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# Characterizing the atmospheric controls on ablation variability on Brewster Glacier, New Zealand using a distributed energy and mass balance model

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Understanding the response of temperate glaciers to climate variability is important in improving our current knowledge of global climate change. Temperate glaciers, including those in New Zealand, are sensitive indicators of climate change and though their contribution to global sea level rise may not be as significant as cold polar and subpolar glaciers and ice caps in the future their retreat will continue to be an important source of terrestrial water to our oceans. Though complete loss of all glacial ice in New Zealand would only have a minor impact on global sea level rise, understanding the links between glacier behaviour in the Southern Alps and climate is critical in efforts to unravel past patterns of Southern Hemisphere climate and in developing tools to predict future trends.

The Southern Alps of New Zealand are surrounded by vast areas of ocean and are strongly influenced by the interaction of subtropical and polar air masses, as well as acting as a barrier against prevailing westerly airflow. The exceptional precipitation and ablation rates that are common on the maritime glaciers of New Zealand result in them having a very high mass balance sensitivity, making them extremely useful indicators of climate variability. Using recently obtained micrometeorological data collected over two summer periods in the ablation zone of the Brewster Glacier, New Zealand we explore in detail the influence of climate variability on ablation using a distributed energy and mass balance model. In particular, we focus on the spatial and temporal variability of the energy balance terms during the summer seasons to identify the main drivers of ablation, and to characterize quantitatively what atmospheric events control large or extreme ablation episodes. This work provides us with a platform to develop present understanding of the linkages between physical processes controlling glacier fluctuation and atmospheric circulation over the Southern Alps.