Geophysical Research Abstracts
Vol. 15, EGU2013-13825, 2013
EGU General Assembly 2013

A Novel and Low Cost Sea Ice Mass Balance Buoy.

Keith Jackson (1,2), David Meldrum (1), Jeremy Wilkinson (3), Ted Maksym (4), Justin Beckers (5), and Christian Haas (5)

(1) Scottish Association for Marine Science, United Kingdom., (2) University of Aberdeen, United Kingdom., (3) British Antarctic Survey, United Kingdom., (4) Woods Hole Oceanographic Institute, U.S.A., (5) University of Alberta, Canada.

Understanding of sea ice mass balance processes requires continuous monitoring of the seasonal evolution of ice thickness. While autonomous ice mass balance buoys (IMBs) deployed over the past two decades have contributed to our understanding of ice growth and decay processes, deployment has been limited, in part, by the cost of such systems. Routine, basin-wide monitoring of the ice cover is realistically achievable through a network of reliable and affordable autonomous instrumentation. We describe the development of a novel autonomous platform and sensor that replaces the traditional thermistors string for monitoring temperature profiles in the ice and snow using a chain of inexpensive digital temperature chip sensors linked by a single-wire data bus. By incorporating a heating element on each sensor, the instrument is capable of resolving material interfaces (e.g. air-snow and ice-ocean boundaries) even under isothermal conditions. The instrument is small, low-cost and easy to deploy. Field and laboratory tests of the sensor chain demonstrate that the technology can reliably resolve material boundaries to within a few centimetres and over 50 scientific deployments have been made with encouraging results. The discrimination between different media based on sensor thermal response is weak in some deployments and efforts to optimise the measurement continue.