Chemical & Physical Sciences
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COLLOQUIUM SEMINAR SERIES

THE HIDDEN HYDROGEOSPHERE AND BIOSPHERE: IMPLICATIONS FOR DEEP SUBSURFACE MICROBIOLOGY AND THE SEARCH FOR LIFE

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In the last 10-20 years, global investigations in the world's oldest rocks have revealed groundwaters flowing at rates > L/min from fractures at km depth in Precambrian cratons. With mean residence times ranging from nillions to bmore than a billion years at some sites, not only do these groundwaters provide unprecedented samples for investigation of the Earth's ancient hydrosphere and atmosphere, they are opening up new lines of exploration of the history and biodiversity of extant microbial life in the Earth's subsurface. This study demonstrates that geochemical (abiotic) processes of water-rock reaction may be able to sustain not only a deep subsurface H and S cycle essential to sustaining planetary habitability in the absence of photosynthesis, but that processes of water-rock reaction may also sustain an abiotic carbon cycle capable of bridging the abiotic-biotic interface by generation of simple organic acids from calcite. This study points out that a radiolytically driven H, S and C deep cycle provides a mechanism for sustaining deep subsurface microorganisms in the absence of interaction with the surface photosphere, and suggests a model for planetary habitability capable of sustaining chemolithotrophic life on planets or moons where photosynthesis may never have arisen.

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featuring

Dr. Barbara Sherwood Lollar

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