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Ground-Penetrating Radar Studies of Permafrost, Periglacial, and Near-Surface Geology at McMurdo Station, Antarctica

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ABSTRACT: Installations built on ice, permafrost, or seasonal frozen ground require careful design to avoid melting issues. Therefore, efforts to rebuild McMurdo Station, Antarctica, to improve operational efficiency and consolidate energy resources require knowledge of near-surface geology. Both 200 and 400 MHz ground-penetrating radar (GPR) data were collected in McMurdo during January, October, and November of 2015 to detect the active layer, permafrost, excess ice, fill thickness, solid bedrock depth, and buried utilities or construction and waste debris. Our goal was to ultimately improve surficial geology knowledge from a geotechnical perspective. Radar penetration ranged between approximately 3 and 10 m depth for the 400 and 200 MHz antennas, respectively. Both antennas successfully detect buried utilities and near-surface stratified material to ~0.5 – 3.0 m whereas 200 MHz profiles were more useful for mapping deeper

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