

## PhD Project Opportunity:

### Project Title: Linking process-scale physics to regional glacier mass balance

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#### Project Overview

Glacier changes are challenging to measure on a regional scale, with the largest uncertainties being in firn processes for assessing mass change on individual glaciers, and measurement sparsity for assessing mass change over whole regions. In this project, there are a number of different topics that could be pursued, with two examples below.

- *Firn*. In warm, high-accumulation glacier environments, meltwater percolation, refreezing, and transient liquid water storage fundamentally alter firn density evolution in ways that existing dry-firn compaction models do not capture. This PhD will directly characterise these processes on maritime glaciers through field measurement of firn characteristics to constrain and improve firn models for warm maritime accumulation regimes.
- *Continuity*. Geodetic mass balance, derived from surface elevation change, is the primary tool for measuring glacier mass change at regional scales, but separating mass balance from ice flux divergence requires well-constrained ice thickness and velocity fields that remain sparse or absent in many glacier regions. This PhD will combine targeted ground-penetrating radar surveys of ice thickness with surface velocity fields derived from repeat satellite and aerial imagery to partition observed elevation change into dynamic and mass balance components, allowing physical and machine learning models to extend this to unmeasured glaciers.

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#### Ideal Candidate

We welcome applications from students with:

- a complete a BSc (Hons), or MSc degree in physics, mathematics, geophysics, geology, data science, or a related field and will ideally have had some prior research and fieldwork experience.
- an interest in researching glacier processes, has a good mathematical and statistical background, has good computer programming and scripting skills, and is keen to work in a multi-disciplinary team

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#### Supervisory Team

- **Primary Supervisor:** Brian Anderson (brian.anderson@vuw.ac.nz)
- **Co-supervisor(s):** Lauren Vargo and Shaun Eaves, Victoria University of Wellington, and Ruschle Dadic, SLF, Switzerland.