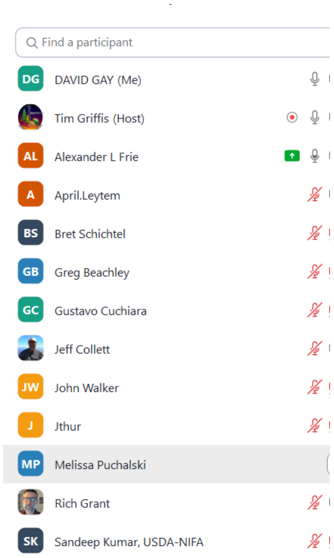
Meeting Note of the MutliState 1213 Project

SAES

12/7/2022

Held online

- Opened by Tim at 1 pm CST
- Asked Dr. Thurston to give some opening remarks
    - Need to add publications for last year. She will do this for last year
    - We have 60 days to do our report. Minutes are important to include
    - We are a multistate project
- Round of introductions, we have 13 attendees
    - Dr. Jeannette Thurston (SAES rep, she is our AA)
    - Greg Beachley/US EPA
    - Alex Frie (Tim's former grad student), UM Duluth
    - Bret Schichtel/NPS
    - John Walker/US EPA
    - Jeff Collett/Colorado SU
    - Melissa Puchalski/US EPA
    - Gustavo Cuchiara/CSU works with Bret, CMAQ modeler
    - Sandeep Kumar/USDA NIFA, research leader
    - David Gay/UW Madison, WSLH
    - April Leytem (came in late)
    - Tim Griffis/UM
    - Jamie Schauer unable to attend this particular time



DAVID GAY (Me)
Tim Griffis (Host)
Alexander L Frie
April.Leytem
Bret Schichtel
Greg Beachley
Gustavo Cuchiara
Jeff Collett
John Walker
Jthur
Melissa Puchalski
Rich Grant
Sandeep Kumar, USDA-NIFA

- Research Activities from the group
    - Alex Frie (Tim's former student), UM Duluth gave a ppt presentation
    - Flight campaign in 2021 where ammonia measurements were made along with other gases
    - Goal was to make an estimate of emissions through a black box type of approach
    - Jan- March flight time, with two passes made over several states in the Midwest
    - NH_3: 30 ppb high, to very low in central MN
    - Followed the two passes with a modeling WARF/CHEM simulations of the data
    - Also compared to satellite retrieval of ammonia data.
    - This presentation focused on the longer term averages
    - Model showed low under production at heavy livestock area, locations with the model. In low cattle areas the model did significantly better

  - Model seems to not be able to capture the variability that the aircraft measured.
  - Model vs aircraft agree quite well in non-point regions (crops)
  - Mass balance is still under review
  - They were able to calculate emissions rates per acre with the flights, and the model was generally pretty good. SW MN especially. Less good in the high point source areas.
  - Summary
    - Large underestimates in NEI
    - Large underestimates in the model
    - Livestock operations explain the low spring peaks of emissions; could be either livestock emissions, or it could be fertilizer emissions from the crops.
  - There is no bi-directional ammonia flux in the models, so this could be part of it.
  - Manure management in the spring could be causing these spring peaks.
  - Alex had to leave early

Update by Rich Grant

- Pretty small effort; working mostly on nitrous oxide in the soils
- A student has been working on the AMON network data to try and estimate the upwind sources. Can we measure the upwind concentrations based on AMON values.
- Chose long-term AMON sites (43 sites)
- Compared to the nearest NWS site for air temperature (averaged to biweekly)
- Multivariate analysis to estimate the background concentrations.
- Significant is the number of farms rather than the number of head of animals.
- Used google earth to figure out the type of farms, went out in radii around farms (10 an 20K rings)
- Looked at the dominant season of maximum emission (varies by type of farm)
- Using google counts, most of the max emission is in the summer, the remainder is in the spring
- Looking at the ratio of max seasonal emission to total emission (intensity), compared these to mean seasonal concentrations.
- Mean seasonal intensity is clearly partially explained by the number of farms
- Preliminarily, it takes about 10 farms in a 20km area around the AMON to see influences on the AMON seasonal concentration
- In general in a broad areas, the AMON concentrations are explained more by the season rather than the number of farms around an area.
- How much variability is due just to the distance to the nearest farm? Haven't looked at it yet

Update By Jeff Collett

- Summary from NADP meeting presentation
- Goal: to better understand the bidirectional emissions and the impact on the Rocky Mountain National Park.
- Urban, ag, oil/gas sources of N to the park
- Deposition flux measurements, using a modified Bowen, and micrometeorological towers
- Tower located about ½ way up mountain, over a grassland, and a tower in the forest canopy
- Higher concentrations in the upslope conditions, as expected.
- Much greater deposition fluxes at this time also, as expected
- Looking at nitric acid, pm2.5 and ammonia
- Ammonia deposition is lower than nitric acid deposition (about 50%)
- For ammonia, canopy interactions are very important
- Some emissions during the downslope period seen.
- Still a lot of work to do here before they turn in their reports.
- Modeling parameterization is ongoing now, and will present some of this work later on (CMAQ)
- Q" filter packs are run typically 3-4 hours for the shortest period, not able to get to 30 minutes; filter pack system is about $10K. Micromet observations are also being measured to help with some of the modeling constants.

Update from John Walker

- Flux tower in Wendell ID, surface NH3 measurements
- Looking for regional patterns, and testing fluxes over days to weeks rather than standard micrometeorological approaches
- What are the deposition rates? Understanding how much effort to run these systems.
- QCL systems (eddy covariance system) to better understand specific key parameters
- Second effort: Colleen Baublitz, bi-directional model at AMON sites. They can use AMON concentrations to estimate dry deposition based on AMON sites.
- Result in the East look pretty good, but in the West, the model is simulating quite large emissions that are perplexing.
- Need more modeling/measurement in the West, with high pH soils.
- Q: this potentially could be used to run with the AMON to estimate dry deposition of NH3 in the future; with lots of assumptions. But it is consistent with CMAQ; he seems to think it is a reasonable approach. Some data would have to go into it, but it has a place in NADP in the future.

Update By Bret Scheckel

- Having some mass balance issues with their modeling of nitrogen in the NPS
- Missed some of this

Update By DG

- Lost 20 AMON sites during the year
- Gave a quick update of the SNIPIT wet deposition samples

Update by Melissa

- 20 AMON sites, due to budget problems
- Equipment is still there, so we can restart sampling if the budget allows
- Hope is still alive that these sites will restart at CASTNET and AMON
- Likely to be a CR (Dec 16)
- Q: what site of decision process; primarily in the NE because we had other sites that could be used to cover, and cost of site operation, so we cut off some of the more expensive sites. Lots of politics involved, of course

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Are there cross cutting activities out there that we could get started.

Any RFPs out there that would lend themselves to this type of action?

Bret: improvement of agricultural activities; improvements of these emissions would be very helpful for a lot of different research.

Walker: Tesh Rowe would be a good person to invite listen to about a way into the NEI of better emissions estimates. For those people that work in specific regions,

April: the activities for ag. are the biggest unknown (dairy for example); how do you rationally assign emissions inventories for this type of activity. The emissions here are very poor. We have also been trying to use satellite results for a top down inventory calculation. A really good project would be to do top down to bottom up inventories to make a better estimate of the accuracy of current inventories. Why/where are the differences?

Tim: we use towers to try to do the exact same thing to figure out where the emissions are not very good, and how do we make them better.

Bret: how do you get the activity measures or a better handle on them. A project that would be able to refine our activity data would be very valuable to a lot of other people. This group would be very good to attack this type of data

April/Rich: a lot of this data or records down actually record any of this inventory. Some of the activities estimates are way off. She gave a few examples. Even when they ask farmers/Dairy farmer who get surveyed, the questions are poor, and are probably getting the wrong information and information.

Walker: Tesh Rowe knows a lot about the inventories of activities, manures, etc.

Tim: knows a few people

DG: we now have the soils laboratory in our WSLH; they work with a lot of dairies, and not the Dairy farmer and could be able to work with known contacts.

Accomplishments need to be/can be

1. Presentations
2. Publications

Jean: Reporting is due in 60 days.

Tim wrapped up the meeting at 2:25 pm central