TDEP Science Committee Meeting
Minutes from October 28, 2011

1. K. Morris gave an introduction on TDEP
    a. Exec approved the science committee, recommended including an international component
    b. Mission and charges were presented to the group

2. G. Lear presented on **Changes to CASTNET**
    a. PRISM data now included to make CASTNET and NADP wet deposition maps
        i. Improvements in precision of wet deposition estimates, especially in the west, using PRISM + NADP
    b. MLM soil moisture problems
        i. Vd very sensitive to soil moisture, missing meteorological data
        ii. Revising MLM code to maintain soil moisture budget even if all meteorological parameters are missing. This has been completed by D.Schwede.
        iii. Exploring possibilities for filling in missing data
            1. Soil moisture: primary site, nearby site < 200 km, historical average
            2. Precipitation: primary site, NADP hourly data from electronic gage, disaggregated daily NADP precipitation, nearby CASTNET site, historical average
    c. Missing metrological data for calculating Vd
        i. EPA CASTNET sites have stopped meteorological measurements at all but 4 sites. NPS CASTNET sites continue to make meteorological measurements except surface wetness
        ii. Typically 20% meteorological data is missing from a site
        iii. To account for missing values, CASTNET will create a table with all the means of each available hour for each week
        iv. Replace missing Vd with the average of the corresponding hourly value from that week
        v. Aggregate data set with replaced values to week, season, year
        vi. Final step is to characterize the additional error added due to missing data replaced with the average
        vii. Eventually drop MLM and use CMAQ deposition velocities
            1. All S and N species available, but still no validation method
    d. Total Deposition Measurements
        i. Cost and methods are the biggest inhibitors
        ii. CASTNET is funding the MARGA 2s (MARGA instruments at 2 heights) and Ameriflux study in Howland ME with ozone @ 8 heights and filter packs at 2 heights (above and below canopy)
    e. Discussion
        i. Need for direct flux measurements was stated

1. J. Walker – Need data on leaf surface chemistry
2. B. Vet – Co-dependence of SO2 Vd and NH3 Vd and changes as SO2 concentration decreases
3. J. Walker – Need to develop flux measurement community – we can't do it all
    - Need low cost flux measurements
    - Need measurement development effort
4. D. Schwede – Monitoring groups need to work with modelers so that methods provide needed information
5. J. Vimont – What about using hourly SO2 concentrations to further characterize error?

ii. H. Lou - MESO-West has precipitation data that could be used to fill in missing CASTNET precipitation

3. D. Schwede presented on **Gaps in N and S Modeling and Measurement**
    a. Gaps in measurements include: Organic N (gas & particulate), NO2, NO, HNO3, NOY
        i. Discussion – How do we get at the true N budget – specifically organic N?
            1. A. VanArsdale - Is true NO2 needed? Yes…
            2. R. Dennis – how is organic N classified? Should we partition organic N measurements into contributions from photochemistry and biomass burning?
            3. R. Artz – organic N is very unstable, but important to measure – how do you measure it?
            4. J. Walker – How well do we understand organic N emissions for the total N emissions budget?
            5. R. Dennis – we don't know deposition of dry organic N.
            6. J. Walker – organic N contribution to dry total N is similar to organic N contribution to wet total N
            7. J. Ray - what is needed for HNO3?
                - (D.Schwede – need to revisit surface resistances)
                - Need different ways to handle aerodynamic resistances
                - Need wide spatial distribution of monitoring
    b. Gaps in Modeling –
        i. Differences in methods for estimating aerodynamic resistances
        ii. Gap in understanding HNO3 Vd
        iii. Discussion – surfaces
            1. J. Ray – uptake rates over different vegetation are different
                - differences in environment also affect uptake rates (i.e. grass in a meadow versus grass in a city).
                - Not yet understood
            2. B. Schichtel – ability to model reduced N is also necessary

iv. Surfaces – need to understand how to model deposition velocities over all surfaces such as: wetlands, in-canopy, coastal, high elevation, urban, clearings, patchy landscapes. In addition, edge effects need to be considered.
v. Discussion - Defining uncertainties
    1. Urban areas - R. Artz – military community has performed studies on how gases permeate through cities – might be useful for this group.
    2. E. Elliot – U. of Pittsburg is working on multi-collaborative effort to look at urban environments
    3. A. VanArsdale – create a list of statements describing the uncertainties, why we need to fill in the gaps and prioritize
    4. G. Murray – high-elevation is a priority
    5. Before this went much further it was decided that everyone would have different priorities. The planning committee would put together a list of statements and we could discuss at the next TDEP meeting in the spring
vi. Modeling processes - how do we measure the exchange pathways individually to improve model parameterizations?
vii. Discussion
    1. W. Robarge – we don't understand vegetation well enough to know how and where they get their water. What is driving plant growth?
    2. J. Walker, A. Vanarsdale and W. Robarge – Discussion on getting the agricultural community involved – using EROS to engage community, agencies. Need to convince USDA/EPRI of the need for air quality monitoring/deposition. Funding? 30% of deposition to agricultural areas is from dry deposition. Overlying vegetation absorbs 80% of fertilizer – help farmers predict uptake & deposition.
    3. B. Vet – Canadian Ministry of Ag wanted to fine tune fertilization rates based on atmospheric deposition
    4. W. Robarge – swine industry doesn't have any interest in monitoring (NADP), but if NH3 is regulated they will need long-term monitoring. How do we highlight that NADP can detect changes/trends. Provide cost/benefit from monitoring to ag.
    5. R. Dennis – CMAQ can be the driver to reach out to groups. Model is ready to take on bi-directional effects.
viii. Should there be a nitrogen flux measurement workshop? – too soon for spring 2012

4. B. Schichtel presented on **Measuring Total Chemically Reactive N**
    a. Missing several important species in monitoring networks, not capturing diurnal cycles, accuracy is questioned. Can we get total chemically reactive N (TCRN) from ambient data?
    b. Can measure Total N more easily, but for management decisions speciation is needed so that source apportionment can be performed

i. Discussion
    1. D. Burns – ecosystem processes and effects should drive importance of reactive N measurements.
    2. R. Dennis – Organic N is more reactive than originally thought to be – importance is increasing in ecosystems
    3. A. VanArsdale – should we measure CO2 as uptake for N.
    4. J. Walker – Use Ameriflux sites and partner with them
    5. H. Luo, C. Rogers – need for collaboration and area for sharing data on web. Van used to provide updates on data availability
    6. J. Walker, D. Gay - Could organic N be included in NADP measurements – need to refrigerate. Additional cost and logistics. More information about where the measurements are needed is necessary before moving in that direction

**5.** M. Gustin presented on **Surrogate Surfaces & Passive Samplers for Measuring GOM Dry Deposition and GOM concentrations**

**a.** Discussion – can we move to a passive Hg network for measuring Hg deposition?

**i.** M. Gustin – passive samplers work well for regional trends. Turbulence would impact deposition

**ii.** F. Marsik – samplers don't use power so you can deploy them in areas where you can't put a Tekran

**6.** F. Marsik presented on **Preliminary Results from a Hg Dry Deposition Measurement Methods Inter-comparison**

**a.** Variability between different approaches

**7.** F. Marsik presented on **Atmospheric Hg Deposition Modeling**

**a.** Discussion – what are the next steps for Hg?

**i.** D. Gay – need Hg dry depositon velocity estimates, 20-25 Tekrans measuring concentrations, passives are the future because of the cost, Hg is a global pollutant – and therefore we need global monitoring. Process for offering data to scientists to come up with dry deposition estimates

**ii.** A. Vanarsdale, R. Artz, D. Burns, M. Risch – add additional surrogate surfaces to Tekran sites to understand the differences. No reason to monitor Hg without meteorological data, need for H20 vapor, CO and SO2. Litterfall is also important at forested sites – but can it be standardized? Yes, within NADP and USGS

iii. M. Gustin – Need to understand O3 and H2O vapor impacts on Tekran measurements. Surrogate surfaces will provide some control

iv. E. Prestbo – AMNet is a monitoring network – additional research needed outside of NADP. Funding for Hg process work and dry deposition studies is not there. Need better linkages between research and routine monitoring. RAMIX highly collaborative – results presented next meeting by Mae Gustin.

8. Recap

a. Action Items
    i. Statements of need for modeling and monitoring
    ii. Other Issues:
        - How to engage Ag community
        - Carbon flux
        - Organic Nitrogen wet deposition measurement initiative
    iii. Possibly produce “state of science” report
    iv. Website for TDEP on the NADP page
b. Next meeting
    i. Spring NADP Meeting in Portland, OR - meeting with CLAD plus additional day
    ii. Possibly smaller discussion groups will be formed
    iii. Kristi/Gary are co-chairs