

EGU22-6108

<https://doi.org/10.5194/egusphere-egu22-6108>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Simulating traits adaptation of trees in refugia

**Josias Gloy**, Stefan Kruse, and Ulrike Herzschuh

Alfred-Wegener-Institut, Geosciences | Polar Terrestrial Environmental Systems, Potsdam, Germany (josias@gloy.de)

Cryptic refugia enable tree species to survive outside their current range in an area occupied during a previous glacial/interglacial period. Once the climatic conditions are more favorable the populations can expand from these refugia. This can impact the resulting tree composition as it can enable species to dominate that are computationally weaker. The smaller population size of a cryptic refugium, the isolation and adaptation to unfavorable conditions can however also lead to the loss in genetic diversity and weaker populations.

One type current populations that might find its origin in those refugia are the larches of Eastern Siberia that are dominating vast areas. While it is known and apparent from observation that once established they present a currently stable ecosystem it is now known what factors lead to their establishment in contrast to Northern America and Europe where other conifers dominate the landscapes.

We are using an individual-based model that includes trait adaptation and will be modified to allow for inbreeding depression effects. This model will be used to simulate the refugia and the connections between them during the glacial to assess the fitness and genetic diversity that long isolation can cause. Furthermore we are going to perform breakout simulations to simulate the migration into the area in the interglacial period.

This results could give insights into the adaptations and genetic diversity in refugia and how these impact the colonization and ultimately shape the ecosystem. This knowledge could be used to make stronger predictions about future developments and the possibility of regeneration of the ecosystem should it be further changed by climate change.