

USDA-EPA Collaborative Ammonia Research

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Background

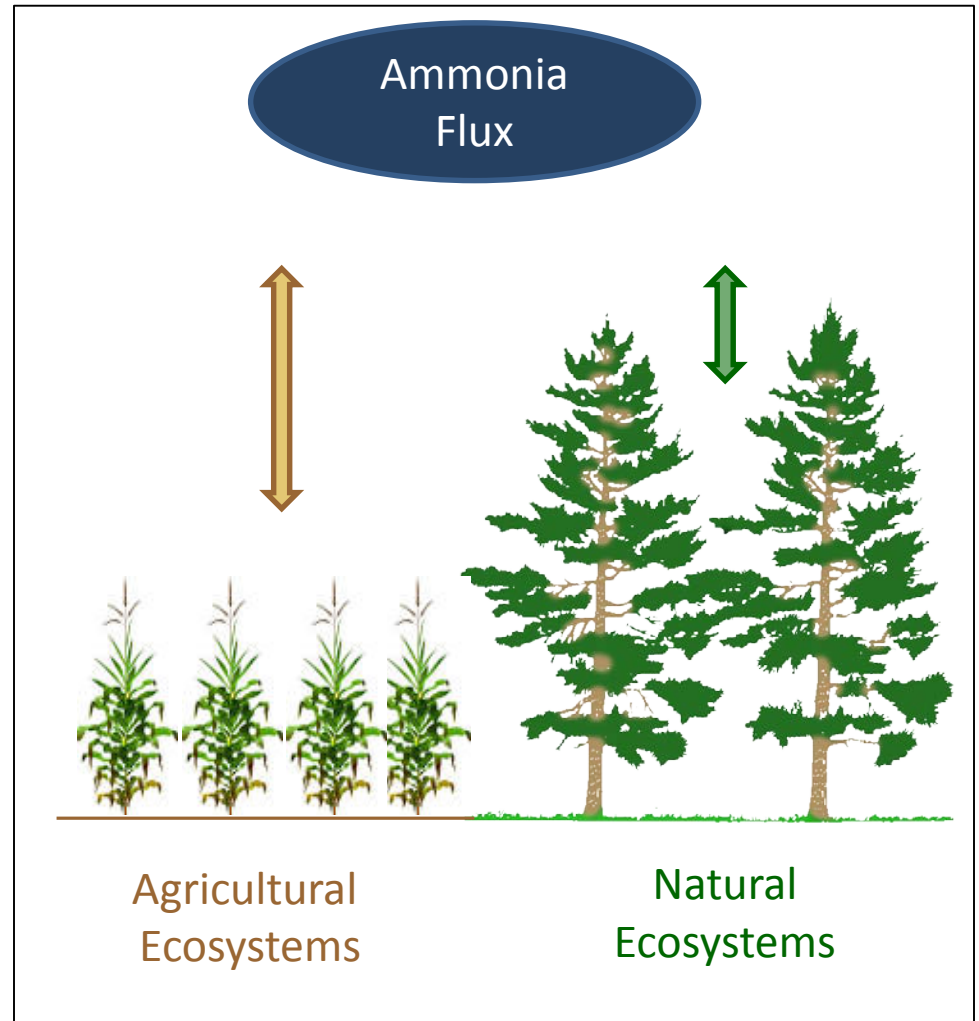
- USDA-EPA formed an ammonia workgroup in summer of 2014
- Goals:
 - Clarifying the EPA regulatory approach in general and as related specifically to ammonia emissions and their fate
 - Assessing and summarizing the state of the science with regard to agricultural ammonia emissions and their fate
 - Identifying research gaps and priorities in this science realm
 - Assessing and prioritizing agricultural ammonia mitigation strategies

Background

- Workgroup convened a two-day meeting (March 29-30, 2016) in Research Triangle Park, NC to:
 - present overviews of past and current USDA and EPA activities related to ammonia
 - USDA emissions work
 - EPA emissions inventory
 - EPA regional modeling
 - discuss research needs related to ammonia dry deposition and spatial variability in agricultural areas
 - discuss methods for measuring and modeling local ammonia transport and deposition near sources

Background

- Ammonia may be emitted from or deposited to vegetation, soil, and water, depending on the ratio of the atmospheric NH_3 concentration to the “compensation point” of the underlying surface.
- Ammonia air-surface exchange processes are “bi-directional”
- The compensation point (χ) is governed by the nitrogen status and acidity of the exchange surface.



Science Questions Informed by Ammonia Deposition and Spatial Variability Studies

- Dry deposition
 - What are the rates and spatial gradients of dry deposition downwind of agricultural sources?
 - What are the best methods for measuring dry deposition of ammonia in these environments?
 - Do bidirectional flux models accurately simulate dry deposition in these environments?
- Spatial variability
 - Do regional air quality models accurately simulate ammonia air concentrations in agricultural regions?
 - Deposition, ammonia/aerosol interactions

USDA ARS Air Quality Research

- In 2015 USDA-ARS began a new planning cycle for the National Program 212 – Climate Change, Soils and Emissions (Marlen Eve)

Managing Emissions from Livestock

- Characterization of emissions pathways of gas and aerosols
- Information on emissions processes (transportation, deposition, atmospheric reactivity)
- Effects of climate and management practices on emissions
- Improved GHG inventories, models, and support tools
- Assist other agencies with “scaling up” farm emissions data to better represent regional/national trends
- Develop cost effective mitigation strategies

Other Emissions Work

- Dust and PM_{2.5} emissions from cropping systems and post harvest operations.

ARS and EPA Collaborative Research

- Research identified by the AAQTF related to better understanding ammonia emissions/atmospheric reactivity
- Evaluate local transport and deposition of ammonia from livestock production facilities
 - Flux measurements to characterize deposition rates
 - Air concentration measurements to characterize spatial variability
 - Evaluation of flux measurement methods
 - Evaluation of bidirectional flux model
- Evaluating the role of ammonia deposition impacts on water quality in the Mulberry River in Arkansas

Benefits from Collaboration

- Better estimation of dry deposition rates
- Data used to improve process level field-scale models of deposition
 - Bidirectional modeling framework
- Evaluation of regional air quality model
 - Improved understanding of contribution of ammonia to regional nitrogen deposition
 - Improved understanding of relationships between ammonia and particulate matter
- Strengthening the working relationship between USDA and EPA and establishing common goals for future work