C-1 Studies on the Development of Comprehensive Model of Atmosphere-Soil and International Cooperative Field Survey to Clarify the Budget of Environment Acidifying Substances in East Asia

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Budget for FY1996-1998 346,930,000 Yen (FY1998; 108,884,000 Yen)

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To clarify the transboundary air pollution from the Asian continent to Japan, we conducted model development, international observations and dry deposition evaluation. A long-range transport model including a detailed chemical reactions was developed to characterize the transboundary pollution. Mesoscale phenomena such as synoptic scale high/low pressure change and the Baiu rainfront plays an important role for transportation the air pollutant emitted from China and Korea.

Non methane volatile organic compounds emission amounts were compiled for China, Korea, Japan and Taiwan. A emission model and economic growth model were linked to project the emission of SO_2 and NOx for China under the four kinds of economic growth scenarios. Chinese SO_2 emissions by district at 2025 were estimated.

Soil buffering capacities were evaluated with improved models and field measurements. Weathering rates calculated from cation budgets and Sr isotope ratios were agreed with estimates by a model adapted for volcanic soils assuming sandy fraction' s dissolution.

The transport simulation runs of sulfur oxides was performed. The contribution rate by the east Asian continent and domestic emission sources of Japan was analyzed.

It was found that there is another transport route from the Asian continent to Japan in addition to the three routes we reported before; a path from central/southern China to north Kyushu across the northern East China Sea.

High concentrations of nss-SO_4^{2-} were observed in winter, 1999, indicating the transboundary air pollution covering larger than 200 km with synoptic weather condition.

We investigated the element budgets of forested catchments in Japan and Korea, the growth characteristics of Asian tree species on acidifying soils conditions, and the determination of nitrification rates of various forest soils.

Dry deposition velocities of O_3, NO_2 and SO_2 were measured for crop-lands, a red-pine forest and Chinese soils. Fine droplet deposition was studied by artificial fog experiments carried out in a vertical shaft.

Aerosols deposited on the tree leaves were analysed for 29 elements by neutron activation analysis. Sb, enriched in the aerosls, may be a good indicator for evaluating the load of atmospheric pollutants in the environment.

Concentration profiles of sulfate aerosol were measured in forests to deduce dry deposition velocity. Whereas the profiles were homogeneous under the canopy, the concentration increased over the canopy, whcih suggested sulfate formation at the canopy.