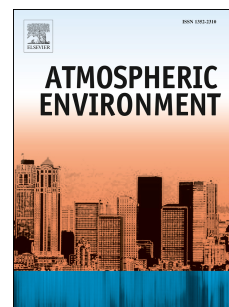


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Didier Ntwali, Hongbin Chen



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Diurnal spatial distributions of aerosol optical and cloud micro-macrophysics properties in Africa based on MODIS observations.

Didier Ntwali^{a, b, c}, Hongbin Chen^{a, *}

^a Key Laboratory of Middle Atmosphere and Global Environment Observation (LAGEO), Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China

^b School of Earth Sciences, University of Chinese Academy of Sciences (UCAS) ¹

^c Rwanda Meteorology Agency (Meteo Rwanda), P.O. Box 898, Kigali, Rwanda

ABSTRACT

The diurnal spatial distribution of both natural and anthropogenic aerosols, as well as liquid and ice cloud micro-macrophysics have been evaluated over Africa using Terra and Aqua MODIS collection 6 products. The variability of aerosol optical depth (AOD), Ångström exponent (AE), liquid and ice cloud microphysics (Liquid cloud effective radius LCER, Ice cloud effective radius ICER) and cloud macrophysics (Liquid cloud optical thickness LCOT, Liquid cloud water path LCWP, Ice cloud optical thickness ICOT, Ice cloud water path ICWP) parameters were investigated from the morning to afternoon over Africa from 2010 to 2014. In both the morning (Terra) and afternoon (Aqua) heavy pollution ($AOD \geq 0.6$) occurs in the coastal and central areas (between 12°N - 17°N and 10°E - 15°E) of West of Africa (WA), Central of Africa (CA) (0.5°S - 7°S and 10°E - 25°E). Moderate pollution ($0.3 < AOD < 0.6$) often occurs in West and North of Africa (between 5°N - 27°N and 16°W - 5°E), and clean environmental ($AOD < 0.3$) conditions are common in South of Africa (SA), East of Africa (EA) and some regions in North of Africa (NA). The West-North of Africa (WNA) and Central-South of Africa (CSA) regions are dominated by dust ($AE < 0.7$) and biomass burning ($AE > 1.2$) aerosols. The mixture of dust and biomass burning aerosols ($0.7 < AE < 1.2$) are found at the coastal areas in West of Africa (CoWA) and Central of Africa (CA) (5°N - 8°N and 10°E - 34°E), particularly in the morning and afternoon respectively. The LCER often decrease from the morning to the afternoon in all seasons, but an increase occur from the morning to the afternoon in CSA (5°S - 22°S) in DJF, both CA (2°S - 5°N) and CoWA in JJA and SON. The ICER increase from the morning to afternoon in all seasons over Africa and decreases in South of Africa (5°S - 20°S) in DJF. The LCOT increases from the morning to afternoon in NA and SA while a decrease occur in CA in all seasons. The LCWP increase in many regions of Africa in all seasons while a decrease occurs in CoWA during JJA. The ICOT and ICWP show a remarkable increase from the morning to afternoon in regions dominated by biomass burning (CSA) compared to regions dominated by dust (WNA) aerosols in DJF, MAM and SON. Dust aerosols are mainly distributed in WNA by northerly and westerly winds in

Corresponding author:

E-mail address: chb@mail.iap.ac.cn (H. Chen)

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