

**ARMSTRONG'S SAMPLE SUITE PROVIDED INSIGHTS INTO A BROAD RANGE OF LUNAR SCIENCE QUESTIONS.** H. H. Schmitt, University of Wisconsin-Madison, ([hhschmitt@earthlink.net](mailto:hhschmitt@earthlink.net))

**Introduction:** Research on the sample suite collected by Neil Armstrong on Apollo 11 has provided insights into lunar science questions that range from the age and nature of the lunar mare and large basins to the identification of the lunar magma ocean to the quantity of available lunar resources. [1,2] Had there never been another lunar mission, lunar and Earth science would have made an immense leap forward.

**Samples:**

- Broad major, trace, isotopic and mineralogical compositional data
  - Mare basalts
  - Exotic fragments in regolith
- Mare basalts are old (3.9-3.6 Ga)
  - 5 cooling units
  - 9 separate vesicle assemblages
  - 2 varieties of pyroclastic glasses
- Large basins are older
- Solar history recorded by the Moon
- Later Solar System history recorded in lunar regolith
- Magma ocean hypothesis
  - Fractional crystallization to give crust and mantle
    - Anorthositic fragments
  - Re-melting of differentiated mantle to produce mare
    - Titanium-rich source
- Solar wind volatile resources in regolith
  - Agitation losses in sample handling
- Petrologic and geotechnical characteristics of lunar regolith
- Nature of the lunar surface environment

**Experiments**

- Solar wind composition
- Very high seismic Q of crust
  - Mega-regolith
  - Thermal insulation
- Very low seismic noise from lunar interior
- High precision Earth-Moon distance through laser ranging

**References:** [1] Apollo 11 Preliminary Science Report, (1969) NASA. [2] The Moon Issue, (1970) Science, 167. [3] Proceedings of the Apollo 11 Lunar Science Conference (1970) Geochem. Cosmochem. Acta, 1, 2, 3 and subsequent proceedings and other publications.