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A cold cavity? Results of a high resolution ice-shelf ocean coupled model of Terra Nova Bay and the ocean cavity beneath the Nansen Ice Shelf.

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Terra Nova Bay in the western Ross Sea of Antarctica has received increasing attention recently by international oceanographic and sea ice observation campaigns. In Terra Nova Bay strong katabatic events create one of the most intense sea ice producing polynyas in Antarctica. The associated deep convection drives the formation of HSSW, the precursor of AABW. It also facilitates the oceanic heat exchange with the adjacent ocean cavity beneath the Nansen Ice Shelf (NIS). Terra Nova Bay presents us with the unique opportunity of studying many of the primary interactive processes of atmosphere, ocean, ice shelves and sea ice, in a relatively confined region.

In this talk we will show results of a high resolution, coupled ocean-ice shelf modeling study that synthesizes and contextualizes available data sets from various recent observation campaigns. Our results include the first tidal model of Terra Nova Bay and the NIS cavity, the seasonal heat budget of the cavity and the formation of meso-scale eddies inside the polynya. We have also investigated the oceanographic role of erosion features at the base of the NIS, associated ice shelf melt rates and the impact of fresh water outflow in preconditioning the onset of winter polynya activity as well as the large scale circulation in Terra Nova Bay.