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PAST AND PRESENT MASS BALANCE AND ICE FLOW CHARACTERISTICS OF VICTORIA LOWER GLACIER, MCMURDO DRY VALLEYS

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Victoria Lower Glacier is a small (125 km^2) valley glacier with a maximum thickness of approximately 350m, blocking the coastal end of Victoria Valley, the northernmost of the McMurdo Dry Valleys (MDV). The glacier is independent of the EAIS. A local accumulation dome, rising to 624m above sea level, divides the glacier into two ice masses, one flowing westward into the Dry Valleys, and the other flowing eastward towards the coast, into the Wilson Piedmont Glacier. Mass balance measurements using the submergence velocity method indicate a slightly negative mass balance. The horizontal velocity of the glacier is approximately 0.6m/year and the glacier surface is lowering by approximately 0.1m/year.

Ground penetrating radar (GPR) was used to map internal ice flow structures and bedrock topography. A GSSI SIR 10 A was used with a maximum time window of 10,000ns to capture deeper bedrock reflections. A 35MHz antennae pair was used for differential bedrock mapping and internal flow structures. A 200MHz antenna recorded higher resolution data from the upper 100m. Differential, kinematic GPS provided absolute positioning of the GPR data. The GPR profile resolves regular, horizontal ice layering in the upper 100m. Below 250m the radar signal fades, possibly due to the relatively high dust and salt content, typical for MDV glaciers.

We correlate the GPR profile with chemistry and density measurements of a 180m deep ice core. The upper 50m of the core were sampled with 2cm and below with 20cm resolution. The measurements include density, major ions (Ca, K, Mg, Na & Cl, NO_3, NH_4, SO_4), MS, trace elements (Al, Cu, P, Fe, Si, Sr, Zn), and isotopes (oxygen, hydrogen, and deuterium excess). We use the GPR profile to infer spatial and temporal snow accumulation variability.