

Long Term Scattering and Absorption Properties of Aerosols in Amazonia Using AERONET Measurements

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Abstract: Agriculture expansion, climate change and its intrinsic variability are critical ingredients on Amazonian deforestation and interactions between land use change and climate change are major drivers for these changes. Aerosol optical properties are an important and direct way to understand and quantify these effects, since it accounts properties such as absorption, scattering and refraction index. AERONET uses data from photometers that can measure the aerosol optical depth and, associated with a set of algorithms, can give information of physical properties of aerosols almost in real time. For the last 18 years, those properties have been measured at several AERONET sites using CIMEL sun photometers in Amazon. Measurements were done in Central Amazon (Manaus EMBRAPA and ATTO tower), as well as in Rio Branco, Cuiabá, Ji Paraná, and Alta Floresta and results have shown important geographical and seasonal variability in terms of aerosol impacts. It is possible to observed five main aerosol components: natural biogenic primary aerosol particles, biogenic secondary organic aerosols, biomass burning, long-range transport from Africa and eventual urban component. In addition, the Ångström matrix calculated with absorption and scattering Ångström exponent, helps in separating these different components, which allows observing a clear separation between dry and wet season aerosols in terms of components with dominance of biogenic aerosols in the wet season and biomass burning in the dry season with strong contribution of OC and EC, and what is interesting is that no dust episode was observed using this technique. Therefore, it was possible to observe Brown Carbon (BrC) in addition to Black carbon (BC) and it accounts for a significant 15% of aerosol absorption.

Keywords: AERONET; Amazon; Aerosol Optical Depth.

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