Integration of Remote Sensing Measurements and Numerical Modelling of Snow on Sea Ice

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ABSTRACT

Our understanding of snow distributions in the polar regions is severely restricted due to the heterogeneity, both in space and time, of this solid precipitate. Processes such as vapour, mass and energy fluxes across the interface are, to a large extent, controlled by the presence and geophysical state of the snow cover on sea ice. A significant portion of the uncertainty in cryospheric processes can be linked to the role that snow plays in moderating these fluxes across the ocean–sea ice–atmosphere interface.

In this paper, we present several years of research results that show how both passive and active microwave remote sensing can be used to estimate geophysical characteristics of snow on sea ice (grain size, water in liquid phase, and SWE). We then present our approach to integrating these remote sensing estimates directly within a numerical snow model (SNTHERM) and one dimensional sea ice model (Flato). We conclude with a description of how this integration of remote sensing and modelling can be used to understand physical and thermodynamic processes operating across the ocean–sea ice–atmosphere interface.

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