Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

MIS029-P08 会場:コンベンションホール 時間:5 月 23 日 14:00-16:30

富士山頂で採取した粒径別エアロゾル中の無機成分による PM の動態解析
Dynamic analysis of particulate matter at Mt. Fuji during summer seasons using inorganic constituents

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Unlike other pollutants, airborne particulate matter (PM) is a complex mixture of particles that are very different in size, chemical composition, physical state and morphology. Moreover, PM has a variety of emission sources, which range from natural to anthropogenic and stationary to mobile. It also has a variety of physical and chemical properties. Therefore, not only the size distribution of particles but also information related to their chemical composition will play an important role in solution of the behavior and major emission source of PM and their effect on human health and the ecosystem. Test analysis samples of size-resolved PM were collected using a 3-stage NLAS impactor (Tokyo Dylec Co., Ltd., particle cut-size of stage is 10 micron, 2.5 micron and

1.0 micron for a flow rate of 3 L/min) with a one-day sampling interval on the a polycarbonate filter and back-up filter. Sampling of the PM was conducted at the summit of Mt. Fuji, from 11 to 18 August, 2008 using by the developed active sampler system which can operate anywhere with dry batteries and/or car batteries. . Elemental compositions of sample were determined by ICP-MS, and ionic species were analyzed by IC. For ICP-MS analysis, a part of filter and half of a back-up filter were directly treated with 10mL of nitric acid for 10 min using an ultrasonic apparatus, and 100uL of 1% Triton solution was added. For IC analysis, treatment was conducted with 8 mL of ultra pure water for 10 min of ultrasonication. A blank filter and a blank back-up filter were analyzed with all the procedures. The determination limits and concentration range of ICP-MS and IC were investigated from the reproducibility of calibration standard solutions and linearity of calibration curves.

Almost complete detachment of the collected samples from the polycarbonate filter and back-up filter sample was achieved by 1% nitric acid and/or ultra pure water with 10 min of ultrasonication. Characteristic inorganic composition data were obtained for each PM size, and it is believed to be possible to elucidate the behavior and major emission sources of PM by analyzing these data. Therefore, obtaining highly accurate analysis data in a short time by combining collection of PM using the polycarbonate filter with the simple method and the developed active sampler system will lead new development in PM research.