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PC9) CB4를 이용하여 부산 지역의 오존 전구 물질의 배출량에 대한 오존 농도의 민감도

Sensitivity of Ozone Concentrations to Ozone Precursor Emissions In Busan Metropolitan Area Using the Carbon Bond Mechanism IV

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1. Introduction

Photochemical ozone is formed from nitrogen oxides (NO_x) and volatile organic compounds (VOCs) through non-linear interactions between chemical reactions and meteorology, and the relationship between precursors and photochemical ozone will be changed to match the emission distribution and meteorological fields.

It is generally known that for some conditions the process of ozone formation is controlled almost entirely by NO_x and is largely independent of VOC, while for other conditions ozone production increases with increasing VOC and does not increase (or sometimes even decreases) with increasing NO_x

In this study, we study the sensitivity of ozone concentrations to emissions and meteorological fields in Busan Metropolitan Area using a three-dimensional air quality simulation model.

2. Methods and Simulations

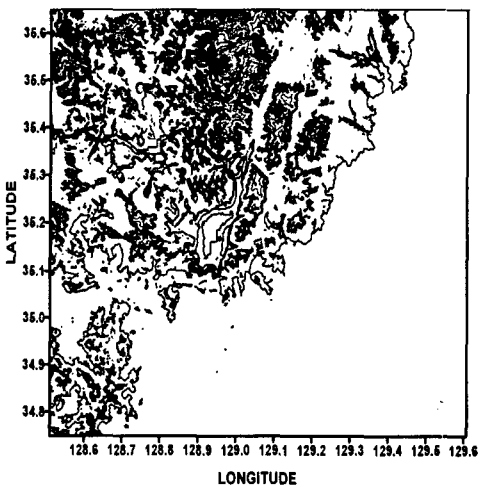

Fig. 1. Topography of Busan Metropolitan Area

The application of a three-dimensional air quality simulation model including meteorology, chemistry and emissions is required to understand the relationship between photochemical ozone and its precursor emissions of NO_x and VOC. In this study, it is used the CB4, which is the photochemical mechanism, and MM5 (the diagnostic Meteorology Model) which is the meteorological mechanism. These simulations are conducted in summer days using emissions from the Kimhae Clean Air Act 21 (2003).

In this study, the subject domain of simulations is shown Figure 1 and is including Busan Metropolitan. The area of the nested finest domain is 100×100km with 2km horizontal grid spacing.

To investigate the relationship between the emissions of NO_x, VOCs and maximum O_3 concentrations covering the Busan area, simulations were conducted in two sets. In one set, NO_x emission is held constant and VOCs emission is varied from 10% to 200%. In the other set, VOCs emission is held constant and NO_x emission is varied from 10% to 200% (*W. Jiang et al*, 1996;

Marcia C. Dodge, 1989). It will be found that sensitivity of ozone concentrations to the VOC/NO_x ratio. Two additional sets of simulations were run to apply to a NO_x-sensitive regime and a VOC-sensitive regime. In one set, NO_x emission is held constant and VOCs emission is reduced from 10% to 100%. In the other set, VOCs emission is held constant and NO_x emission is reduced from 10% to 100% (*W. Jiang et al*, 1996; *Sanford Sillman*, 1999).

3. Discussion

Elevation of ground-level ozone has been a serious concern in the past several decades. Busan Metropolitan located near the shore has undergone several high ozone concentrations. We have been considering a counterplan against the high ozone concentrations.

This sensitivity of ozone concentrations to ozone precursors emissions can be applied to ozone-decrease scenarios which can be carried out as a fundamental research. Using the sensitive regime may decrease ozone concentration when the emission of the subject area are known.

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