



NAI Focus Group

NASA ASTROBIOLOGY INSTITUTE

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Astromaterials include lunar samples, meteorites, interplanetary dust particles, and any sample returned to Earth by a space mission. The objectives of the newly created Astromaterials Focus Group are to: 1) coordinate and facilitate astrobiological investigations of Mars meteorites and terrestrial analogs of potential Mars samples; 2) facilitate the development of sample acquisition/collection technology and procedures; and 3) advance the development of instruments and techniques for examining all astromaterials for evidence of past or present life. The Astromaterials Focus Group can serve as a clearinghouse for data, concepts, new developments, and for planning future in situ analyses of Mars and future sample return efforts from an astrobiology point of view. This group is also expected to make informed recommendations on missions, instruments, sample selection, back contamination issues, and NASA programs to make maximum use of all astromaterials.

Background

The initial efforts of the Astromaterials Focus Group have been directed towards the fifteen known Mars meteorites that are available for scientific analysis. Evidence for the Mars origin of these meteorites is multiple and overwhelming. The mass of these meteorites varies considerably from sample to sample, but a total of many kilograms is present in the world's Mars meteorite collection. These meteorites, together with other examples of astromaterials such as carbonaceous chondrites and inter-

planetary dust particles, contain organic compounds which may be the result of abiotic synthesis. The study of such materials can provide basic information on extraterrestrial prebiotic chemistry, addressing such questions as: what compounds may have been available before life began, what was their relative abundance, and where were they most abundant? Other major areas of investigations which can be advanced by the examination of these samples include: 1) evidence for the present or past occurrence of water on Mars, 2) age dating and the history of Mars, 3) possible microfossils in the Martian environment, and 4) the development of new life detection techniques. More generally, the Astromaterials Focus Group can play an important role interacting with, and making recommendations to, mission planners, sample return and curation teams, and the NASA planetary protection efforts - providing expertise and guidance where appropriate to assure that sample return missions meet astro-

This 4.5 billion-year old rock, labeled meteorite ALH84001, is believed to be from Mars and to contain fossil evidence that primitive life may have existed on Mars more than 3.6 billion years ago.



biology requirements and that they maintain maximum protection against sample contamination.

Recent Activities

The Astromaterials Focus Group is planning a workshop for June of 2002, to be held at the NASA Ames Research Center, which will review and examine the data related to biogenic magnetite in Mars Meteorite ALH84001. The workshop of invited speakers will cover the evidence for and against biogenic magnetite in ALH84001. A questionnaire is also being formulated by the Astromaterials Focus Group to be sent to all of its members and to the NAI Executive Council. This questionnaire will solicit recommendations regarding sample maintenance during collection, packaging on Mars, return to Earth, and the receiving and processing of samples on Earth.

Artist John J. Olson's conception for the future of space exploration. The Astromaterials group is attempting to further understand the existing data on meteorites and provide the essential data required for future Mars missions.



This artist's rendering illustrates a Mars Sample Return mission under study at Jet Propulsion Laboratory and the NASA Johnson Space Center. The image depicts a rover that is fitted with a stereo camera vision system and tool-equipped arms for sample collection.