

## **Field intercomparison of ammonia passive samplers: results and lessons learned.**

Amy Stephens (1), Sarah Leeson (1), Matthew Jones (1), Netty van Dijk (1), John Kentisbeer (1), Marsailidh Twigg (1), Ivan Simmons (1), Christine Braban (1), Nick Martin (2), Janet Poskitt (1), Martin Ferm (3), Eva Seitler (4), Paolo Sacco (5), Linda Gates (6), Ariën Stolk (7), Jean-Marc Stoll (8), and Sim Tang (1)

(1) Centre for Ecology and Hydrology, NERC, Penicuik, United Kingdom (chri2@ceh.ac.uk), (2) NPL, Teddington, UK (nick.martin@npl.co.uk), (3) Swedish Environmental Research Institute, Gothenburg, Sweden (martin.ferm@ivl.se), (4) FUB, Rapperswil, Switzerland (fub@fub-ag.ch), (5) FSM, Padova, Italy (paolo.sacco@fsm.it), (6) Gradko International Ltd, Winchester, UK, (Linda@gradkolab.com), (7) RIVM, Bilthoven, The Netherlands, (ariën.stolk@rivm.nl), (8) UMTEC, Rapperswil, Switzerland (jstoll@hsr.ch)

Ammonia pollution contributes significantly to eutrophication and acidification of ecosystems with resultant losses of biodiversity and ecosystem changes. Monitoring of ambient ammonia over a wide spatial and long temporal scales is primarily done with low-cost diffusive samplers. Less frequently, surface flux measurements of ammonia can be made using passive samplers at plot scale.

This paper will present a field intercomparison conducted within the MetNH<sub>3</sub> project to assess the performance of passive samplers for ambient measurements of ammonia. Eight different designs of commercial passive samplers housed in shelters provided by the manufacturer/laboratory were exposed over an 8-week period at the Whim experimental field site in Scotland between August and October 2016. Whim Bog has a facility in place for controlled releases of ammonia (<http://www.whimbog.ceh.ac.uk/>). Automated conditional release from the line source occurs when the wind direction in the preceding minute is from the northeast (wind sector 180-215°) and wind speed is > 5 m s<sup>-1</sup>.

The passive samplers were exposed at different distances from the release source (16, 32 and 60 m) and also at a background location. Most were exposed for 2 x 4-week long periods and some for 4 x 2-week long periods. At the 32 m position, an active denuder method, the CEH DELTA sampler and a continuous high temporal resolution wet chemistry ammonia instrument (AiRRmonia, Mechatronics, NL.) were also deployed alongside the passive samplers to provide reference measurements of ammonia. Results are presented within the context of the MetNH<sub>3</sub> CATFAC controlled laboratory exposure assessments.

The results are discussed in terms of typical deployments of passive samplers and quality control. Measurement for policy evidence for both local and regional studies using passive samplers are discussed.