Ambient Nano-Aerosol in East Asian Cities based on East-Asia Nanoparticle Monitoring Network (EA-Nanonet)

- Worradom Phainuang\(^1\)\(^2\), Surapa Honglieb\(^1\), Mitsuihko Hata\(^1\), Masami Furuchi\(^1\), Atsushi Matsuki\(^1\), Kazuhiro Sekiguchi\(^1\), Fumie Yoshikawa\(^1\), Fumikazu Ikemori\(^2\), Rie Nishimura\(^2\), Perapong Teksakul\(^2\), Sivmyr Ho\(^2\), Kunali Kunafi\(^2\), Daishi Onizuka\(^2\), Akira Toriba\(^2\), Kensaku Kakimoto\(^2\), Nobuyoshi Yamashita\(^2\), Hui Ge\(^1\), Tong Zhang\(^1\), Ning Tang\(^1\), Thunyapat Thongyen\(^1\), Sirikalaya Suvachitthawan\(^1\), Panwadee Suwattiga\(^1\), Thaneya Chethiyakornkul\(^1\), Khaajomsak Sopajaree\(^1\), Tanachai Pankanomsuk\(^1\), Surajit Teksakul\(^2\), Jiraporn Chomaneep\(^3\), Seingheng Hui\(^3\), Sopai Thry\(^3\), Seingheng Hui\(^3\), Porsry Ung\(^3\), Peou Hang\(^3\), Rawawn Maniratnachote\(^3\)

1 Kanazawa University, Japan, 2 Prince of Songkla University, Thailand, 3 Saitama University, Japan, 4 National Institute of Technology, Toyama College, Japan, 5 Nagoya City Environmental Center, Japan, 6 Research Institute of Environment, Agriculture and Fisheries, Osaka, Japan, 7 Institute of Technology, Cambodia, 8 Universitas Islam Negeri Sultan Syarif Kasim, Indonesia, 9 Osaka Prefectural Institute of Public Health, Japan, 10 National Institute of Advanced Industrial Science and Technology, Japan, 11 Kasetsart University, Thailand, 12 King Mongkut’s University of Technology North Bangkok, Thailand, 13 Chiang Mai University, Thailand, 14 APSARA Authority, Cambodia, 15 The National Nanotechnology Center (NANOTEC), Thailand

INTRODUCTION

- Ambient nano-aerosol has been getting an increasing attention from their health risk point of view.
- Not enough information on the status and characteristics of ambient nano-aerosol and their emission sources yet.
- Status and characteristics of ambient nano-aerosol have not been compared between different locations in different countries.
- East Asia Nano-particle monitoring Network (EA-Nanonet) was established for the monitoring of ambient nano-aerosol.
- Campaigns were conducted in Oct-Nov. 2015 and Mar-Apr. 2016 and a part of summarized results is reported in the present conference.

METHODOLOGY

- Air Sampler as a common tool for the Campaign

  - Sampler: The sampler consists of four impactor stages (> 10, 2.5 - 10, 1 - 2.5, 0.5 - 1 µm) and an inertial filter stage (0.1 - 0.5 µm) as well as a backup filter (< 0.1 µm) (See Fig 1).
  - Filter: A quartz filters filters 55 mm (Pallflex 2500QAT-UP).
  - Flow rate: 40L/min.

Sampling period and locations

- Period: March 28-April 3, 2016 (the first major campaign)
- Location: 15 sites in 6 different countries (See Fig 2)
- Duration: 1 - 7 days depending on the PM concentration at each site.

Fig 2. Locations of monitoring sites for the campaign in March-April 2016

- Analyzed chemicals
  - Carbon: elemental carbon (EC, char-EC, soot-EC), organic carbon (OC) using a thermal-optical carbon analyzer (Sunset carbon analyzer) following the IMPROVE-TOR protocol.
  - Ions: Cl\(^-\), NO\(_3\), SO\(_2\), Na\(^+\), NH\(_4\)+, K\(^+\), Mg\(^2+\), Ca\(^2+\) using LC
  - WSOC: water soluble organic carbon using TOC analyzer
  - Organic acids: malonic acid, maleic acid, succinic acid and oxalic acid using GC-MS

RESULTS AND DISCUSSION

- Japan, TSP concentrations in this campaign range from 21.79 – 42.81 µm\(^3\).
- The highest concentration shown in Saitama. The lowest was Kanazawa.
- SEA found TSP concentrations range from 47.54 – 183.93 µg/m\(^3\). Vietnam was the highest concentration and the lowest was observed in Songkhla, Thailand.

- PM\(_{10}\) mass concentration ranged 2.7 - 5.9 µg/m\(^3\) in Japan while 5.7 - 18.9 µg/m\(^3\) in Southeast Asian (SEA) countries, or, 2 - 3 times larger in Southeast Asia. 2.5 - 10 µm was dominate in Japan and Southeast Asia.

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