

ADMLC

Atmospheric Dispersion Modelling Liaison Committee www.admlc.com



Seminar: Dry Deposition and Surface Chemical Reactivity

Venue: UK Health Security Agency, Harwell (near Oxford), OX11 0RQ

10:00-16:00 Wednesday 4 October 2023

Dry deposition of reactive chemicals from airborne plumes onto surfaces (soil, vegetation etc.) is currently a topic of significant interest to a range of sectors including environmental, defence and industrial safety. In the environmental sector, deposition of nitrogen and related compounds from sources such as intensive agriculture and vehicle emissions has recently affected planning decisions for new developments in the UK. In the Netherlands, similar issues around nitrogen deposition and restrictions on emissions has led to considerable debate, including public demonstrations in the streets¹. In the defence and industrial safety sectors, modelling studies published around a decade ago indicated that dry deposition could significantly reduce the size of hazardous clouds produced from Toxic Industrial Chemical (TIC) releases. However, new data for chlorine deposition published in the last few years by the University of Arkansas² have called these results into doubt. The new measurements showed that high vapour concentrations relevant to TIC release scenarios caused surfaces to become saturated and deposition rates to diminish – effects that were not taken into account in the earlier modelling studies. Further tests are currently ongoing at the University of Arkansas to investigate dry deposition of ammonia. Other exposure measurements have recently been undertaken at the US Army DEVCOM Chemical Biological Center. Various organisations are also currently investigating the feasibility of conducting dry deposition and surface reactivity measurements in large-scale ammonia field trials as part of the US-led Jack Rabbit III project.

Given the current interest in this topic of dry deposition, the ADMLC is holding an in-person seminar on the subject on Wednesday 4th October 2023. The aim of the meeting is to share knowledge and experience in modelling and measuring dry deposition of vapours, and to bring together experts working on the subject from the environmental, defence and industrial safety sectors. This includes model developers, test engineers, measurement specialists and users of atmospheric dispersion modelling outputs influenced by dry deposition.

The seminar will follow a similar format to previous ADMLC seminars (for details of our last event, see <https://admlc.com/seminar-12th-march-2020>). It will be hosted by the Centre for Radiation, Chemicals and Environmental Hazards at the UK Health Security Agency, Harwell (near Oxford), OX11 0RQ <https://goo.gl/maps/swtS4aNFd4sv5WhZ9>. The event is free to attend and lunch will be provided. A list of the invited speakers is given below:

¹ <https://www.politico.eu/article/netherlands-nitrogen-headache-pollution/>

² <https://doi.org/10.1016/j.atmosenv.2022.119350>

- **Simon Gant (HSE, UK and ADMLC chair)** “Welcome and introduction”
- **Steven Hanna (Hanna Consultants)** “Time variability in ammonia deposition and re-evaporation as a cloud from a one-minute accidental release passes by”
- **Jon Pleim (US EPA)** “Bidirectional ammonia flux modeling in the CMAQ-EPIC system”
- **Tom Spicer (University of Arkansas)** “Chlorine and ammonia environmental surface reactivity and adsorption/desorption modeled as dry deposition for large-scale release consequence assessment”
- **David Carruthers (CERC)** “Description and evaluation of particulate deposition modelling in ADMS”
- **Nabila Lichiheb (NOAA)** “Processes of ammonia surface-atmosphere exchange in different ecosystems across the U.S.”
- **Marsailidh Twigg (UKCEH)** “Measurement and modelling concentrations and dry deposition of ammonia: methods and challenges”
- **Benjamin Loubet (INRAE)** “Modelling ammonia deposition near large agricultural sources with a coupled Lagrangian Stochastic, k - ϵ , and diffusion resistance approach”
- **Helen Webster (Met Office)** “Modelling dry deposition in an operational Lagrangian model”
- **Oscar Björnham (Swedish Defence Research Agency, FOI)** “An exploration of dry deposition research by FOI - with emphases on winter conditions”
- **Roy Wichink Kruit (RIVM)** “Measurement-model fusion techniques to quantify nitrogen deposition in the Netherlands”

Our hope is that the seminar will help to connect representatives from industry, academia, government departments and consultancies, and provide an opportunity to share knowledge and experience in this field. If you would like to register for the event, please email: admlc@ukhsa.gov.uk.