

3.123 VERTICAL TRANSPORT OF PRIMARY BIOLOGICAL AEROSOLS EMITTED FROM THE AMAZON RAINFOREST.

Early Career Scientist

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Abstract:

Primary biological aerosol particles (PBAP) are essential as a nutrient source and for dispersal of reproductive material. Pollen and fungal spores are potential giant cloud condensation nuclei over tropical rainforests. Thus, they likely influence local and regional scale precipitation processes. We analyzed the vertical distribution of coarse particles above a rainforest using tower-based measurements at the Amazon Tall Tower Observatory (ATTO) in Brazil. Sampling campaigns were conducted during both the wet and dry seasons from 2015 to 2017. A Recording Volumetric Spore Sampler (Burkard) was used to collect particles on the tower at 24, 40, 60, 80 and 300 m heights. Samples were imaged with optical microscopy, and time series of bioaerosol abundance were obtained based on morphological classification, quantification and identification, at least on family level. Pollen grains, fungal spores, fern spores and canopy debris, such as leaf and insect fragments, as well as plant waxes and glands, decreased in abundance from below canopy to 300m height. Precipitation, relative humidity, and wind speed had a strong influence on the vertical distribution of those PBAP. Large pollen grains, such as *Podocarpus*, were absent high above the canopy except during thunderstorm events. Pollen grains above the canopy often appeared ruptured, e.g., bamboo. The low rainfall across the 2015 dry season, recorded during an El Niño event, correlated with an increased number of suspended PBAP, due to an increased emission and/or decreased rain-related scavenging. For 60 and 80m, there were significant ($P < 0.01$) differences between day and night concentrations of pollen and fungi. The abundance of bioaerosols high above the Amazon rainforest was much lower than expected given the canopy emissions. Outside of storm events, coarse primary aerosols, especially pollen, might

generally undergo less atmospheric entrainment and have less influence on atmospheric processes than previously assumed.