Extent of late Holocene volcanic activity in Southern Patagonia

*Maximillian Van Wyk de Vries[1], Emi Ito[1], Mark Shapley[1], Guido Brignone[2], Shanti Penprase[1], Alexander Schmies[1]

1. University of Minnesota, Twin Cities, 2. University of Cordoba

Glaciated volcanoes may respond in several ways to changes in ice volume. For instance, the rate of magma influx, number of volcanic debris avalanches and quantity of eruptions may all be affected by thinning ice. However, the magnitude of these effect is highly variable, depending on the properties of both the volcano and local ice mass. Due to their remoteness and difficulty of access, ice covered volcanoes are also some of the least well studied. This is particularly relevant in areas such as southern Patagonia, where active volcanoes are adjacent to the southern hemisphere’ s largest non-polar ice cap. In this project we aim to determine the background frequency and magnitude of eruptions of the volcanically active portion of Southern Patagonia.

Previous work has identified a small number of Holocene eruptions, however the lack of an extensive and high preservation dataset limits our understanding of the volcanic sources. We collect a total of nearly 50 lacustrine sediment cores from a large proglacial lake, Lago Argentino, that is within 100 km of the three active volcanoes of the Southern Patagonian Icefield: Lautaro, Aguilera and Reclus. The location of this lake and the cores collected is shown in the associated figure. We use this over 100m of well laminated lake bottom sediment to identify tephras from local volcanic eruptions. Early analyses suggest that an order of magnitude more late Holocene tephra horizons can be identified than found in previous studies, including key regional marker horizons as well as more than 10 fine cm to mm scale tephra bands.

Our results suggest that the understudied volcanoes within the Southern Patagonian icefield, in particular Aguilera and Lautaro stratovolcanoes, may have a higher eruptive frequency than previously considered. This suggests that the magma plumbing system of these volcanoes is also more active, which increases the likelihood of ice thinning and depressurization triggered eruptions. In addition, our results have geohazard implications for a region with a rapidly growing tourist population. With much of the Southern Patagonian icefield thinning at rates of several metres a year, more detailed work is required to understand likely future volcanic influence on this region in the coming decades to centuries.

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