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Numerical modelling of the biomass-burning aerosol direct radiative effects on the thermodynamic structure of the atmosphere and convective precipitation

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The atmospheric transport of biomass burning emissions in South America and the direct radiative effects of the aerosol particles of the regional haze are addressed in this work. This study is carried out through a numerical simulation of the atmospheric motions using the Coupled Aerosol Tracer Transport to the Brazilian Regional Atmospheric Modeling System – CATT-BRAMS. A radiative code that includes the aerosol particle absorption and scattering is fully coupled to the CATT-BRAMS allowing atmospheric model feedback studies. The atmospheric model responds to the presence in the atmosphere of this highly absorber aerosol particles, from the direct radiative point of view, cooling the atmosphere in the lower levels and heating it in the upper levels of the boundary layer. Temperature gradients associated with the presence of the biomass-burning aerosol can reach 2 Celcius degrees over very polluted areas. Consequently, the atmospheric model responds with a reduction of the kinetic turbulent energy, stabilizing the atmosphere and suppressing the convective precipitation.

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