

Irreversible changes in the northern part of the WAIS: a view from above and below.

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Terry Hughes named the Amundsen Sea Embayment (ASE) sector the weak underbelly of the WAIS 40 years ago. No one believed him then because there was no observation to support it, but everyone took a note of it. This situation changed with the advent of satellite missions in the early 1990s, ship cruises in the mid 1990s, airborne deployments in the early 2000s that reveal rapid, ongoing changes in the region, with more observations to come. We now have a record of 40 year of change in flow speed and mass change, 20 years of grounding line migration, a detailed mapping of the bed topography and ice thickness which was only sketchy in the 1970s (and still included major artifacts as recently as 6 months ago), information about the sea floor topography in front of the glacier and beneath ice shelves, and a better understanding of local ocean conditions, wind forcing and sensitivity of the glaciers to oceanic perturbations. The time scales of projection of collapse of this sector from numerical ice sheet models remain highly uncertain, anywhere from 100 to 900 yr. We will review these observations, what lead us to conclude that this sector is undergoing irreversible retreat, how this relates to the big picture of climate change in Antarctica, and what this means for the coming decades. We will highlight key observational and numerical modeling elements that are still missing from this picture to help reduce uncertainties in time scale of projection and the implications of what we have learned in northern WAIS for other sectors.

Changes in WAIS from observations (*The Times They are a-Changin'*).