Rapid functional shifts in natural boreal forests over the last 65 years

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Abstract

Forest composition is critical for its functioning. While global environmental changes have modified forest composition, it remains unclear how temporal shifts in functional composition differ across regions and biomes. Using extensive spatial and long-term forest inventory data (17,107 plots monitored 1951–2016) across Canada, we found that functional composition shifted toward fast-growing deciduous broadleaved trees and higher drought tolerance over time; notably, this functional shift was more rapid in colder regions (boreal biome). Further, the functional composition of colder plots shifted toward drought tolerance more rapidly with rising CO2 than warmer plots (temperate biome), suggesting the vulnerability of boreal forests against global environmental changes. Future ecosystem management practices should consider spatial differences in functional responses to global environmental change, with attention to boreal forests experiencing higher rates of warming and compositional changes.

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