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**AGU Fall Meeting 2009**

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**Snow and Ice Crust Changes over Northern Eurasia since 1966**

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When temperature of snow cover reaches zero Celsius first time since its establishment, snowmelt starts. In many parts of the world this process can be lengthy. The initial amount of heat that “arrives” to the snowpack might be insufficient for complete snowmelt, during the colder nights re-freeze of the melted snow may occur (thus creating the ice crust layers), and a new cold front (or the departure of the warm front that initiated melt) can decrease temperatures below the freezing point again and stop the snowmelt completely. It well can be that first such snowmelt occurs in winter (thaw day) and for several months thereafter snowpack stays on the ground. However, even the first such melt initiates a process of snow metamorphosis on its surface changing snow albedo and generating snow crust as well as on its bottom generating ice crust. Once emerged, the crusts will not disappear until the complete snowmelt. Furthermore, these crusts have numerous pathways of impact on the wild birds and animals in the Arctic environment as well as on domesticated reindeers. In extreme cases, the crusts may kill some wild species and prevent reindeers’ migration and feeding.
Ongoing warming in high latitudes created situations when in the western half of Eurasian continent days with thaw became more frequent. Keeping in mind potential detrimental impacts of winter thaws and associated with them snow/ice crust development, it is worthwhile to study directly what are the major features of snow and ice crust over Eurasia and what is their dynamics. For the purpose of this study, we employed the national snow survey data set archived at the Russian Institute for Hydrometeorological Information. The dataset has routine snow surveys run throughout the cold season each decade (during the intense snowmelt, each 5 days) at all meteorological stations of the former USSR, thereafter, in Russia since 1966. Prior to 1966 snow surveys are also available but the methodology of observations has substantially changed at that year. Therefore, this analysis includes only data of 585 Russian stations from 1966 to 2008 that have all years of data with a minimal number of missing observations. Surveys run separately along all types of environment typical for the site for 1 to 2 km, describing the current snow cover properties including characteristics of snow and ice crust. Joint analysis of these characteristics of crust together with a suite of synoptic information at the stations allows us to empirically assess the process of snow and ice crust formation and development throughout the cold season and outline major factors responsible for their dynamics. Finally, regional averaging and time series analysis of both, these factors and the crust characteristics themselves, answer the question about the regional climatic changes of snow and ice crusts over Northern Eurasia, including those crust characteristics that are of practical importance for reindeer husbandry. These results for the Russian Federation will be presented at the Meeting.

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