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A THERMAL SHOCKER: THE POLAR FÖHN OF THE VICTORIA VALLEY, MCMURDO DRY VALLEYS, ANTARCTICA

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The polar föhn of the McMurdo Dry Valleys (MDVs) is responsible for temperature changes of > 40°C and may cause both winter and summer air temperatures to rise above 0°C. These extraordinary variations in temperature are often accompanied by strong gusty winds that persist for several hours to several days. Consequently, the polar föhn affects all facets of surficial landscape processes in the MDVs including triggering the onset of summer snow and ice melt and stream flow, thawing of near surface permafrost and the subsequent release of fine grained sediment to aeolian entrainment and transport, rock weathering via aeolian abrasion, and the evolution of niveo-aeolian land forms (dunes). Despite being such an integral element of the unique MDV landscape, the polar föhn has not been the subject of major scientific investigation and is frequently mistaken for katabatic flow.

In the Victoria Valley, MDVs, the impact of the polar föhn on local meteorology produces the largest short term temperature fluctuations known. These occur during winter when the penetration of the topographically-modified föhn into the valley is believed to displace an extreme cold air pool which forms over Lake Vida. We believe that föhn onset is caused by forced and pressure driven channelling of gradient airflow into the Victoria Valley associated with cyclonic systems in the Ross Sea – McMurdo Sound region.

In this paper, we present an overview of the synoptic to local scale meteorology of the polar föhn events monitored in the Victoria Valley and compare these to observations of föhn from mid-latitude alpine locations. A model is then presented to account for the extreme temperature changes recorded at Lake Vida during wintertime föhn events.