

Estimation of Ozone Production in Southern Taiwan Based on Observed Photo-Stationary State and Model Simulation

CHEIN-JUNG SHIU¹, SHAW CHEN LIU², JEN-PING CHEN¹, PO-HSIUNG LIN¹, CHIH-CHUNG CHANG², and HER-ZIN LIN²

¹*Institute of Atmospheric Sciences, National Taiwan University, Taipei, Taiwan*

²*Research Center for Environmental Changes, Academia Sinica, Taipei, Taiwan*

In this study, observed photo-stationary state (PSS) relationship of NO and NO₂ and a one-dimensional (1d) photochemical model are applied to estimate the spatial and temporal patterns of the rate of ozone production (P(O₃)) in southern Taiwan. In specific, intensive field measurements of PSS at EPA Chaochou monitoring station in southern Taiwan during January 20 to 26, 2005 are compared with the PSS calculated by the 1d model. The photolysis rate coefficients required by the PSS and 1d model calculation are calculated in the Tropospheric Ultraviolet Visible radiation model using observed aerosol optical depth and ozone column density. In-situ measurements of VOCs and trace gases are also used in the models. Preliminary results suggest that P(O₃) deduced values from PSS are generally a factor of 2 to 10 greater than those simulated in the model. Furthermore, the large P(O₃) values are not consistent with the moderate concentrations of O₃ observed. A possible explanation is that a significant amount of PAN is produced that interferes with the NO₂ converter of the NOx instrument.

²Keywords: Ozone, photo-stationary state, photochemistry, aerosols and air pollution