# Far-ultraviolet photometric characteristics of JSC-1A lunar regolith simulant: comparisons to Apollo soil 10084

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**Abstract**. We have characterized the far-ultraviolet (FUV) spectro-photometric response of lunar mare regolith simulant JSC-1A and report significant differences from Apollo soil 10084[1]. Hapke analyses of the JSC-1A phase curves reveal a ~ 3-4 fold increase in single scattering albedo and a forward scattering behavior compared to 10084. While JSC-1A was designed to simulate the compositional and geotechnical properties of low-Ti mare soil, it lacks space weathering attributes such as the nanophase iron found in the weathered rims of Apollo grains and glassy agglutinates. Our preliminary analyses suggest space weathering components likely contribute to the FUV darkening of the Apollo soil relative to JSC-1A and the changes in scattering properties (backward vs. forward); however, differences in composition, especially the Ti content but also other metal oxides like $Na_2O$, MgO, $K_2O$[2] and iron oxidation states[3] cannot be ruled out presently. Additionally, JSC-1A spectra present a blue slope in the FUV, ~ 10× larger than those reported for the 10084 soil. Previous studies have attributed UV bluing to space weathering[4], though recent light scattering models[5] do not corroborate this correlation. Further work with an extended set of Apollo soils and lunar simulants is warranted to deconvolute the relative contributions of weathering versus composition to the FUV spectro-photometric behavior of these materials. We also note that within experimental uncertainties, the single scattering albedo and scattering properties do not show a strong grain size dependence based on our studies with sieved JSC-1A samples. Future simulant development efforts may consider the inclusion of space weathering components in high fidelity "spectral" analogs of lunar material, in line with ISRU mineral beneficiation using magnetic processes.

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