Activities of “Green Earth Network”, A Japanese Non-Profit Organization (NPO), in China

Kunio TAKAMI[1)], Hideyuki SHIMIZU[2)], Takashi UEHIRO[2)]

[1)] Green Earth Network (GEN), 1-4-24-501 Ichioka, Minato, Osaka, Osaka, 305-8506, Japan
[2)] National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki, 305-8506, Japan

There are many activities conducted by Japanese groups/parties to conserve/rehabilitate eco-environments in China. “Green Earth Network” is such one organization which has planted actively in desertificated area in China. We wish to introduce its activities briefly.

“Green Earth Network (GEN)” was formally established in 1993 (voluntary party), after a year of preparatory group. It was approved by Osaka pref. as a non-profit organization (NPO) in 1999, and also certified as a specified NPO in 2005, which could get favored tax treatment, by the director general of the National Tax Administration Agency. The members are scattered in all Japan, especially around Osaka and Tokyo, and the numbers are up to 650 people in total (including 30 groups). The budget is about 70 million Japanese yen in a year.

1) In January 2006, the planting (greening) cooperation was started in Da-dong city, Shan-xi province, being introduced by the Communist Youth League of China. Our first counter part was Da-dong city Youth Association and then relegated to the Trade Union of Da-dong city in 2003. And “Da-dong office of Green Earth Network”, specializing in this cooperation, was founded in 1994.

2) About 17 million trees and 5000 ha have been afforested so far. At the early stage, many trees were withered, and we experienced many failures. The cooperated project fund was up to about 23 million Chinese yuan. Followings are some of our activities;

・Greenbelts were made by three kinds of pine, Chinese pea tree and *Hippophae ramnoides* in mountainous/hilly land to prevent water soil erosion and wind sand blown.

・Orchards, mainly apricot, were made in local elementary schools. Their profits were used for the educational support for un-schooled children.

・Nursery fields, botanical gardens and experimental forest were constructed and managed with technological improving and human recourse training supported by Japanese specialists.

3) 250~350 Japanese volunteers in a year joined in GEN activities to make friendly (face to face) partnership with Chinese. About 2500 people have been participated so far.

4) Other than the planting, GEN conducted some activities related to water problems, disaster relief from earthquakes, construction supports for elementary schoolhouse

5) Financing sources are membership fee, company/personal donation, government/ foundation subsidies and business incomes, etc.

*Japan side: “Green Earth Network”
Representative: Yoshishige TACHIBANA, Secretary-general: Kunio TAKAMI
Venue: 1-4-24-501, Ichioka, Minato, Osaka, Osaka, 552-0012, Japan
Tel:.81-6-6576-6181, Fax:.81-6-6576-6182
E-mail: gentree@s4.dion.ne.jp, URL: http://homepage3.nifty.com/gentree/
*Chinese side (Counter part): “Da-dong office of Green Earth Network”
所长：武春珍，副所长：魏生学
绿色地球网络大同事务所（隶属大同市总工会）
山西省大同市城区柳航新村1号楼门面房
电话：86-352-505-6713，传真：86-352-505-6691

Key Words: Da-dong city, Greening, Non-profit organization (NPO), Planting, Volunteer

Application of laser Lidar on dust events in Hohhot

Xuhui Dong[1], Hui Qi[1], Shuli Zhao[2], Tiesuo Li[3], Xuechun Bai[3], Yian Di[1], Yan Chen[1], Yanpeng Wang[1], Nobuo Sugimoto[4], Masataka Nishikawa[4], Kazuhiko Sakamoto[5], Qingyue Wang[5]

1. Sino-Japan Friendship Center for Environmental Protection, Beijing, China.100029. (dxh9772@hotmail.com)
2. China National. Environmental Monitoring Centre, Beijing, China.100029
3. Inner Mongolia Environmental Monitoring Centre, Hohhot, China
4. National Institute for Environmental Studies, Japan.
5. Saitama University, Japan.

Abstract: Condition and technical parameter were described in this article and the uninterrupted monitoring data from 2003 till now was summarized. The observation result in 2005 showed that 5 dust events were found during January to May with 3 of them occurred in April, rather less than that in other years. Compared with 2004, dust events emerged relatively late in this year, among which the most severe event was in April 28-29. The extinction coefficient of laser lidar exceeded 2 km^{-1} (corresponding to 3.5mg/m^3) and the concentrated area distributed from ground to the height of 1km with the height of dust cloud reached 2km. This event reached Beijing and lasted for 25 hours, while the dust concentration was 1.5 mg/m^3 and the height of dust cloud reached as high as 2km. CFORS module was applied to simulate the backward trajectory of this event, which led to the judgment that the origin of this event was located in south part of Mongolia.

Atmospheric Deposition of ^{137}Cs Associated with the Asian Dust Event in March 2002

Hideshi FUJIWARA[1)], Hideyuki SHIMIZU[2)], Yasuhito SHIRATO[3)], Toshiya OHKURO[4)]

[1)] National Institute for Agro-Environmental Sciences, 3-1-3 Kannondai, Tsukuba, Ibaraki 305-8604, Japan

[2)] National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki, 305-8506, Japan

[3)] Ministry of Agriculture, Forestry, and Fisheries of Japan, 1-2-1 Kasumigaseki, Chiyoda, Tokyo 100-8950, Japan

[4)] University of Tokyo, 1-1-1 Yayoi, Bunkyou, Tokyo 113-8657, Japan

No further contamination by ^{137}Cs has been registered after the cessation of atmospheric nuclear testing in 1980 and the Chernobyl nuclear reactor accident in 1986. Therefore, the atmospheric concentration of ^{137}Cs has probably dropped in recent years. However, the deposition of this radionuclide in Japan from the late 1990s to the early 2000s has not shown an obvious decreasing trend. In the 1990s, weak depositions had been observed in spring. A considerable deposition of ^{137}Cs was observed in the northwest coastal area of Japan in March 2002. Since no nuclear explosion or serious accident occurred in the early 2000s, the transport of contaminated dust appears to be the only plausible explanation for this event. In March 2002, a massive sandstorm was observed in East Asia, and the raised dust was transported across the sea to Japan. This dust originated from Mongolia and northeast China, in an area distant from the Chinese nuclear test site at Lop Nor or any other known possible sources of radionuclides. Our radioactivity measurements showed ^{137}Cs enrichment in the surface layer of grassland soils in the area, which was attributed to accumulation during past nuclear testing. We suppose the grassland is a potential source of ^{137}Cs-bearing soil particles. Since the late 1990s, this area has experienced drought conditions, resulting in a considerable reduction in land vegetation. We attribute the prodigious release of ^{137}Cs-bearing soil particles into the atmosphere during a sandstorm and the subsequent deposition of ^{137}Cs in Japan to this change.

Key words: ^{137}Cs, Deposition, Dust, Fallout, Radionuclide, Sandstorm

Development of Lidars for Dust Monitoring Network

Ichiro MATSUI[1)], Nobuo SUGIMOTO[1)], Atsushi SHIMIZU[1)]

[1)] National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki, 305-8506, Japan

Lidars are useful tools for measuring vertical profiles of aerosols. It was, however, it was not easy to operate lidars automatically. We have developed simple reliable lidars using compact flashlamp pumped Q-switch Nd:YAG lasers. The lidars measure backscattering at two wavelengths (532 nm, 1064 nm) and depolarization ratio at 532 nm. The prototype of the lidar was developed in 1996 for long-term monitoring of aerosols in the study related to global warming. It has been operated continuously in Tsukuba since 1996. The lidar has originally single channel (532 nm). The depolarization and 1064-nm channels, indispensable for dust monitoring, were added later. Based on the design of the prototype, the compact lidar systems currently used in the NIES lidar network were developed. Table 1 shows major specifications. In this paper, we present details of the lidar system including the data transfer system for network operation.

Key words: Depolarization ratio, Dust monitoring, Lidar, Network

Table 1 Specifications of the compact lidars

Laser wavelength	532 nm and 1064 nm
Laser pulse width	~10 ns
pulse repetition rate	10 Hz
pulse energy	20 mJ (532 nm), 20 mJ (1064 nm)
Receiver telescope diameter	20 cm
Receiver field-of-view	1 mrad
Receiver channels	532 nm co-polar, 532 nm cross-polar (photomultiplier tubes) 1064 nm (avalanche photodiode)
Data acquisition	12-bit analog to digital converters

Enhancement of Mite Allergen-Induced Eosinophil Infiltration in the Murine Airway and Local Cytokine/Chemokine Expression by Asian Sand Dust

Takamichi ICHINOSE[1)], Kaori SADAKANE[1)], Hirohisa TAKANO[2)], Rie YANAGISAWA[2)], Masataka NISHIKAWA[2)], Ikuko MORI[2)], Kyoko HIYOSHI[3)], Hideyuki SHIMIZU[2)]

[1)] Oita University of Nursing and Health Sciences, Oita, Japan.
[2)] National Institute for Environmental Studies, Ibaraki, Japan.
[3)] Ishikawa Prefectural Nursing University, Ishikawa, Japan.

Recently, the number of the patients with allergic asthma has been steadily increasing globally, including Japan and the other developed countries. In particular, house dust mites have been shown to be the predominant source of the current increase in asthma prevalence. On the other hand, the increases in atmospheric concentration of sand dust and/or suspended particulate matters are associated with asthma severity and adverse respiratory health effects. For example, Asian sand dust events, which spread over large areas, including East China, the Korean Peninsula, and Japan, are associated with an increase in daily mortality in Seoul, Korea, and Taipei, Taiwan. The dust has also produced cardiovascular and respiratory problems in Seoul, Korea, and neutrophilic airway inflammation in mice (Ichinose et al., 2005). The present study was undertaken to clarify the role of Asian sand dust on mite allergen, *Dermatophagoides farinae* (*D. farinae*)-induced eosinophilic inflammation in the murine lung, using sand dusts from the Maowusu Desert (Inner Mongolia) (SD-1) and the Tengger Desert (China) (SD-2).

Male ICR mice (5 wk of age) were intratracheally administered saline; SD-1 alone; SD-2 alone; *D. farinae* alone; *D. farinae* + SD-1; and *D. farinae* + SD-2, 4 times at 2-wk intervals. The two types of sand dusts enhanced infiltration of eosinophil in the airway, along with goblet cell proliferation related to *D. farinae*. The degree of eosinophil infiltration induced with SD-2 was greater than that with SD-1. The SD-1, which contained higher amounts of b-glucan, increased the expression of interferon (IFN)-γ in bronchoalveolar lavage fluids (BALF) with or without *D. farinae*, but SD-2 did not. Synergistically or cumulatively elevated levels of interleukin (IL)-5, eotaxin, and monocyte chemotactic protein in BALF related to *D. farinae* were higher with *D. farinae* + SD-2 than with *D. farinae* + SD-1. These results suggest that increased cytokine and chemokines in BALF play an important role in the enhancement of eosinophil infiltration in the airway induced by *D. farinae* + sand dusts. The reduced eosinophil infiltration in the SD-1-treated mice could be due to suppression of Th-2 cytokine and eotaxin via interferon-g induced by microbial materials, such as b-glucan.

The experimental findings in the present study suggest that a warning concerning Asian sand dust effects on allergic respiratory disorders in the eastern Asia region may be warranted.

Key words: Allergic asthma, Asian sand dust, Chemokine, Cytokine

Evaluation of the Technologies and Activities for Control Desertification in China

Guo Yu QIU[1,2)], Hideyuki SHIMIZU[2)], Jing YIN[1)], Peijun SHI[1)], Yong GAO[3)]

[1)] College of Resources Science and Technology, Beijing Normal University, Beijing 100875, China

[2)] National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki, 305-8506, Japan

[3)] Inner Mongolia Agricultural University, Hohhot 010019, China

China is one of the counties facing most serious desertification in the world. The total area affected by desertification is 2,622,000 km^2, covering 27.3% of total territory of China (CCICCD, 1996). During 1950-1999, due to increasing in population and other environmental stresses, desertified area had been increasing regardless the huge efforts to combat desertification by government and local people. The rate of annually desertified land rate was 1560 km^2 $year^{-1}$ in 1950s to 1970s. This rate increased to 2100 km^2 $year^{-1}$ in 1980s and 3600 km^2 $year^{-1}$ in 1990s. Because the activities to combat desertification in China have been conducting since 1950s, extensive projects have been carried out and huge amount of data and experiences have been accumulated. However, because the evaluations of these projects and technologies are not fully done, the application of these technologies is seriously limited. To use these achieved results and experiences actively for future desertification control, we have collected, reviewed, and analyzed 56 books, 149 journals, and 454 papers. Based on it, the activities and technologies that can effectively control desertification are recommended.

1. Suitable fundamental strategies of government. Governmental strategy is extremely important for control decertification. There are five fundamental strategies in China, including (1) awareness rising of publicity and reinforcement of education; (2) consolidation of legal knowledge and reinforcement of execution of laws; (3) enhancement of the effects to combat desertification by applying advanced science and technology and training professional personnel; (4) promotion of sustainable development through rational utilization of resources; (5) preparation of preferential policies and increase of fund input

2. Country actions. To solve the desertification problem completely, Premier Rongji Zhu announced a national wide campaign for environmental restoration in 1999, which refers to "re-vegetation the over cultivated farmland, over grazed rangeland, and barren lands with trees, shrubs, and herbs". The planed re-vegetation area is 320,000 km^2 with a financial support of US $41 billion. In 1999-2003, the actual re-vegetated area is 151,653 km^2, which is 146% of the total desertified area in last 50 years (1950-2000). By these measures, the desertification issue could be expected to be effectively controlled in China.

3. Straw checkerboard technique. Straw checkerboard is a sand dune fixation technique, which is built in the shape of checkerboard by using the straws of wheat, rice, and reed. In general, the advantages of straw checkerboard technique can be summarized as: remarkable effect of dune fixation; easy to build; getting result rapidly; good for environment. The disadvantages of this technique are that materials (straw) and labors cost and replacement after 3-5 years. On the whole, straw checkerboard can be regarded as a very effective technique.

4. Vegetation establishment/recover technologies. These technologies include planting shrubs and trees, sowing seeds by airplane, natural vegetation recover by protection, and etc. The best and inexpensive way to control desertification is natural vegetation recover by protection and vegetation establishment without irrigation.

Key words: China, Country action, Desertification, Establishing vegetation, Fundamental strategies, Straw checkerboard

Influence of *Salix psammophila* Checkerboard on Wind-sand Flux and Soil Physical and Chemical Properties

Yong GAO[1)], Hideyuki SHIMIZU[2)], Guo Yu QIU[2), 3)], Ji WANG[1)], Jian WANG[1)]

[1)] Inner Mongolia Agricultural University, Hohhot 010019, China

[2)] National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki, 305-8506, Japan

[3)] College of Resources Science and Technology, Beijing Normal University, Beijing 100875, China

The material used to build straw checkerboard is branch of *salix psammophila*, one native Shrub In Desert area. The sizes of checkerboard are 1m×1m, 1m×2m, 2m×2m, 2m×3m, 2m×4m, 2m×5m, 3m×3m, 3m×4m, 4m×4m, 4m×5m, 3m×6m. Results show that, In compared to barren dune, wind velocity at 20cm and 200cm height of checkerboard whose sizes is 3m×4m obviously decreases ($p<0.05$)。Effect of reducing wind of the small size checkerboard(1m×1m、1m×2m、2m×2m and 2m×3m)is better than that of the large size checkerboard. At the foot of dune with checkerboard on it, the sand flux intensity in 0~4cm surface layer is significantly larger than that at the slope and the top of dune. In compared to barren dune, setting *salix psammophila* checkerboard can effectively control wind-sand flux activity of surface. The living *salix psammophila* checkerboard can obviously increase the fine sand and clay content of surface layer in 0~30 cm depth. *Salix psammophila* checkerboard can improve chemical characteristics of dune, especially the living *salix psammophila* checkerboard. The content of total nitrogen, total potassium and total phosphorus improve in different degree; Ph value of soil does not change in the main.

Key words: Checkerboard, Desertification, Reducing wind and stabilizing sand, *Salix psammophila*, Soil physical and chemical properties

Lidar observation and characterization of a heavy dust event in Beijing Area

Xuhui Dong[1], Yanping Chen[1], Shuli Zhao[2], Hui Qi[1], Lijun Ren[1], Yanpeng Wang[1], Nobuo Sugimoto[3], Masataka Nishikawa[3], Kazuhiko Sakamoto[4], Qingyue Wang[4]

1. Sino-Japan Friendship Center for Environmental Protection, Beijing, China.100029. (dxh9772@hotmail.com)
2.China National Environmental Monitoring Centre. Beijing, China.100029
3.National Institute for Environmental Studies, Japan.
4. Saitama University, Japan.

Abstract: This article described the monitoring and technical characteristics of sandstorm monitoring network central station and discussed the pollution characteristics of the dust events occurred in 2006 in Beijing. 28 dust events were observed form January to May in 2006 in Beijing. The Lidar monitoring results showed that the severe sandstorm occurred during April 16-18 in Beijing in 2006 lasted 68 hours, the dust cloud reached 3000 meters high. The visibility derived from the lidar data was 1000 m, and the total suspended particle (TSP) concentration was about 22 mg/m^3 at the peak. Maximal TSP concentration measured on the ground was 2097μg/m^3, but PM10 was only 123μg/m^3 which occupied just 6% of TSP. As for deposition volume of this event, the amount of each unit was 17.0g/m^2 and the total amount achieved 286kton (assuming that the area of Beijing is 16800 km^2) in Beijing. This event has four characteristics: a) wind speed in front of the dust cloud was weak; b) moving speed of the dust cloud was slow; c) multi-dust cloud overlap each other that led to severely high dust concentration; d) coarse particle was the main component and concentrated in Beijing area. HYSPLIT (Hybrid single-particle Lagrangian Integrated Trajectory) was applied on this event and the origin was fixed on Mongolia boarder, north part of Inner Mongolia and south-east part of Beijing. With backward wind trajectory, a judgment can be made that this event was mixed with three dust cloud which even influenced Japan and Korea by long distance transport.

The results also show that the dust events occurred in Beijing in 2005-2006 had inner correlation with that of Hohhot but happened 6-10 hours later. As for the same dust event, the dust clouds in Hohhot were usually low (1-2 km) while the dust clouds in Beijing were relatively high (2-4 km). It is obvious that the TSP concentration (extinction coefficient) of the same dust event is higher in Hohhot than that in Beijing while the quantity of monitored dust events is much more in Beijing than that in Hohhot. Beijing's pollution level was affected not only by Inner Mongolia but also by surrounding area, while Hohhot pollution only represented the local condition.