Geophysical Research Abstracts, Vol. 9, 00194, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-00194

Development of a snow water equivalent (swe) retrieval algorithm over first-year sea ice using in-situ passive microwave data

A. Langlois, D.G. Barber and B.J. Hwang

Centre for Earth Observation Science (CEOS), University of Manitoba, Canada
(umlangl2@cc.umanitoba.ca / Fax: +001-204-272-1532 / Phone: +001-204-474-8599)

The objectives in this work are a) to present these ‘state’ variables and to investigate the processes, which govern variability in the vertical, horizontal and temporal dimensions, b) to describe how snow thermophysical properties affect passive microwave emission and c) to develop new statistical SWE algorithms accounting for an evolving snow thickness over first-year sea ice using winter in-situ passive microwave emission for snow on landfast sea ice. The data collection occurred during the Canadian Arctic Shelf Exchange Study (CASES) overwintering mission that took place in Franklin Bay, NWT, Canada between December’03 and June’04

Results show that differences in snowpack thickness can substantially change the vertical and temporal evolution of snow properties. In the late winter and early spring significant changes occurred especially for snow grain size. Snow grain kinetic growth of 0.25-0.48 mm·day^{-1} was measured coincidently with increasing salinity and wetness for both thin and thick snowpacks. A SWE algorithm has been developed from the data using coincident *in-situ* passive microwave measurements. SWE predictions over thick snow are quite accurate, and showed very good agreement with the physical data (R^2 = 0.94) especially during the cooling period (i.e. from freeze up to the minimum air temperature recorded) where the snow is dry and cold. Thin snow SWE predictions also showed fairly good agreement with field data (R^2 = 0.70) during the cold season.

Keywords: Arctic, Snow, First-Year Sea Ice, SWE, Passive Microwave, Climate Change.