Postdoctoral Position(s) available - Stable Isotope Laboratory, University of Toronto

Water-rock reactions supporting the deep subsurface biosphere by producing electron donors and acceptors in the subsurface have been identified, from serpentinization (mineral hydration reactions), to radiogenic reactions (Lin et al., 2005a&b; Sherwood Lollar et al., 2014; 2021; Li et al., 2016). This project focuses on the potential for a radiolytically driven H, S, and C deep cycle in the Earth’s subsurface, and the reaction mechanisms and rates sustaining deep subsurface microorganisms in the absence of interaction with the surface photosphere. Unlike lithologically-dependent reactions like serpentinization, radiogenic reactions are common to all planets and moons, and as such, the Earth-based focus on this work will have direct relevance for models of planetary habitability capable of sustaining subsurface chemolithotrophic life on planets or moons where photosynthesis may never have arisen (NASEM, 2018).

Constraining the governing controls on these reactions is a major limiting factor in our ability to predict rates of energetic availability (habitability) in the subsurface, biomass quantities, levels of microbial activity, and the distribution and preservation of life in the deep earth. Key parameters to be investigated in this program include the influence of mineral, and elemental distributions (O, F, U, Th, K) that drive and trace these major radiogenic reactions, as well as uncertainties in the distribution, transport and age of deep groundwaters that host microbial ecosystems. Finally, a major challenge is to quantitatively predict the overarching controls on α, β, γ radiation flux that define this Radiogenic (rather than Photosynthesis based) biome.

Field, laboratory and modelling opportunities are available to extend the existing program to explore the implications of our work on Earth analogs to the search for life on the rocky bodies and ocean worlds of our solar system. Applicants with a PhD in geochemistry, geobiology, chemistry, microbiology or related disciplines are encouraged to apply.

The University of Toronto is committed to an equitable, diverse, and inclusive workforce. We welcome applications from all qualified persons. We encourage women; First Nations, Métis and Inuit persons; members of visible minority groups; persons with disabilities; persons of any sexual orientation or gender identity and expression; and all those who may contribute to the further diversification of ideas to apply.

Applicants please send a detailed CV, statement of research interests and potential fit to the team, along with 3 letters of recommendation directly to:

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Due Date: Position is open immediately and will remain open until the position(s) are filled.