

Significance of exceptional recent climate and glacier changes in West Antarctica

Eric Steig, University of Washington

The West Antarctic Ice Sheet (WAIS) has warmed significantly in the last 50 years, and sea ice concentrations have declined in the adjacent Amundsen and Bellingshausen Seas for at least the last three decades. Contemporaneously, outlet glaciers that drain the WAIS into the ocean have accelerated, leading to overall mass loss and a significant contribution to sea level rise. The rising temperatures and declining sea ice are linked with the glacier accelerations by changes in atmospheric circulation, which have enhanced the flow of warm Circumpolar Deep Water (CDW) onto the Antarctic continental shelf, resulting in thinning of floating ice shelves. Data from an array of ice core records from the WAIS show that recent conditions are likely unprecedented in at least the last 200 years, but are dominated by decadal variability. Similar conditions occur with a frequency of about once per century over the last 2000 years. The unusual climate in West Antarctica in recent decades can be attributed primarily to similarly unusual conditions in the tropical Pacific. Future changes in the tropics will need to be taken into account in projections of the Antarctic ice sheet contribution to sea level rise.