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Epiphytic cryptogams as a source of bioaerosols and trace gases

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Cryptogamic covers comprise (cyano-)bacteria, algae, lichens, bryophytes, fungi, and archaea in varying proportions. These organisms do not form flowers, but reproduce by spores or cell cleavage with these reproductive units being dispersed via the atmosphere. As so-called poikilohydric organisms they are unable to regulate their water content, and their physiological activity pattern mainly follows the external water conditions. We hypothesize, that both spore dispersal and the release of trace gases are governed by the moisture patterns of these organisms and thus they could have a greater impact on the atmosphere than previously thought.

In order to test this hypothesis, we initiated experiments at the study site Amazonian Tall Tower Observatory (ATTO) in September 2014. We installed microclimate sensors in epiphytic cryptogams at four different heights of a tree to monitor the activity patterns of these organisms. Self-developed moisture probes are used to analyze the water status of the organisms accompanied by light and temperature sensors. The continuously logged data are linked to ongoing measurements of trace gases and particulate bioaerosols to analyze these for the relevance of cryptogams. Here, we are particularly interested in diurnal cycles of coarse mode particles and the atmospheric abundance of fine potassium-rich particles from a currently unknown biogenic source. Based upon the results of this field study we also investigate the bioaerosol and trace gas release patterns of cryptogamic covers under controlled conditions. With this combined approach of field and laboratory experiments we aim to disclose the role of cryptogamic covers in bioaerosol and trace gas release patterns in the Amazonian rainforest.