



Insights on ice-ocean interactions from remotely sensed icebergs

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Icebergs are a key component of the ice-ocean system that, until recently, have received relatively little attention. Icebergs are important to ocean circulation and ecosystems as sources of distributed freshwater and nutrients, and they pose hazards to navigation and infrastructure. Fortunately, icebergs larger than a few meters across are readily observable in satellite imagery, enabling the derivation of large datasets of iceberg size and abundance through utilization of the satellite archive. Recent advances in image analysis techniques, combined with access to advanced computing, have improved our ability to observe icebergs in remote sensing datasets on a range of temporal and spatial scales. Here we present a new automated technique to map icebergs and extract information about iceberg size distributions from satellite-based optical imagery. We demonstrate the successful derivation and application of an automated iceberg delineation algorithm, developed for the Landsat suite of sensors to investigate the size and spatial distribution of icebergs in Disko Bay, West Greenland. Application of this algorithm to six years of the Landsat archive yields information on the size and spatial distribution of icebergs from Greenland's most prolific source of icebergs, Jakobshavn Isbræ. Through a comparison of the iceberg datasets with records of iceberg discharge from Jakobshavn Isbræ, we demonstrate what remotely-sensed iceberg distributions can (and cannot) tell us about changes in ice dynamics over time.