

Summary of the Sixth Meeting of Working Group I for Joint Research on Dust and Sand Storms Incheon, 28-29 November 2013

1. The sixth 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 Sheraton Incheon Hotel, Incheon, Korea, on 28 and 29 November 2013. Representatives from Mongolia, China, Korea, and Japan participated in this meeting.
2. In Session One, Dr. Young-San Park as a moderator announced the opening of the meeting, on behalf of his Director General of the National Institute of Meteorological Research (NIMR). He introduced the schedule planned for the 1.5 day meeting and upon his request, all participants took a moment to officially introduce with each other.
3. In Session Two titled with WG I Activities, Mr. Hiroshi Fujita, Ministry of the Environment Japan (MOEJ), reviewed and summarized what was discussed at the 5th WG I Meeting held in Fukuoka, Japan in which total 19 participants attended. He reminded the colleagues of the improvement previously accomplished in terms of data and information sharing as well as the communication with WG II. In particular, he shared the progress on the mid-term strategy until 2014, which basically illustrates the ongoing activities agreed at previous WG I Meetings.
4. Dr. Sang-Sam Lee, NIMR, Korea, introduced what has been achieved regarding the cooperative data sharing of DSS during 2013. According to his report, Mongolia has provided with hourly average PM10 (4 sites), China with hourly average PM10 (10 sites), Korea with hourly average PM10 (36 sites), LIDAR (1 site), and visibility (6 sites), while Japan has submitted hourly average of SPM (21 sites), PM10 (11 sites), PM2.5 (3 sites), LIDAR (15 sites), and visibility (61 sites). It was worth to note that the Chinese side began to provide hourly average PM10 data from this year, whereas it used to share daily data until last year. He also gave the information about the web-hard where it is possible to find all related data of each counterpart, while showing some data figures as an example. Through his presentation, it was seen that lidar data can be a useful source for detecting not only DSS but also air pollution. He stated that those data shared among this region will be essential for a variety of scientific research papers, modeling works, and comparison with satellite data and 3-dimensional observation.
5. During the Q&A session for Dr. Lee's presentation, there was a comment to appreciate China's efforts to improve the time-resolution of the data as well as Korea's efforts to make the easier process for sharing and downloading data. There were some more questions about the reason for the big differences in Mongolian data from site to site and Japanese data from Kagoshima, and participants shared their own opinions on the possible factors (e.g., it might be the difference in the instruments installed at each site or severe meteorological conditions in spring and winter that sometimes lead to a power outage in case of Mongolia, whereas it might be due to the volcanic impacts for Kagoshima). Regarding this, there was a call for more research works to better design the sites, especially for the southern part of Mongolia. Furthermore, a special emphasis on the importance of collecting and sharing more PM2.5 data was made, while the necessity for the capacity building (observation techniques, calibration, etc.) on data sharing and advanced applications for future works was stressed too.
6. Mr. Benfeng Pan, China National Environmental Monitoring Center (CNEMC) made a presentation on

the activities in terms of DSS and air quality in China monitored during 2013 with QA/QC and the improvement of air quality monitoring in the country. He noted that the country set up a new standard for air quality implemented in 74 major cities, while monitoring some more pollutants such as PM_{2.5}, SO₂, NO₂, CO, and O₃. In addition, he introduced several efforts China exerted to improve QA/QC of the air quality monitoring.

7. During the Q&A Session for Mr. Pan's presentation, the Japanese side mentioned that they would like to be informed when there are any changes in PM_{2.5} and PM₁₀ ratios in China, and Mr. Pan answered that the new standard for the data will be applied to every city by 2016. He also stated that CMA agreed to share the DSS forecast information with CNEMC.
8. Mr. Masayoshi Futami, Overseas Environmental Cooperation Center (OECC), Japan, presented a draft outline of joint report in 2014, including the framework of the report, observation and prediction system, draft of Japanese part, and future schedule with detailed information on what will be included in each chapter. He concluded his presentation by suggesting completing a draft report by the end of 2013, as it needs to be submitted to the Steering Committee Meeting that will be held in January 2014.
9. Session Three began with the announcement made by Mr. Fan Meng, a chairperson. All participants were invited to discuss "Monitoring and Analysis Results of the DSS 2011 cases."
10. Dr. Jugder Dulam, Institute of Meteorology, Hydrology and Environment (IMHE), Mongolia, shared the characteristics of severe dust events observed in the Mongolian Gobi during the spring season of 2011 with more detailed information, including background conditions, PM₁₀ concentrations, and vertical distributions. She concluded that some factors such as drought in the previous year, little precipitation, dry land conditions with less vegetation cover, and intensive dust storm played a major role in generating DSS in the country. There was a question about the degree of DSS in Mongolia in 2012 and 2013, and she answered it was not quite severe for both years potentially due to the better vegetation cover.
11. Dr. Liang Li, CNEMC, described the result of the case of DSS 2011 monitored in China, while explaining and showing weather condition, satellite images, air pollution in major cities, and PM₁₀ concentration in some cities. It was noted that China adopted Air Pollution Index (API) to characterize the level of air pollution since 2000. He concluded that the number of DSS events decreased in 2011 compared to previous years, which left less associated impact on air quality of the country.
12. Mr. Beomcheol Shin (NIMR) made a presentation titled with 'DSS 2011-01 & 02 Dust Monitoring results at KMA'. It was found that the strongest and longest dust episode in 2011 showed 82 hours and 15 minutes in terms of its duration with the maximum concentration of 1,025 µg/m³ (1-4 May, 2011). It was the record breaking severe dust event, since 2002. In case of DSS 2011-02, the duration was recorded 27 hours and 45 minutes (12-13 May, 2011) and 15 hours (14 May, 2011), respectively. This time the maximum concentration showed 838 µg/m³. There was a comment that it may be useful and interesting to see the linkage between DSS events and climatological features and/or synoptic patterns, which is a new scientific movement in the region.
13. Dr. Jeong Eun Kim (NIMR) introduced the chemical analysis for the DSS 2011-00 (haze case) conducted in Seoul Hwangsa Monitoring Center. It was interesting to notice that the physical and chemical characteristics showed that PM₁₀ mass concentration increased by up to 5 times compared to the previous day, when meteorological condition was stable with low wind speed and westerly wind. It was found that most of ionic species were anthropogenic, while its concentration showed higher value up to 9 times when comparing with that of a clean day.

14. Dr. Nobuo Sugimoto, National Institute for Environmental Studies (NIES), Japan, described the monitoring and analysis results of the DSS 2011 cases. He showed the plots made using PM10, SPM, visibility data as well as lidar data shared in WG1 for DSS 2011-00, -01, and -02. He also mentioned the DSS 2012 case where there was no significant dust event during the spring season of the year. In some cases models did not perform well, for example overestimating dust in November. Before closing the presentation, he introduced polarization optical particle counter in which forward scattering and backscatter polarization characteristics are measured for each single particle, while demonstrating the optical characteristics of pure and polluted Asian dust. He stated that the polarization is a good index to analyze non-spherical particles.
15. In Session Four, Dr. Masao Mikami played a role as a chair and presided over the discussion. The topic for the session was “Modeling Study on the DSS 2011 Cases.”
16. Dr. Munkhtsetseg Erdenebayar, National University of Mongolia, Mongolia, demonstrated the simulation results of MGLADAM for DSS 2011-01, while sharing the future research plan on dust modeling. She spoke about the information on the conditions favorable for DSS in the source regions as well as the MGLADAM simulation plots. The future plan included the evaluation of MGLADAM and the modified MGLADAM based on the study taking account of soil moisture functions.
17. Dr. Fan Meng, Chinese Research Academy of Environmental Science (CRAES), China, illustrated air quality modeling and forecasting in Northeast Asia, focusing on the action plan to prevent and control air pollution of the country and its implication to the East Asian region. He stated that strict criteria will be applied to reduce the total amount of pollutants, while reflecting any policy changes in the action plan. He expressed the willingness to participate in the DSS modeling and forecasting studies, working with other partners, using lidar and satellite observations.
18. Dr. Bonyang Ku (NIMR) explained simulation results of ADAM2 for DSS in 2011, showing the comparisons between simulated and observed surface PM10 concentrations in each of the four nations. She concluded that the UM-ADAM2 model was highly capable of forecasting dust events in the source region, its tracks, and arrival time in Korea, but it was difficult to accurately simulate the intensity of DSS. There was a comment that this meeting could provide a good chance for each participating country to validate the performance of models by inter-comparing with the result from source regions.
19. Dr. Takashi Maki, Meteorological Research Institute (MRI), Japan, talked about the modeling study on the DSS 2011 cases with the introduction of Japanese global aerosol forecasting model, MASINGAR mk-2. In conclusion, he summarized the results of each case, notifying that the intensity of dust emission still remained as a challenge, even though dust concentration with JMA’s wind showed close analysis value to NCEP’s wind. He also informed that the country plans to upgrade MASINGAR and assimilate satellite data as hourly data near source area is critically important in validating and modifying aerosol models. He emphasized the importance of considering all kinds of aerosol in model simulation when it comes to PM2.5.
20. Session Five titled with “Other Related Activities” was chaired and proceeded by Dr. Jugder Dulam.
21. Dr. Masao Mikami (MRI) introduced WMO SDS-WAS Program which aims to enhance the ability of countries to deliver timely and quality DSS forecasts, observations, information, and knowledge to users through an international partnership of research and operational communities. He compared WMO SDS-WAS and TEMM WG I by presenting the structure of the two programs and confirmed that they

covered the same goal, establishing a monitoring network and a forecast model.

22. Director General of NIMR, Dr. Jae-Cheol Nam gave a speech to welcome the participants. He apologized for the late arrival for the meeting, explaining that he had to attend another meeting held in Turkey, as he was elected as the Vice President of CAS, WMO. He stated that he was proud of having this kind of cooperative tie regarding Asian Dust in the region, becoming a good example of collaborative activities for mutual benefits in the global communities. He expressed his sincere appreciation to the keen cooperation for the environmental management and services shown by all attendees of this meeting.
23. Ms. Xiaoyan Meng (CNEMC) discussed the spring dust activities over northern China in recent 50 years from 1961 to 2012 and its impacts on PM10 pollution. She demonstrated that the frequency of and the area affected by DSS is declining, while PM10 daily concentration varied depending on the duration. There was a comment that it was impressive to see the statistical analysis on DSS events which showed decreasing patterns. The participants also discussed why floating dust did not show much decreasing trend, and she answered that the factors might rely on local characteristics, such as constructions, farming, etc.
24. Dr. Youngsin Chun (NIMR) shared the information about the compilation of Special Issue, focusing on dust and sand storm in East Asia. She proudly talked about the works done by WG I published in SOLA (Japan, 2011) and APJAS (Korea, 2013) and the one to be published soon hopefully in 2015 by the Chinese side. To show the productive result of WG I activities, she presented the list of papers already published, while introducing field surveys of WG I and WG II and TEMM Environmental Award. She also expressed her willingness to invite and involve scientists from North Korea to further develop the study related to DSS. It was noted that the collective efforts made by this group will be stipulated in the document of WMO CAS as one of its provisional annotated agenda. She also showed a list of some significant DSS 2012 events to select specific cases for future data sharing and participants agreed to confirm three cases (01: March 27-April 2, 02: April 20-May 2, and 03: November 25-30).
25. Next, the attendees discussed the future cooperation, in particular about finishing the joint report by this year. They decided to designate a person for each country as a point of contact to deal with this issue. Dr. Young-San Park (Korea), Mr. Masayoshi Futami (Japan), Mr. Benfeng Pan (China), and Dr. Jugder Dulam (Mongolia) were designated as a point of contact, with Mr. Masayoshi Futami as a coordinator. All countries were asked to submit their report to Mr. Futami by December 20, 2013 and it will be reviewed for finalizing before the end of December. It was decided that China will take care of Chapter 1 (Introduction), Chapter 2 will be handled by all countries, Chapter 3 by Korea, Chapter 4 by both Korea and Japan, Chapter 5 by Japan, and Korean will complete Chapter 6.
26. In terms of data sharing for the year of 2012, Mongolia will provide hourly average PM10 (5 sites), PM2.5 (3 sites), RH (2 sites), lidar (2 sites), and visibility (3 sites), Korea will provide hourly average PM10 (36 sites), daily average PM2.5 (number of sites to be determined later), lidar (2+2 sites?), visibility and RH (6 sites), and AOT (COMS?, SKYNET), Japan was willing to share hourly average SPM (21 sites), PM10 (11 sites), PM2.5 (3 sites), lidar (11 sites), visibility and RH (61 sites), AOT (3 sites (JMA), MTSAT?, SKYNET), and China will offer hourly average PM10 (10 sites). It was noted that the visibility data of Mongolia was observed by instruments, whereas that of Korea and Japan was done by naked eyes. Those items with question marks will be confirmed later.
27. Regarding the paper submission for the next special issue, Korea, Japan, and Mongolia were asked to submit the titles of their papers to China so that China can negotiate with journals in the nation. The

tentative deadline for the manuscript preparation was suggested some time in May, 2014, while review and final collection of the papers was some time in November, 2014 to publish it in early 2015.

28. Dr. Youngsin Chun recommended to have a technical training program specially designed for observation in WG I, similar to what has been done between CMA and KMA for PM10 operation training. By adding about 1 more day to this WG I, the training course can be conducted as a part of this Meeting. There was a comment that it seemed like a good idea. Another suggestions contained to think about inviting members from SDS-WAS to exchange scientific insights together 1-2 days before the official WG I meeting is held as well as a technical staff member of EANET as an invited member of Japanese delegation to discuss QA/QC and other technical matters in terms of PM monitoring.
29. There was an opinion for an involvement of the Ministry of Environment and Green Development of Mongolia to TEMM for further development and cooperation. The need for cooperating with the WMO SDS-WAS research was also mentioned. Another comment was made that we need to closely collaborate with WG II to better countermeasure for dust and its related social impacts among relevant countries.
30. Before closing the Meeting, it was announced that the seventh meeting of the WG I will be held in China in 2014 based on the decision of the TOR of the WG I. The detailed information of the seventh meeting will be confirmed later.