

Session: OS-7 Atmosphere-Ice-Ocean interactions in the Polar Regions

Polar program: None

**Title: Coastal polynyas on PIPERS: enhanced ice growth in strong katabatic wind events**

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Text: The PIPERS cruise to the Terra Nova Bay (TNB) polynya during April-June 2017 focused on joint measurements of air-ice-ocean wave interaction. Measurements were taken during intense katabatic wind events (over  $35 \text{ ms}^{-1}$ ) and temperatures of  $-15\text{C}$ . Wave amplitudes of over 2m and 7-9 sec periods built and large amounts of frazil ice crystals grew. The frazil ice gathered initially into short plumes that were added together laterally to create longer and wider streaks, an apparently "self-herding" characteristic of ice in small pieces, found in other granular materials. The wave field within the wider streaks was dampened and enhanced the development of pancake ice. Eventually, the open water areas sealed off and developed a uniform pancake ice cover. As the waves died off, sustained katabatic wind velocities resulted in a wide area of concentrated, rafted, pancake ice of 30 to 40cm thickness that was rapidly advected downstream until the end of the katabatic event. High resolution TerraSar-X radar satellite imagery showed the length of the ice area produced in one single event extended over 300km or ten times the length of the open water/frazil ice area during the polynya event. The TNB polynya is therefore an "ice factory" where frazil ice is manufactured into pancake ice floes that are then pushed out of the assembly line, rafted into "dragon skin" ice and advected, until the katabatic wind dies off at the coastal source.

Preferred Presentation  
Type: **Oral Presentation**