Above ground response of rainforest functional groups to experimental drought

Angelika Kübert¹, Kathrin Kühnhammer², Ines Bamberger¹, Erik Daber¹, Jason De Leeuw³, Kinzey Bailey³, Jia Hu³, S. Nemiah Ladd¹, Laura Meredith³, Joost van Haren³, Matthias Beyer², Maren Dubbert¹, and Christiane Werner¹

¹University of Freiburg, Ecosystem Physiology, Freiburg, Germany (angelika.kuebert@cep.uni-freiburg.de)
²Institute for Geoecology, Technische Universität Braunschweig, Langer Kamp 19c, 38106 Braunschweig, Germany
³School of Natural Resources and the Environment, University of Arizona, Tucson, United States of America

Functional group-specific water use strategies are vital in understanding plant performance under current and future global climate change related drought scenarios. Different functional groups have different strategies to regulate their above ground water use and loss in order to respond to drought stress. Here, we studied the ecohydrological response of a controlled rain forest system to a 10-week lasting experimental drought (Biosphere 2 Water, Atmosphere, and Life Dynamics, B2 WALD project). Using gas exchange chambers, we specifically investigated the response of the two main rain forest functional groups - three canopy tree species and two understory species - in their above ground water use efficiency. Rates and isotopic fluxes of transpiration, assimilation and night respiration were monitored in high temporal resolution. In combination with plant physiological information (i.e., leaf water potential) a complete picture of their above ground water use could be gained. We expect that the deep rooting canopy tree species will be able to keep their above ground water use constant while the shallow rooting understory species will have to adapt their water use efficiency to budget their water reserves and resources.