Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06788, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06788
EGU General Assembly 2008

Modelling the areal evolution of Arcticmelt ponds

F. Scott, D.L. Feltham
CPOM, University College London

An accurate estimate of the fraction of the upper sea ice surface covered in melt ponds during the summer melt season is essential for a realistic estimate of the albedo for global climate models. We present a sea ice model that simulates the two dimensional (areal) evolution of melt ponds on an Arctic sea ice surface, with emphasis on understanding the physical processes that govern melt pond size and shape. Water transport across and through the sea ice surface is described by the major hydraulic processes believed to be present. The model is coupled with a one dimsnsional thermodynamic sea ice melt pond model to describe heat flux in each cell

The model simulates a section of a sea ice floe where edge effects such as the presence of leads are neglected. The model consists of a grid of cells, each of which can be in one of four possible configurations: snow covered ice; bare ice; melt pond covered ice or open water. Eventually, a cluster of adjacent cells each containing melt water may be considered to have formed a melt pond.

Lateral and vertical melt water transport is described by Darcy's Law. Melting in each grid cell is simulated using a one-dimensional thermodynamic module for ice and snow melting (and freezing), with an additional parameterisation to describe the heat flux through melt ponds.

The ice topography is constructed using a stochastic model initialised with SHEBA ice thickness data. The sensitivity of melt pond coverage to ice surface roughness is investigated.