

GC34A-07 Change in streamflow across Eurasian pan-Arctic, contemporary trajectories and possible causes

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River flow is an integrated characteristic reflecting numerous environmental processes and their changes aggregated over the watershed areas. River discharge plays a significant role in the fresh-water budget of the Arctic Ocean and ocean salinity and sea ice formation are critically affected by river input. Changes in the fresh water flux to the ocean can exert significant control over global ocean circulation via the North Atlantic deepwater formation with consequences for north hemisphere climate. Thus, it is important to understand ongoing changes in streamflow across Eurasian pan-Arctic, which contributes 75% of the total terrestrial runoff to the Arctic Ocean.

We analyzed variability of the annual and monthly river discharge across the Eurasian pan-Arctic drainage basin based observational records until 2012. To analyze the monthly trends in river discharge we cannot use river monitoring stations located along many large rivers due to impoundments and other human impacts within the drainage basins. An analysis of monthly discharge records longer than 50 years for rivers with no significant human impacts has been applied to identify seasonal variations and changes in the hydrological regime. The results showed significant changes in winter and summer-autumn runoff across many regions of Eurasian pan-Arctic. We hypothesize that the possible 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. Using new data for river ice and discharge for small and medium size rivers in Russian pan-Arctic we have checked this hypothesis using integrated analysis of data for streamflow, river ice thickness and air temperature. Preliminary results have shown significant correlation between these parameters in many basins confirming the hypothesis.

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