

**THE REGOLITH PORTION OF THE LUNAR
METEORITE SAYH AL UHAYMIR 169**

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Introduction: SaU 169 is a complete, light gray-greenish stone (70 x 43 x 40 mm) with a mass of 206.45 g found in the Sultanate of Oman in January 2002. The rock consists of two contrasting lithologies. Approximately 87 vol% consists of a holocrystalline, fine-grained poikilitic polymict KREEP-rich impact melt breccia, the other 13 vol% are shock-lithified regolith [1].

Discussion: The regolith shows two formation stages and contains the following clasts: Ti-poor to Ti-rich basalts, gabros to granulites, and regolith breccias. The younger regolith additionally contains a highland gabbro-norite clast with anorthite (An₉₆₋₉₇), forsteritic (Fo₈₅) and fayalitic (Fo₁₂) mineral clasts, and impact melt glass shards. The average regolith bulk chemical composition and its REE content lie between the soil and regolith breccias of Apollo 12 and 14, with more affinity with Apollo 14 [2,3,4]. The largest KREEP breccia clast in the regolith is identical in its chemical composition and total REE content to the ITE-rich high-K KREEP rocks of the Apollo 14 landing site, pointing to a similar source. The regolith shows characteristic lunar ratios of Fe/Mn (74-80) and K/U (535-1682). The Sc content, the Sm versus Al₂O₃ and the La/Yb values show that the SaU 169 average regolith is very similar to the Apollo 14 regolith breccias but different to regoliths from other Apollo landing sites and lunar far side highland regolith. All data point to a regolith origin at the lunar front side with strong influence from Procellarum terrane KREEP rocks.

Reference: [1] Gnos E., Hofmann B., Al-Kathiri A., Lorenzetti S., Eugster O., Whitehouse M. J., Villa I. M., Jull A. J. T., Eikenberg J., Spettel B., Krähenbühl U., Franchi I. A. and Greenwood R. C. 2004. Pinpointing the source of a lunar meteorite: Implications for the evolution of the moon. *Science* 305: 657-659. [2] Jolliff B. L. 1998. Large-scale separation of K-frac and KREEP-frac in the source regions of Apollo impact-melt breccias, and a revised estimate of the KREEP composition. *International Geology Review* 40: 916-935. [3] Warren P. H. and Wasson J. T. 1979. The origin of KREEP. *Reviews of Geophysics and Space Physics* 17: 73-88. [4]