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Redutions in global radiation cause large increases in river flows in northern regions

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The water flow in boreal and arctic rivers has increased over the past decades. We use long term time series of river flow, surface radiation and precipitation to investigate changes in evapotranspiration. Evapotranspiration was estimated using water balance calculation as well as recession analysis to attribute the changes in river runoff to changes in evapotranspiration and precipitation. We found that a decrease in evapotranspiration was responsible for about 1/3 of the increase in runoff. We used the Priestley Taylor equation, driven by a network of long term irradiance measurements to attribute the decrease in evapotranspiration largely to a decrease in incoming shortwave radiation. This decrease in shortwave radiation is caused by increases in the atmospheric aerosol depth due to air pollution.