Analysis of Aerosol Optical Depth and Angstrom Exponent Number over Singapore 2007 - 2014

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ABSTRACT: Aerosols family type, size distribution and regional and global coverage are one of the least understood parameters affecting our current understanding of Earth radiation budged. Aerosol particles, depending on its composition and size, can be strongly scattering or strongly absorbing particles which interacting directly with the incoming solar radiation. Other indirect effects can include acting as cloud condensation nuclei or cloud seeds, hence influencing cloud lifetimes and rain cycles. South-East Asia is one of the fastest growing economic regions. As a consequence, emissions of anthropogenic aerosols, such as from industrial pollution and biomass mass burning, have increased. Singapore, being located at the crossroads of known biomass burning emission sources, is annual greatly affected by those phenomena. To understand and study such emission sources, the Centre for Remote Imaging Sensing and Processing (CRISP) in Singapore has deployed a permanent automatic Sun-tracking Photometer which is part of the Aerosol Robotic Network, AERONET[1]. With this direct sun measurements are conducted daily and all data products are screened and validated by AERONET. The principal products obtained are the aerosol optical depth (AOD), the derived Angstrom Exponent (AE) as well as fine mode and coarse mode part of the aerosol size distribution. Previous local and regional studies focused on the investigation of haze/smoke events particularly between the months of August and October due to trans-boundary smoke transport, mainly caused by forest and agriculture burning in Sumatra and Borneo (Indonesia). In this study, we try to answer the question of whether there is an inter-annual pattern and whether there is a noticeable trend within the AOD and AE data sets over the last 7 years. AERONET level 1.0 data sets are further processed and exclusively used for this work. For tracing back and identifying potential aerosol sources the HYSPLIT[2] model is used.

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1 http://aeronet.gsfc.nasa.gov

2 https://ready.arl.noaa.gov/HYSPLIT_traj.php