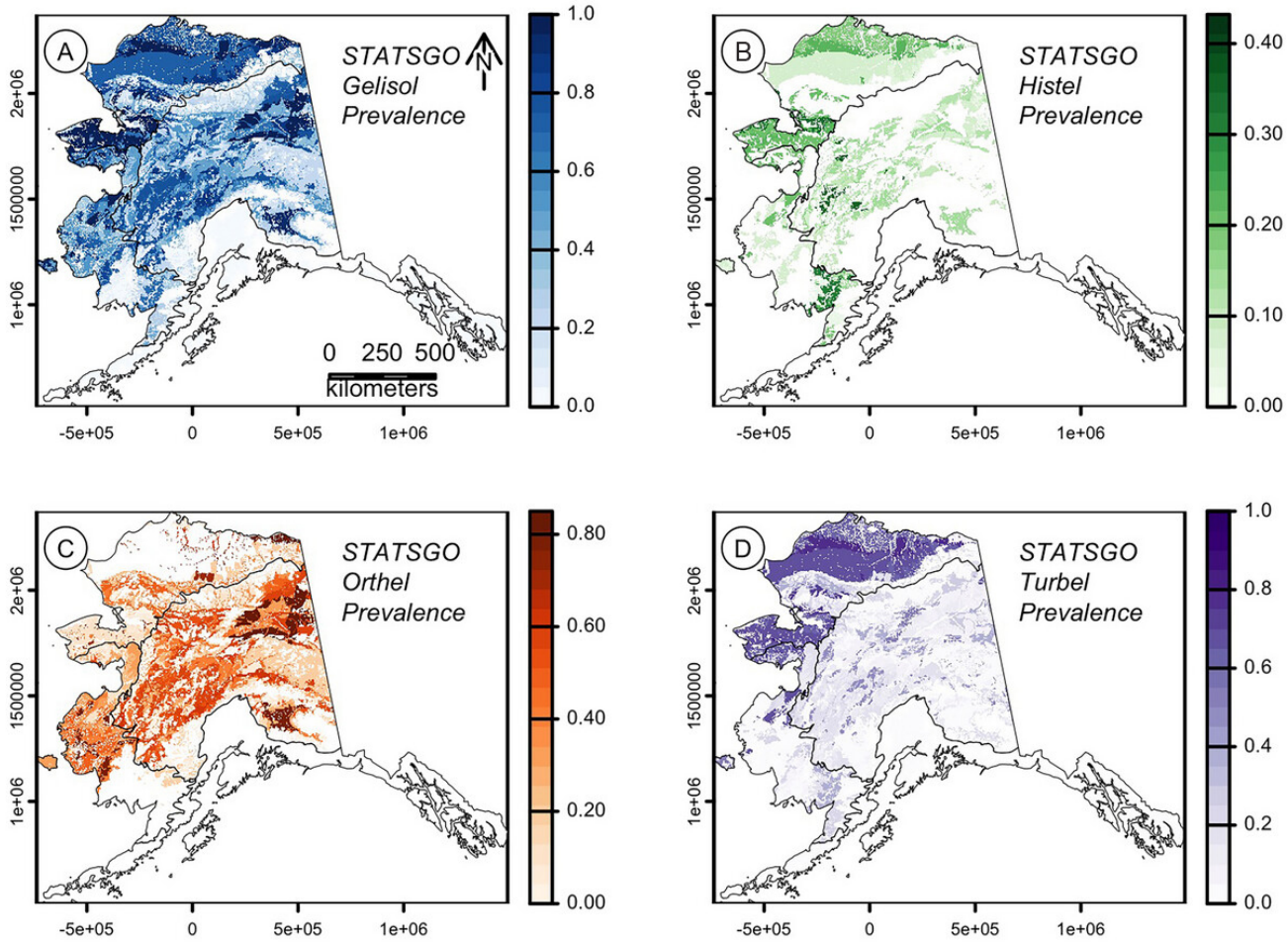
Science Societies

Climate change is reshaping Alaska's soil map

February 25, 2025



Prevalence of (A) Gelisols, (B) Histels, (C) Orthels, and (D) Turbels across the state of Alaska in the Alaska State Soil Geographic Dataset. Gelisols are permafrost-affected soils. Image from Jelinski et al. (2024).

Warming temperatures in Alaska are causing widespread changes to frozen ground with major implications for infrastructure, ecosystems, and land management. Current soil maps and classifications depend heavily on the presence of near-surface permafrost (within 1–2 m of the soil surface), but climate change may dramatically alter where these frozen soils occur.

In a recent study, scientists integrated multiple models of future near-surface permafrost conditions with existing soil maps to estimate how soil classifications might change across Alaska through the end of this century. They found that 15–53% of Alaska's permafrost-affected soils could change classification by mid-century, and 41–69% could change by 2100. The most dramatic changes are expected in central and western Alaska while northern Alaska's frozen soils appear more stable.

These findings suggest many Alaskan soils may need to be remapped and reclassified as the climate warms. The research provides crucial guidance for soil scientists about where and when to focus future mapping efforts and highlights the need to develop new approaches for classifying and managing these rapidly changing landscapes. The results also indicate that certain types of permafrost-affected soils should be considered threatened as they may largely disappear from parts of Alaska by century's end.

Dig deeper

View the original article:

Jelinski, N. A., Pastick, N. J., Kholodov, A. L., Sousa, M. J., & Galbraith, J. M. (2024). Estimates of soil taxonomic change due to near-surface permafrost loss in Alaska. *Soil Science Society of America Journal*, 88, 1626–1646. https://doi.org/10.1002/saj2.20729
