MEETING

HGS DINNER MEETING— DECEMBER 11, 1989

HARRISON H. SCHMITT—Biographical Sketch

Harrison "Jack" Schmitt has the varied experience of a geologist, scientist, astronaut, pilot, administrator, businessman, educator, writer, and United States Senator.

He trained as a geologist and scientist at the California Institute of Technology, as a Fulbright Scholar at the University of Oslo, and at Harvard University, receiving his Ph.D. in geology from Harvard in 1964 based on earlier field studies in Norway.

He was selected for the Apollo Scientist-Astronaut program in 1965 and served as the Lunar Module Pilot for Apollo 17—the last Apollo mission to the Moon.

Schmitt's studies of the Valley of Taurus-Littrow on the Moon in 1972, as well as his earlier scientific work, made Schmitt one of the leading experts on the history of the terrestrial planets. As the only scientist to go to the Moon, he was also the last of twelve men to step on the Moon.

After organizing and directing the activities of the Scientist-Astronaut Office and of the Energy Program Office for NASA in 1973-1975, Schmitt fulfilled a long-standing commitment by entering politics. He was elected to the U.S. Senate from his home state of New Mexico in 1976.

In his last two years in the Senate, Senator Schmitt was Chairman of the Senate Commerce Committee's Subcommittee on Science, Technology, and Space and of the Senate Appropriations Committee's Subcommittee on Labor, Health and Human Services, and Education. He serves as a member of the Army Science Board and as consultant to the National Strategic Materials and Minerals Program Advisory Committee. Senator Schmitt recently was selected as a member of the President's Commission on Federal Ethics Law Reform.

EVOLUTION OF THE MOON: THE APOLLO MODEL

The major lunar evolutionary stages and their defining characteristics now appear to be as follows:

1. **The Beginning** — (4.6 Billion years ago.) Formation of the moon was roughly contemporaneously with the Earth. Evidence suggests a beginning through accretion of relatively cold material rather than through catastrophic separation from a pre-existing and largely differentiated Earth.
2. **The Melted Shell** — (4.6-4.5 billion years ago.) Accretionary melting and volatile depletion of the outer 200-300 km of the moon with accompanying differentiation into a 60-70 km thick anorthositic crust and a 100-200 km thick mafic upper mantle.
3. **The Cratered Highlands** — (4.5-4.3 billion years ago.) Saturation of the lunar crust, once it could preserve impact structures, with impacts capable of forming craters 50-100 km in diameter.
4. **The Old Large Basins and Crustal Strengthening** —(4.3-4.0 (?) billion years ago.) Formation of Pre-Nectarian large basins with rapid isostatic adjustment of the crust to mass concentrations and deficiencies. Moving upward into the cooler upper crust and becoming significantly contaminated with crustal debris in the process, KREEP related liquids crystallized and formed interlocking networks of intrusions. Once solidified, these interlocking intrusions, combined with the removal of underlying urKREEP liquid, strengthened the crust.
5. **The Young Large Basins** — (4.0 (?)-3.9 billion years ago.) Formation of Nectarian and Imbrium age circular large impact basins in a crust strong enough to support mass concentrations and mass deficiencies indefinitely.
6. **The Light-colored Plains** — (3.9-3.8 billion years ago.) Lunar wide debris deposition in most of the then existing basins may have resulted from a combination of the degasing of the mantle that preceded the formation of mare basalt magmas.
7. **The Basaltic Maria** — (3.8-3.0 (?) billion years ago.) Surface eruption and subsurface intrusion of basaltic maria.
8. **The Changing Crust** — (3.0 (?) billion years ago to present.) Formation of the Procellarum volcanic ridge system and the eastern limb and western farside light-colored swirls possibly due to brief period of mantle convection. Meteor impact frequency reached approximately present values.

Apollo 11 began the process of understanding the evolution of the Moon and, indeed, the early evolution of the Earth. Now, it has been recently noted that, early in the Third Millennium, the moon mare may provide the vast and environmentally benign energy resources required by Earth and the consumables required for Martian settlement.