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The role of inter- and intra-specific variability in controlling trait measurements in tropical forests

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Tropical rainforests harbour the greatest diversity of woody plant species in the world. Consequently, within any individual forest plot, replicating functional trait measurements, particularly at species level can be challenging. However, trait variation within and between species can be very large. Limited sampling opportunities in diverse forests poses a huge challenge to understanding the role both inter- and intra-specific variation play when we scale up individual trait measurements to plot or landscape averages. Using data from tropical forests within Latin America and South East Asia, we explore the potential role which inter- and intra-specific variation may play when attempting to compare functional trait values in tropical forests experiencing different environmental conditions. We demonstrate the need for renewed care considering how we construct sampling protocols within these forests for functional trait sampling. This includes considering the size and canopy position of the trees we sample across plots, alongside the number of individual within a species, and the number of species, we sample to generate results concerning how variation in environmental conditions influences plant functional traits. Considering such issues also offers considerable opportunities to advance our knowledge of the processes of acclimation and trait plasticity and how they may influence responses to environmental change. In-turn opening new prospects to better inform vegetation models, particularly individual-based models and therefore to investigate the impact of these properties at larger scales.