



Chemical & Physical Sciences

UNIVERSITY OF TORONTO

MISSISSAUGA

COLLOQUIUM SEMINAR SERIES

A GLIMPSE OF TWO DECADES OF RESEARCH ON LANDSCAPE EVOLUTION: THE CHANGE IN THE DRAINAGE PATTERN OF THE EAST ANTARCTIC ICE SHEET FOR THE LAST 8 MILLION YEARS



Currently, the Antarctic cryosphere is experiencing a rapid environmental change. Continuing ice decay directly contributes to the global sea level rise that threatens the world's population living in coastal areas. However, the behavior of the East Antarctic Ice Sheet (EAIS) under global warming and its future contribution to global sea level rise is extremely uncertain; model projections for the next centuries vary from tens of cm to 15 m. The timing and amplitude of changes in the behavior of the EAIS under climatic forcing in the past are of utmost importance for assembling information about what could happen in the future. As the drainage of the EAIS is poorly constrained in the coastal outflow regions, the Sør Rondane Mountains (SRM) in Queen Maud Land afford the unique opportunity to elucidate how the EAIS responds to changes in climate over time because the SRM dam the ice in the south and play a key role in the drainage pattern of the ice. In this study, we used classical field methods, remote sensing technologies, and analysis of cosmogenic ^{10}Be , *in situ* ^{14}C , ^{26}Al , ^{21}Ne , and ^{36}Cl to track the pace of EAIS' response to climate forcing and associated surface lowering since the Late Miocene. Our data suggest that the ice masses on the high-elevated plateau and the lower elevated foreland started to separate between 3 and 1 Ma (million years) (i.e., decoupling of the drainage), which suggests that since then, the ice on the plateau and the foreland responded differently and independently from each other to climate changes. In addition, we found that the margin of the ice plateau to the south of the mountain chain was stationary since the LGM, which is shown by the BIM on the southwestern end of the Dry Valley. In brief, the outcomes of this study deliver fundamental data on past behavior indeed the sensitivity of EAIS to climate variations thus promoting a more informed view of its possible behavior in the future.

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featuring

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