

Abstract for SCAR 2024

To be submitted to '6 - Interactions between ice shelves and oceans: current state and future projections'

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ABSTRACT DRAFT (300 words max)

'Sea Ice as Modulator of Ocean-Ice Shelf Interactions'

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Antarctica's floating glacial ice shelves are focal points for grounded ice sheet export through calving and basal ice shelf melt. In the Amundsen Sea Embayment (ASE) there have been thinning of ice shelves and accelerated glacial losses, driven in large part by changes in the atmospheric and ocean circulation that in turn drive changes in the delivery of warm modified Circumpolar Deep Water to ice shelf cavities and grounding lines. The ASE is also distinguished by the Pine Island and Amundsen Sea polynyas, two areas of very high sea-ice production rates. These two polynyas are separated and heavily influenced by the Thwaites Glacier Tongue and its northward extension of icebergs cemented together by fast ice. This partially grounded northward ice obstruction is a physical barrier to both surface air-sea interactions and to ocean and sea ice circulation. While it has been shown that the marine icescape (inclusive of seasonal and multiyear sea ice, fast ice, and grounded and drifting icebergs) plays an important buttressing role in the stability of Antarctic ice shelves, here we investigate how the marine icescape in the ASE might also modulate ocean circulation and ocean heat delivery to ice shelf cavities. In this presentation, we address the role of seasonal sea-ice in driving variability in sea ice-ocean interactions and subsequently, ocean-ice shelf interactions in the ASE. For this analysis, we combine satellite observations of sea ice, ocean observations (including oxygen isotopes) from the ASE, and output from a regional 3D sea ice-ice shelves-ocean model to investigate the role of sea ice as modulator of ocean-ice shelf interactions. In a companion study (St-Laurent et al, 2024), the role of icebergs, ice tongues, and fast ice in modulating ocean-ice shelf interactions are additionally evaluated.