

Summary of the 18th Meeting of the Working Group I for Joint Research on Dust and Sand Storms

Hybrid meeting, Seoul, Korea, June 30th and July 1st (Mon. -Tue.), 2025

1. The 18th 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 hosted by the Republic of Korea on June 30th and July 1st (Mon. and Tue.), 2025. The representatives of the WG I members from Japan, China, and Korea as well as invited representatives from Mongolia participated in this meeting (Annex1: Agenda of the meeting and list of participants).
2. In Session I, Dr. Sangbaek Kim, Director of the Global Atmospheric Watch and Research Division, National Institute of Meteorological Sciences (NIMS/KMA), Korea, delivered the opening remarks and warmly welcomed the participants. Ms. Young-Ah Kim from NIMS/KMA, introduced the agenda of the meeting, which was adopted by all participants. There was a commemorative photo session.
3. In Session II, chaired by Dr. Liang Li from Air Quality Monitoring Division, China National Environmental Monitoring Center (CNEMC/MEE), China, focused on taking stock of discussions and activities. Dr. Atsushi Shimizu from Regional Environment Conservation Division, National Institute for Environmental Studies, Japan, presented a review of the 17th meeting of WG I, summarizing the key outcomes and follow-up actions from the previous meeting. This was followed by a presentation from Dr. Hee-Jung Yoo from NIMS/KMA, who introduced the current status of DSS data sharing and proposed a new method for improving the sharing of observation data among member countries. He stated that the transition to Google Drive with expanded 200GB storage is planned to be completed by July 31st.
4. Session III, chaired by Dr. Atsushi Shimizu featured a series of presentations on ongoing studies related to DSS monitoring and modeling in each participating country.
5. Prof. Keiya Yumimoto from Research Institute for Applied Mechanics, Kyushu University, Japan, introduced a newly launched DSS research project in Japan, explaining its objectives, methodology, and anticipated results. The research aims to build databases, analyze dust mechanisms, develop forecasting systems, assess economic impacts, and propose countermeasures, contributing to policy support and international cooperation on Asian dust issues.
6. Prof. Atsushi Matsuki from Institute of Nature and Environmental Technology, Kanazawa University, Japan, presented assessing the potential of a low-cost pollen sensor for DSS event detection, including comparative analysis with conventional Optical Particle Counters (OPCs). The key point is that an intercomparison of pollen sensors (PS2, PS3) with OPCs in Tsukuba (2024–2025) showed that PS2 was not suitable for detecting DSS in Japan but may be useful in source regions. PS3 showed good potential for simultaneous pollen and DSS monitoring, despite saturation issues in fog, and could serve as a low-cost alternative for DSS observation with proper

threshold settings.

7. Dr. Liang Li presented assessment of dust monitoring and ambient air quality in China (2023), highlighting recent trends in dust weather and its effects on urban air quality. In 2023, 50 large-scale regional dust events were recorded across China, significantly increasing PM_{2.5} and PM₁₀ concentrations in many cities. Among 339 cities, 203 met national air quality standards, with O₃, PM_{2.5}, and PM₁₀ identified as the main pollutants. The proportion of good air quality days ranged from 16.7% to 100%, with a national average of 85.5%. The chemical composition of PM_{2.5} varied by region, and dust weather was found to have a notable impact on air quality nationwide.
8. Mr. Changbeom Cho from National Meteorological Satellite Center (NMSC/KMA) reported on the current status of the GK2A service products for DSS monitoring, demonstrating their applications for improved forecasting and early warning. He introduced four key products—RGB Dust, DEBRA, D*-Parameter, and ADPs. Each product utilizes techniques such as Brightness Temperature Difference (BTD) based visualization, dynamic enhancement algorithms, quantitative intensity estimation, and aerosol type classification. He also shared results from a verification case study of a weak dust event in January 2021, emphasizing the importance of combining satellite observations with ground-based data and numerical weather prediction models to enhance the accuracy of dust detection and monitoring.
9. Dr. Mi Eun Park from NIMS/KMA presented the current status and utilization of KMA's DSS model (ADAM3), with updates on recent model developments. ADAM3, Korea's DSS prediction model developed since 2001, has been continuously enhanced to accurately simulate Asian dust occurrence, transport, and removal processes. Recent improvements include incorporating soil moisture, vegetation, and precipitation impacts, as well as applying 3DVAR data assimilation using monitoring data. Further update of critical wind speed for Asian dust source is forthcoming.
10. Dr. Gomboluudev Purevjav from the information and Research Institute of Meteorology, Hydrology and Environment, Mongolia, presented an overview of the spatial and temporal distribution of dust storms in Mongolia, based on meteorological station data from 2000 to 2023, and highlighted long-term trends and their implications for regional monitoring efforts. The study indicated that dust storm occurrence is closely linked to surface conditions and strong wind frequency, with major events recorded in 2018, 2021, and 2023. Future research will apply regional climate models (RegCM4/5) to project DSS trends and associated risks under climate change scenarios.
11. In session IV, chaired by Ms. Young-Ah Kim focused on reports from the countries on DSS2023 Events.
12. Dr. Hee-Jung Ko (NIMS/KMA) presented the observation and analysis of the DSS2023 case, which originated in the Gobi Desert and Inner Mongolia on May 19, 2023. The dust traveled to Korea and affected the country for approximately 59 hours, during which PM₁₀ concentrations increased significantly nationwide. Chemical analysis revealed that the dust contained not only soil particles but also various air pollutants.

13. Ms. Yajing Li from CNEMC/MEE presented the impact of sand storms on the proportion of crustal elements in PM_{2.5}, focusing on the chemical characteristics of dust events. She introduced the current status of particle composition network monitoring in China, and based on the monitoring results of Beijing, she showed the variation trend of concentration of SO₂, NO₂, PM_{2.5}/PM₁₀, water-soluble ions, crustal elements in PM_{2.5} from Apr. 8 to May. 23, 2023. The crustal elements in two sand storm events share similar chemical composition, indicating a similar source. Meanwhile, different from dust pollution, she introduced other two types of pollution events. Different pollution events exhibit varying trends in component increase.
14. Dr. Takashi Maki from Department of Atmosphere, Ocean, and Earth System Modeling Research, Meteorological Research Institute (MRI), Japan, presented report on model analysis from Japan for the DSS2023 event and related international activities. He reported that the JMA model successfully captured the DSS2023 transport timing, with some intensity overestimation, and highlighted international efforts (WMO SDS-WAS, UNCCD COP16), stressing the importance of promoting TEMM DSS work toward UNCCD COP17 in Mongolia (2026).
15. The session concluded with a discussion led by Dr. Mi Eun Park (Korea) and Dr. Atsushi Shimizu (Japan) on the selection of DSS2024 cases for joint data sharing and future analysis. Korea proposed three events (March 28–31, April 16–20, June 24), and Japan suggested three key periods (March 27–April 3, April 16–21, June 24–28), based on their respective monitoring data. Korea and Japan shared similar spikes in similar periods, China agreed. Therefore, 3 cases were selected: March 27–April 3, April 16–21, and June 24–28.
16. Following a short break, Session V, chaired by Dr. Liang Li was dedicated to discussions on the detailed milestones for the 4th Mid-Term Action Plan (MTAP) (2026–2030).
17. Dr. Keiichi Sato (Japan Secretariat of WG I) presented a report summarizing the achievements of DSS WG I and the progress of the current 3rd MTAP (2020–2025), including advancements in data sharing platforms, forecasting models, and scientific contributions. The report also identified challenges such as delays in cloud migration, limited real-time data sharing, and the need for stronger collaboration with WG II, Mongolia and outreach groups. He will circulate the zero-draft among the 4 countries for review and confirmation.
18. Discussions followed on setting priorities for the next 4th MTAP, covering enhanced data sharing, improved DSS forecasting and early warning systems, streamlined monitoring networks, expanded collaboration with WG II, and the promotion of joint activities with Mongolia.
 - It was emphasized that the continuation of previous WG I activities should remain unchanged.
 - Rather than feeling burdened by the need to produce definitive results over the next five years for research on short-, medium-, and long-term DSS predictions, we agreed that even small progress or pilot projects are valuable.
 - It was agreed to make the new 4th MTAP more detailed. It was agreed to remove redundant mention to satellite data that was also included in previous activities and to clarify unclear phrases about expected results.
 - Description of collaboration with Mongolia was unclear. It was noticed that this description

will be modified as appropriate.

19. The first day of the meeting concluded with a banquet hosted by the organizing committee.
20. The second day of the 18th meeting of the WG I began with Session VI, chaired by Ms. Yumi Yasuda from Ministry of the Environment, Japan (MOEJ). The session focused on further discussions for the 4th MTAP, continuing from the discussions held on the first day.
21. Participants discussed key elements and strategic directions for the 4th MTAP based on a presentation delivered by Ms. Yasuda.
 - Key priorities outlined for the next 4th MTAP included: continuation of current WG I activities; expansion of data sharing scope and enhancement of the data sharing system; improvement of DSS forecast and early warning systems—including short-term, Sub-Seasonal to Seasonal (S2S), and long-term forecasting; streamlining and automation of monitoring systems; strengthening cooperation with WG II; deepening collaboration with Mongolia; and encouraging broader participation from external research groups. Special emphasis was placed on the need to enhance integrated response capabilities by strengthening data sharing and collaborative research, particularly in view of the evolving impacts of climate change on dust source regions and affected areas.
22. Participants also recognized the importance of close cooperation with WG II. Furthermore, there was a shared understanding on the need to further develop collaborative frameworks with Mongolia to build a more effective regional response system.
23. Overall, participants expressed general agreement with the proposed direction of the 4th MTAP. It was confirmed that detailed timelines and milestones would be finalized at the 19th meeting of WG I scheduled for 2026. In addition, the venue and schedule of the 19th meeting will be confirmed by the beginning of November 2025, whether to be held in China sequentially or together with the UNCCD COP17 scheduled to be held in Mongolia in August 2026.
24. Following a short break, Session VII was chaired by Ms. Young-Ah Kim and focused on summarizing the key outcomes of the meeting.
25. The participants reviewed the draft meeting summary collectively, and minor revisions were suggested to ensure accuracy and reflect the key points of the two-day discussions. The participants agreed that the draft would be further revised by the Secretariat and circulated to all members for final confirmation after the meeting.
26. The meeting concluded with closing remarks from representatives of China, Japan, Mongolia, and Korea. In their remarks, the representatives expressed appreciation for the efforts of all participants and the excellent organization of the host country. They also reaffirmed their commitment to continuing close collaboration under the WG I framework in the years ahead. The host country of next year's WG I meeting will be decided after discussions among 4 countries before the beginning of November 2025.

Annex1: Agenda of the meeting and list of participants

The 18th Meeting of Working Group I for Joint Research on Dust and Sand Storms

(Online & On site Meeting)

- ◆ **Date:** June 30th and July 1st (Mon. and Tue.), 2025
- ◆ **Venue:** Mercure Seoul Magok Hotel (4F), Seoul, Republic of Korea
- ◆ **Host:** National Institute of Meteorological Sciences (NIMS)/KMA
- ◆ **Language:** English
- ◆ **Online meeting Link:** Webex

◆ DAY 1 (June 30)

09:50 (UTC+9) Connection Test	
Session I	Opening Chair: Ms. Young-Ah Kim (KOREA)
10:00 - 10:05	Opening Remarks Dr. Sangbaek Kim, KOREA
10:05 - 10:10	Introduction of participants
10:10 - 10:15	Adoption of the agenda
10:15 - 10:25	Group Photo
Session II	Taking stock of discussions and activities Chair: Dr. Liang Li (CHINA)
10:25 - 10:35	Review on the 17th Meeting of Working Group I Dr. Atsushi Shimizu, JAPAN
10:35 - 10:50	Introduction to current status and a new method of DSS data sharing Dr. Hee-Jung Yoo, KOREA
Session III	The study on DSS monitoring and modeling from each country Chair: Dr. Atsushi Shimizu (JAPAN)
10:50 - 11:05	Newly launched DSS research project in Japan Dr. Keiya Yumimoto, JAPAN
11:05 - 11:20	Assessing the potential of a low-cost pollen sensor for DSS event detection Dr. Atsushi Matsuki, JAPAN
11:20 - 11:40	DSS monitoring and air quality analysis in China (2023) Dr. Liang Li, CHINA
11:40 - 12:00	Current status of GK2A service products for DSS Mr. Changbeom Cho, KOREA
12:00 - 12:15	Current status and utilization of Korean DSS model (ADAM3) in KMA Dr. Mi Eun Park, KOREA
12:15 - 12:35	Spatial and temporal distribution of dust storm in Mongolia based on meteorological station data between 2000-2023 Dr. Purevjav Gomboluudev, MONGOLIA
12:35 - 14:00	LUNCH

Session IV	Report from the countries on DSS2023 Events Chair: Ms. Young-Ah Kim (KOREA)
14:00 - 14:20	Observation and analysis of DSS2023 Case Dr. Hee Jung Ko, KOREA
14:20 - 14:40	The impact of sandstorms on the proportion of crustal material in PM_{2.5} components Ms. Yajing Li, CHINA
14:40 - 15:00	Report on model analysis from Japan for the DSS2023 event and related international activities Dr. Takashi Maki, JAPAN
15:00 - 15:20	Selection of DSS2024 cases Dr. Mi Eun Park, KOREA Dr. Atsushi Shimizu, JAPAN
15:20 - 15:40	BREAK
Session V	Discussion on the detailed milestones for Mid-Term Action Plan (2026-2030) Chair: Dr. Liang Li (CHINA)
15:40 - 17:00	Proceeding report 2020-2025 Dr. Keiichi Sato (Japan Secretariat of WG I) Continuation of previous WG I activities Encourage the expansion of data sharing scope and enhanced data sharing system Encourage the enhancement of the DSS forecast and early warning systems Enhancement of the streamline of DSS monitoring system Enhancement of cooperation with WG II Strengthening collaborative efforts with Mongolia Encouragement of the participation of outreach research groups
17:00 -	Banquet

◆ **DAY 2 (July 1)**

10:00 (UTC+9) Opening	
Session VI	Discussion on the detailed milestones for Mid-Term Action Plan (2026-2030) (Continue) Chair: Ms. Yumi Yasuda (JAPAN)
10:00 - 11:00	Continuation of previous WG I activities Encourage the expansion of data sharing scope and enhanced data sharing system Encourage the enhancement of the DSS forecast and early warning systems Enhancement of the streamline of DSS monitoring system Enhancement of cooperation with WG II Strengthening collaborative efforts with Mongolia Encouragement of the participation of outreach research groups
11:00 - 11:20	BREAK
Session VII	Summary Chair: Ms. Young-Ah (KOREA)
11:20 - 12:20	Making a Meeting summary
12:20 - 12:30	Closing Remarks Representative from China Representative from Japan Representative from Mongolia Representative from Korea
12:30 - 13:30	LUNCH
13:30 - 17:30	Technical Tour

The list of participants of the 18th meeting of DSS WG I

Name	Country	Affiliation	Position	In-person Online
Sangbaek Kim	Korea	Global Atmospheric Watch and Research Division, National Institute of Meteorological Sciences/KMA	Director	In-person
Young-Ah Kim	Korea	Global Atmospheric Watch and Research Division, National Institute of Meteorological Sciences/KMA	Senior Researcher	In-person
Hee-Jung Yoo	Korea	Global Atmospheric Watch and Research Division, National Institute of Meteorological Sciences/KMA	Researcher	In-person
Mi Eun Park	Korea	Global Atmospheric Watch and Research Division, National Institute of Meteorological Sciences/KMA	Researcher	In-person
Hee Jung Ko	Korea	Global Atmospheric Watch and Research Division, National Institute of Meteorological Sciences/KMA	Researcher	In-person
Migyeong Kim	Korea	Global Atmospheric Watch and Research Division, National Institute of Meteorological Sciences/KMA	Researcher	In-person
Changbeom Cho	Korea	Satellite Analysis Division, National Meteorological Satellite Center/KMA	Senior Researcher	In-person
Yao Liu	China	Department of International Cooperation, Ministry of Ecology and Environment of the People's Republic of China (MEE)	Officer/ Director	Online
Liang Li	China	Air Quality Monitoring Division, China National Environmental Monitoring Center CNEMC/MEE	Senior Engineer	In-person
Yajing Li	China	Air Quality Monitoring Division, China National Environmental Monitoring Center CNEMC/MEE	Engineer	Online
Tomoyuki Izumi	Japan	Office for International Cooperation, Environmental Management Bureau, Ministry of the Environment	Director	Online
Yumi Yasuda	Japan	Office for International Cooperation, Environmental Management Bureau, Ministry of the Environment	Deputy Director	In-person
Ayano Kotani	Japan	Office for International Cooperation, Environmental Management Bureau, Ministry of the Environment	Technical Officer	Online

Katsuyuki Yamada	Japan	Environmental Pollution Control Office, Environmental Management Bureau, Ministry of the Environment	Deputy Director	Online
Takatoshi Yoshimoto	Japan	Environmental Pollution Control Office, Environmental Management Bureau, Ministry of the Environment	Deputy Director	Online
Taketo Mori	Japan	Biodiversity Strategy Office, Biodiversity Policy Division, Nature Conservation Bureau, Ministry of the Environment	Technical officer	Online
Atsushi Shimizu	Japan	Regional Environment Conservation Division, National Institute for Environmental Studies	Prime Senior Researcher	In-person
Takashi Maki	Japan	Department of Atmosphere, Ocean, and Earth System Modeling Research, Meteorological Research Institute	Section Head	In-person
Keiya Yumimoto	Japan	Research Institute for Applied Mechanics, Kyushu University	Professor	In-person
Atsushi Matsuki	Japan	Institute of Nature and Environmental Technology, Kanazawa University	Associate Professor	In-person
Gomboluudev Purevjav	Mongolia	Information and Research Institute of Meteorology, Hydrology and Environment	Scientific Secretary	In-person
Bayartsetseg Sukhee	Mongolia	Integrated Policy Planning Department of the Ministry of Environment and Climate Change	Senior Specialist	In-person

(Meeting Secretariats)

Keiichi Sato	Japan	Asia Center for Air Pollution Research, Japan environmental Sanitation Center	Head, Atmospheric Research Dept. (Secretariat for Japanese Delegation)	In-person
Mari Futami	Japan	Asia Center for Air Pollution Research, Japan environmental Sanitation Center	Senior Researcher, Atmospheric Research Dept. (Secretariat for Japanese Delegation)	In-person