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Hydrological process change with air temperature over the Lena Basin in Siberia

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Abstract We use long-term monthly discharge and sub-basin air temperature data in the Lena River to examine the relationship between hydrological processes and permafrost change. The ratio of the maximum to minimum monthly discharge (Qmax/Qmin) decreased, while the recession coefficient in the cold season (Qapr/Qdec, discharge in April *vs* discharge in November) increased over the upper Lena and Aldan sub-basin during 1936 to 2000. The annual basin air temperature (AT) has increased from 1940 to 2000. There is a significant relationship between Qmax/Qmin, Qapr/Qdec and AT. The positive relationship between Qapr/Qdec and AT, and the negative relationship between Qmax/Qmin and AT became significant from a single year to 7-year running average. These results suggest that the Qmax/Qmin and Qapr/Qdec changes may be related to the basin warming and perhaps permafrost degradation.

Key words hydrology; permafrost; temperature; Siberia