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Computer Modeling of Solar Ion Radiation Processing of Planetary Surface Materials SYDNEY CHAMBERLIN, Utah State University, ROY CHRISTOFFERSEN, SAIC/NASA, Johnson Space Center — Airless bodies in the interstellar environment are constantly bombarded with ions from stellar winds. Resulting ion-atom interactions gradually cause chemical and structural changes to occur on their surfaces. One of the more significant changes is the formation of amorphous rims on regolith grains. Ion transport physics gives some description of the dynamics underlying such radiation damage, but gives little insight into other factors such as the width of the damaged layer and the degree of amorphization over time. Monte Carlo simulation programs for modeling ion-atom interactions exist, but have never been fully exploited for use in space radiation processing and fail to accommodate the range of parameters present in plasmas such as the solar wind. In this study we have utilized an existing Monte Carlo program, Transport and Range of Ions in Matter (TRIM), to model radiation in the space environment. A series of input data files and calculation protocols were created to investigate a range of typical solar wind parameters. The new outputs of the model consist of damage profiles for the amount of deposited ion collision energy as a function of ion angle, solar wind energy distribution, and sputtering rate. Results obtained with this model are found to be in reasonable agreement with experimental measured results from irradiated mineral grains.

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