Abstract # 12639 - **Distinctive Carbonates in Five Martian Meteorites: Search for Water on Mars**

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Recently published results from Mars orbital data strongly support both the idea that large bodies of water were present at the surface in the past (1) and the possibility that significant amounts of water ice are currently present in the regolith just below the planet's surface (2). These new findings increase the significance of the evidence in martian meteorites that some low-temperature aqueous alteration and secondary mineral deposition occurred on Mars.

Carbonates are especially important because they are associated with the possible signs of martian biologic activity in meteorite ALH84001 proposed by McKay *et al.* (3). Most of the martian meteorites examined for secondary phases have been found to contain carbonates, and some of these carbonates are demonstrably from Mars. Carbonates in different meteorites are not all alike, however. The concentrically zoned carbonates in ALH84001 are unique among the martian meteorites analyzed in detail thus far; petrographically similar carbonates have not been described in the other martian meteorites. Carbonates in the other

meteorites commonly occur as irregular vein fillings or as small subhedral to euhedral crystals. Calcium carbonate seems to be the most common, and has been described in the observed falls Nakhla, Shergotty, and Chassigny along with Antarctic meteorite EETA79001. Sideritic carbonate is present in Nakhla, while magnesian carbonates have been described in Chassigny and EETA79001. It is likely that carbonates in the martian meteorites can help us answer a number of questions. For example, did they all result from deposition by relatively low-temperature aqueous fluids? Is it possible to obtain information about the fluids from which the carbonates precipitated? Based on textures and compositions of the carbonates, what can we infer about the near-surface history of each rock on Mars? Were some carbonates mobilized and re-precipitated after the meteorites landed on Earth? If so, is it still possible to determine anything about the pre-terrestrial history of the phases? These comparative studies should provide a basis for further studies of the meteorites and should also help increase background knowledge for sample return missions.

References:

(1) Irwin *et al*. (2002) *Science* **296**, 2209.
(2) Boynton *et al*.(2002) *Science* **297**, 81.
(3) McKay *et al*. (1996) *Science* **273**, 924.