

## **Geomorphological contrast between advance and retreat phases at the terminus of a dynamic maritime glacier: Fox Glacier/Te Moeka o Tūwae, New Zealand**

Heather Purdie<sup>1</sup>, Paul Bealing<sup>1</sup>, Christopher Gomez<sup>2</sup>, Brian Anderson<sup>3</sup>, Oliver J Marsh<sup>4</sup>

<sup>1</sup> *University of Canterbury, College of Sciences, School of Earth and Environment, Christchurch, New Zealand*

<sup>2</sup> *Kobe University, Graduate School of Maritime Sciences, Laboratory of Volcanic Risks at Sea. Higashinada-ku, Fukaeminami-machi 5-1-1 Kobe City 658-0022, Japan.*

<sup>3</sup> *Antarctic Research Centre, Victoria University of Wellington, PO Box 600, Wellington, New Zealand.*

<sup>4</sup> *British Antarctic Survey, High Cross, Madingley Road, Cambridge, CB3 0ET, United Kingdom.*

[heather.purdie@canterbury.ac.nz](mailto:heather.purdie@canterbury.ac.nz)

Fox Glacier/Te Moeka o Tūwae is a fast-responding maritime glacier that has undergone multiple advance and retreat phases during recent decades. Here we use a combination of repeat photography, Structure from Motion (SfM), and ice discharge measurement, to identify key morphological differences associated with these repeated phases changes, and assess how much of the current terminus is still active. Increasing surface-debris cover at the margins and topographic shading result in asymmetry of the retreating terminus, with central portions receding faster than the margins. In 2019, the glacier is already shorter than in any time in recorded history, and ice flux is insufficient to sustain the current glacier length, meaning that a further 450 m of the glacier terminus region is potentially vulnerable to collapse.