

PC10) Comparing Meteorological Fields and Their Impacts on Carbon Bond Mechanism-IV Modeling

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1. Introduction

Performance of photochemical models and their response to emission controls are heavily dependent on the inputs to the model. Two key inputs to these models are accurate meteorological and emissions data. But they can contain significant errors which contribute to uncertainties in photochemical simulation (Kumar and Russell, 1996; Sistla et al., 1996; Pielke and Uliase, 1998; Barna and Lamb, 2000; Nelson L. Seaman, 2000; Hogrefe et al., 2001; Biswas et al., 2001).

The MM5 and RAMS currently are the most thoroughly tested models for air-quality studies (Nelson L. Seaman, 2000). In Hogrefe et al.(2001), the meteorological fields of these models are used and are compared through several analyses (Hogrefe et al., 2001, Biswas et al., 2001).

In this study, the two models are used for Carbon Bond Mechanism-IV (CB4, Gery et al., 1989) as inputs and the results are analyzed comparing with the observed data.

2. Methodology

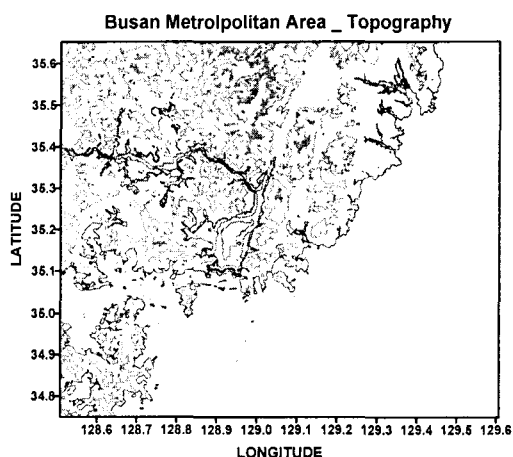


Fig. 1. The fine domain of this study

The physical options of MM5 and RAMS are used in simulations through the tuning of options such as cumulus parameterization and explicit moisture scheme. Prognostic models are so sensitive to initial and boundary conditions that the model stabilizes for 24 hour in this study (Barna and Lamb, 2000).

The emission is applied it used Busan Air Act21 (PDI, 2002) to the input of photochemical modeling. And hourly concentration of secondary pollutants is calculated in the fourth domain using the photochemical model, CB4.

In the this simulation, prognostic meteorological fields are generated using the PSU/NCAR Fifth Generation Mesoscale Model (MM5, Grell et al., 1994) and the Colorado State University Regional Atmospheric Modeling System (CSU-RAMS, Pielke et al., 1992; Nicholls et al., 1995). These models usually have a nested-grid capability, terrain-following vertical coordinates, flexible resolution and a variety of physical options.

There are twenty three layers in the vertical direction and four level of one-way nested domain are used with grid resolutions of 54, 18, 6 and 2km in both models. The fine modeling region (Fig. 1) is including Busan metropolitan having a complex coastal environment.

3. Simulations and the results

The two different sets of meteorological fields are used as input to the CB4 for the episode day. The episode day is selected by the means of analysis of main wind direction of the fourth domain and it is represented the normal summer day of Busan.

The simulation is conducted for the episode day and the results are compared with observed data. The hourly concentration of ozone induced two meteorological fields also are analyzed using statistical measures.

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