

Relationship Between Cloud-to-Ground Lightning and Aerosol Properties on the State of Sao Paulo

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ABSTRACT: This work evaluates the relationship between spatial-temporal properties of Cloud-to-Ground (CG) lightning and aerosol during the summertime over the state of Sao Paulo for a period of the 7 years (2004 to 2010). Cloud-to-Ground (CG) lightning data (CG lightning occurrence, polarity and peak current) was provided by the Brazilian lightning detection network (BrasilDAT) while Aerosol Optical Deep (AOD) and Effective Radius (ER) at 550 nm were provided by Moderate Resolution Imaging Spectroradiometer (MODIS) sensor aboard of the TERRA satellite. The mainly sources of air pollution in Sao Paulo State are associate with the industrial processes, intense automotive flux and burned for crop of sugar cane. Thus, the influences of aerosol effect (urban and burn) on invigorate of the thunderclouds and CG lightning properties were characterized. The results showed strong relation between microphysical and radiative effects and AOD variability. For lower AOD values, the thunderclouds presented high lightning activity, suggesting predominance of the microphysical effect. In the other hand, for highest AOD values, the high aerosol concentration tends to reduce the convection intensity. Consequently, was observed weaker CG lightning occurrence. The RE had a strong variability for the AOD and CG lightning intensity. For highest values of RE, was observed the greatest occurrence of +CG lightning. This results suggests that highest (lowers) values of AOD can be associated the thunderclouds in dissipation (convective) phase with large (small) stratiform area, which leading the exposition of the positive charge center and turn strong +CG lighting.

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