[EJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CG Complex & General

[A-CG38]Science in the Arctic Region

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The Arctic and circumpolar region is the key area for the study of global change because the anthropogenic impact is projected to be the largest in this area due to the complicated feedback processes of the nature. A number of international and interdisciplinary research projects have been conducted for the studies on the land-atmosphere-ocean system. In order to understand the feedback processes occurring in the Arctic and to project the global warming in the future, we need to establish the intense observational network and to exchange the knowledge and information by combining the different scientific communities under the common interest of the Arctic. The objectives of this session are 1) to exchange our knowledge on the observational facts and integrated modelling and 2) to deepen our understanding on wide range of natural sciences related to the Arctic and the circumpolar region. Studies on humanities, social sciences, and interdisciplinary fields are also welcomed.

[ACG38-P25]Development of the Greenland Ice Sheet surface melt detection algorithm using multiple space-borne sensors for GCOM-C and GCOM-W

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Recent mass loss of the Greenland Ice Sheet had been affected by the expand of melt period for snow albedo reduction. Surface melt causes the enhancement of the snow metamorphism and the snow grain size gaining. And glacial microbe cultivation is also accelerated because they could live in the liquid water. Therefore, it is important to detect the snow melt onset. In previous studies, there were many methods for detecting the snow melt using remote sensing technique using passive microwave radiometer, optical sensor and thermal infrared sensor. These methods had advantages and disadvantages originated from spatial resolution, observation frequency and atmospheric conditions. In this study, we developed the Greenland Ice Sheet surface melt detection algorithm using multiple space-borne sensors applying to GCOM-W/AMSR-2 and GCOM-C/SGLI. In this algorithm, four independent methods including two microwave brightness temperature methods using GCOM-W/AMSR-2 (XPGR method described in Abdalati and Steffen, 1997 and improved XPGR method), optical method (Chylek et al., 2007) and thermal infrared method (Hall et al., 2013) using Terra+Aqua/MODIS were combined by weighted majority algorithm. In order to consider the characteristics of each methods and determine the weight, we evaluated the accuracies of these melt/freeze classification methods using surface temperature estimated by longwave radiation observation derived from Automatic Weather Station (AWS) data installed by PROMICE on the Greenland Ice Sheet. And we decided the weight from total accuracy of each detection methods. Ensemble method using obtained each weight were evaluated the accuracy using AWS data and it showed highest total accuracy than four independent methods. It means that multi method ensemble can provide the effect of improving accuracy of the Greenland Ice Sheet surface melt detection similarly to the boosting algorithm (Freund, 1995). In further study, we will evaluate optical and thermal infrared methods using GCOM-C/SGLI observation data and integrate to ensemble algorithm.

[Reference]
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Chylek et al. (2007): J. Geophys. Res., 112, D24S20.
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Freund. (1995): Inform. Comput. 121, 256-285.