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CONTROL ID: 1202867

TITLE: Changes in Snowpack Density over Northern Eurasia since 1966

PRESENTATION TYPE: Assigned by Committee (Oral or Poster)

CURRENT SECTION/FOCUS GROUP: Global Environmental Change (GC)

CURRENT SESSION: GC16. Regional Climate Impacts 7. Environmental, Socio-economic and Climatic Changes in Northern Eurasia and their Feedbacks to the Global Earth System: The Role of Remote Sensing and Integrative Studies

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ABSTRACT BODY: Regular snow observations have been conducted in Russia since 1882 and snow course surveys are performed at meteorological stations since 1930s. In 1966, the measurement routine was changed substantially and at present, only snow survey data obtained no earlier than 1966 can be used for climate change studies. The course length is 2000 m or 1000 m in the field and 500 m in the forest. The snow cover depth is measured every ten meters in the forest and every twenty meters in the field. Snow density at the 1000-m and 500-m courses is measured every one hundred meters and at the 2000-m course, every two hundred meters. Snow course surveys determine snow depth and density, snow water equivalent, ice crust and saturated snow thickness, the amount of snow and ice crust covering the course, and the state of the underlying ground. Snow surveys are conducted every ten days, when no less than half the visible area around the station is covered with snow. In spring, before and during snowmelt, measurements are made every five days. In the forest, until 20 January, measurements are made once per month. Since 1881, the annual surface air temperature has increased by 1.5K (in winter by 3K); since the early 1980s, the late summer sea ice extent has decreased by 40% providing a near-infinite source of water vapor for the dry Arctic atmosphere in the early cold season months. There is also evidence of more frequent thaw days over northern latitudes of western Eurasia. All these factors affect the state of snowpack. In the recent decades, the Russian territory has experienced increases in winter and maximum snow depth and an increase in maximum snow water equivalent in Western and Central Siberia, Sakhalin and eastern European Russia. Our past studies indicate significant changes in regional features of the snowpack. Changes of snowpack density were not assessed in these studies and in this presentation we

are infilling the gap. Apart from the description of long-term averages of snowpack density, the estimates of its change that are averaged over quasi-homogeneous climatic regions are derived, and regional differences in the change of snow characteristics are assessed. The snowpack density is analyzed from snow course survey long-term time series at 958 meteorological stations shown in the Figure. Regional analysis of snow cover data was carried out using quasi-homogeneous climatic regions. While maps (climatology, trends) are presented mostly for visualization purposes, major conclusions about snowpack density changes are based on area-averaged time series where some measure of statistical significance can be attached to the results.

INDEX TERMS: [0736] CRYOSPHERE / Snow, [1621] GLOBAL CHANGE / Cryospheric change, [1637] GLOBAL CHANGE / Regional climate change.

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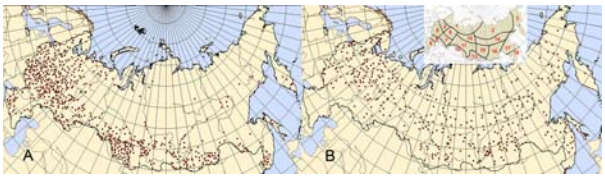

Locations of 958 meteorological stations with long-term snow survey information for the past five decades for surveys (A) in field (open terrain) (665 stations) and (B) forested (425 stations) environments. The inset map in (B) shows the quasi-homogeneous climatic regions used for regional averaging here and in our previous studies.

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Additional Details

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