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Satellite-based assessment of aerosol loading and transport over West Africa

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Since West Africa lies adjacent to both the Sahara desert, which is the largest dust source in the world, and southern Africa, which is one of the largest sources of biomass burning emissions (aerosols and trace gases) in the world, a considerable amount of aerosols from these source regions enter West Africa. In addition, a substantial amount of pollution, smoke, and dust are generated locally in West Africa from industrial, transportation, agricultural, and biomass-burning activities. A multi-year (2000-2004) time series of regional average aerosol optical thickness (AOT) from the Terra and Aqua Moderate-resolution Imaging Spectroradiometer (MODIS) sensor for various regions of the world revealed that, with a peak monthly mean AOT value of ˜0.7 at 550 nm wavelength, West Africa ranks at the top in regional aerosol loading, with India and China as close seconds. To quantify the impact of such an overwhelming aerosol loading on the West African Monsoon (WAM), it is important to distinguish the different aerosol types (dust, smoke, pollution) and their seasonality and degrees of occurrence, and evaluate their relative influences on radiation, clouds and precipitation. Indeed, we are currently quantifying biomass burning and deriving the rates of smoke aerosol emission in West Africa based on MODIS measurements of aerosols and fires. These results will enable distinction between the smoke locally generated from biomass burning in West Africa and other aerosols from local and long distance sources. This study will be valuable in supporting the upcoming AMMA measurements.