

What is the natural rhythm of temperate and boreal forest disturbances in the absence of human management?

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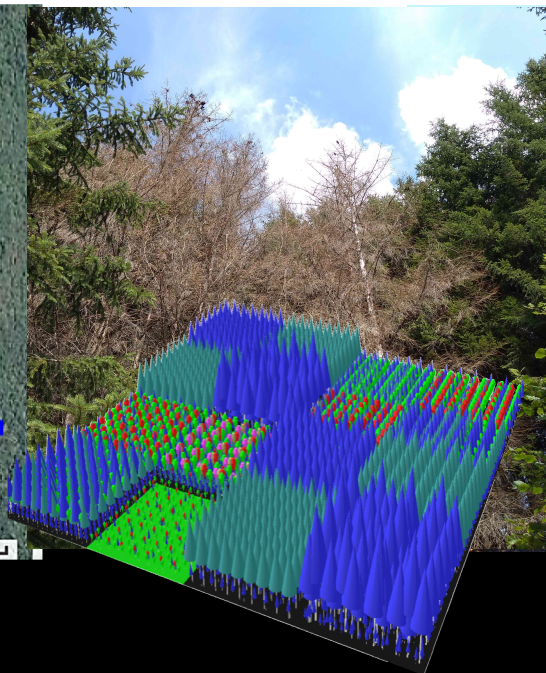
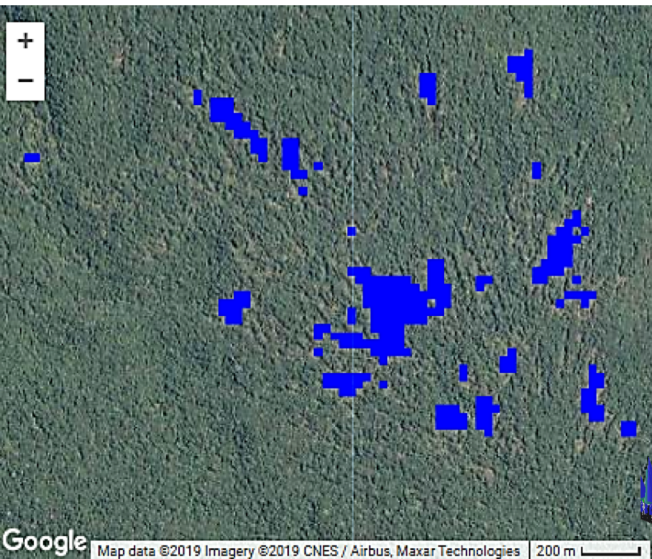
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ECOSYSTEM DYNAMICS AND
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Please note: Data presented is preliminary!

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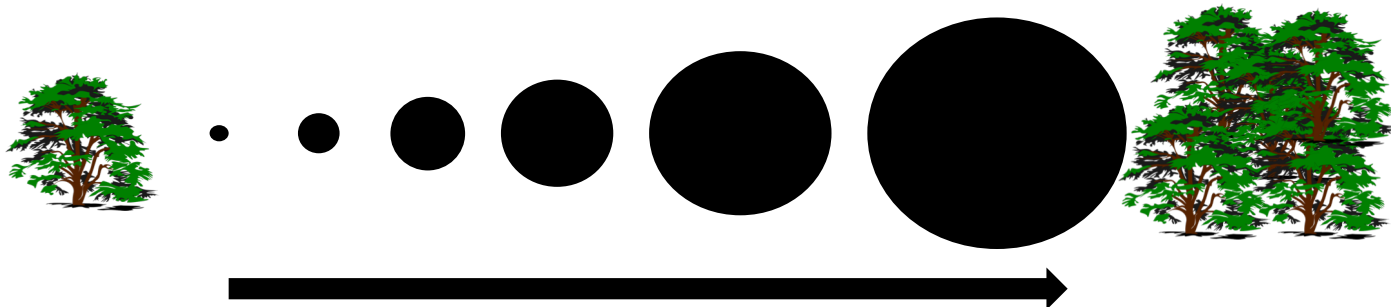
Types and scale of stand-replacing disturbances

Natural



Etc.

Anthropogenic



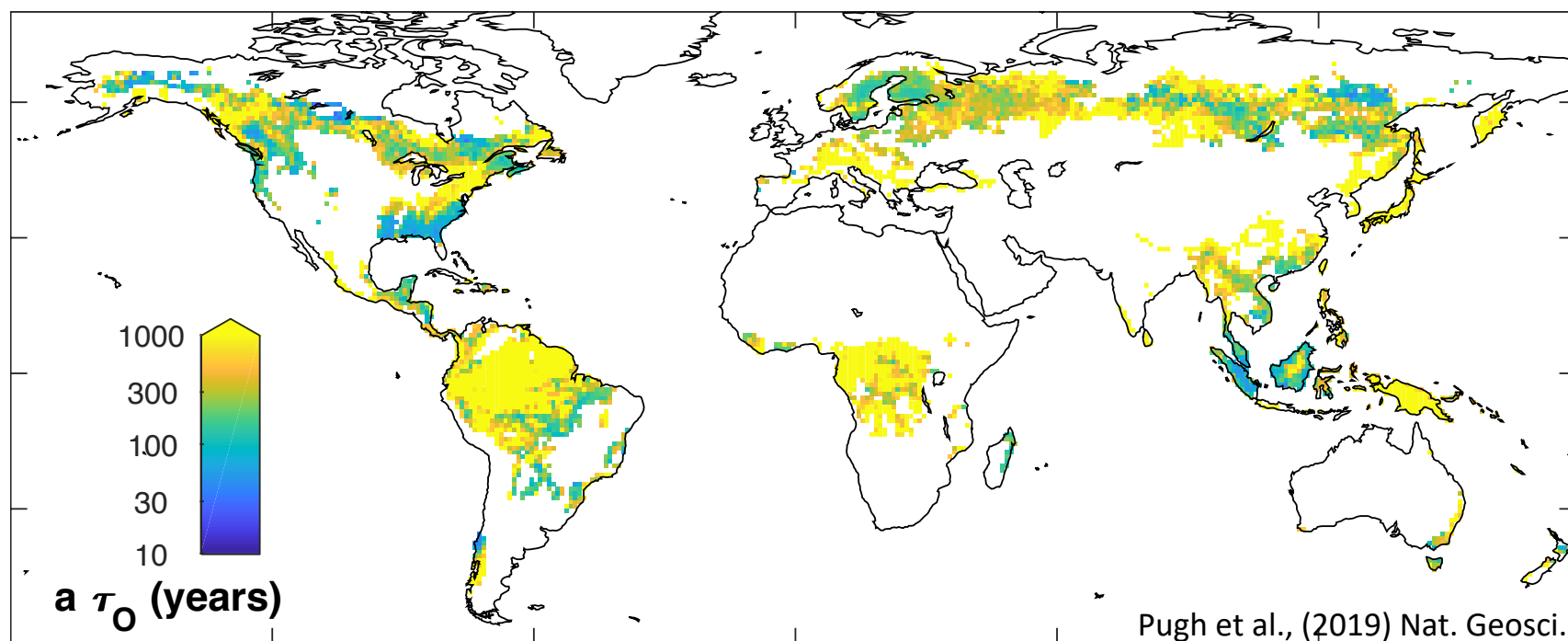
Scale → Stand scale (defined as ≥ 0.1 ha)

Stand-replacing disturbance return period (all disturbances)

Time between stand replacing disturbances (≥ 0.1 ha) approximated by mean forest loss divided by forest area (disturbance rotation period).

Based on Global Forest Change 2000-2014 forest loss data (Hansen et al., 2013, Science).

Integrates over all disturbances including harvest, but excludes land-use change.



**But what about natural disturbance rates alone
in absence of management?**

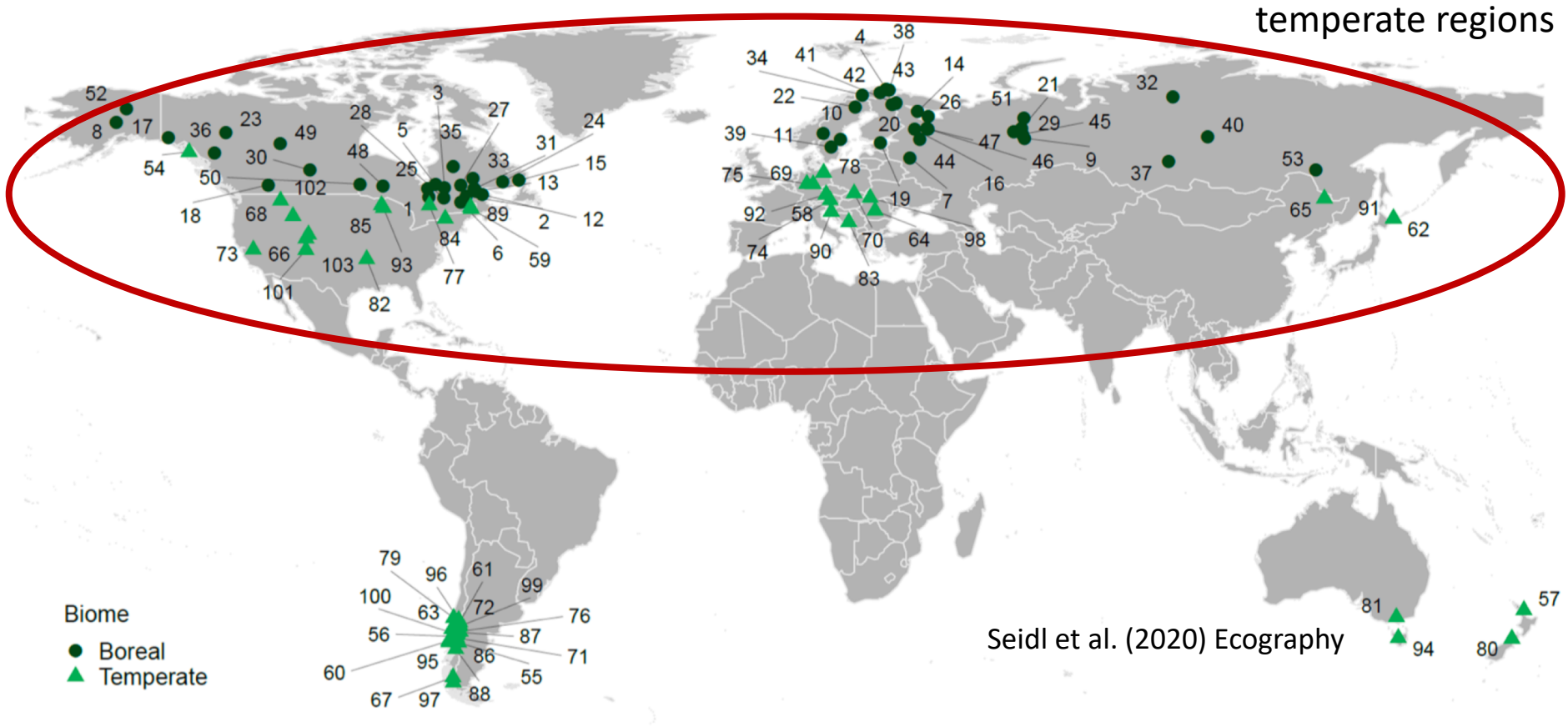
Natural disturbance reconstruction

1

100 protected areas (temperate and boreal)

→ Only natural disturbances

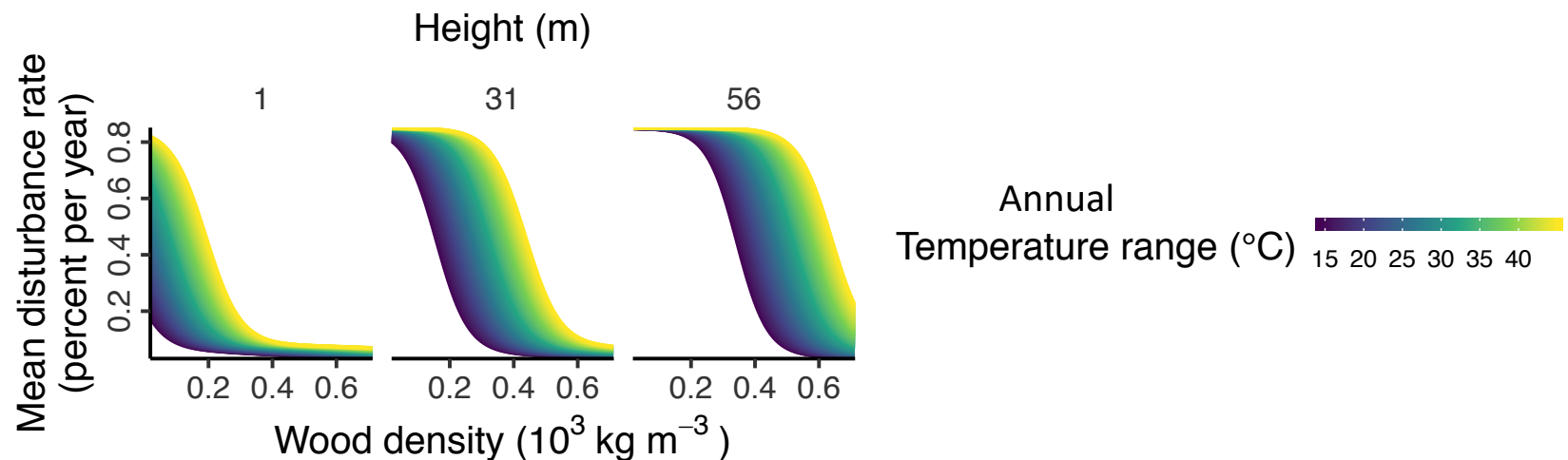
Focus on northern boreal and temperate regions



Look at disturbances in these landscapes as seen in Global Forest Change data 2000-2014

Natural disturbance reconstruction

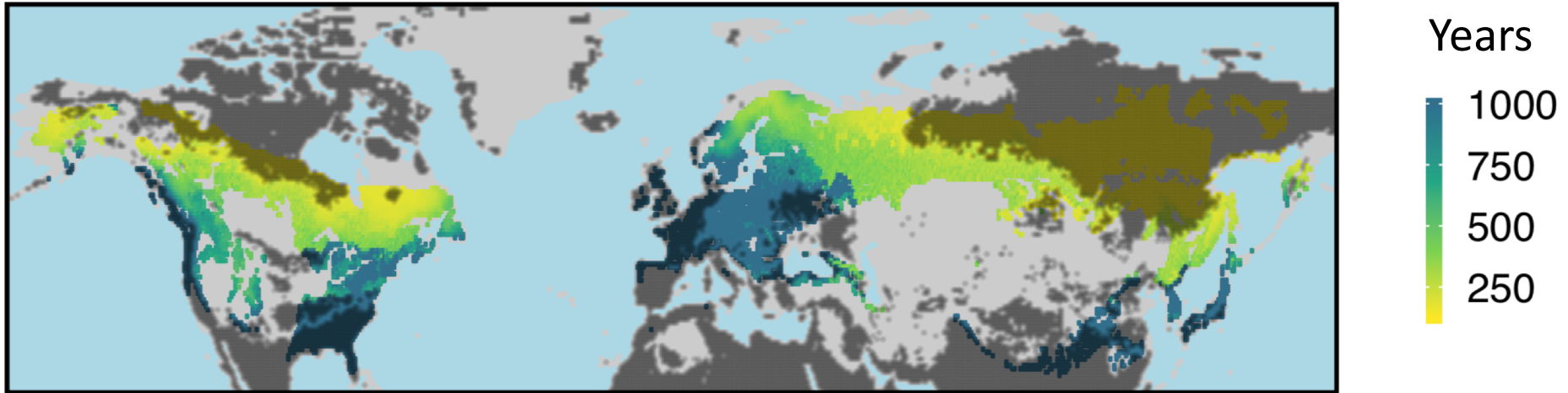
- 1 100 protected areas (temperate and boreal)
→ Only natural disturbances
- 2 Disturbances fall into **three clusters** based on patch size and shape (Sommerfeld et al., 2018, Nat. Comm.; Seidl et al., 2020, Ecography)
- 3 Cluster associated with **tree traits** (max. height, wood density) and **climate**
- 4 Likelihood of disturbance **varies with climate anomaly** by cluster



- 5 Implement empirical disturbance likelihood function in LPJ-GUESS dynamic vegetation model

Natural disturbance reconstruction

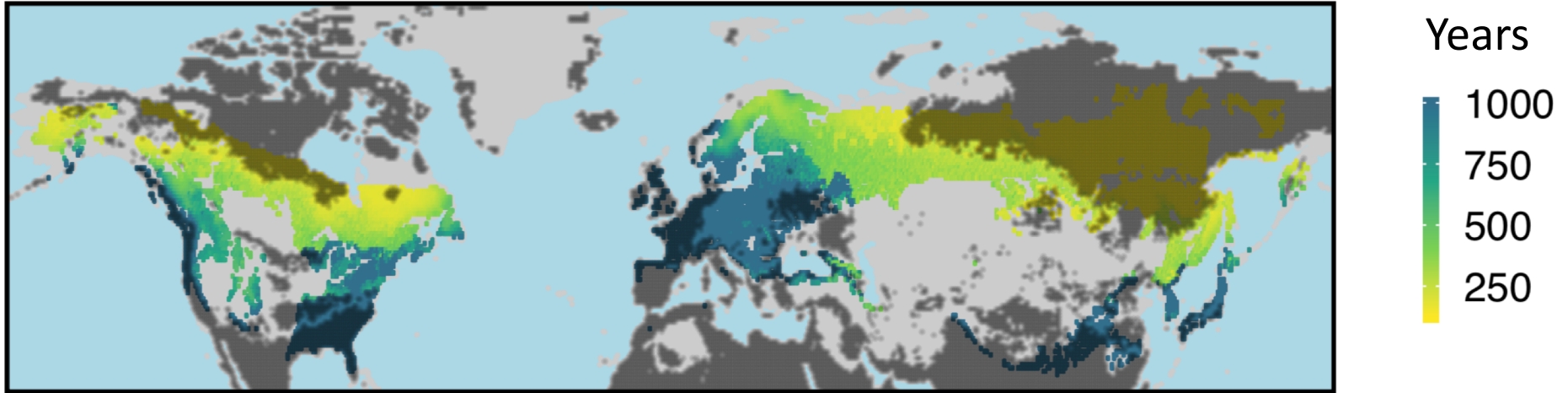
Disturbance return period estimates assuming potential natural vegetation with no management



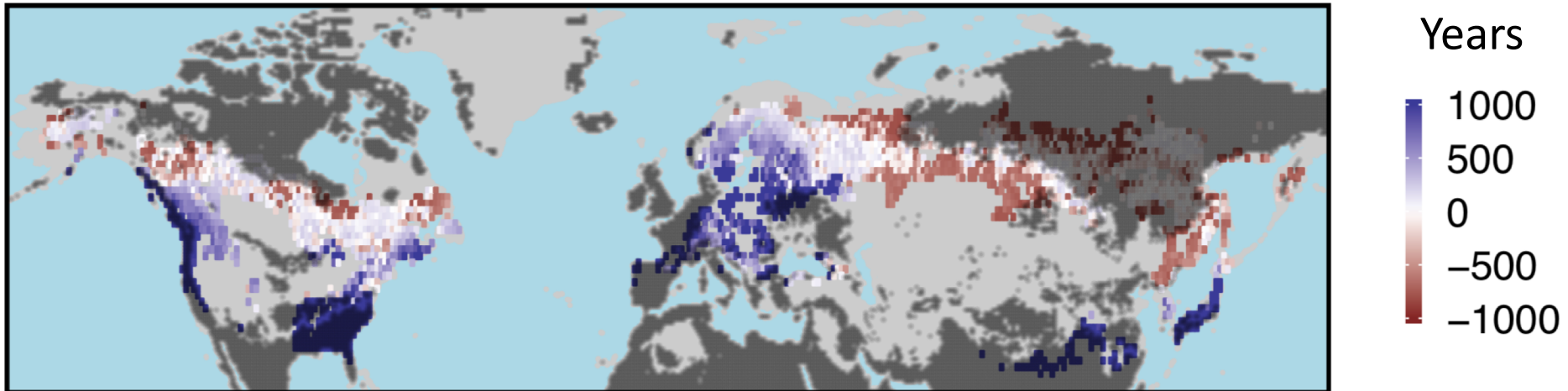
Simulated by LPJ-GUESS based on climate and community composition for the period 2000-2014. Grey shading indicates regions were outside the composition/climate envelope of the training data.

Natural disturbance reconstruction

Disturbance return period estimates assuming potential natural vegetation with no management



Difference between natural and observed return periods, 2000-2014



Thanks!



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Discussion via chat or email welcomed!

Please bear in mind that all unpublished results shown are preliminary

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