## Influence of Ocean Circulation Patterns on Ocean Heat Transport to Ice Shelves

**Pierre St-Laurent, John M. Klinck, Michael S. Dinniman**
Old Dominion University, Center for Coastal Physical Oceanography

Oceanic exchanges across the continental shelves of Antarctica play an important role in biological systems and the mass balance of ice sheets in West Antarctica. We focus in this research on the ocean heat transport to idealized ice shelves representative of the conditions encountered in Antarctica. In most shelf seas around the continent, the waters are close to freezing point and the mean circulation includes a westward flow at the shelf break (case 1). Conditions in the Amundsen and Bellingshausen seas (West Antarctica) are contrasted and include warm waters on the continental shelf and an eastward flow at depth at the shelf break (case 2). We examine the differences between these two cases by comparing process-oriented simulations conducted with a high-resolution (1km) 3-D ocean model (ROMS) coupled to a thermodynamically-active ice shelf. In both cases the cross-shelf exchanges of heat are initiated by corrugations at the bottom of the sea (troughs). However the magnitude of the onshore heat transport and the mechanism behind it are significantly different. This asymmetric response is explained by potential vorticity conservation and is compared to observational data recently acquired in the Ross and Bellingshausen seas. By assuming one large trough per 1000km of coastline, it is estimated that such flow-topography interaction provides 1GW of oceanic heat (relative to freezing point) per km of Antarctic coastline.