

OA11 Effects of Asynoptic Data Assimilation in Regions of Complex Terrain

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1. Introduction

The air quality modeling was developed sharply in these ten years. This means the development of source information and the accurate estimation of emissions. However, the accurate estimation of meteorological fields as the development of numerical meteorology is important to enhance the prediction of air quality (Sistla et al., 1996; Pielke and Uliase, 1998; Barna and Lamb, 2000). Hanna et al.(2001) showed that meteorological factors such as wind, humidity and cloud type and amount had an effect on ozone prediction of urban regions using UAM(Urban Airshed Model) and it induced uncertainties in the estimation of ozone amount. Seaman(2000) explained that ozone was produced by the interaction of meteorology, emissions and chemical reactions and expressed that meteorology had an mainly effect on chemical reactions. In addition, he suggested the reduction of uncertainties to improve the prediction of air quality in meteorological fields.

In order to estimate the accurate meteorological fields, we have to express the accurate initial and boundary conditions of the model. The studies of synoptic and asynoptic data assimilation are now under way to improve the conditions. It analyzes systemically and generally a enormous amount of observation data and produces a variety of variables for real-time forecasts at Korea Meteorological Administration/ Meteorological Research Institute (KMA/METRI) (Kim et al., 2002). Radar as asynoptic observation and GMS(Geostationary Meteorological Satellite) data are applied to a basis process of research with routine observation at KMA. Although Automatic Weather Station(AWS) are located densely in the whole country, the utility of AWS data in data assimilation is lower than intrinsic value of the data and the data are used only to verify output of the model.

In this study, we investigated the utility possibility of surface data assimilation and the improvement degree of meteorological fields as quality control of used data in numerical simulations in Busan region having the complex terrain.

2. Description of Experiments

As the main purpose of this study is verification of the utility of surface data assimilation, the description of numerical experiments is presented in Table 1-1.

Table 1-1. Experimental design.

| Experiment | Variables nudged | Quality control |
|------------|------------------|---------------------------------|
| Run 0 | - | - |
| Run 1-1 | u, v, T, q | S ^a , M ^b |
| Run 1-2 | u, v, T, q | - |
| Run 2-1 | T | - |
| Run 2-2 | u, v, T, q | M ^b |

^asurface data following synoptic field

^bsurface data removed for mechanical error

The five experiments are simulated in the prognostic mesoscale model, MM5. The meteorological factors calculated in MM5 are compared with observation data using the statistical indexes. The difference maps for each case from Run 0 are applied to investigate the effects of data assimilation and the data used analysis nudging.

3. Reference

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