

Multi-Decadal Observations of the Antarctic Ice Sheet from Archival Radar Film

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Airborne radar sounding at MHz frequencies provides direct and wide-ranging observations of conditions within and beneath the Antarctic Ice Sheet. However, most digital radar sounding data have been collected in the last 15 years, limiting our ability to understand processes that govern longer-term ice-sheet behavior. To address this, we have digitized over 400,000 line-kilometers of Antarctic radar sounding data originally recorded on archival optical film between 1971 and 1979 at high resolution. We compare these scans with contemporary data and quantify the thickness change of the Thwaites Eastern Ice Shelf between 1978 and 2009, revealing the loss of over half of its thickness over the past three decades. These scans provide a new, extensive, multi-decadal baseline critical for observing and modeling ice-sheet change on societally-relevant timescales.