



Cryospheric impacts of climate change on the Antarctic Peninsula

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For at least the 50 years, mean annual atmospheric temperatures on the Antarctic Peninsula have been warming at rates that are many times the global mean. The warming has included significant changes in summer melting conditions, sea-surface temperatures, and sea-ice cover. Warming has shown strong altitudinal, spatial, seasonal, and decadal variations, and while it has not been possible to catalogue the cryospheric impacts in full, several clear examples have become icons of change in Antarctica. These climate impacts include, the retreat of ten separate ice shelves over several decades, which in some cases culminated in spectacular collapse and acceleration of tributary glaciers; an increase in the area and duration of snow-free ground; and the retreat of 87% of the ~250 marine and tidewater glaciers on the west coast of the Antarctic Peninsula, which has now been linked to a widespread glacier acceleration. An estimate of the net imbalance of the northern Antarctic Peninsula ice sheet, suggests that it is now contributing around $0.16 \pm 0.06 \text{ mm a}^{-1}$ to global sea-level and that despite its modest size compared to East and West Antarctic ice sheets, this area should not be discounted in future projections of sea-level contribution. The magnitude and rate of recent changes in the ice-cover on the Antarctic Peninsula prompt the question of what will happen to this area in future decades. Even if the current rates of change are continued with any appreciable acceleration, some dramatic changes will occur and it is possible that these could have important implications for the unique biological communities that occupy niche habitats and may encourage alien species invasion. In this talk, I will review past changes and highlight advances in understanding of glacial dynamics, iceberg calving and ice-fracture, and energy transfer that are essential for us to make reliable projections of future change in the Antarctic Peninsula

ice sheet.