# ABSTRACT
# SIMULATION OF THE AEROSOL FEEDBACK EFFECT TO METRO MANILA AIRSHED CLIMATE USING WRF/CHEM

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This study presents the climatic effects of aerosols in the Metro Manila airshed in from 2009-2011 using the Weather Research and Forecasting coupled with Chemistry model. The performance of how the two microphysics schemes (Lin et. al and Morrison 2-moment) simulate different meteorological parameters are also presented. Model simulations were conducted over the Metro Manila airshed on December 2011 to February 2012 (DJF) and June to August 2012 (JJA) at 4 km resolution. Model outputs were validated using seven synoptic stations of the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) which are located in the simulation domain. Inconsistencies in temperature is attributed to incorrect representation of landuse/land cover and unresolved topography of the domain. In addition, the two microphysics schemes under-predicted the amount of precipitation during DJF and over-predicted rainfall during JJA. The model generally simulated sea level pressures well for all stations but lacks the ability to capture abrupt pressure tendencies. Wind speeds were over predicted but performed better during DJF. In general, the Morrison 2-moment scheme performed better than the Lin et al. Scheme. Using the Morrison 2-moment microphysics scheme, climatic effects of aerosols in Metro Manila airshed was quantified focusing on rainfall and temperature. Metro Manila is of Type 1 climate according to the modified Coronas climate classification. For this research, months of December to February is denoted as the cool-dry season while the months covering March to May is denoted as warm-dry season. In addition, the months covering June to November is denoted as wet season. Results showed that the direct effect of aerosols decrease the incoming shortwave radiation by 4.6 Wm-2 (0.83%) and 1.42 (0.20%) Wm-2 for cool-dry and warm-dry seasons, respectively, while an increase of 5.36 Wm-2 (0.85%.) was observed for wet season. On the other hand results for the indirect effect of aerosols showed that there is a decrease in the incoming solar radiation for all seasons. The decrease is quantified to be 19.97 Wm-2 (4.53%), 24.25 Wm-2 (4.02%), and 36.61 Wm-2 (6.92%) for cool-dry, warm-dry and wet season respectively. These changes in the incoming solar radiation affected the temperature and precipitation in the domain. On a daily average basis, precipitation increased by 0.75 mm/day on cool-dry months and 0.34 mm/day on wet season while a decrease of 0.45 mm/day was observed for the warm-dry months. On the other hand, cloud mixing ratio exhibited a decrease in all of the season – 9.06 μg/Kg, 3.51 μg/Kg, and 51.8 μg/Kg for cool-dry, warm-dry, and wet season. Possible reason for the decrease in cloud mixing ratio but an increase in precipitation is due to longer cloud lifetime which inhibit the incoming solar radiation to reach the ground and the outgoing long-wave radiation to escape.