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Evaluation study of the suitability of instrumentation to measure ambient NH₃ concentrations under field conditions

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The uncertainties in emissions of ammonia (NH₃) in Europe are large, partially due to the difficulty in monitoring of ambient concentrations due to its sticky nature. In the European Monitoring and Evaluation Program (EMEP) the current recommended guidelines to measure NH₃ are by coated annular denuders with offline analysis. This method, however, is no longer used in most European countries and each one has taken a different strategy to monitor atmospheric ammonia due to the increase of commercial NH₃ monitoring instrumentation available over the last 20 years. In June 2014, a 3 year project funded under the European Metrology Research Programme, “Metrology for Ammonia in Ambient Air” (MetNH₃), started with the aim to develop metrological traceability for the measurement of NH₃ in air from primary gas mixtures and instrumental standards to field application. This study presents the results from the field intercomparison (15 instruments) which was held in South East Scotland in August 2016 over an intensively managed grassland. The study compared active sampling methods to a meteorological traceable method which was developed during the project with the aim to produce a series of guidelines for ambient NH₃ measurements. Preliminary results highlight both the importance of inlets and management of relative humidity in the measurement of ambient NH₃ and of the requirement to carry out frequent intercomparison of NH₃ instrumentation. Overall, it would be recommended from this study that a WMO-GAW world centre for NH₃ would be established and support integration of standards into both routine and research measurements.