

Sustainable Nitrogen Management Seminar 2025

Summary

Network Center for EANET

Executive summary

The seminar focused on the role of the Acid Deposition Monitoring Network in East Asia (EANET) in addressing the global environmental issue of nitrogen pollution. The session began by contextualizing nitrogen as a pollutant that has transgressed planetary boundaries, referencing United Nations Environment Assembly (UNEA) resolutions urging for sustainable nitrogen management. EANET's new Medium-Term Plan (MTP) for 2026-2030 was presented, which incorporates nitrogen management as a key objective, leveraging the network's extensive monitoring capabilities. Guest speakers delivered detailed presentations on nitrogen monitoring. Professor Kazuhide Matsuda discussed the challenges in accurately measuring nitrogen deposition, especially for ammonia, and advocated for the use of passive samplers. Dr. Yongjoo Choi presented a study using CRIS satellite data combined with machine learning to map and analyze ammonia concentrations over Korea, identifying key agricultural emission sources. The seminar concluded by emphasizing the need for enhanced monitoring, improved data analysis techniques, and international collaboration to effectively manage reactive nitrogen pollution in the region.

I. Introduction

1. The Sustainable Nitrogen Management Seminar 2025 – Accumulation of nitrogen data in EANET, the EANET Project Fund Activity 2025-04, was convened to discuss the accumulation and utilization of nitrogen data.
2. The seminar was held online on December 22, 2025, from 13:00 to 17:00 (UTC+7), with 58 participants attending out of 82 registered.

II. Opening of the Seminar

3. The seminar was moderated by Dr. Hiroyuki Sase, Network Center for EANET (NC), Asia Center for Air Pollution Research (ACAP), who introduced the session's focus on atmospheric nitrogen concentration, deposition, and the challenges of monitoring, particularly ammonia, in rural and forest ecosystems.
4. Dr. Toshimasa Ohara, Director General of ACAP, delivered the opening remarks, emphasizing that reactive nitrogen is a significant global environmental concern affecting health, ecosystems, and climate. He highlighted EANET's long-term monitoring data as a critical resource for supporting international policy and sustainable nitrogen management, in line with its new medium-term plan. The primary goal of the seminar is to foster a shared understanding within the EANET community on how to more effectively use its data to address global nitrogen challenges.

III. Presentation Session: Accumulation of nitrogen data in EANET

5. Dr. Sase introduced the seminar's topic, highlighting nitrogen's role as a global pollutant that has surpassed planetary boundaries. He referenced the 2022 UNEA Resolution on Sustainable Nitrogen Management and explained EANET's commitment to this issue through its new Medium-Term Plan (2026-2030). He detailed EANET's monitoring capabilities, covering various nitrogen species across different environmental media, and announced the 10th International Nitrogen Conference in 2026. He also introduced the guest speakers and moderated the Q&A session.
6. Professor Kazuhide Matsuda, Tokyo University and Agriculture and Technology, presented “Regional assessment of atmospheric nitrogen deposition using EANET monitoring data”. He emphasized the growing importance of reduced nitrogen (ammonia) and the challenges in its measurement, particularly the artifact issues with the filter-pack method. He proposed using passive samplers as a cost-effective way to expand monitoring. He also discussed the complexity of estimating deposition due to the bidirectional exchange of ammonia between the atmosphere and ecosystems, and highlighted the need to improve deposition velocity models.
7. Dr. Yongjoo Choi, Hankuk University of Foreign Studies, presented “Spatio-temporal distribution of Ammonia over Korea using CrIS Satellite: Validation with in-situ Measurements and Bias Correction”. He detailed the process of validating satellite observations against in-situ measurements and applying bias correction with a random forest machine learning model. His research successfully mapped ammonia concentrations, showing high levels in agricultural and livestock-heavy areas, particularly during summer. The study demonstrated the potential of combining satellite data with ground measurements to improve understanding of ammonia pollution.

IV. Major discussion

[Monitoring Techniques for Nitrogen Deposition]

8. A significant part of the seminar was dedicated to discussing methods for monitoring nitrogen. The issues of the traditional filter-pack method for dry deposition were explained, including the artifact problem where ammonium nitrate on filters can volatilize, leading to inaccuracies. Passive samplers were presented as a cost-effective and simpler method to expand the monitoring network for gaseous ammonia. Dr. Choi's presentation showcased a hybrid approach, combining satellite data (CRIS) with in-situ measurements and machine learning to create high-resolution ammonia concentration maps, demonstrating the potential of integrating different data sources.

[Ammonia (NH₃) Deposition and Bidirectional Exchange]

9. The seminar placed a strong emphasis on ammonia as a key component of nitrogen deposition. Its sources, mainly agriculture and livestock, were discussed. Professor Matsuda elaborated on the concept of bidirectional exchange, where ammonia can be both deposited

onto and emitted from surfaces like soil and vegetation, depending on a 'compensation point'. This complicates the estimation of net deposition flux and requires more sophisticated modeling and measurement techniques, such as the relaxed eddy accumulation method, to accurately assess its impact on ecosystems.

V. Closing of the Seminar

10. Dr. Fan Meng, Deputy Director General, ACAP, delivered the closing remarks for the seminar. He expressed gratitude to the speakers for their valuable and insightful presentations on nitrogen management and monitoring. He also thanked all participants for their active engagement and contributions to the discussion, officially closing the event.
11. The Sustainable Nitrogen Management Seminar 2025 – Accumulation of nitrogen data in EANET was successfully finished.

Speakers:

- **Professor Kazuhide Matsuda**, Tokyo University of Agriculture and Technology, Japan
- **Dr. Yongjoo Choi**, Hankuk University of Foreign Studies, Republic of Korea
- **Dr. Toshimasa Ohara**, Director General, Asia Center for Air Pollution Research (ACAP)
- **Dr. Fan Meng**, Deputy Director General, ACAP
- **Dr. Hiroyuki Sase**, Head, Ecological Impact Research Department, ACAP

NC staff:

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