

Decadal variability in the tropical Pacific and its impact on West Antarctic Ice Shelves

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Several important ice shelves in West Antarctica have experienced periods of enhanced melting in the past few decades. The melting has been attributed to an increase in the temperature of the ocean waters that abut the ice sheets which was, in turn, due to alongshore (westerly) wind anomalies that lifted warm water from below up and onto the continental shelf, where it subsequently made its way to the ice sheet terminus (Thoma et al 2008).

In this talk, we present analyses of observations and results from numerical modeling experiments. We demonstrate the recent trends in atmospheric circulation over the south Pacific that are responsible for the variations in the melting of these ice sheets are due to trends in the tropical Pacific sea surface temperature (SST): a localized warming in the central Pacific in the 1990s caused a teleconnection pattern that featured an anomalous high pressure in the Amundsen Sea that caused coastal ocean changes and warmer water adjacent to the ice shelves (Ding et al 2011; Steig et al 2012). Similarly, the strong La Nina event in 2010-2012 significantly reduced the melting in West Antarctica (Dutrieux et al 2014). We hypothesize the ultimate fate of these ice shelves depends in no small part on the future disposition of the tropical Pacific atmosphere-ocean system. This raises important issues concerning the causes of the observed decadal variability in the tropical Pacific, which we will discuss.