ABC Training School

Hanimaadhoo, Rep. Of Maldives

6-14 October 2004

Regional capacity building and training of young scientists and students from the south and southeast Asian region is one of the important hallmarks of the ABC-Asia project. The ABC supper station located at Hanimaadhoo, in the Republic of Maldives served as the site for the first ABC Training School conducted during 6-14 October 2004. The school is designed to have classroom lectures as well as hands-on-training in field experiments to facilitate practical training for regional students and postgraduates and active interaction with ABC scientists. The participation of students and young scientists in all components of project ABC from the beginning of its implementation will help in building regional capacity as well as enable the participating scientists and institutions to plan and conduct studies of similar nature in their region.

The Training School was announced in the UCSD ABC homepage, in the UNEP Regional Resource Centre for Asia and Pacific (UNEP-RRCAP) homepage and through e-mail contacts. From the applications received, students were selected based on merit while maintaining a balance in the geographical and gender distribution. A total number of 15 students from seven countries, viz., Bangladesh, India, Kirgisthan, Nepal, Repulic of Maldives, Srilanka and Thailand.

Lectures delivered:

6 October 2004

Lecture 1: Introduction to Earth's Climate System (V. Ramanathan)

Lecture 2: Atmospheric Chemistry in the Anthropocene (P.J. Crutzen)

Lecture 3: Interaction of Solar Radiation with the Earth's Atmosphere (A.Jayaraman)

Lecture 4: Aerosol Radiation Interaction: Aerosol Optical Properties (D. Kim)

7 October 2004

Lecture 5: Aerosol Climate Interaction (V. Ramanathan)

Lecture 6: Aerosol Measurements (A. Jayaraman)

Lecture 7: Aerosol Radiative Forcing (D. Kim)

8 October 2004

Lecture 8: The Role of the Tropics in Tropospheric Chemistry (P.J.Crutzen)

Lecture 9: Optical and Chemical properties of East Asian Aerosols (S.C. Yoon)

Lecture 10: The Atmospheric Brown Cloud (A. Jayaraman)

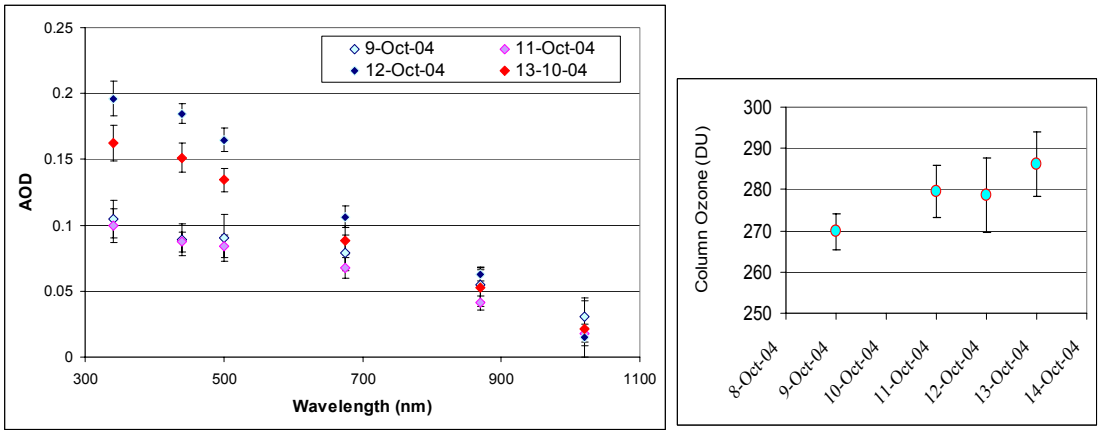
10 October 2004

Evening Lecture: Issues for Science Researchers Relevant for the ABC Gosan Campaign (Teruyuki Nakajima)

Laboratory Training (9-14 October 2004):

The students were divided into smaller groups and were given hands-on training in operating and collecting data from a variety of state-of-art instruments for aerosol and radiation measurements. Regular discussion meetings were held for students to present the data collected and training was given in inter-comparing the data and interpreting them. The observations include: aerosol optical properties using Nephelometer and Athelometer, particle size distribution using CCN counter, aerosol extinction and scattering measurements, vertical profile of aerosols, boundary layer height, cloud base and thickness determination using Micro Pulse Lidar, global radiation measurement using Bio-Spherical-Instrument, and global radiation spectrum using Analytical Spectral Device -Grating Spectrometer, Aerosol optical depth, column ozone and water vapour concentrations using Microtops sun-photometer, and Meteorological Observations and

solar fluxes using pyranometers, pyrheliometers, global, direct and diffuse fluxes in the short and long-wave bands.



(Left) Daily average aerosol optical depth measured by the students over the Hanimaadhoo Climate Observatory during the training program. The observed increase in the AOD at lower wavelengths show the increase in the amount of submicron size particles. The upper level wind varied from westerly to north and north-easterly, which brings polluted continental air over the site. The Micro Pulse Lidar data (not shown here) showed a formation aerosol layer around the 2.5 km altitude. (Right) Measured column ozone amount recorded an increase indicative of additional ozone production in the free troposphere as the pollutant concentration increases.

Synthesis of the data obtained by the students during the training period is discussed in detail during the concluding day of the training school and it is found that the gradual changing wind pattern observed over the observation site from westerly to north, north-easterly, which is expected as the ITCZ moves south, increases the amount of pollutants from a relatively pristine environment to a polluted one. It has also come out from the observation that the changes occur first at higher altitudes, typically above the boundary layer height as it is evident from the lidar measurements which showed an increase in the aerosol scattering around 2.5 km altitude. This observation is further corroborated with the column integrated aerosol optical depth measurements and surface air sampling. While the aerosol optical depth showed a systematic increase in the smaller wavelength indicating an increase in the number of submicron size particles, the surface air sampling for aerosol scattering and absorption do not record any appreciable trend implying that the addition of submicron particles occurred at higher altitudes. This observation is in accordance with the model predicted sulfate aerosol loading and transport over the region.

Table 1. Lecturers

1	Paul J Crutzen Co-chief scientist, ABC Project MPI for Chemistry, Mainz, Gernmany
2	A. Jayaraman Co-Director, ABC Training School PRL, Ahmedabad, India
3	D. Kim C4, SIO, UCSD, La Jollaa, USA
4	T. Nakajima CCSR, Univ. Tokyo, Tokyo, Japan
5	V. Ramanathan Co-chief scientist, ABC Project Co-Director, ABC Training School C4, SIO, UCSD, La Jollaa, USA
6	Soon-Chang Yoon Seoul National University, Seoul, S. Korea

Table 2: Laboratory Training

1	Micro Pulse Lidar, Global radiation measurement using Bio-Spherical-Instrument, and global radiation spectrum using Analytical Spectral Device -Grating Spectrometer, Microtops sun-photometer, Meteorological Observations and solar fluxes using pyranometers, pyrheliometers in the short and long-wave bands.	D. Kim A. Jayaraman
2	Aerosol optical properties (Nephelometer and Athelometer) particle size distribution by CCN counter, aerosol extinction and scattering measurements	C. Craig G. Hallar

Table 3: Students

1	Amjad Abdulla Ministry of Environment and Construction, Male, Rep. of Maldives
2	Mohamed Adam Meteorology Office, Hanimaadhoo, Rep. of Maldives
3	Ms. Raheema Gasim Meteorology Office, Hanimaadhoo, Rep. of Maldives
4	Harish Kumar Gupta Devi Ahilya University, Indore, India
5	Md. Abdul Hannan University of Dhaka, Bangladesh
6	Abba Elizabeth Joseph National Physical Laboratory, New Delhi, India
7	Sverdlik Leonid Kyrgyz-Russian-Slavic University, Kyrgyzstan
8	Ms. Mizna Mohamed Ministry of Environment and Construction, Male, Rep. of Maldives
9	Abdulla Naeem Meteorology Office, Hanimaadhoo, Rep. of Maldives
10	Bidya Banmali Pradhan International Centre for Integrated Mountain Development, Nepal
11	Anup Krishna Prasad Indian Institute of Technology, Kanpur, India
12	K. H. M. S. Premalal Department of Meteorology, Sri Lanka
13	Yoosuf Qasim Meteorology Office, Hanimaadhoo, Rep. of Maldives
14	Ahmed Sameer Meteorology Office, Hanimaadhoo, Rep. of Maldives
15	Boossarasiri Thana Chulalongkorn University, Bangkok, Thailand

ABC Students taking training in data analysis and interpretation

ABC Classroom in progress

The certificate issued to the students after the successful completion of the ABC Training School

Project Atmospheric Brown Cloud - Asia

UNEP

Certificate

Ms. xxxxxx, Institute/University, country partook in the ABC Training School conducted at Hanimaadhoo Climate Observatory, Hanimaadhoo, the Maldives during 6 to 14 October 2004 and completed the course successfully.

V. Ramanathan
Co-Chief Scientist, ABC
Co-Director, ABC Training School

A. Jayaraman
Co-Director
ABC Training School