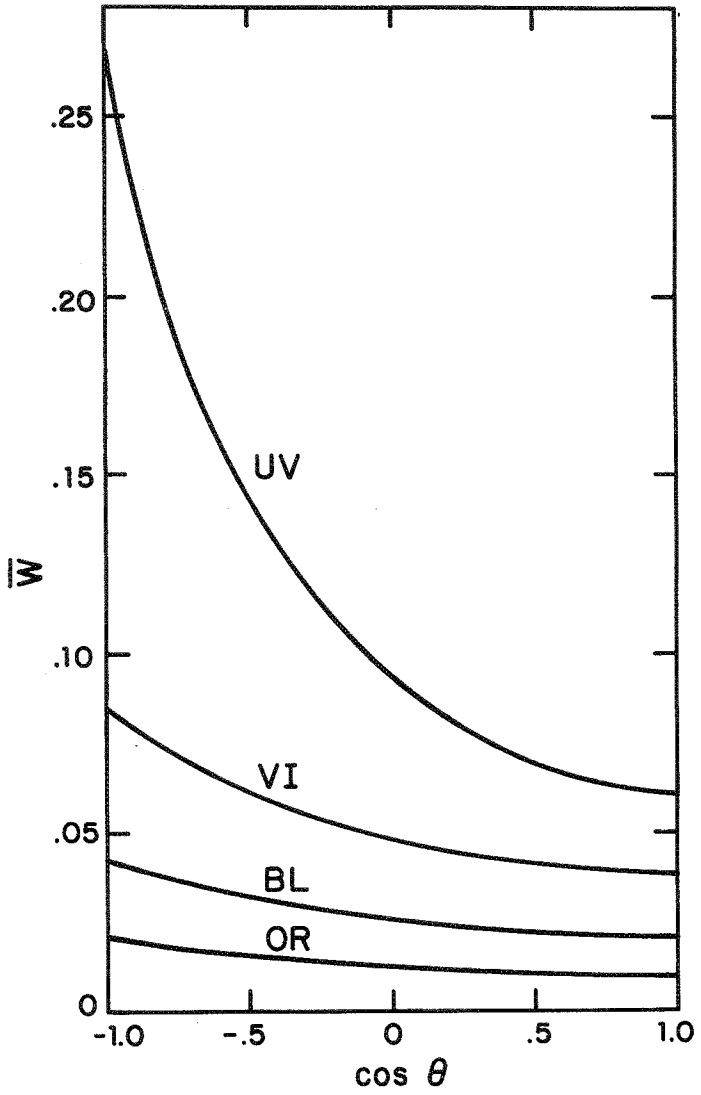
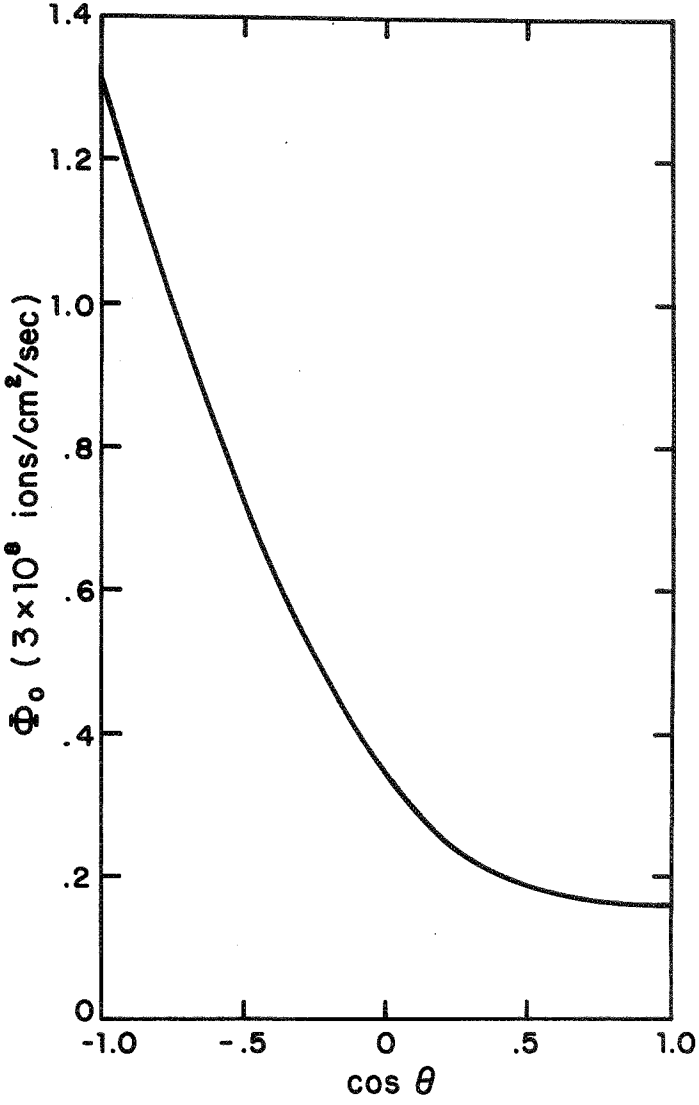
Clarke, R.N., et al. Icarus 56 (1983) 233
Lowe A.L. et al. Nature 292 (1981) 38.
McEwen, A.S. Icarus (in press) (1986).
Nelson, M. et al. Icarus 65 (1986) 129



Smoothed values of Espat Function vs. cosine of logitude from apex of motion



Equitorial Flux of sulfur ions bombarding Europa vs. longitude