



A LUNAR LEGACY: Deeply stimulating investigative memories

SIX MANNED USA APOLLO, & THREE UNMANNED USSR SAMPLE-RETURN MISSIONS

Abstract: Lunar exploration in the late 60s & early 70s was motivated by three factors: 1. A race, after the successful deployment of Sputnik & Yuri Gagarin to beat the USSR; 2. An engineering feat—sans 5G; and 3. A search for life. The first two were accomplished, the third remains elusive [read negative].

The Moon, as our closest celestial neighbor, enjoys a number of unusual properties: the Moon is ~ 25% smaller than Earth, the largest ratio in the solar system; Earth [4.55 Ga] is marginally older than the Moon [4.50 – 4.52 Ga], but the two bodies are surprising similar in bulk chemistry and isotopically; rotating & spherical, in common with 99.9% of celestial bodies, the Moon displays only one face; the Moon originated from Earth following a massive bolide impact; a magma ocean developed with density fractionation into a core [Fe-Ni metal with an ancient magnetic field], an olivine-rich lower mantle, a basaltic upper mantle, and an anorthosite crust; meteorite impact of the mountainous crust (white to the naked eye), exposed the underlying basalt horizon (black to form the circular Mare); the Moon preserves an unprecedented history of large high velocity impacts, with a continuous rain of micro-meteorites and cosmic particles; lacking an atmosphere and terrestrial tectonics, with only trace contents of water, the rocks (apart from meteorite-impact fragmentation and cementation by molten glass), are geochemically pristine; indigenous metals (Fe-Ni alloys), and sulfides (troilite Fe-Ni-S; pentlandite Fe₇S₈) are ubiquitous, ferric Fe is absent, the Moon is intensely reduced and gave rise to an unusual suite of new minerals and glass compositions; the Moon is ideally compatible with “Adamas” but pressure is too low even in its core to form diamond!



Featuring

**Professor Stephen
E. Haggerty**

Earth & Environment
Florida International
University

3:00 p.m. Friday, September 6th, 2019
Wertheim Conservatory: WC-130
Modesto Maidique Campus
11200 SW 8 Street, MIAMI FL 33199

This event is free and open to the public

Department of Earth & Environment

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