Dense gravity current on continental slopes is a primary source for the Antarctic Bottom water (AABW), so it has great impact on global thermohaline circulation and world climate. However, it is not represented well in ocean general circulation models due to lack of resolution and less understanding of small scale processes (e.g., turbulent mixing, bottom boundary layer, tidal processes, etc.) In the present study we perform high-resolution regional experiments with realistic settings to model the AABW formation processes using a non-hydrostatic code.

The results suggest that small topographic features, such as ridges and canyons of less than 10 km horizontal scale, have great impact on where a dense water descend down on continental slopes. The thermobaric effect due to the non-linearity of equation of state also plays an essential role for the descent of cold saline ice shelf water. We also quantitatively investigate the effect of entrainment induced by shear-driven instability.