Summary of the Fifth Meeting of Working Group I for Joint Research on Dust and Sand Storms Fukuoka, 19-20 November 2012

1. The fifth meeting of the Working Group I (WG I) for Joint Research on Dust and Sand Storms (DSS) under the Tripartite Environment Ministers Meeting (TEMM) was held in Fukuoka International Congress Center, Japan, on 19 and 20 November 2012. Representatives from China, Korea, Mongolia and Japan participated in this meeting.

2. First of all, Mr. Hidemasa Yamamoto, Senior Analyst of Transboundary Air Pollution, Environmental Management Bureau, Ministry of the Environment, Japan (MOEJ), delivered opening remarks and gave a welcome speech to all participants.

3. In Session One, Mr. Hitoshi Yoshizaki, Deputy Director, Air Environment Division, Environmental Management Bureau of MOEJ, reported discussion results at the Forth DSS-WG1 meeting as well as Steering Committee Meeting (SCM), Tripartite Director Generals Meeting (TDGM) and TEMM to have successive discussion. Furthermore he explained focusing issues of the Fifth DSS WG I.

4. In Session Two, Ms. Sumin Kim of National Institute of Meteorological Research (NIMR), Korea, introduced on the progress on the cooperative data sharing of DSS. It has been reported that Mongolia has provided hourly average PM10, PM2.5 and visibility (2 sites), China has shared daily average PM10 (10 sites), Korea has gave hourly average PM10 (36 sites), LIDAR (2 sites) and visibility (6 sites) and Japan has submitted hourly average of SPM (21 sites), PM10 (11 sites), PM2.5 (2 sites), LIDAR (12 sites) and visibility (76 sites).

5. Mr. Hitoshi Yoshizaki made a presentation on DSS observation system in Japan and he stressed the importance to compile the report by each country as one of the information sharing activities at the DSS WG I. He introduced the information on visual observation, PM observation, LIDAR network and sampling and composition analysis, and explained that information on EANET activities would be added later. He mentioned information sharing based on a similar template would contribute to forming common understanding among participants.

6. Mr. Pan Benfeng, China National Environmental Monitoring Center (CNEMC), reported on dust and sand storms monitoring activity in China. He informed the state ambient air quality monitoring network and DSS monitoring network by CNEMC. In addition to this, he mentioned that CNEMC has released 3 pollutants related data on the website at present namely PM10, SO_2 and NO_2 as real-time data. In response to a question from a participant, China expressed that probably they can share hourly PM10 data in UTC format, however it is necessary to confirm to Ministry of Environmental Protection of China.

7. Dr. Sang-Sam LEE, Researcher, Asian Dust Research Division, NIMR, reported on the observation system and the transport model of DSS in Korea. He explained that the observation of DSS by naked eye is conducted at 51 stations across Korea and Korea Meteorological Administration (KMA) conducts automatic measurement of concentration of PM10 at 28 weather stations. The observation result of current weather is published on the website of KMA in real time. And he introduced the configuration of the Asian Dust Aerosol Model (ADAM).

8. Dr. Munkhtsetseg Erdenebayar, Associate professor, Department of Meteorology and Hydrology, School of Geography and Geology, National University of Mongolia, explained that visual observation of DSS is conducted at 130 meteorological stations and 199 posts across Mongolia. She reported that the observation result is published on the website of Institute of Meteorology, Hydrology and Environment in near real time, and past observation results are available on the website of National Agency of Meteorology and Environmental Monitoring (NAMEM), Mongolia.

9. Dr. Takashi Maki of Meteorological Research Institute (MRI), Japan, presented DSS forecast model in Japan Meteorology Agency (JMA). He introduced that MOEJ and JMA had started a joint website about "Kosa information" from April 2008 and through this website, users can obtain several interpretations of DSS episodes conveniently. Also he showed that they have a plan to upgrade their model to new Model of Aerosol Species IN the Global AtmospheRe (MASINGAR mk-II) and to introduce data assimilation technique (LETKF) after 2 - 3 years.

10. Dr. Hye Jung Shin of National Institute of Environmental Research (NIER), Korea, announced that it had finished linking the relevant websites of each country's forecasting results (e.g., KMA, JMA) under the TEMM website. She mentioned that if there are any documents to be able to share from WG I member, they will be uploaded to the website. As for the prediction result sharing, China side explained that there is a necessity to discuss with China Meteorological Agency (CMA) and China side would consult with CMA.

11. Japan showed appreciation to the participants with regard to drafting the report on the observation system and the transport model of DSS in each country. Japan proposed to keep brushing up the contents and update the information. At the same time, Japan suggested that all countries' report be linked from TEMM home page. All participants agreed with uploading the revised reports basically, in a unified format. Korea was encouraged to suggest a design of the format, taking into account any suggestions from other countries.

12. Mr. Wang Wei, CNEMC, showed the monitoring results on DSS episodes of spring 2010 (DSS2010-01; 15-24 March 2010) and autumn 2010 (DSS2010-02; 4-16 November 2010). It was indicated that DSS 2010-01 was the strongest DSS in 2010, and more than half of the 113 major cities were affected. During this DSS episode, the most severe pollution occurred on 22 March.

13. A presentation on DSS2010-01 and 02 Monitoring and Forecasting at KMA was made by Dr. Lee, Sang-Sam, Asian Dust Research Laboratory of NIMR, KMA. He introduced that DSS2010-01 was the strongest dust episode in 2010 lasting 15 hours and that DSS2010-02 manifested 37 hours which was the strongest autumn dust case since 2002.

14. Dr. Nobuo Sugimoto, National Institute for Environmental Studies, presented the comparison between the LIDAR network data, surface measurements and RC4 (RAMS/CFORS-4DVAR) Dust Emission/Transport Model simulation data for DSS2010-01 and DSS2010-02. He showed that a significant event was observed on April 27- May 6, 2011 and proposed to study this phenomenon next year in DSS WG I.

15. Characterisation of DSS events observed in Japan from mid-term report (2008-2010) was explained by Mr. Hitoshi Yoshizaki. He illustrated that seven events, mainly DSS events during the three years from JFY 2008 to JFY 2010, were processed using multi-angle analysis of different sources of information. He announced that in JFY2013, further analysis will be made, towards the publication of 5-years full

report.

16. Mr. Jong-Chul Ha (NIMR) showed the simulation results of ADAM for DSS2010-01 and 02. He explained that ADAM has a capability to forecast dust occurrence in the source region, pathway and arrival in the Korean peninsula, but not for dust intensity. Also he introduced the UM-ADAM2, which has been operated since September, 2011 for all year round dust forecast. UM-ADAM2 was able to simulate well starting and ending times of dust events.

17. Dr. Munkhtsetseg Erdenebayar introduced MGLADAM (Mongolian ADAM) and the model uses satellite monitoring of surface vegetation, which enables the simulation of dust events occurring not only in springtime but also for the entire year. She explained that MGLADAM has been operated by National Agency of Meteorology and Environmental Monitoring (NAMEM) since late 2010 and the initial and lateral boundary conditions are obtained from the UM (N512L70), which is provided by KMA.

18. Dr. Takashi Maki, MRI, Japan, presented the DSS modeling research activities, in which he introduced the improvement of MASINGAR and the development of data assimilation and inverse model techniques. He showed that the data assimilation technique (LETKF) for estimating dust concentrations and flux as well as inverse model technique for estimating dust flux. He emphasized that the quantity and quality of observation data are critical issue to develop these methods more efficiently.

19. Deposition analysis based on 4D-VAR dust model and DRy And wEt deposition MOnitoring Network (DRAEMON) was introduced by Dr. Yukari Hara, Research Institute for Applied Mechanics, Kyushu Univ. She showed estimated dust deposition flux was validated with DRAEMON data. She stated estimated dry deposition showed relatively good agreement with the observation. However, the model failed to reproduce wet deposition due to the underestimate of precipitation at northern site in Japan.

20. Dr. Itsushi Uno, Professor of Research institute for Applied Mechanics, Kyushu University, introduced Fukuoka City Yellow Sand Public Information System. He mentioned that the city installed Yellow Sand Forecast reporting system as public information system similar to the Korean one, using Japan Meteorology Agency's Official Yellow Sand Prediction Model. It was explained that the city would make Asian Smog Public Notice Information System.

21. The WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) and Asia Node activities were introduced by Dr. Masao Mikami, Director, Atmospheric Environment and Applied Meteorology Research Department of MRI. He explained that SDS-WAS Asia Node discussed the data sharing in the Asian region, SDS-WAS Asia Node common portal development and model inter-comparison. He pointed out that given that Korea has launched a portal site in TEMM and CMA will launch a portal site in SDS-WAS, there would be potential synergy by linking those websites.

22. The participants decided to adopt April 27 - May 6 (DSS2011-01) and May 7 - 18 (DSS2011-02), 2011 as the official term for referring to the dust phenomena within the Working Group as the next targets of the joint study under WG I in 2013. The participants adopted February 1 - 9, 2011 (DSS2011-00) as relevant study, while DSS was not observed during this period, taking into account detail comparison with DSS events focusing on PM2.5.

23. A discussion has been held on feasible data set to be shared. Based on the discussion, the visibility, hourly PM10 data and PM2.5 data were agreed to be shared in DSS WG I. China suggested the possibility to share visibility and hourly PM10 data, subject to the approval by the Ministry of Environmental Protection. As for PM2.5 data, China will consider the feasibility based on the

observation arrangement in the country. On the other hand, Korea will confirm whether their PM2.5 data can be shared among participants.

24. It has been suggested that CMA members would continuously participate in the WG I meetings and be composed of the expert in the WG I in accordance with the TOR of the Working Groups for Joint Research on DSS and Chairman's summary of the Fourth Steering Committee Meeting in 2010. China side agreed to internally discuss a solution on the participation of CMA official.

25. In Session Three, Dr. Youngsin Chun, NIMR, informed on the Asia-Pacific Journal of Atmospheric Science (APJAS) special issues (2nd publication of the WG I). The title of the special issue is "Dust and Sand Storms in East Asia". She reported that the journal is expected to be published in January 2013. She indicated that current number of accepted papers is 10.

26. The WG I asked China to internally confirm the possibility to publish a suitable international journal compiling the papers of WG I and WG II, and China agreed to do so.

27. The chair of the meeting introduced a proposal on draft outline of joint report 2014. The allocation of drafting works was decided as follows: the chapter one (Introduction) by China, the chapter two (Report on the observation system and the forecast model of DSS) by each country, the chapter three (Data sharing and development of portal website) by Korea, the chapter four (Progress of research activities) by Japan (SOLA part) and Korea (APJAS part), the chapter five (Proposed future research cooperation) by Japan and the chapter six (Reference materials) by Korea (refer to Appendix II). As for the proposed future research cooperation, Japan will draft preliminary version, taking into account submissions from other countries. The warning system explanation of each country will be included as an appendix. Each country was urged to develop the draft chapters by the end of June 2013.

28. Dr. Ken Yoshikawa, Professor, Graduate School of Environmental Science, Okayama University reported joint field investigation looking for suitable research site as WG II. He proposed a suitable site for the establishment of joint research site in Hulunbeir. Dr. Masao Mikami commented that the observation of friction velocity using ultrasonic anemometer in monitoring station is crucial to validate numerical models. The WG I recommended careful site selection of the WG II research site, considering linkage between the two WGs.

29. Dr. Yowhan SON, Professor, Division of Environmental Science and Ecological Engineering, Korea University, announced that the result of this discussion will be reported to the next WG II meeting in the end of November 2012 in Korea.

30. The discussion was followed by deliberation on the WG I mid-term strategy. Some modifications of the WG I mid-term strategy were suggested by participants and then the meeting agreed with finalization of the strategy drafting process.

31. Mr. Hitoshi Yoshizaki announced that the next DSS SCM will be held in Japan in 2013, and the results of the discussion at this meeting will be reported to the SCM by Japan. The meeting committed to submit the WG I mid-term strategy to SCM as an official WG I mid-term strategy in the working level.

32. Before closing, it was announced that the sixth meeting of the WG I will be held in Korea in September, 2013 based on the decision of the TOR of the WG I. The detail of the sixth meeting will be confirmed at a later date.

Appendix I

The 5th meeting of Working Group I for Joint Research on Dust and Sand Storms
19-20 November, 2012

Fukuoka International Congress Center, Fukuoka, Japan

List of Participants

China	Benfeng PAN China National Environmental Monitoring Center
	Wei WANG China National Environmental Monitoring Center
Korea	Bongwoo SHIN Deputy Director, International Affairs Division, International Cooperation Office, Ministry of Environment
	Youngsin CHUN Director, Asian Dust Research Division, National Institute of Meteorological Research
	Yohwan SON Professor, Department of Environmental Science and Ecological Engineering, Korea University
	Jong-Chul HA Senior Researcher, Asian Dust Research Division, National Institute of Meteorological Research
	Sang-Sam LEE Researcher, Asian Dust Research Division, National Institute of Meteorological Research
	Sumin KIM Researcher, Asian Dust Research Division, National Institute of Meteorological Research
	Hye Jung SHIN Researcher, National Institute of Meteorological Research
Mongolia	Munkhtsetseg ERDENEBAYAR Associate professor, National University of Mongolia

Japan	Hidemasa YAMAMOTO Senior Analyst of Transboundary Air Pollution, Environmental Management Bureau, Ministry of the Environment, Japan (MOEJ)
	Hitoshi YOSHIZAKI Deputy Director, Air Environment Division, Environmental Management Bureau, Ministry of the Environment, Japan (MOEJ)
	Masataka NISHIKAWA Team Leader, Environmental Analytical Chemistry Section, National Institute for Environmental Studies (NIES)
	Nobuo SUGIMOTO Head of Advanced Remote Sensing Section, Center for Environmental Measurement and Analysis, National Institute for Environmental Studies (NIES)
	Itsushi UNO Professor, Research Institute for Applied Mechanics, Kyusyu University
	Masao MIKAMI Director, Atmospheric Environment and Applied Meteorology Research Department, Meteorological Research Institute
	Takashi MAKI Senior Researcher, Atmospheric Environment and Applied Meteorology Research Department, Meteorological Research Institute
	Ken YOSHIKAWA Professor, Graduate School of Environmental Science, Okayama University
	Yukari HARA Assistant Professor, Research Institute for Applied Mechanics, Kyusyu University

OBSERBER

Fukuoka City	Masanori FUJIMOTO Executive Director, Environmental Control Department, Environmental Bureau
	Shouzou KUBO Director, Environmental Conservation Section, Environmental Control Department, Environmental Bureau
Fukuoka City	Hiromi HAYASHI Chief, Environmental Conservation Section, Environmental Control Department, Environmental Bureau

Japan Environmental Sanitation Center (JESC)	Shinji IWAMOTO Senior Technical Adviser
	Masakazu KUSAKABE Assistant Chief

SECRETARIAT

Overseas Environmental Cooperation Center, Japan (OECC)	Koji NISHIMIYA General Manager Programme
	Masayoshi FUTAMI Researcher
	Junko ICHIGE Coordinator

Appendix II

Draft outline of joint report 2014
(tentative)

Proceedings of Joint research on Dust and Sand Storms among China, Korea and Japan

1. Prefacer (Introduction)
   - Agreement of the 8th TEMM to implement the Tripartite Director General Meeting for joint research on DSS among China, Korea and Japan (2006)
   - The implementation of the first Steering Committee Meeting (SCM) for Joint research on Dust and sandstorms to establish Working Group 1.
   - The first meeting of WG1 and the second SCM in 2008, July.
   - Progress of the historical WG1 discussion
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   - The object of the this report
   - Composition of the report

2. Report on the observation system and the forecast model of DSS
   - Korea
   - China
   - Mongolia
   - Japan

3. Data sharing among the countries
   - Historical progress on the cooperative data sharing
   - Shared parameters from the countries
   - Sharing web site information

4. Progress of Research Activities

   Scientific Online Letters on the Atmosphere (SOLA) -activities by 2011-
   - Proposal to issue from publication on the SOLA at the 2th meeting of WG1.
   - Introduction on the SOLA
   - Review articles

     e.g.,

     (1) Observational study

     (2) Model study

   Asia-Pacific Journal of Atmospheric Science（APJAS）- activities by 2014-
   - Agreement to issue from publication on the APJAS at the 4th meeting of WG1.
   - Introduction on the APJAS
   - Review articles

     e.g.,

     (1) Observational study

     (2) Model study

5. Proposed future research cooperation
   - Overview of the WG1 actuations
   - Tasks for next step and proposals for the policy makers

6. Reference materials
   - The TOR of the Working Groups for joint research on DSS
   - List of members of WG1
   - Summaries of WG1 meeting
     - ○ The first meeting - Seoul, Korea, July 17, 2008
     - ○ Ad-hoc meeting - Shenyang, China, June 18, 2009
     - ○ The 2th meeting - Tokyo, Japan, September 8-9, 2009
     - ○ The 3th meeting - Seogwipo, Korea, November 8-10, 2010
     - ○ The 4th meeting - Beijing, China, November, 11-12, 2011
     - ○ The 5th meeting – Fukuoka, Japan, November, 19-20, 2012