

TITLE **URGENT NEED FOR WARMING EXPERIMENTS IN TROPICAL FORESTS**

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ABSTRACT	<p>Although tropical forests account for only a fraction of the planet’s terrestrial surface, they exchange more carbon dioxide with the atmosphere than any other biome on Earth, and thus play a disproportionate role in the global climate. In the next 20 years, the tropics will experience unprecedented warming, yet there is exceedingly high uncertainty about their potential responses to this imminent climatic change. Here, we prioritize research approaches given both funding and logistical constraints in order to resolve major uncertainties about how tropical forests function and also to improve predictive capacity of earth system models. We investigate overall model uncertainty of tropical latitudes and explore the scientific benefits and inevitable trade-offs inherent in large-scale manipulative field experiments. With a Coupled Model Intercomparison Project Phase 5 analysis, we found that model variability in projected net ecosystem production was nearly 3 times greater in the tropics than for any other latitude. Through a review of the most current literature, we concluded that manipulative warming experiments are vital to accurately predict future tropical forest carbon balance, and we further recommend the establishment of a network of comparable studies spanning gradients of precipitation, edaphic qualities, plant types, and/or land use change. We provide arguments for long-term, single factor warming experiments that incorporate warming of the most biogeochemically active ecosystem components (i.e. leaves, roots, soil microbes). Hypothesis testing of underlying mechanisms should be a priority, along with improving model parameterization and constraints. No single tropical forest is representative of all tropical forests; therefore logistical feasibility should be the most important consideration for locating large-scale manipulative experiments. Above all, we advocate for multi-faceted research programs, and we offer arguments for what we consider the most powerful and urgent way forward in</p>



order to improve our understanding of tropical forest responses to climate change

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