

Evidence for impact magnetization of young lunar glass

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The possibility that impact plasmas might induce magnetizations in surface samples of the Moon has been discussed since initial analyses of Apollo samples in the 1970's, but examples have been debated. Exceptionally robust procedures are needed to recover magnetizations that might be recorded by impact magnetizations; one such example is the pioneering work on Apollo 17 70019, a sample of ca. 2 million-year-old glass coating regolith. Using a variant of Thellier paleointensity analysis, Sugiura et al. (1979) obtained a field strength of approximately 2.5 microteslas, more than 10 times greater than any local field. Here, we analyze a different, pristine sample of 70019 glass and apply Thellier analyses with rapid CO₂ laser heating and partial thermoremanent magnetization (pTRM) checks for alteration, as used in the study of single silicate crystals (Tarduno et al., 2006). For measurement, we use the University of Rochester ultrasensitive 3-component DC SQUID magnetometer. We find a paleointensity of approximately 2 microteslas that confirms the value obtained by Sugiura et al. (1979). This confirmation of results, using different magnetometers spanning four decades, together with recent confirmation of magnetizations from Apollo 16 impact glass sample 64455 (Tarduno et al., 2023), provides strong evidence supporting the impact magnetization hypothesis.

Keywords: Paleomagnetism, Moon, Impacts, Magnetization, Glass, Regolith