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PREFACE

This is the third International Workshop on Mt. Fuji Project organized by NPO "Valid Utilization of Mt. Fuji Weather Station", under the sponsorship of Dentsu Inc. As a very lucky coincidence, the year 2007 is the 80th anniversary for the Dentsu's Mt. Fuji climb involving it employees. In commemoration of this company tradition, Dentsu and NPO "Valid Utilization of Mt. Fuji Weather Station" will jointly organize a conference, the "World Eco-Science Network Conference", which will be had on July 17, 2007. Thus, this international workshop, today, is one of the satellite meetings of the above big conference of tomorrow.

The first workshop and symposium were held on March 3-4, 2006 in Tokyo, which was organized by the NPO "Valid Utilization of Mt. Fuji Weather Station" under the sponsorship of Taisei History and Environmental Fund, supported by Mitsubishi Electric Corporation, Taisei Corporation and Fujikyuko Corporation. Dr. R. Schnell (NOAA, MLO), Prof. P. Bartsch (University of Heiderberg) and Prof. Y.S. Kim (Hang-Yang University) were invited and made impressive lectures on atmospheric pollutant, on high altitude medical research and on atmospheric observation network, respectively. Very active and constructive discussions were had.

The second workshop and symposium were held on Nov. 22-23, 2006 at the University of Tokyo, under the sponsorship of JSPS (Japan Society for the Promotion of Science) fund, No.18631002 in 2006 for the research "Mt. Fuji Project: For the establishment of a high mountain observation platform of extreme environment" (the representative researcher being Yukiko Dokiya, Edogawa University).

In the present workshop in order to deepen the mutual collaboration as well as to develop the interdisciplinary mountain research network, 5 invited papers will be presented, followed by the discussions with the commentators of the similar fields.

Organizers

Prof. Yukiko Dokiya (Edogawa University),

Prof. Shiro Hatakeyama (Tokyo University of Agriculture and Technology),

Dr. Yasuhito Igarashi (Meteorological Research Institute),

Prof. Yasunobu Iwasaka (Kanazawa University),

Prof. Yoshizumi Kajii (Tokyo Metropolitan University),

Dr. Naoki Kaneyasu (National Institute of Advanced Industrial Science and Technology),

Prof. Yoko Katayama (Tokyo University of Agriculture and Technology),

Ass. Prof. Yukiya Minami (Ishikawa Prefectural University)

3rd International Workshop on Mt. Fuji Project

Program

Date: July 16, 2007

Time: 13:00-16:30 (Workshop on atmospheric chemistry), 16:50- (Reception)

Place: Archadia Ichigaya

4-2-7, Kudan-Kita, Chiyoda, Tokyo, Japan

phone: 03-3261-9921 (+81-3-3261-9921)

Room Myoko (Workshop), Room Yoshino and Chokai (Reception)

Opening Addresses

1. Prof. Yukiko Dokiya (Edogawa University, Japan)
2. Dr. Russ C. Schnell (NOAA, USA)
   The Air We Breathe – It Is Not What It Used To Be!

Invited Presentation (Chairs: Prof. Yukiko Dokiya and Dr. Russ C. Schnell)

1. Dr. Paolo Laj (EUSAAR, France)
   The ABC-Pyramid, a High Altitude (5100m) Aerosol Station in Himalayas
2. Dr. Paolo Laj (EUSAAR, France)
   The EUSAAR Integrated Infrastructure Project
3. Dr. Leonard A. Barrie(WMO, Switzerland)
   The Contribution of High Mountain Observatories in the WMO Global Atmosphere Watch (GAW) To Global Earth Observations
4. Prof. N.-H. Lin (National Central University, Taiwan)
   Mt. Lulin (2862 m MSL) as a Regional Background Station in SE Asia
5. Prof. Yoon Shin Kim (Hanyang University, Korea)
   A proposal: Mt. Changbai as an Asian Baseline Station for Air Monitoring

Comments and discussion

Commentators: Prof. Shiro Hatakeyama (Tokyo University of Agriculture and Technology)
Prof. Yasunobu Iwasaka (Kanazawa University)
Dr. Ken'ichi Ueno (Tsukuba University)

Reception

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The Air We Breathe - It Is Not What It Used To Be!

Russ C. Schnell

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As humans consume fossil fuels through combustion, the resulting gases collect in the atmosphere and trap increasing amounts of the Earth's heat. Also, chemicals produced by mankind evaporate and/or leak into the atmosphere where they produce new chemical reactions, the most notable being the destruction of stratospheric ozone and the formation of the Antarctic "Ozone Hole" through CFC (chlorofluorocarbon) reactions on the stratospheric ozone. Since the atmosphere is very thin and air flows around the Earth on timescales of a few weeks to a month, natural and anthropogenic effluents are rapidly transported around the globe. Various countries have set up atmospheric monitoring stations both at sea level and at higher elevations to measure the movement and concentrations of these effluents. Mauna Loa Observatory, established in 1956 in Hawaii, was one of the first such station to measure carbon dioxide and aerosols, although meteorological and related measurements were conducted on Mount Fuji, Japan as early as 1898.

In recent times the rapid growth of the economies in mainland Asia, coupled with predominate west-to-east winds, has allowed for the transport of ever increasing anthropogenic effluents off the Asian continent to offshore islands and across the Pacific Ocean to North America. These effluents are best monitored at high elevation stations away from moisture and clouds often found near sea level. Taiwan has recently established a high altitude, mountain-top atmospheric station to monitor the outflow of effluents from the Asian mainland. Since Mount Fuji is the tallest mountain peak in the region, it is ideally suited to monitor effluents from a more northerly location. Together, these two stations will be able to better quantify both the impact of these effluents on the atmosphere in their respective countries, and to monitor the potential effects of the effluents on the health of their citizens.

The ABC-Pyramid, a High Altitude(5100m) Aerosol Station in Himalayas

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The Himalayan-Karakorum range, lies in the middle of two of the most densely populated and very rapidly growing area of the world: India and China. Monitoring atmospheric composition in this area plays a relevant role in evaluating the Asian background conditions of the free troposphere, in quantifying the pollution levels at high altitudes as well as in studying regional and long range transport phenomena.

In the framework of the Ev-K²-CNR SHARE-ASIA and UNEP-ABC projects, the remote monitoring station ABC-Pyramid Observatory has been installed in the Khumbu valley at 5079 m a.s.l, near the Ev-K²-CNR International Pyramid Laboratory. The "state of the art" laboratory shelter was designed by ISAC-CNR (Bologna, Italy) and LaMP-CNRS (Clermont-Ferrand, France) researchers to permit the monitoring and sampling of atmospheric compounds (aerosol and gases) at high altitude.

The experimental activity at the Observatory is carried out using renewable energy by 96 photovoltaic panels. All the online instrumentation is completely autonomous and remotely controlled, while the human assistance is necessary for the off-line measurements (aerosol sampling on filters, greenhouse gases sampling on flasks) and for some maintenance operations. Measurements and instrumentation status are accessible on-line from ISAC-CNR (Bologna) and from OPGC-CNRS (Clermont-Ferrand) for any remote intervention.

In this talk, we will illustrate the technical solutions and the results from the first year of activity.

The EUSAAR Integrated Infrastructure Project

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The EUSAAR project is funded by the EU under the integrated infrastructure initiative. Its main objective is the integration of measurements of atmospheric aerosol properties performed in a distributed network of 20 high quality European ground-based stations (Supersites). This integration contributes to a sustainable and reliable operational service in support of policy issues on air quality, long-range transport of pollutants and climate change. The lack of coordination programs for non-regulated measurements of aerosol properties is considered a major gap in Earth Observation that urgently needs to be filled. The objective of the networking activities is to ensure most efficient use of available resources by 1- harmonization and validation of current measurement of particle optical, physical and chemical properties performed at Supersites as these are critical to ensure their scientific value 2- centralization of the validated measurements in a common data base accessible to all users and 3- spreading good practices and disseminate information on new protocols and inter-calibration procedures both within and outside the project. The joint research activities have the common objectives to develop affordable and sustainable solutions to improve monitoring strategies and products that will advance up-to-date data reporting across Europe. This concerns retrieval of the aerosol column through a novel technology, development of a new generation of humidity-controlled aerosol instruments and new methodologies for real-time acquisition and diffusion of aerosol parameters.

A major concern of EUSAAR is that networking and joint research activities consolidate current observation effort and to contribute to good practice at aerosol monitoring stations worldwide.

The Contribution of High Mountain Observatories in the WMO Global Atmosphere Watch (GAW) To Global Earth Observations

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The GAW programme of the World Meteorological Organization (WMO) focuses upon the role of atmospheric chemistry in global change issues. It consists of a partnership of managers, scientists and technical expertise from approximately 80 countries. Recognizing the need to bring scientific data and information to bear in the formulation of national and international policy, the GAW mission is threefold: (i) reduce environmental risks to society and meet the requirements of environmental conventions, (ii) strengthen capabilities to predict climate, weather and air quality and (iii) contribute to scientific assessments in support of environmental policy. It does this by: (a) maintaining and applying global, long-term observations of the chemical composition and selected physical characteristics of the atmosphere, (b) emphasising quality assurance and quality control and (c) delivering integrated products and services of relevance to users.

High Mountain Observatories are an important subset of the 24 station Global observatories and approximately 300 Regional stations that comprise the GAW network. The focus of GAW is on six variable groups related to air chemistry's role in climate, weather, air quality and long range transport/deposition of air pollution. These are: greenhouse gases, ozone, ultra violet radiation, aerosols, selected reactive gases and precipitation chemistry. For each group, there are science advisory groups maintaining measurement guidelines and data quality objectives as well as WMO Member-supported quality assurance, calibration and training centres, observatories and data integration/analysis centres (World Data Centres). Observational programmes and results at GAW high mountain observatories are reviewed. The potential role of the Mt Fuji observatory in an integrated global atmospheric chemistry network is explored.

Mt. Lulin (2862 m MSL) as a Regional Background Station in SE Asia

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Keywords: Precipitation chemistry; Aerosol chemistry; Trace gas; High elevation; Mercury

The Lulin Atmospheric Background Station (LABS) in Taiwan held its grand opening for operation on 13 April 2006. It is located at the Lulin Mt. (2,862 m MSL; 23°28'07"N, 120°52'25"E) in central Taiwan. The LABS is unique because its location and altitude can enhance the global network of GAW (Global Atmosphere Watch) in the Southeast Asian region where no high-elevation baseline station is available. Our site is located between the GAW Waliguan station (3,810 m) in Tibetian plateau and Mauna Loa Observatory (3,397m) in Hawaii. Trajectory study indicates that this site provides us a great of chances to observe a variety of air mass originated from contaminated or clear source regions, giving a distinctive contrast of atmospheric changes. Present continuous operations include precipitation chemistry, aerosol chemistry, trace gases (CO, O_3, CFCs, VOCs), mercury, atmospheric radiation, and meteorological variables. International collaborations have been extended with US NOAA, NASA and EPA. In order to assess the background air chemistry of the LABS, a pilot study on precipitation chemistry, aerosol chemistry, CO flask sampling and manual collection of atmospheric mercury have been conducted since the spring of 2003. In this presentation, we will report the results from the pilot study and later continuous measurements of aforementioned species. The pH values of weekly precipitation samples generally ranged in 5.0-5.6, reflecting a CO_2-equilibrated background value. Comparison between Mt. Fuji and Mt. Lulin will be also made. Intensive measurements of aerosol chemistry were made basically two weeks for each season. The speciation for elemental, gaseous and particulate Hg was determined using a continuous analyzer. The optical depth at the wavelength of 500 nm was categorized with respect to source regions. Continuous data of CO and O_3 are included for discussion. Case studies to show the impact of various air masses on air chemistry of LABS will be also presented.

A Proposal: Mt. Changbai as an Asian Baseline Station for Air Monitoring

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Recently Mt. Changbai, where is located between China and North Korea, has been given international attention in terms of forest conservation as the highest mountain in Korea. As Asian dust becomes worse, various studies related to its components, airborne transfer route and health effect have been performed in South Korea in addition to international collaboration among Korea, China and Japan in order to prevent public health from it. Based on such a aspect, to install air monitoring station for measuring Asian dust in Mt. Changbai has a considerable significance as international-jointed work as well as academic value. Although a conference related to research plan for monitoring Asian dust in Mt. Changbai, suggested by Prof. Yoon Shin Kim, has been held in Korea and Japan every year since 2000, its conducting potential was only reviewed owing to other politic, social and economic situations faced with each country. Through continuous efforts, however, affirmative permission that air monitoring station can be set up in area around the Institute of Chinese Atmospheric Physics located in Mt. Changbai was granted by China. Thus, many scholars of Korea, China and Japan will have interest in devising various research subjects related to air monitoring for Asian dust in the future.

Additionally, it is expected that such a collaborative study among Korea, China and Japan could devote to globally environmental conservation if the project of air monitoring for Asian dust in Mt. Changbai was begun.