



Funded PhD Position in Carbon Capture / Geochemistry

Testing the efficacy of enhanced rock weathering for large-scale carbon capture

Chief Supervisor

Terry Isson (University of Waikato – Tauranga)

Co-supervisor(s) for this project

Louis Schipper (University of Waikato – Hamilton)

Shuang Zhang (Texas A&M University)

Noah Planavsky (Yale University)

Description

To avoid devastating climate impacts globally, atmospheric carbon dioxide (CO₂) removal is required over the next century. Yet, few tenable large-scale CO₂ removal applications exist. It is now time for us to radically re-imagine the way we live on this planet. Enhanced rock weathering (ERW) of primary silicate minerals (e.g., olivine) has been proposed as a viable strategy for global-scale carbon capture, with a notable net 0.5-5 Gt CO₂ yr⁻¹ potential proposed by recent modelling work. Additional potential economic and environmental benefits of ERW on pasture could include: (1) offsetting the need to add lime to pastures; (2) offsetting marine and terrestrial acidification; (3) reduced nitrous oxide (N₂O) flux; (4) release of essential nutrients (e.g., Ca, Mg, K, Si, Fe, Zn); (5) enhanced ecosystem carbon storage; and (6) increased crop yield. Despite the massive potential, there are currently no natural field data to corroborate the rates of carbon dioxide capture deemed possible in model space. As part of this project, the PhD student will perform ERW trials on agricultural land (e.g., permanent pasture), using both dunite and basalt. This work will be tackled with a toolbox consisting of geochemical (elemental and mineralogical) analysis, reaction transport models and machine learning techniques in collaboration with a well-rounded supervisory team. This project constitutes only a portion of the PhD thesis, there is room for the candidate to lead the way in shaping the remainder of it.

Prior experience in any of the following areas: geochemistry, carbon cycling, geospatial analysis, reaction transport modelling, machine learning is highly valued. The PhD candidate will be based at the Tauranga campus, as part of the Earth-Life Interactions Research Group (habitableearth.com). This 3-year scholarship covers stipend and fees.

As part of your application package, kindly include:

1. CV (including information for 2-3 referees)
2. Cover Letter (this can include: a description of why you want to undertake a PhD; how your previous experiences have prepared you for the research project that you are applying for; what your passions are within or outside of academia)

Review of applications will commence on 30th June 2022 and continue until the position is filled.

Kindly email your application to: terry.isson@waikato.ac.nz