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Lunar megaregolith mixing by impacts: spatial dispersal of basin melt and its implications for sample interpretation

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The formation times of lunar impact basins are critical to understanding the late accretion history of the inner solar system. The correct interpretation of the provenance and ages of sampled basin melt is essential to the calibration of lunar chronology. The expected abundances of basin melt in the lunar near-surface are not fully understood. Basin melt has been gardened by a long sequence of subsequent impact events, diffusing its presence and abundance. We developed a numerical model to investigate this process by means of the Monte Carlo method in a spatially resolved model. The fraction of melt in ejecta was tracked globally and at the Apollo 14-17 and Luna 20 sampling sites and was compared with K-Ar age distributions of lunar impact melt breccias.

We provide a picture of the potential distribution of basin melt, which helps for the interpretation of the returned samples. The results may thus offer other authors insight into revisions of the published K-Ar dataset by using the more advanced dating techniques.