YORK UNIVERSITY
DEPARTMENT OF EARTH AND SPACE SCIENCE AND ENGINEERING
and
CENTRE FOR RESEARCH IN EARTH AND SPACE SCIENCE

S E M I N A R

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The Scottish Association for Marine Science (SAMS)

Arctic sea ice buoys and remote sensing: Tools for studying sea ice dynamics

ABSTRACT

Arctic sea ice is in a constant state of motion and stress. In winter external forces (primarily wind and ocean currents) cause a continuous sheet of sea ice to be deformed, forming leads, ridges, and rubble fields. These features comprise extremes of sea ice thickness distribution and thus important for the overall mass balance of Arctic sea ice. To cause such features the ice has to be deformed and fractured at high strain rate. Such process is by nature highly heterogeneous (localized), intermittent, and displays multi-fractal, scale-invariant behaviour. This means that small-scale deformations are the actual processes that create these features, yet difficult to study due to lack of *in-situ* data. In this talk we present the fracturing of a single sea ice floe at a spatial scale of 100 to 300 meters, captured by Arctic sea ice buoys and satellite imagery. The deformation events were intermittent, each lasted less than a day, and highly compressive; the area occupied the buoy array decreased by about 44% during these deformation events. Of particular interest was the calculated strain rate during the deformation, of the order of 10^{-5} s^{-1}, which is much higher than brittle fracturing strain rate estimated for the cracks of 100 m in length. The effects of large-scale wind stress (ice motion) on the small-scale deformation are shown; however other factors such as ice thickness and strength, degree of consolidation play a role as well.

BIOGRAPHY

My research interests lie in understanding how sea ice in polar regions changes in the presence of atmospheric and oceanic forcings. The highlighted research questions are how sea ice dynamics (drift/deformation) interact with sea ice thermodynamic (melt/growth), how atmospheric and oceanic forcings influence those interactions, and how those interactions affect the sea ice growth and retreat processes. My approach in addressing the challenging questions is to use combination of sea ice mass balance buoy, upper-ocean profiler and satellite remote sensing. In this way we are able to observe not only vertical sea ice growth/melt (and upper ocean structure) but also horizontal sea ice floe dynamics (e.g. breakup, lead opening/closing). - See more at: http://www.sams.ac.uk/phil-hwang#sthash.NujS2It1.dpuf

Refreshments will be served at 3:15 p.m. in Room 422 Petrie Science and Engineering Building.

DATE:	**Tuesday, November 4th, 2014**
TIME:	**3:30 p.m.**
LOCATION:	**Room 422, Petrie**