

## PA25)            산업도시와 일반도시의 입자상 오염물의 성분특성과 이동경로 분석연구

### Analysis of Components and Transports of Particles in Industrial and General Cities

이 병 규 · 이 창 홀<sup>1)</sup>

울산대학교 건설환경공학부, <sup>1)</sup>동진분석기술연구소

#### 1. Introduction

Korea Ministry of Environment have enforced measures to improve the ambient air quality around industrial areas since 2000. Analyzing concentrations of PM10 has been a general nationwide method to evaluate the air quality in the field of particulate matter (PM) in Korea. In reality, PM2.5 has a high deposition rate into the lung, and thus analysis of its components and concentrations is very important to evaluate the Urban Air Quality (UAQ). Changwon and Masan areas, located southern part of Korea, are a newly developed industry clustering zone and also have developing seashore areas. There is very few available research of components and concentrations of PM2.5 in Changwon (industrial) and Masan (residential) cities. This study focused on component and concentration analysis of PM (TSP and PM2.5) collected during the fall season of 2004.

#### 2. Methodology

PM2.5 samples using PUF samplers (URG Corp.) and TSP samples using a hi-vol air sampler (Sibata) were collected at Changwon site (surrounded a mechanical industrial complex (IC)) and heavy traffic areas) and Masan site (located a residential area with less traffic and near small chemical IC areas) during the fall season, August 25 to December 10 of 2004. Total 25 and 14 day (24 hr) samples of PM2.5 and TSP were obtained at Changwon and Masan sites, respectively. Heavy metals, acidic ions and components, and PAHs extracted from PM 2.5 and TSP samples according to their extraction methods were analyzed by atomic absorption spectroscopy (AAS: Flame-AAS or GF-AAS), ion chromatography (IC), and high performance liquid chromatography (HPLC: Waters 2690)-UVD (Waters 2487, 254nm), respectively. In order to determine the regional (or spatial) and temporal variation effects of PM concentrations during the study periods, the origins and paths of PM on some days of the study periods were traced using a backward trajectory analysis (vertical velocity method in hysplicit model version 4). The backward isentropic air trajectory modeling from Changwon and Masan at 1500 m altitude was performed using winds based on a statistical analysis of the latitude, longitude and height of trajectory at 6-hour intervals over 2 days.

#### 3. Results and Discussion

In analysis of PM2.5 and TSP collected at an IC site with heavy traffic and large mechanical IC areas of Changwon and a residential site with less traffic and small chemical IC areas of Masan during the fall season, the median concentrations of PM2.5 in Changwon and Masan were similar each other. However, the median concentration of TSP in Changwon was higher than that in Masan. Therefore, the concentration ratios of PM2.5 to TSP in Masan are higher than those in Changwon (Fig. 1). That is because the TSP in the Changwon site was significantly affected by

heavy traffic emissions. The concentrations of particulate matter mainly affected by the characteristics of local winds and anthropogenic sources such as home heating, local traffic, and industrial emissions nearby the sampling sites. They might be also affected by the long range transports of air mass. Figure 2 showed transport paths of particles by backward isentropic air trajectory modeling. Particle concentrations might be significantly affected by the transport paths which consisted of northwestern directions which had the northern China and passed inland in Korea, southern directions which were came from the pacific ocean, and western directions.

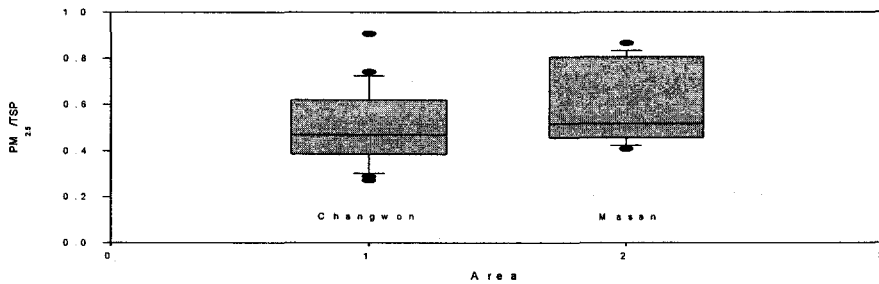


Fig. 1. Concentration ratios PM2.5 to TSP collected in Changwon and Masan.

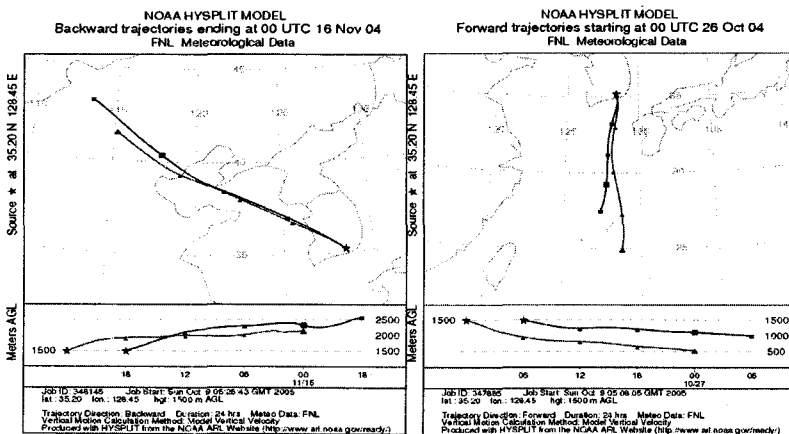


Fig. 2. Analysis of transport paths of particles by backward trajectories.