NRCS Research Needs

Soil/landscape affects on nutrient dynamics
- not just in place nutrient cycling - sources and sinks for C, N, and P in the landscape; wetland restoration or construction to remove N from fertilized (chemical or manure) cultivated landscape - both runoff and shallow ground water - may also be good area to address nitrate additions to the Mississippi River/Gulf of Mexico.

NRCS Research Needs

Organic carbon relationships with landscape position

Trace element relationships with parent material and landscape – is ARS interested in metals.

NRCS Research Needs

- Trace organic material interactions with soil.
- Importance of the micorrhyzial fungi and the plant root-nutrient interface.
- Affect of fertilizers on micorrhyzial activity and the micorrhyzial fungi community control on carbon sequestered

NRCS Research Needs

Soil change (dynamic soil properties) - affect of C forms (particulate organic matter; active C (permanganate extractable) C, other "forms") on aggregation, infiltration, etc.; C forms contributing to organic matter increases with management/vegetation changes and the stability of these forms; differences in these among soils

NRCS Research Needs

- Soil Carbon Quantification
  - In conservation practices particularly residue management and conservation tillage
  - Uncertainty estimates
  - Fate of soil carbon in eroded landscapes
    - How does sequestration change with different amounts of erosion
    - Does erosion always result in soil carbon loss
    - Fate of carbon: Detachment/transport vs deposition

NRCS Research Needs

P index calculations vary among states - can better predictions of P delivery to surface water be made by using soil information other than hydrologic group and curve number. Soil/landscape affects on infiltration/runoff relationships; P adsorption in different soils (texture, organic C, mineralogy, other)

NRCS Research Needs - AQ

- Particulate Matter
  - Particulate Matter Emissions from Animal Operations
  - Sampler Bias
  - ID and Quantification of Fugitive Dust from Agricultural Operations
  - Evaluation of Wind Erosion Prediction System (WEPS) for PM 10 and PM 2.5

NRCS Research Needs -AQ

- Nitrous Oxide Investigations
  - Mechanisms of N2O release in cropping and manure management systems
  - Complete agronomic system analysis
    - Field measurements & models of N emissions under different cropping systems
    - Ways to increase fertilizer N efficiency, establish alternative management systems for N, protocols for N2O emissions reductions
    - Effect of different animal waste management systems on N2O emissions

NRCS Research Needs -AQ

- Ammonia Emissions and VOCs from all aspects of Agricultural Operations
  - Quantification and Contributions of VOCs to odor, PM and ozone
  - Inorganic Aerosol Formation of Ammonia
    - Identify sources, timing, quantity from all aspects of ag operations
- Process-based models for VOC and Ammonia

NRCS Research Needs - AQ

- Fire Emissions Research
  - Burning crop residue – holistic evaluation
  - Impacts of burning on soil carbon
  - Burn frequency – impact on air quality and climate change
  - Quantification of biomass consumed in burning
  - Develop emissions factors for crops
  - Quantify biomass consumed and emissions factors for grazing/rangeland

NRCS Research Needs

- Process-based models for emissions from animal operations
  - Research
  - Synthesis of results
- Odors
  - Sources, compounds
  - Conditions/practices to mitigate
  - Near-field/local dispersion and transport
  - Influence of diurnal boundary layer and topography on odor

NRCS Research Needs

- Collaboration with ARS scientists, air quality and atmospheric scientists
  - Quantification at local, regional and national scales
- Close collaboration with Wind Erosion Research Unit, NRCS Air Quality Team and ARS research facilities

NRCS Research Needs

- Development of design parameters for new conservation practices
- Quantification of benefits to air quality and climate change from implementation of conservation practices