**HARMO22**

**22nd International Conference on
Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes**
*10-14 June 2024, Tartu, Estonia*

## SHORT ABSTRACT

***Abstract title: Benchmark exercise for nitrogen dispersion and deposition modelling at local scale using operational models***

*Name and Affiliation of the First Author*: H.A.M. (Marina) Sterk, RIVM (National Institute for Public Health and the Environment)

*Email of first author*: marina.sterk@rivm.nl

*Names and Affiliations of the Co-authors*:

RIVM: Eelke Kooi, Addo van Pul, Pim Meijer, Cor Jacobs, Gudrún Thorkelsdottir

VITO (Flemish Institute for Technological Research): Stijn Janssen, Wouter Lefebvre

Aarhus University, Department of Environmental Science: Anne Sofie Lansø

CERC (Cambridge Environmental Research Consultants): Jenny Stocker, Martin Seaton

CEH (UK Centre for Ecology and Hydrology): Bill Bealy, Audric Vigier

Wageningen University, Department of Environmental Sciences: Maarten Krol

## Abstract text *(maximum 350 words.)*

Deposition of reactive nitrogen species on nature areas can have negative effects on environmental quality and biodiversity. Estimates of nitrogen deposition are used for policy plans and for permitting economic activities in several countries; models and observations provide these estimates. The Dutch government has initiated a research program with the aim of improving the reactive nitrogen modelling and measurement strategy. One element of that research program is a benchmarking exercise to assess the performance and accuracy of operational models at local scale (up to 25 km distance from the source). This exercise has two parts: a model intercomparison study and a validation exercise. In both parts, model performance will be explained by an analysis of model inputs, formulations and outputs. Models used for the study are: ADMS, AERMOD, IFDM, OML, OPS, STACKS and SRM2.

The aim of the model intercomparison is to identify to what extent modelled predictions of ambient concentrations and deposition fluxes from different operational models vary, considering differing sources, surroundings and meteorological conditions. The used sources are a buoyant stack, a livestock farm, a motorway and manured land.
This work shows for which circumstances the variance between model outcomes are particularly small or large. Some circumstances with large variance will be further investigated in a follow-up to the benchmark exercise with Large Eddy Simulations.

In the validation exercise, model outputs will be compared to observations from field campaigns for different sources of reactive nitrogen. Model accuracy is quantified with a range of statistical indicators (in accordance with FAIRMODE). An important aim is to determine if nitrogen concentration and deposition can be more accurately determined by using ensemble modelling. Therefore, ensemble averages of model outcomes will also be calculated and compared to observations.

This presentation focusses on the design and the results of the model intercomparison.