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From ice crystals to ice caps, the climate of Mars as seen at the poles

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MSI Conference Room • 3550 University

Like Earth, Mars has two polar ice caps that contain a climate archive going back millions of years. Surface processes acting today will eventually become part of that climate archive, and understanding the ongoing processes is the best way to look backward in time to extract information about past climates. In this presentation, I will discuss experiments, modeling, and observations analysis that my lab at York University is performing related to ice processes at the polar layered deposits (PLD) of Mars. Our experiments simulate the growth of carbon dioxide crystals to form thick deposits and test the rheological properties of lab-made CO_2 in order to understand the mechanical strength for glacial deposits on Mars. In concert with JPL, our modeling efforts incorporate the CO_2 flow laws to predict flow rates and morphology of CO_2 glaciers on the south PLD. We are also observing transportation of materials via wind erosion across the PLD that indicate wind speeds and directions we can use to infer properties of the current climate. Finally, I will present portions of CSA supported proposal to send a NASA Discovery class mission to orbit Mars with instruments that better constrain all of these topics.

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