

Model Evaluation of NO₂ horizontal distribution with MAX-DOAS ground measurement during Chiba-Campaign 2015

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In this study, the horizontal distribution of nitrogen dioxide (NO₂) simulated by the chemical transport model (CTM) has been extensively evaluated with Multi-Axis Differential Optical Absorption Spectroscopy (MAX-DOAS). Although the ground-based observation network (i.e., AEROS system) in Japan can provide the hourly NO₂ concentration, its horizontal coverage is sparse, especially over rural or remote sites. The space-based satellite measurement can provide the spatial distribution of air pollutants; however, measured values are vertically integrated concentrations. To overcome these disadvantages in existing observations, we used MAX-DOAS measurement to evaluate the model performance. The scattered sunlight observations in the UV/visible at several elevation angles between the horizon and zenith, so-called MAX-DOAS technique, can retrieve both trace gases and aerosol profiles. Total of four MAX-DOAS measurement systems located at Chiba University (35.63°N, 140.10°E, 21 m a.s.l.) are allocated to cover north, east, west, and south, and provide the horizontal distributions for the lower troposphere. By targeting the period of Chiba-Campaign 2015 conducted from 9 to 23 November 2015, here we present the detailed model evaluations on NO₂ spatial and vertical distribution, and temporal variation.

Keywords: Chemical Transport Model, MAX-DOAS, NO₂