



## **The Astrobiology Drilling Program: Recent reportable results**

R. Grymes (1), H. Ohmoto (1,2), R. Buick (1,3), A. Anbar (1,4), R. Summons (5) and S. D'Hondt (1,6)

(1) NASA Astrobiology Institute, USA, (2) Pennsylvania State Astrobiology Research Center, Pennsylvania, USA, (3) University of Washington, Washington, USA, (4) Arizona State University, Arizona, USA, (5) Massachusetts Institute of Technology, Massachusetts, USA, (6) University of Rhode Island, Rhode Island, USA (rose.grymes@nasa.gov / Fax: +1 650-6044251 / Phone: +1 650-6043239)

The NASA Astrobiology Institute (NAI) Astrobiology Drilling Program's (ADP) initial focus has been on acquiring unweathered, unoxidized, and uncontaminated rock samples from geological settings preserving indicators of early life. Two projects have been undertaken, the Archean Biosphere Drilling Project (ABDP, 2002-present, NAI lead H. Ohmoto) and the Deep Time Drilling Project (DTDP, 2003-present, NAI lead R. Buick, Co-PIs A. Anbar and R. Summons). Both projects recovered materials from the Pilbara, Western Australia. ABDP's focus is in systematic paleontological and biogeochemical research on early Earth's biosphere, elemental cosmic and geochemical fluxes, climate, and ocean/atmosphere chemistry. Examination of ABDP core #6 revealed, for the first time, stromatolitic structures in the Mt. Roe Basalt Formation (2.775 Ga). Chemical mapping of redox sensitive elements suggests their production by aerobic organisms. ABDP cores also show red hematite beds at depths below the modern water table, which argues against their derivation as modern oxidation products of siderite. DTDP will characterize marine microbial types in the late Archean and environmental controls on their distributions through integrated analysis of hydrocarbon molecular biomarkers, redox indicators and biogeochemical cycling in kerogenous sediments. DTDP's Hamersley Basin drill core stratigraphically represents the last 100 Ma of the Archean, Initial studies of carbonaceous shales suggest a diverse microbial biota in late Archean oceans based on the molecular biomarkers detected. These include 2-methylhopanoids indicative of cyanobacteria and steranes biosynthesized by eukaryotes, in accord with the earlier findings of Summons et al. (1999) and

Brocks et al. (1999). Complementary studies of sulfur isotopes and major and minor element analyses in the same sediments are underway. Further information on the background, policies, and projects of the ADP, including information on participating and/or accessing materials, can be found at <http://nai.nasa.gov/adp> or by contacting the Executive Director, [Rose.Grymes@nasa.gov](mailto:Rose.Grymes@nasa.gov).