Water balance response of permafrost-affected watersheds to changes in air temperature

presented by Vladimir A. Alexeev

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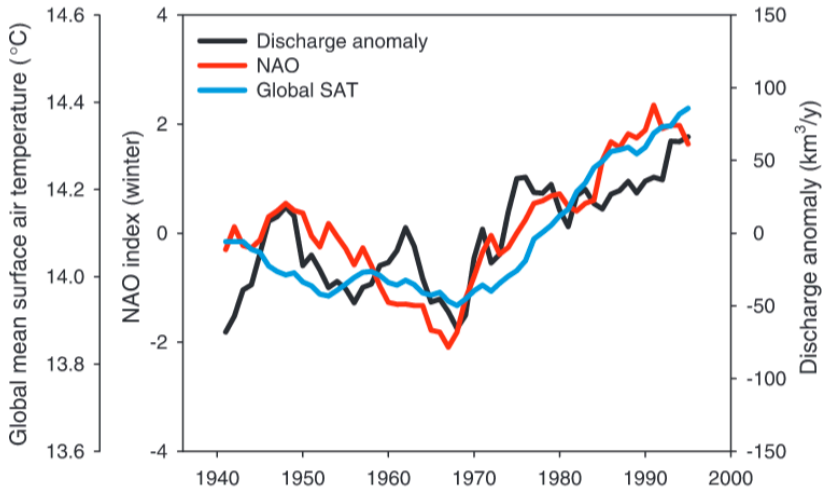
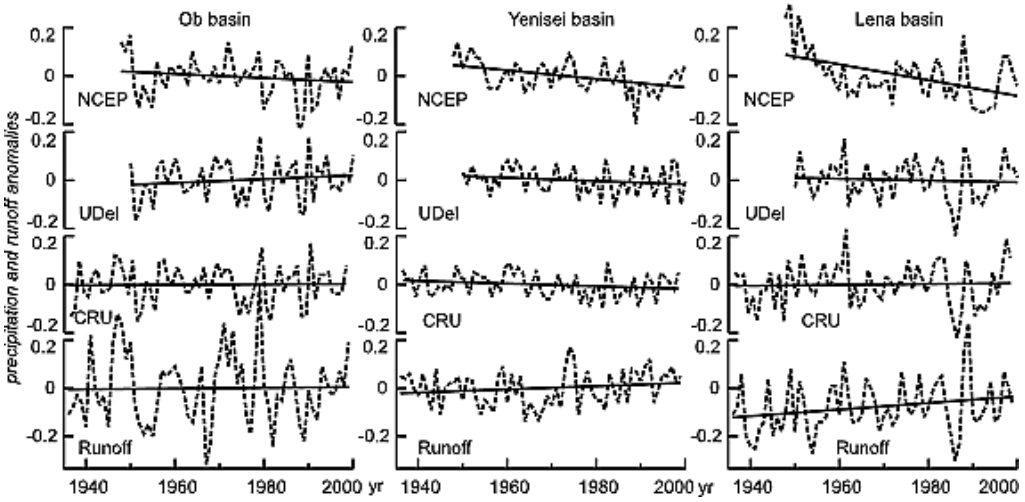


Increasing river discharge to the Arctic Ocean
Peterson et al, 2002



Compatibility analysis of precipitation and runoff trends over the large Siberian watersheds
Berezovskaya et al, 2004

Model application

Cold (current) climate:

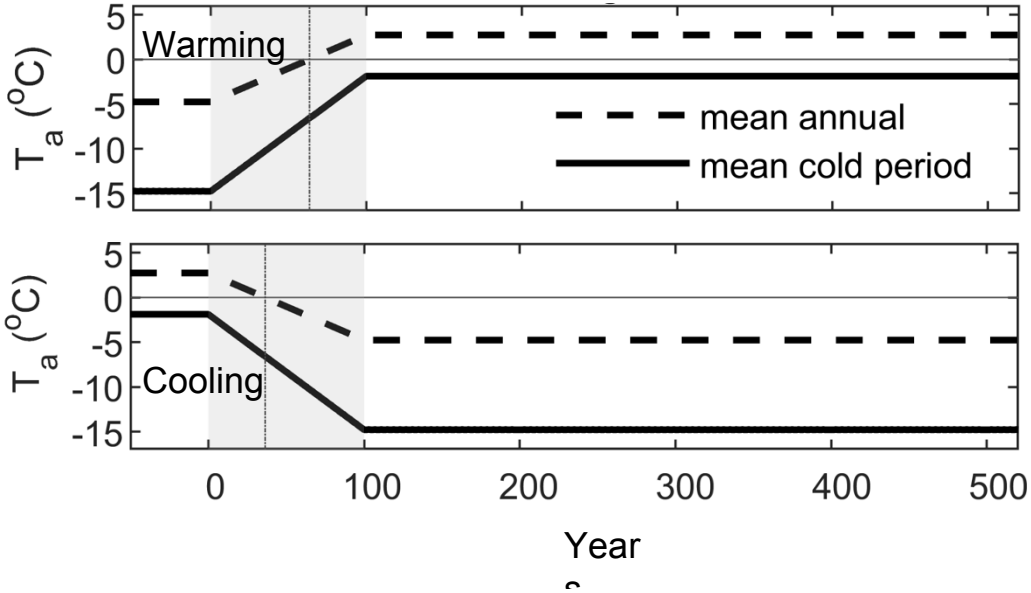
- -4.8°C mean annual air

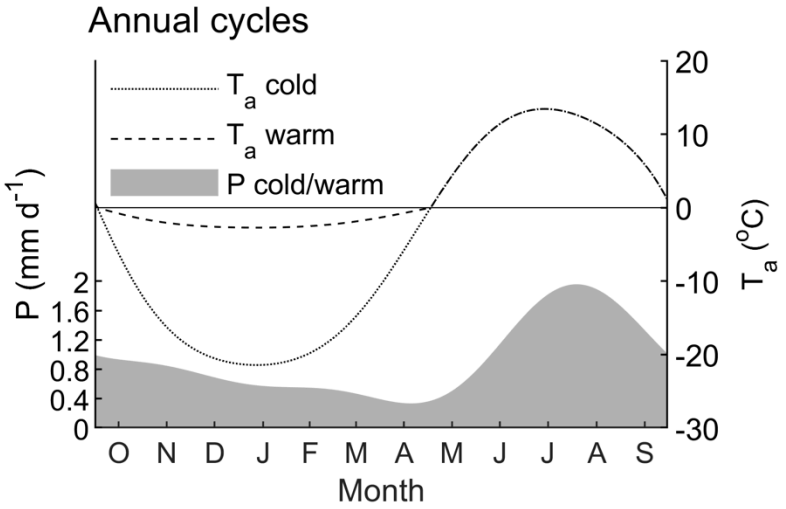
Warm climate:

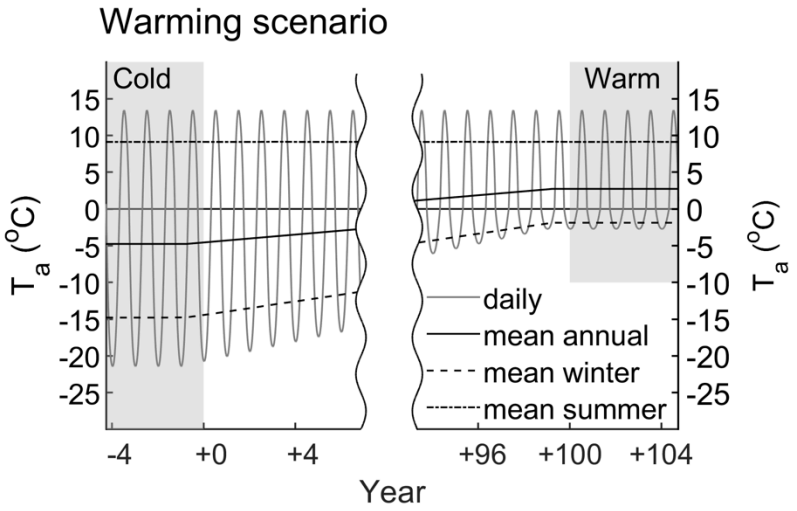
- 2.7°C mean annual air

340 mm annual precipitation (same in both experiments!)

K_s: high, medium, low







Results

Annual water balance

Warming:
Decrease in evapotranspiration: 5-11%
Increase in total runoff 5-11% provided by **baseflow** (interflow)

Cooling:
Reverse changes
Hysteresis

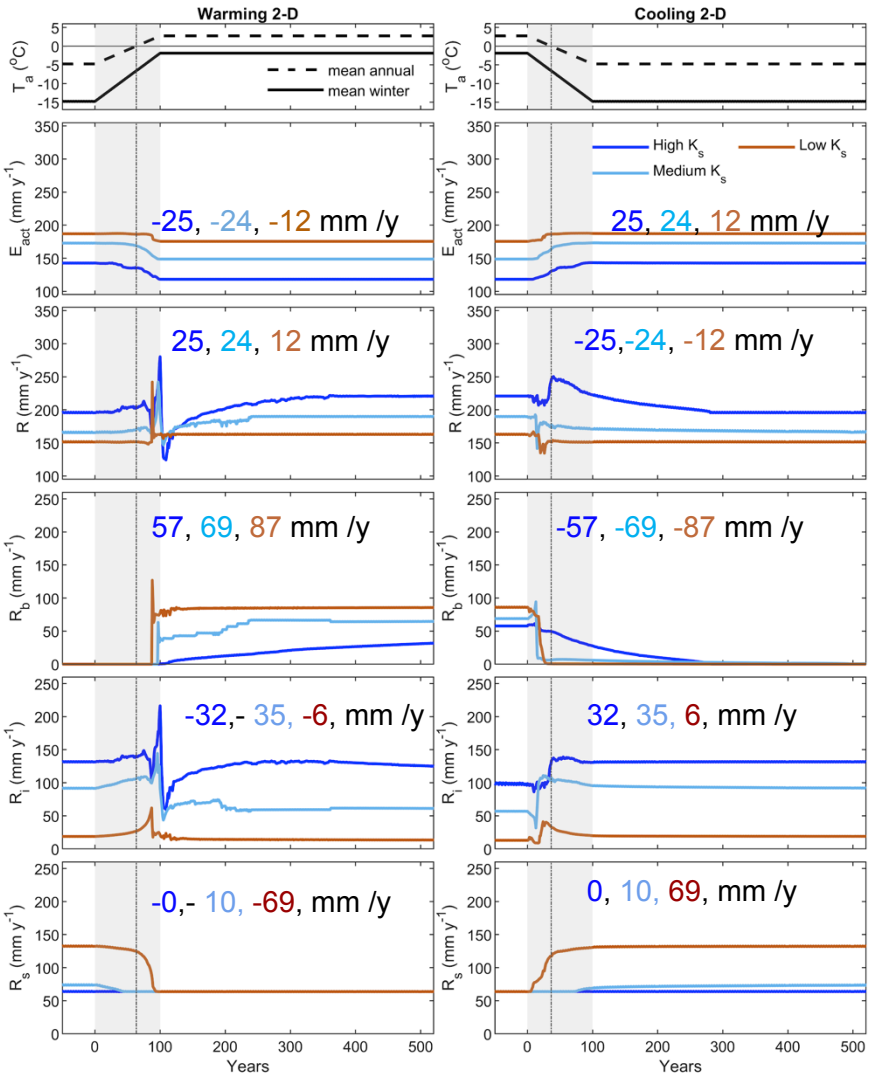
E $(evapotraspiration)$

R $(total\ runoff)$

R_b $(baseflow)$

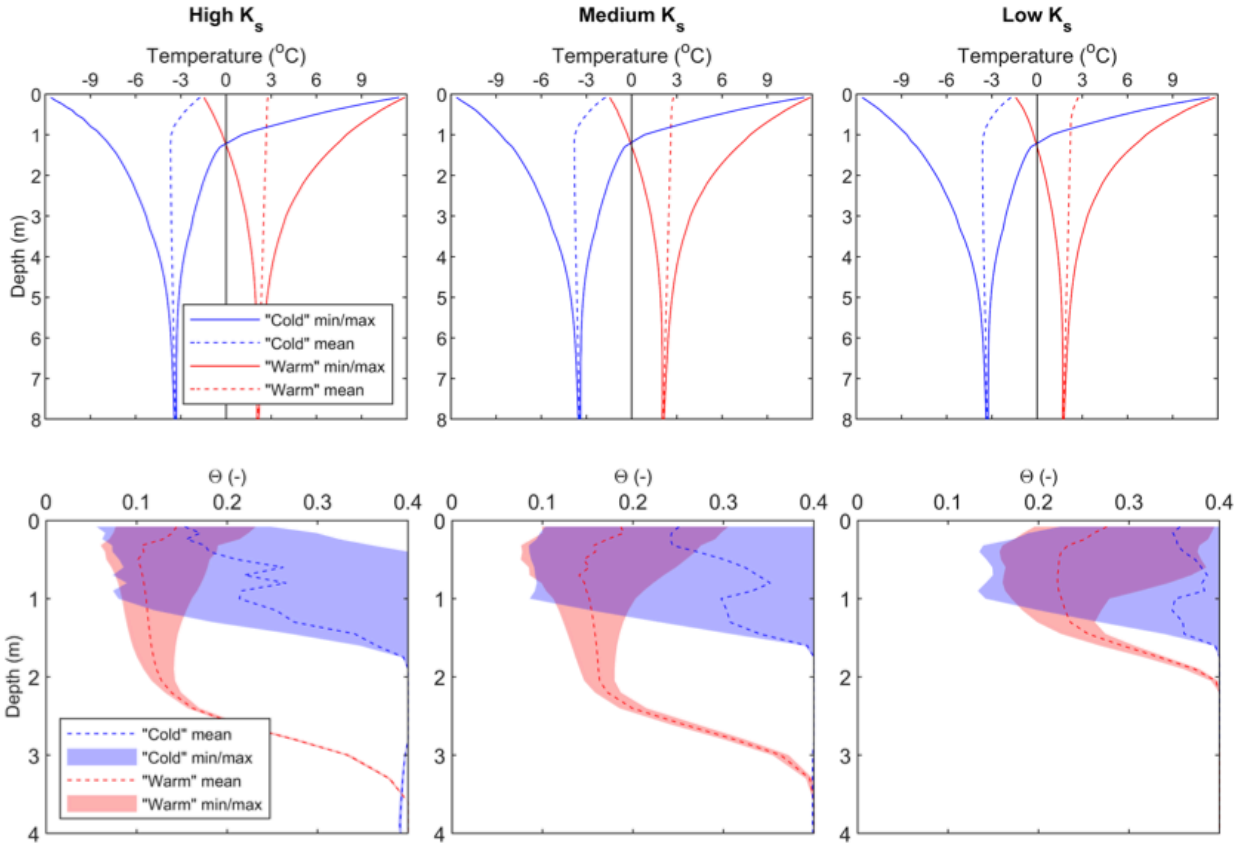
R_i $(interflow)$

R_s $(surface\ runoff)$



Results

Soil moisture and temperature



Conclusions

Impacts of long-term result of winter air temperature increase (**with the same amount of precipitation!!!**):

- Higher Runoff
- Lower Evapotranspiration
- 100-300 years timescale

- High sensitivity to hydraulic conductivity, topography

Acknowledgments
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