

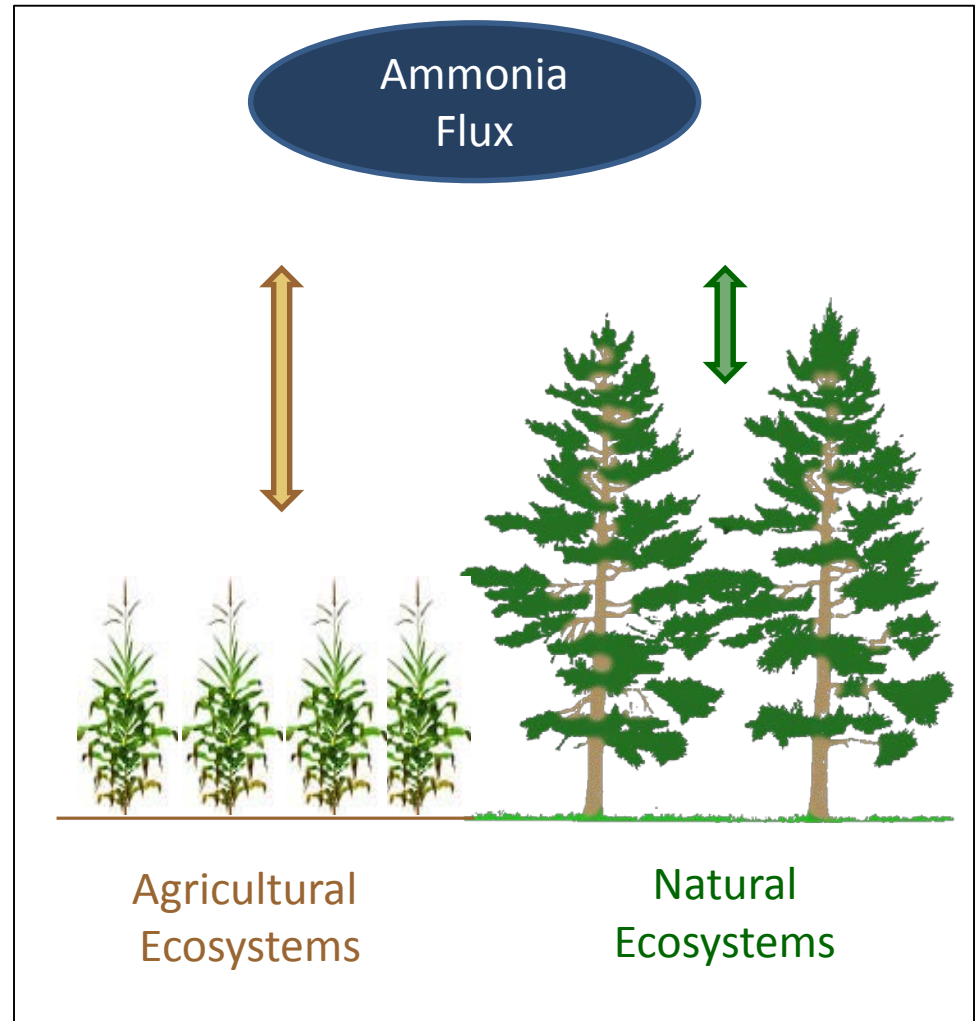
# USDA-EPA Collaborative Ammonia Research

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# Background

- Ammonia may be emitted from or deposited to vegetation, soil, and water, depending on the ratio of the atmospheric  $\text{NH}_3$  concentration to the “compensation point” of the underlying surface.
- Ammonia air-surface exchange processes are “bi-directional”
- The compensation point ( $\chi$ ) is governed by the nitrogen status and acidity of the exchange surface.



# Ammonia Workgroup

- 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

# Collaboration Activities

- 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

# 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 and EPA Coordinated Research

- In 2015 USDA-ARS began a new planning cycle for the National Program 212 – Climate Change, Soils and Emissions (Marlen Eve)
- Project plans were developed over the course of the year based on stakeholder input and are currently undergoing peer review.
- Some of the projects are addressing data gaps identified by the AAQTF
- Most relevant is research related to better understanding ammonia reactions in the atmosphere, including sources, sinks and reactions

# Planned Studies

- 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