MARIE THARP LECTURE SERIES
FOR OCEAN RESEARCH | **NO.36**

GEOMAR

Dr. Estella Atekwana

Dean of the College of Earth, Ocean and Environment at the University of Delaware, USA

"IT WAS VERY EXCITING IN THOSE DAYS. WE WERE EXPLORERS."

Marie-Tharp (1920-2006), Oceanographer

Online Seminar Friday, 18th June 2021, 15:00 CEST

Biogeophysics: Microbial Mediated Geophysical Signatures and the Search for Life in Extreme Environments

Microorganisms are found in almost every conceivable niche of the Earth from hydrothermal vents in the deep ocean basins to the cold subglacial lakes of Antarctic ice sheets. As such, microorganisms have played an important role in transforming Earth systems (e.g., accelerating mineral weathering), global climate change, and mediating different biogeochemical cycles over most of Earth's 4 billion year history.

In-situ microbial-rock interactions are dynamic and occur at both temporal and spatial scales that prove difficult to investigate at resolutions needed to fully understand them, thus necessitating the need for the development of non-invasive tools/sensors to interrogate these processes. Interestingly, these microbial-rock interactions modulate changes in rock physical properties, generating measurable geophysical signatures that can be recorded with conventional geophysical sensors (e.g., seismic, magnetics, electrical and electromagnetic). The recognition of these microbial-catalyzed changes in geophysical signatures resulted in the development of Biogeophysics: the study of the physical changes in earth materials catalyzed by microorganisms that are observable with geophysical techniques, as an interdisciplinary field of study. In this presentation, I will provide examples of how geophysical tools are used to sense subsurface microbial activity, from cell growth and biofilm formation to biomineralization and biogeochemical cycling of metals to the monitoring of microbial-induced natural attenuation of contaminants. Challenges and limitations will also be highlighted and potential for use in the search for life in extreme environments will be explored.

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Düsternbrooker Weg 20 | 24105 Kiel | Germany
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