SPRING 2017 SEMINAR SERIES

DEPARTMENT OF OCEAN, EARTH, AND ATMOSPHERIC SCIENCES
3:00PM – ROOM 200 IN THE OCEANOGRAPHY/PHYSICS BUILDING
THURSDAY April 6th, 2017

"Physical drivers of the highly-productive Amundsen Sea Polynya."

Dr. Pierre St-Laurent
Postdoctoral Research Scientist
Center for Coastal Physical Oceanography
Old Dominion University

ABSTRACT

The Antarctic continental shelves feature numerous coastal 'polynyas' fringing the edge of the continent. Polynyas are openings enclosed within sea ice and are typically generated by seaward-directed winds. They are also associated with primary production as they allow sunlight in areas that are otherwise covered by sea ice. Of the 46 Antarctic coastal polynyas documented in a recent study, the Amundsen Sea Polynya (ASP) stands out as the one with the highest net primary production per unit area (105 g-C/(m2 yr), 16% more than the Ross Sea Polynya). At the same time, the Amundsen Sea features the fastest-melting ice shelves of the Antarctic continent. Just upstream of the ASP, the Thwaites and Pine Island ice shelves combine to release about 200 gigatons of meltwater per year. In this presentation, we will examine the physical effects of this melt and how it contributes, directly and indirectly, to the highly-productive ASP. Direct observations from research cruises and realistic numerical simulations reveal a vigorous three-dimensional oceanic circulation in the vicinity of the ice shelves. This mechanism ('ice pump') is analogous to a traditional estuarine circulation with ice shelf melt in place of river inflow. The circulation is found to be effective at mobilizing deep nutrients that would otherwise be inaccessible and unavailable for the primary production of the ASP (typically constrained by iron availability). The presentation will reveal the pathways of dissolved iron in the system and how they can influence the productivity of the ASP.

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