

# WARMER CLIMATE INDUCES DOUBLE TREE-RING GROWTH OF SIBERIAN PINE ON KHAMAR-DABAN

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## STUDY AREA

The Khamar-Daban mountain range stretches 350 km along the southwest of Lake Baikal. Its northern macroslope is covered with dark coniferous mixed forests, with a local Siberian pine (*Pinus sibirica*) dominance. Droughts and massive dieback of forests has been observed for the last several years in the region. Forests get exposed to pathogens to a large extent. However, there have been no cases of Siberian pine dieback at the lakeshore part of the mount range until now.



The site is located in coastal zone at the mouth of Pereemnaya river. We took 40 core samples from living trees of 1-3 health categories. All investigated trees have damage scars from the blows of a hammer, which is used in pine nuts production. Abundant resin flows on trunks and specific smell of fermentation indicated wet wood disease.



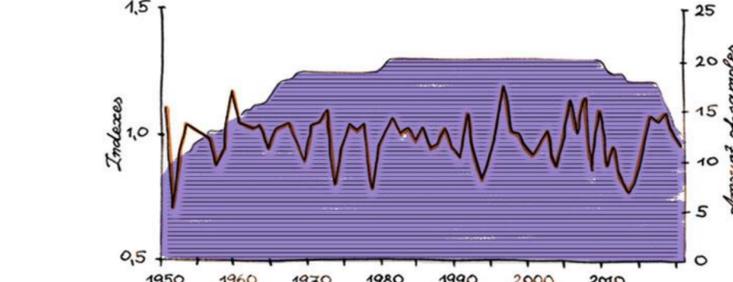
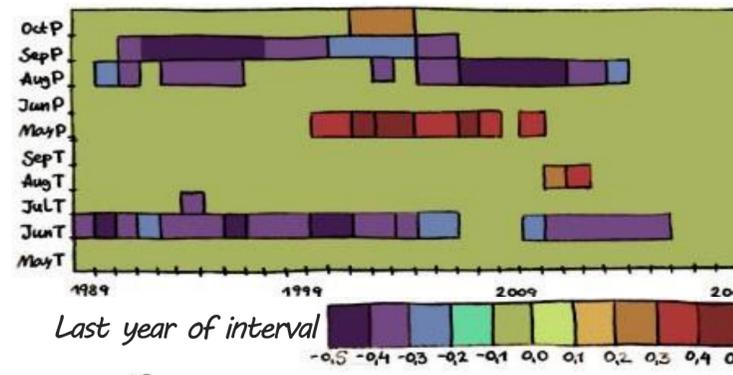
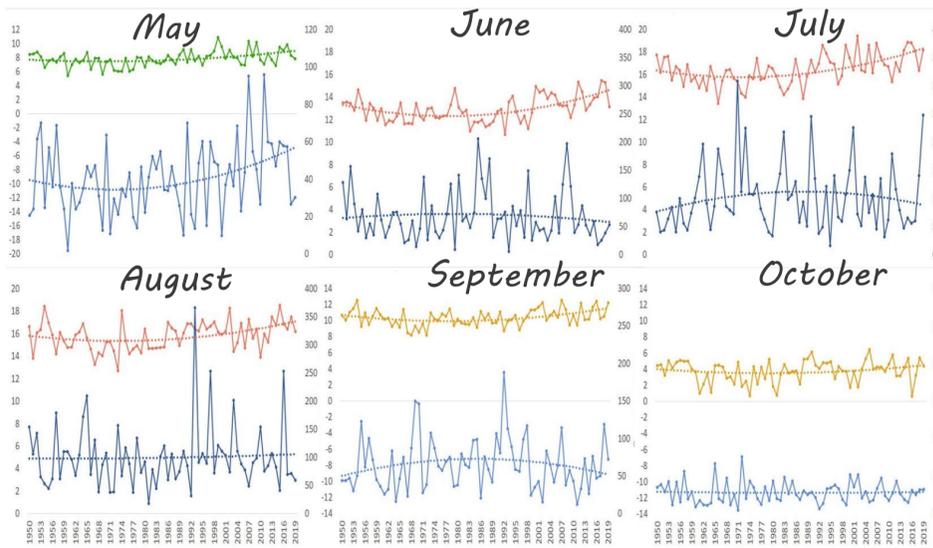
For climatic analysis we used data from Babushkin weather station.



The "hammer" scar

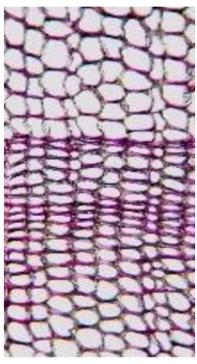
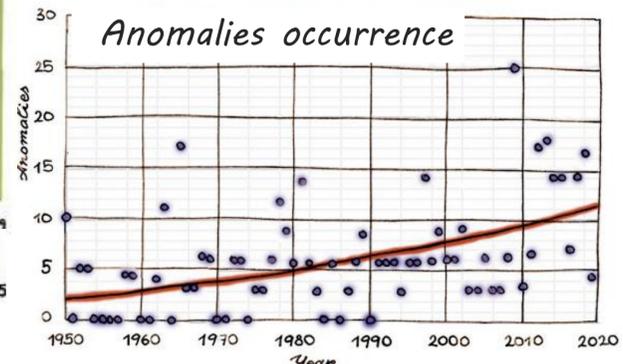
## FINDINGS

### Climatic analysis



### Tree-ring structure anomalies

Baikal Natural Reserve's chronicles provided records of increasing cases of unusual phenomena of plants and phytocenoses life such as secondary flowering and opening leaves in the fall. These data align with frequent "double ring" occurrence. The anomalies of density fluctuation present in all samples.



There is no one pronounced limiting factor in the area. Thus, May and October precipitations affect positively the pine growth, whereas, higher June temperatures impact is negative due to increasing transpiration and soil drying.

Changes in ring width correlated with May, late summer and autumn precipitation and summer temperatures. Investigating wood samples, we found anomalies of tree ring structure in the form of "double growth" and "false ring". Such anomalies are typical both for trees on experimental routes and for the Baikal reserve (control). We suppose these anomalies are indicators of increasing growing season length due to the warmer August-October period. The climatic tendency towards warmer and drier conditions will contribute to Siberian pine forests destruction.