P2.5 IDENTIFICATION OF CEDAR POLLEN SOURCE FORESTS TO IMAPCT ON TOKYO URBAN AREA

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1. Introduction

Japanese cedar (*Cryptomeria Japonica*) is one of major pollinosis-triggering aeroallergens in Japan. In the most parts of the country, *Cryptomeria Japonica* trees release large amounts of pollen each spring season and over 20% of urban population is suffered from allergic reactions to the pollen. As one of the steps to establish cedar forestry countermeasures against the pollinosis, a study was made to identify the source forests of cedar pollen to reach to the Tokyo Metropolitan Area by the long distance atmospheric transport. In the study, the individual cedar forests were numerically identified by tracing back of the trajectory of pollen to impact on the Tokyo Metropolitan Area using a Lagrangian dispersion model

2. The procedures of the cedar pollen dispersion study

The characteristics of the dispersion model and tools employed for the present study are briefly summarized in Table 1. As for procedures to put pollen into the atmosphere, three major components were taken into consideration, namely, the empirical estimation of pollen production, the timing of flowering, and the pollen emission process from trees.

3. Identification results of the cedar pollen source forests

Figure 1 is a snap-shot of the pollen emission estimated considering the three components from cedar forests on the windward sides of the Tokyo Metropolitan Area at 15 JST (Japan Standard Time) on 24th March 2005. At the day, cedar flowers were in full bloom in Kanto and Tokai areas. Figure 2 is the depiction of the simulated distribution of the pollen at 24 JST on the day and at 6 JST on 25th. The estimation of the distribution was carried out applying the time-series of distribution of pollen sources such as given in Figure 1 and wind fields calculated by MM5 meso-scale model with the initial condition at 21 JST on 23rd to the Lagrangian dispersion model. During the daylight on 24th westerly wind covered the area of the simulation on the whole and in the inland part of the Kanto Plane wind is relatively weak and variable. In the midnight of the day high concentration pollen appeared in the northwest part of Tokyo, the southern part of Saitama Prefecture and the southwest part of the Akaishi Mountains. The pollen was emitted into the atmosphere on the windward of the Tokyo area and around the Akaishi Mountains during the day-time. On the morning of 25th, strong northeasterly wind prevailed over the whole of the Kanto District, and rather high concentration was simulated in and

around the Tokyo Metropolitan Area including Kanagawa Prefecture.

Figure 3 represents the spatial estimation of the density of daily total amount of pollen, which reached to the Tokyo Metropolitan Area (Tokyo 23 wards), emitted from the individual source forests during the 24 hours on 23rd. The forests located in western parts of the Kanto Plane and in southern part of the Akaishi Mountains are significant sources of pollen to reach to Tokyo Metropolitan Area. In order to forecast pollens in the Tokyo Metropolitan Area, we have to consider not only Kanto area forests but also long distance advection from Shizuoka Prefecture rather far from the Tokyo Metropolitan Area. In the simulation the number of the pollen transported by westerly winds from Shizuoka Prefecture over the Izu Peninsula was estimated to be much greater than we previously expected.

4. References

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Table 1 Overview of Numerical dispersion model for the Japanese cedar pollen.

Analysis date	23-25 March 2005
Analysis Area	East Japan
Attainment targets	Tokyo Metropolitan Area
Meteorological field estimation	From MM5 meso-scale model calculation
Flowering status estimation	Based on temprature by objective analysis between JMA-Mesoscale model output and observation data
Total account of pollen production	Calculated by the cedar forest area dimensions(m^2) over 26 years old cedar trees and amount of male flowers per m^2
Pollen quantity supplied from cedar forest	Calculated by pollen emission and deposition rate balance in forests
Dispersion model	Lagrangian dispersion model including up-down draft process in Convective Boundary Layer

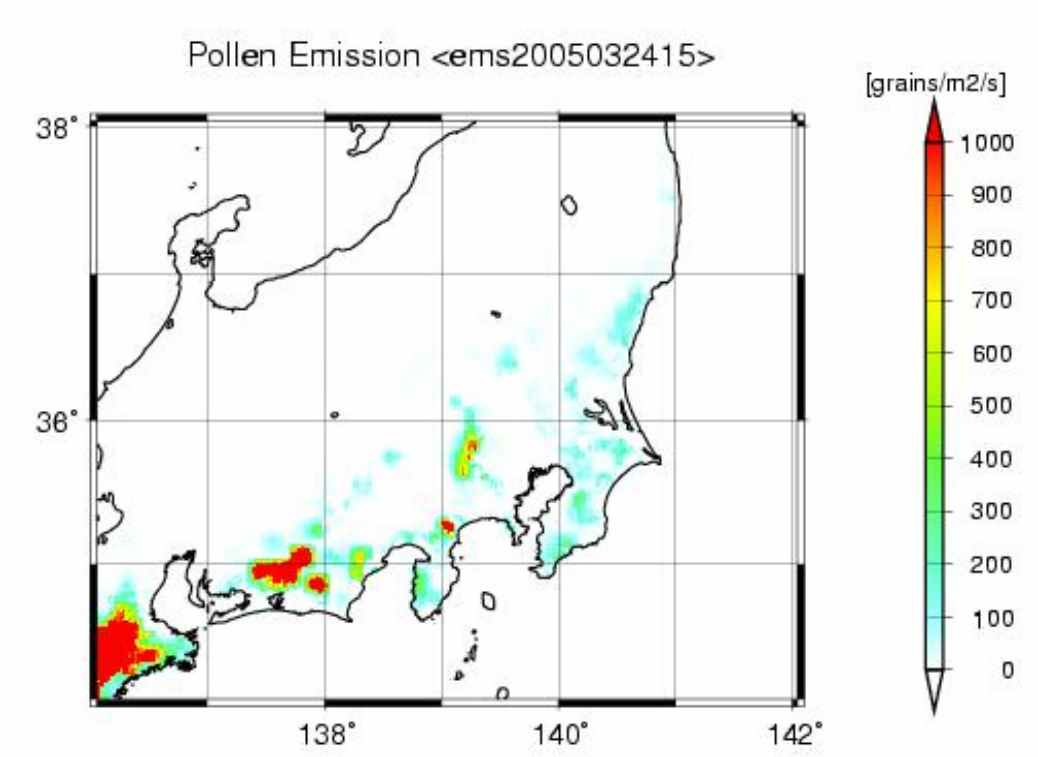

Fig.1 The estimation of pollen emitted from individual cedar forests at 15 JST on 24th March 2005

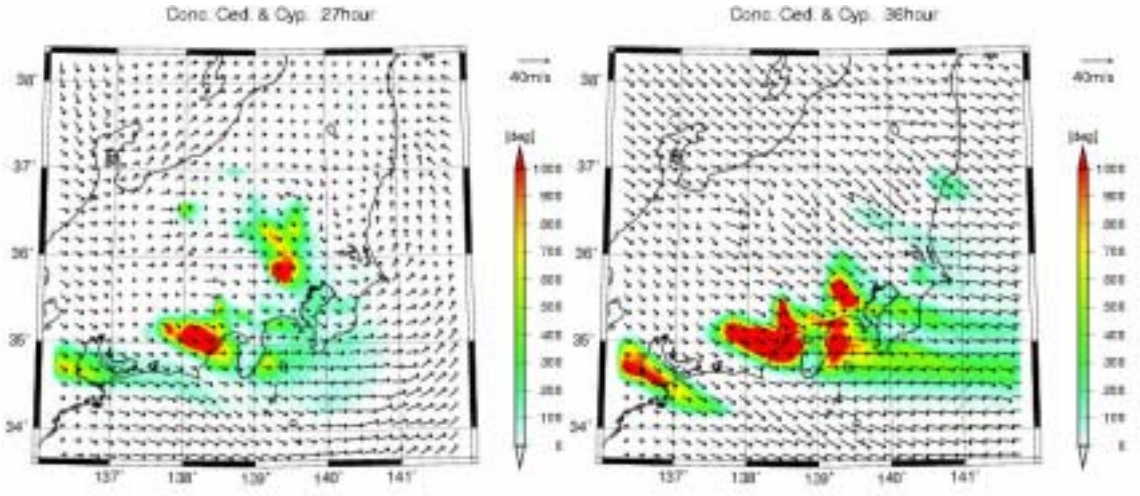

Fig.2 Simulated spatial distribution of density of cedar pollen by the Lagrangian dispersion model
(left: at 24 JST on 24th March 2005, right: at 6 JST on March 25th)

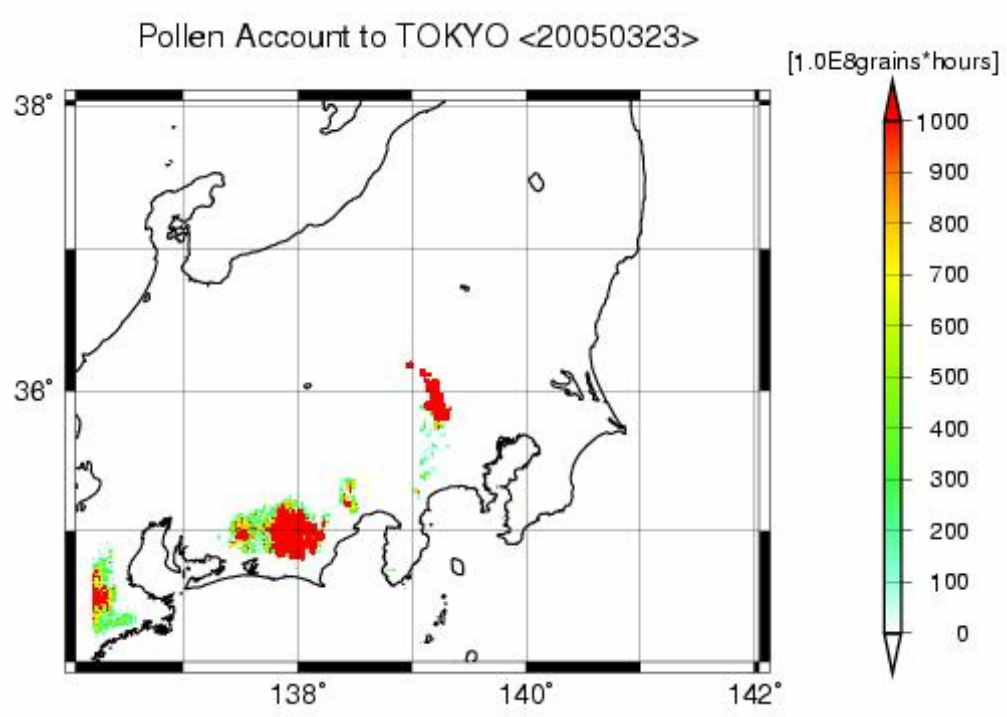

Fig.3 Estimation of density of daily amount of pollen which reached to Tokyo Metropolitan Area from the individual forests on 23rd March 2005