Uneven preservation of ancient DNA along lake sediment cores: A case study of high-latitude and high-elevation lakes

—— Preliminary results of Lake Bolshoe Toko

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Preservation of plant DNA from lake surface sediments is related to lake water pH and conductivity

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ORIGINAL ARTICLE

Environmental DNA
WILEY

Preservation of sedimentary plant DNA is related to lake water chemistry

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Abstract

Little is currently known about preservation of plant DNA in lake sediments. Most prior information originates from laboratory experiments while systematic field-based studies are still lacking. Here, we used the "*g*" and "*h*" universal primers for the P6 loop region of the chloroplast *trn*L (UAA) intron to amplify plant DNA from 219 lake surface sediments from China and Siberia. We introduce (i) the percentage of sequence counts with the best identity ≥95%, (ii) weighted average identity, (iii) weighted average DNA fragment length, and iv) rarefied richness of terrestrial seed plants of plant DNA metabarcoding as proxies for sedimentary DNA preservation and relate them to five environmental variables (lake water conductivity, lake

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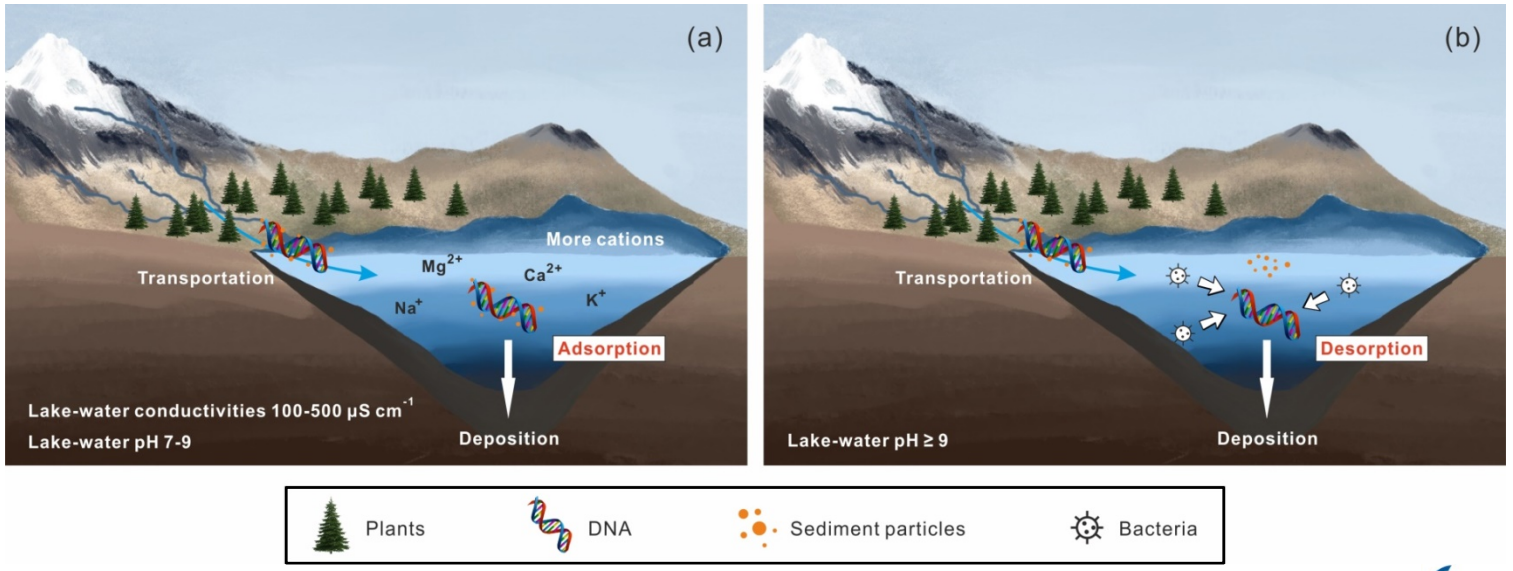
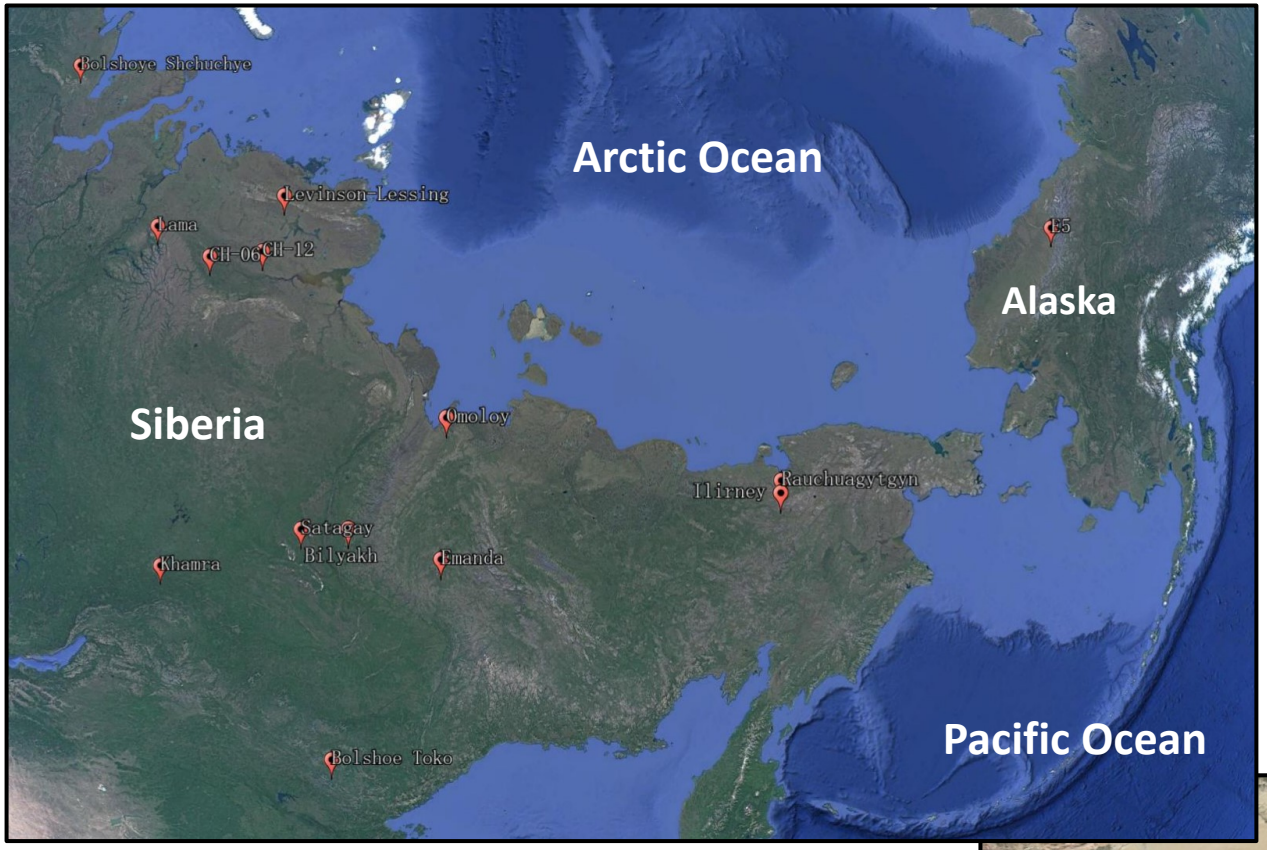
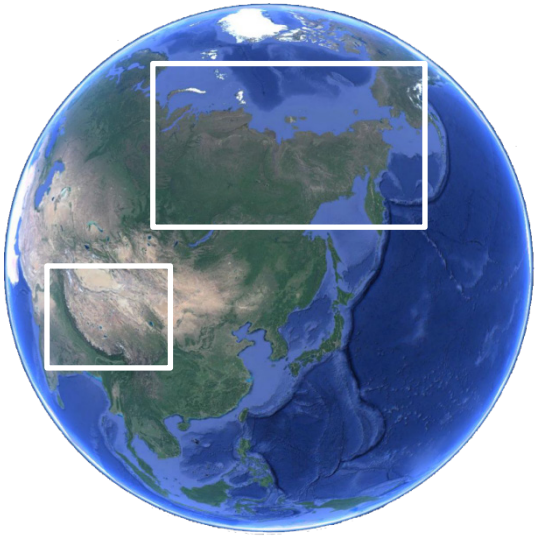






- A big dataset of Siberia and China.
- Metabarcoding data (the *trn*L P6 loop) are available for around 15 lakes.
- Metagenomic data are available for 4 lakes.

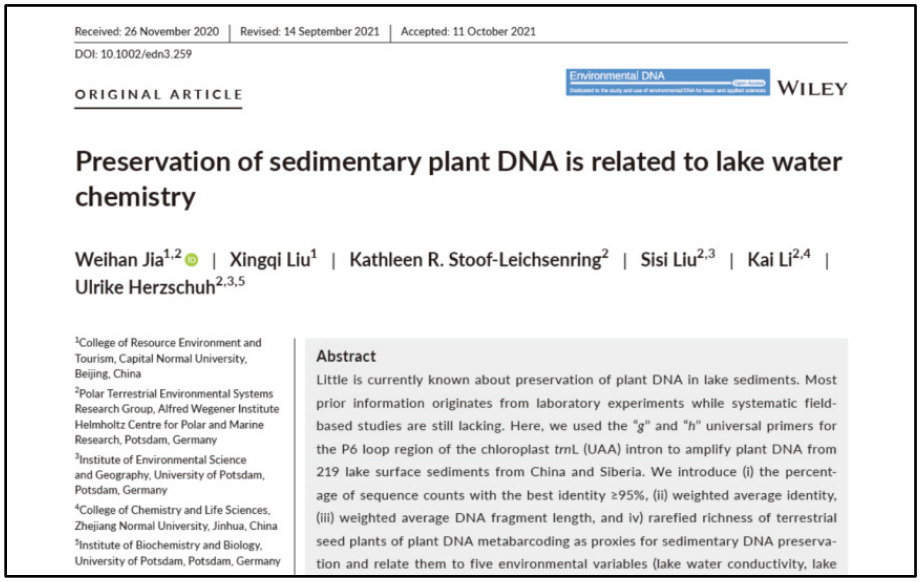
Potential proxies for DNA preservation

Metabarcoding:

1) The percentage of sequence counts with the best identity ≥95% (PCT)
2) Weighted average identity (WAI)
3) Weighted average fragment length (WAFL)
4) Rarefied richness of terrestrial seed plants
5) Dissimilarity between PCR replicates
6) Plant DNA content

Metagenomics:

1) Average fragment length
2) Duplication rate
3) GC content



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Preliminary results – Lake Bolshoe Toko

Depth 70-145 cm (10-16 ka):

- More glacial melting water (freshwater) input due to increased temperature (the B/A warm period).
- Lower water conductivity → Unfavorable for DNA adsorption (current water conductivity is 35.1 µS/cm)
- Glacial clayey materials (‘glacial flour’) are free of extracellular DNA (Giguet-Covex et al., 2019).

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Thank you very much for your attention!