TITLE	**TROPICAL FOREST CARBON BALANCE IN A WARMER WORLD: A CRITICAL REVIEW SPANNING MICROBIAL- TO ECOSYSTEM-SCALE PROCESSES**
PUBLICATION TYPE	Journal Article
YEAR	2012
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JOURNAL	Biological Reviews
VOLUME	87
PAGINATION	912-927
KEY WORDS	biogeochemical cycling, carbon flux, carbon stocks, climate change, ecosystem processes, global warming, temperature, temperature threshold, tipping point, tropical forest.
ABSTRACT	Tropical forests play a major role in regulating global carbon (C) fluxes and stocks, and even small changes to C cycling in this productive biome could dramatically affect atmospheric carbon dioxide (CO_2) concentrations. Temperature is expected to increase over all land surfaces in the future, yet we have a surprisingly poor understanding of how tropical forests will respond to this significant climatic change. Here we present a contemporary synthesis of the existing data and what they suggest about how tropical forests will respond to increasing temperatures. Our goals were to: (i) determine whether there is enough evidence to support the conclusion that increased temperature will affect tropical forest C balance; (ii) if there is sufficient evidence, determine what direction this effect will take; and, (iii) establish what steps should to be taken to resolve the uncertainties surrounding tropical forest responses to increasing temperatures. We approach these questions from a mass-balance perspective and therefore focus primarily on the effects of temperature on inputs and outputs of C, spanning microbial- to ecosystem-scale responses. We found that, while there is the strong potential for temperature to affect processes related to C cycling and storage in tropical forests, a notable lack of data combined with the physical, biological and chemical diversity of the forests themselves make it difficult to resolve this issue with certainty. We suggest a variety of experimental approaches that could help elucidate how tropical forests will respond to warming, including large-scale in situ manipulation experiments, longer term field experiments, the incorporation of a range of scales in the investigation of warming effects (both spatial and temporal), as well as the inclusion of a diversity of tropical forest sites. Finally, we highlight areas of tropical forest research where notably few data are available, including temperature effects on: nutrient cycling,

	heterotrophic versus autotrophic respiration, thermal acclimation versus substrate limitation of plant and microbial communities, below-ground C allocation, species composition (plant and microbial), and the hydraulic architecture of roots. Whether or not tropical forests will become a source or a sink of C in a warmer world remains highly uncertain. Given the importance of these ecosystems to the global C budget, resolving this uncertainty is a primary research priority.
LINK	https://doi.org/10.1111/j.1469-185X.2012.00232.x