



Understanding of changes in winter runoff across Eurasian pan-Arctic using new observational data.

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There are many evidences of increasing river runoff in Eurasian pan-Arctic. In some regions the winter river flow has increased over 50% when compared to multi-year means. Due to the extensive freeze of surface hydrology, river runoff during the winter is mostly defined by groundwater drainage. The possible causes of winter discharge increase include growth of precipitation in summer-fall and increase in active layer thickness and permafrost thaw. These causes, however, cannot explain consistent increase in discharge throughout the entire winter. We assume that the potential cause of increased winter river runoff is the reduction of barriers between subsurface water reservoirs and surface runoff due to improved drainage pathways as the result of increasing winter air temperature and decreasing river ice thickness.

To check this hypothesis we evaluated the long-term relationships over 1960-2012 between air temperature, river ice thickness and river discharge for 32 small and medium size rivers located in different regions of Eurasian pan-Arctic with various climatic conditions and land cover. Preliminary analysis has shown better relationships between river ice thickness and river discharge in regions with no underlying permafrost implying stronger influence of river ice on surface and ground water exchange in these areas.