Seasonal analysis of Brown Carbon, Black Carbon and Dust at Central Amazonia with Ångström Matrices

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Abstract: Aerosol optical properties are an important and direct way to understand and quantify the seasonal effects of the Amazonian aerosol by means of the intensive optical properties: absorption and scattering Ångström exponent. AERONET photometers measure the aerosol optical properties and associated with a set of algorithms, obtain information of the aerosol physical characteristics such as the aerosol optical depth (AOD) and the absorption aerosol optical depth (AAOD) almost in real time. For the last 22 years, those properties have been measured at several AERONET sites using CIMEL sun photometers in Amazon. Measurements were done in Central Amazonia (Manaus and ATTO tower), as well as in the deforestation arc: Rio Branco, Cuiabá, Ji-Paraná, and Alta Floresta, and results have shown important geographical and seasonal variability in terms of aerosol impacts. We can access the seasonal Brown Carbon, Black Carbon, and Dust calculating the Ångström matrix with absorption and scattering Ångström exponent. We observe a clear separation between dry and wet season, and in the later, also a period in which Dust comes from Saara (mostly between January to April). Therefore, it was possible to observe Brown Carbon (BrC) in addition to Black Carbon (BC), which is responsible for 12% of the AAOD of aerosols at 440nm in the deforestation arc in sites that are about 1000 km apart and show consistency very good. As for pristine sites, such as the ATTO site, the contribution of BrC is 25% in relation to the AAOD at 440nm where we have very little human interference.

Keywords: AERONET; Amazonia; Angstrom Matrix.

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