Comparison of Aerosol Absorption Optical Depth from Remote-sensing and *In Situ* Measurements

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The aerosol absorption optical depth (AAOD) product derived from AERONET sun/sky radiometer measurements has been widely used to evaluate model predictions of black carbon (BC) and its radiative forcing. Most recently, the Bounding BC assessment (Bond et al., 2013) used the AERONET AAOD retrievals to justify adjusting modelled BC column burdens upwards by a globally-averaged factor of 2.6, leading to the conclusion that BC is the #2 most important climate-warming agent (behind CO_2), with an average forcing of +1.1 W m-2 (90% uncertainty bounds +0.17 to 2.1 W m-2). However, the verification of the AERONET AAOD retrievals relies primarily on short-term aircraft studies done under conditions of very high aerosol loadings (biomass burning, dust), and the retrievals have not been evaluated under the low optical depth conditions that prevail over most of the globe. In this paper, we report comparisons of AERONET AAOD with *in situ* measurements of aerosol light absorption coefficient obtained over sites in Oklahoma (SGP) and Illinois (BND) in the US. The comparisons, illustrated in the figure for SGP, show that the *in situ* measurements do not support the up-scaling of modelled BC column burdens.

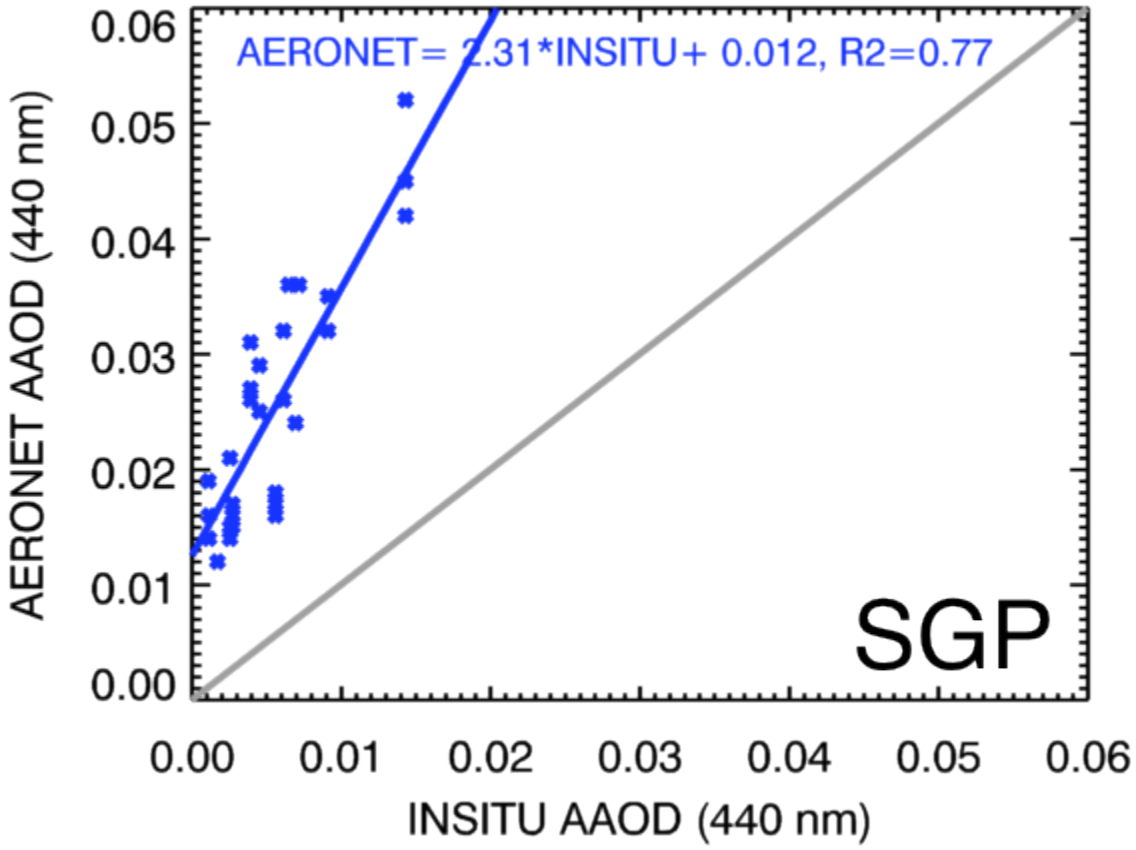

Figure 1. Comparison of aerosol absorption optical depth at Southern Great Plains, Oklahoma, USA.