The *Arctic Mars Analog Svalbard Expedition* (AMASE) project

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The AMASE project studies the role of biogenic processes during precipitation and weathering of carbonates in Mars analog environments on NW Spitsbergen. Carbonate deposits in the Quaternary Bockfjord volcanic complex (Skjelkvale et al., 1987) include calcite deposits (travertine) associated with hot springs, stromatolite textured magnesite in lava conduits, magnesite cemented lava breccias and ubiquitous magnesite-dolomite globules inside lava vesicles. The carbonate globules were first described by Amundsen (1987) and are the only known Terrestrial analog to carbonate globules in the Martian meteorite ALH84001 (Treiman et al., 2002). AMASE also involves development and testing of instruments aimed at future "Search for Life" missions to Mars, in cooperation with the Carnegie Institution of Washington (CIW) and NASA-JPL (Steele et al., 2004).

Studies of the travertine deposits involve water- and rock geochemical analyses (Hammer et al., 2004) and microbial studies (Steele et al., 2004) combined with modeling of pattern forming processes. Abundant microbial activity is evident both in the hot spring pools and as endolithic communities within travertine terraces. A direct link between microbial activity and carbonate deposition remains to be established. Studies of the volcano hosted carbonate deposits involve geochemical and microbial studies including a detailed inventory of organic compounds present within the volcanic rocks. Initial studies concluded that the BVC carbonate globules formed due to low temperature hydrothermal activity (Treiman et al., 2002) and recent work has shown that BVC carbonates are associated with organic material and microbial cells (Amundsen et al., 2004). Preliminary data suggest both abiotic and biotic origins for organic matter in the volcanic rocks. Possible roles of microbial activity during carbonate deposition remains to be established. Results from AMASE 2003 and 2004 have spurred increasing interest for using Svalbard and BVC as testing ground to develop concepts for "Search for Life" missions to Mars. AMASE 2004 involved the first ever field test of a suite of instruments capable of detecting microbial activity on Mars. Future work in collaboration with CIW, NASA-JPL and other institutions will focus on the detection of biosignatures and their preservation in Mars analog arctic environments and involves further field testing of portable instruments being developed for future Mars missions.

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