TITLE	**ACCLIMATION AND ADAPTATION COMPONENTS OF THE TEMPERATURE DEPENDENCE OF PLANT PHOTOSYNTHESIS AT THE GLOBAL SCALE**
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ABSTRACT	The temperature response of photosynthesis is one of the key factors determining predicted responses to warming in global vegetation models (GVMs). The response may vary geographically, owing to genetic adaptation to climate, and temporally, as a result of acclimation to changes in ambient temperature. Our goal was to develop a robust quantitative global model representing acclimation and adaptation of photosynthetic temperature responses. We quantified and modelled key mechanisms responsible for photosynthetic temperature acclimation and adaptation using a global dataset of photosynthetic CO2 response curves, including data from 141 C3 species from tropical rainforest to Arctic tundra. We separated temperature acclimation and adaptation processes by considering seasonal and common-garden datasets, respectively. The observed global variation in the temperature optimum of photosynthesis was primarily explained by biochemical limitations to photosynthesis, rather than stomatal conductance or respiration. We found acclimation to growth temperature to be a stronger driver of this variation than adaptation to temperature at climate of origin. We developed a summary model to represent photosynthetic temperature responses and showed that it predicted the observed global variation in optimal temperatures with high accuracy. This novel algorithm should enable improved prediction of the function of global ecosystems in a warming climate.
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