**Title :** Investigating Chemical Component Relationships in Submicron Aerosol Composition Using Time-of-Flight Aerosol Chemical Speciation Monitoring (ToF-ACSM).

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# ABSTRACT

This study investigates the chemical composition of fine particulate matter in Chiang Mai, Thailand, utilizing data obtained from a Time-of-Flight Aerosol Chemical Speciation Monitor (TOF-ACSM) operated by the National Astronomical Research Institute. The analysis focuses on five major non-refractory aerosol components: chloride (Chl), ammonium ($NH_4$), nitrate ($NO_3$), organic compounds (Org), and sulfate ($SO_4$). Prior to statistical analysis, the dataset underwent rigorous quality control procedures to identify and address anomalous values. Outlier detection was performed using the Rolling Sigma-Clipping method, which systematically removes data points that deviate significantly from local statistical norms. Following outlier elimination, the relationships among the chemical constituents were examined using Spearman's rank correlation coefficient, a non-parametric measure appropriate for assessing associations between variables. Statistical significance was evaluated at a significance level of 0.05. The results revealed significant positive correlations among all five chemical species, with the strongest association observed between nitrate and organic compounds. These findings suggest common sources or formation pathways for these aerosol constituents and provide insights into the complex chemical dynamics governing air quality in Chiang Mai.

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