HGS Environmental and Engineering Geologists Dinner Meeting
Wednesday, January 14, 1998 • Steak and Ale, 3030 Post Oak • Social Period 5:30 p.m. Dinner 6:00 p.m.

Chronologies of Martian Meteorites: New Developments After the 1997 Mars Mission

by Dr. John H. Jones, Planetary Science Branch, NASA Johnson Space Center

A suite of approximately 12 meteorites (called SNC meteorites) have been identified as having originated from the planet Mars. The assignment of a Martian origin to the 12-meteorite suite is well documented. Members of the suite are assigned on the basis of similar oxygen isotopic compositions. Some individuals within the suite, however, contain trapped gases that are chemically and isotopically indistinguishable from the Viking lander analysis of the Martian atmosphere. This is an important observation as the Martian atmosphere is quite thin. Consequently, its chemical composition is continually being modified and is unique from Earth's and other planets.

The SNC acronym is short for shergottite-nakhlite-chassigny, three different lithologies within the suite, all of which are igneous. The shergottites are basalts or basaltic cumulates, the nakhlites are augitecumulates, and chassigny is an olivine cumulate. All members of the SNC suite have been subjected to isotopic analysis and radiometric dating. The nakhlites and chassigny meteorites yield consistent igneous ages of 1.2–1.3 billion years. This is old for an Earth rock, but is quite young for meteorites, which are typically 4.0–4.5 billion years old.

The shergottites, however, have been assigned a variety of igneous crystallization ages that range from 4.5 billion years to 350 million years. It will be argued that combining petrography with isotopic age dating allows a resolution of the shergottite age dilemma. The solution to this problem has interesting consequences for the geologic history of Mars.

Biographical Sketch

Dr. John H. Jones received his B.S. from the University of Kentucky in 1978, and M.S. and Ph.D. degrees in geochemistry from the California Institute of Technology in 1978 and 1981. After postdoctoral and research associate positions with the University of Arizona, he joined the NASA Johnson Space Center as a staff scientist in 1987. His research interests include comparative planetology, the geochemical evolution of Mars, early history of the Earth-Moon system, meteorites and the origin of the solar system, and experimental trace element geochemistry.

Chairman's Note

The public interest in Mars may have waned from the past summer's euphoria related to the Pathfinder and Sojourner Mars mission. That gives us a chance to have one of NASA's pre-eminent scientists speak to us about Martian geology. How do scientists know that these meteorites have fallen on Earth after originating from Mars? This dinner meeting will be an opportunity to share your views with others concerning the implications of the Mars research and if they represent transported Martian alien life forms to Earth!

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