

Mapping the Composition of Europa's Surface. W. R. Goode^{1,2} and S. Kempf^{1,2}, ¹University of Colorado, Boulder, ²Laboratory for Atmospheric and Space Physics.

The Surface Dust Mass Analyzer (SUDA) is a time-of-flight mass spectrometer that will fly aboard NASA's Europa Clipper with an expected launch date in 2023. During close flybys of Europa (~25-100 km at closest approach), SUDA will measure the chemical composition of particles encountered by the instrument via impact ionization. SUDA is expected to collect particles from both ice particle plumes on the surface of Europa and surface ejecta created by hypervelocity impacts of micrometeoroids with the moon. The focus of this study is on associating detected surface ejecta with their site of origin on Europa with reasonable accuracy. This can be achieved using probability ellipses obtained from Monte Carlo simulations. The simulations are designed using established models of impact ejecta dynamics and provide the necessary distributions of particle velocities for a given position relative to Europa. The simulated velocities and detection positions are used to backtrack the ejecta particle's trajectory to its launch site on the surface. The spatial resolution of surface chemical composition measurements along the ground track of the spacecraft can be characterized for any flyby. While this study focuses on SUDA's mission at Europa, our method is quite general and can be easily applied to other airless bodies.