DMAG Fall 2024 Minutes

Attendees: Mark Kuether, Zac Najacht, Dana Grabowski, Amy Mager, Nichole Miller, Jean Steele, Chris Rogers, Greg Beachley, Amanda Cole, Tim Sharac

Comparison of historic, serial NTN sample processing vs parallel processing.

- Former efforts (2022-2024) were absorbed into current parallel process.
- Tim S. asked whether the new process afforded additional insights into data processing, and if there had been additional scrutiny of the notes codes or the processes as a whole.
 - Zac indicated that the new process has been effective at reducing the data processing time. It has provided cross training to multiple team members. This has led to reduced data processing time as well as process flexibility. If one member is out, others can fill in without great effort.
 - Dana discussed the contamination protocol for the notes invalcode "c". This involves visible debris in the sample, as well as an abnormal concentration on multiple analites. This protocol remains the same.
 - An ongoing question is whether the time frame used for the analite comparison is appropriate. The time frame is currently all time (1978 to present). However, a reduction over time (i.e. SO4) could lead to masking a value that is high relative to the current measurements. The open question is whether a floating time frame of 5, 10, or 15 years would be more appropriate to reduce the chance of that type of masking.

OCR technology for paper forms

The PO, in conjunction with SLH, continues to look into using OCR for form reading. Amy commented that the Environmental Health Division (EHD) and other groups have been reviewing OCR technology for their own paper form data entry needs.

MLN Data Processing

Casey L. had been working with the lab team to ensure the MLN data entry and processing application was working as needed. The team continues to discuss how to apply notes codes and lab qualifiers to the data. The 2023 MLN results were delayed due to issues with the methylmercury standard in July 2024. That had been corrected by the time DMAG met in the fall, and the samples were being processed again. (MLN 2023 has been published on the web).

AMoN Data Processing

- Mark K. was finalizing the AMoN Web Review process before moving the AMoN data to a static table. Casey L. was making some corrections to the processing code which were identified when creating the web review process.

- (Not discussed during meeting) The Web Review Process will only be applied to 2024 and later AMoN data. A high level review of the data issues with the whole AMoN data set (i.e date overlaps, etc) between 2007 to 2024 is available upon request.
- The AMoN Alpha sampler testing was slated to start in mid November 2024. Ten sites will deploy the ALPHA samplers along side of the Radiello samplers for a period of 9 months to test the effectiveness of the ALPHA samplers.
- Amanda C. gave a presentation on the ECCC work on formalizing a process for travel blank corrections and plans to correct for temperature & pressure differences at sites. Canadian site data previously showed that ambient temperatures do significantly impact passive sampling rates and therefore concentrations. The work utilized 2019 NADP AMoN data, first excluding outliers (identified using a 5 yr. overlay plot for samples and a 3*IQR threshold for blanks). A comparison of ambient concentration to blank values confirmed no relationship, which supported an approach that pools all network-wide TBs (travel blanks). To capture seasonal cycles in the TBs, they selected a moving window of 4 weeks before and 4 weeks after the sample period and subtracted the median TB value during that window from the sample loading. It was found that this blank subtraction changed the sample concentrations by up to 70% (lower concentrations).
- Amanda C. detailed the next steps are future work on the temp/pressure corrections to passive sampling rates, mean seasonal corrections for TB & temp/pressure, and the possibility for this to be applied to the ALPHA sampler test data. Temperature correction will proceed using a gridded T product NASA Power, which compared well with on-site T data where available. Pressure correction will use the simple elevation-based correction used by CASTNET
- Mark asked about implications for this study with NADP data. Amanda indicated that there is potential for added value by using these type of corrections on NADP data.

Web Updates

- The web pages were undergoing various updates to correct ongoing issues with charting and reporting.
- The Precip network page was about 90% complete.
- The API code was mostly completed. The main portion to complete was a formal launch plan, and user documentation with code examples.

Map Updates

- The NTN and MDN maps now include the full Canadian provinces below 60 degree latitutde. This raised the question of how interpolation should be handled with that new geography. The MDN used a combination of 500KM and 250KM interpolation, and Mark asked if NTN should adopt this method. The group felt that the 500KM IDW interpolation protocol should be retained for NTN. One main reason for this was for year over year trend analysis. If the protocol changed, this may present as a false trend.

- (After meeting notes Mark discussed the MDN interpolation with Bob during the fall meeting. Bob indicated that this process was developed organically. Bob and other NADP members felt this was a way to show an honest interpolation given the more sparse and reduced MDN coverage.)
- Amanda C asked about the urban sites protocol and whether it applied to industrial area. She raised the case of the oil sands in northern AB, or a BC site near a refinery. The current protocol does not take non-urban industry into consideration with the interpolation. Currently, those features may skew the interpolated results.
- ECCC uses a multiple rating criteria for their mapping, which takes industry, population, emmissions, and other factors into account. They rate sites as 1, 2A, 2B or 3 depending on what factors may affect site chemistry results. This approach was also applied to global precipitation chemistry assessment in Vet et al., 2014.
- Tim S. suggested that Mark can continue to use the group for further feedback. Send additional maps for further commend as desired. He also recommended possibly excluding some sensitive AB sites from interpolation if there were known issues that affected the chemistry.

Future Map Plans

- Mark K. planned to make corrections to the NH4 raster maps for the 2016 and 2017 ande post those to the web.
- Mark K. to work on correcting past and present precipitation maps so they integrate the NADP data with the PRISM data. He will work with Greg B and Tim S. to ensure he is performing that integration correctly.
- Trend Animation maps to be worked on after the above issues are resolved.

The running criteria report

Mark hit a snag when attempting to build this for MDN. It is possible that the faster turn around time may make this simpler. The team will continue to work on this.

RAW OUTLINE NOTES FOR CONTEXT DMAG FALL 2024 MEETING AGENDA

(Amended with meeting notes) (10/23/2024 02:00 PM CST – 03:30 PM CST)

- 1. Welcome (Zac/Mark)
 - a. Attendees: Mark Kuether, Zac Najacht, Dana Grabowski, Amy Mager, Nichole Miller, Jean Steele, Chris Rogers, Greg Beachley, Amanda Cole, Tim Sharac
- 2. Data Review and Reporting (Zac/Dana)
 - a. Network summaries & Status (Zac Najacht/Dana Grabowski)
 - i. NTN May 2024
 - ii. MDN July 2024
 - iii. MLN (Litterfall) 2022 dataset review complete & reported out
 - 1. 2023 data to be completed approx. mid-November (per Christa Dahman)
 - iv. AMoN July 2024
 - v. AMNet 2023 dataset currently in review
 - vi. PRECIP current-2024

b.

Network	Approx. Sites	Approx. Samples per Month
NTN	256	12791 / 12 mo. = 1066
MDN	83	4142 / 12 mo. = 345
MLN	23	Seasonal / Variable
AMoN	100	2591 / 12 mo. = 216
AMNet	10	8760
PRECIP	289	1,156 (289 / week)

- c. Data to website (Mark Kuether)
 - i. Web data status
 - 1. MDN data posted through:
 - a. Weekly July 2024
 - b. Annual 2023
 - 2. NTN data posted through:
 - a. Weekly January 2024

 Mark has been focused on 2023 annual data summary and creating maps/charts leading up to the Fall 2024 meeting. Publishing of NTN data to the web will be back on track soon after the Fall meeting.

- b. Monthly, Season, Annual, WY 2023
- 3. AMoN data posted through:
 - a. May 2024
 - b. No annual summaries
- 4. AMNET Data posted through 2023
- 5. MLN Data posted through 2022
- d. High level SOP Completed. To be filed by Fall Meeting. Detailed SOP's ongoing.
- 3. Updates (Zac/Mark/Jean)

- a. Data Review: reviewer flags, qualifiers & comments (Zac/Casey/Nichole Miller)
 - i. changes to data review processes (Zac)
 - New streamlined data review process implemented in April 2024 (August 2023 dataset was first)
 - 2. Shifting roles/tasks within sample receiving & data team to continue implementation of more branched approach Dana, Jean, Cami, Maya now contributing to NTN data review
 - 3. We have completed 9 months of preliminary review since implementation turnaround time improvements
 - 4. On tentative schedule to reach 90 day turnaround time goal for NTN preliminary data review by end of the year
 - 5. NTN Data Review SOP will need updating
 - 6. Comparison of new process to historical data from old process:
 - a. Valid/invalid (web data)
 - b. QR (Quality Rating) Codes A/B/C (preliminary data review)
 - c. Notes codes (qualifying flags) (a, b, c, d, e, f, h, l, l, m, n, p, q, u, v, z)
 - d. Chemistry values for analytes (Ca, Mg, Na, K, Cl, NO3, SO4, NH4, PO4)
 - 7. Tim S. inquired about the transition to the new process and what knowledge was gained, and if further scrutiny of notes codes or processes as a whole were identified.
 - a. Zac responded indicating that we have gained the ability to process NTN monthly data sets more efficiently and faster using multiple people and more divided tasks.
 - b. Cross-training on these tasks, as well as being able to work further ahead on some steps helps us be better prepared to weather future setbacks (fed govt. shutdowns, COVID, staffing changes, LIMS problems/development) and remain on course with preliminary data review turnaround times.
 - c. Dana brought up & we discussed reassessing SL (screening level) coding in NTN preliminary data review, as the mechanism for invalidating samples. Invalidation for contamination (code c) is based on having both visible debris in samples and having a high concentration in comparison with analytical chemistry results with site specific historical averages. Currently, SL Coding uses analytical values covering the entire range of a sites history for this comparison. One question, raised previously in NADP and DMAG, is whether we should adjust this to a limited time scale (5, 10, or 15 years) to ensure sample assessment is based on current trends, and not overly influenced by older past trends. Zac indicated that we would welcome input into this discussion.
 - ii. Future Plans (Mark):
 - 1. To update NTN and MDN web review to confirm date based notes codes where able.
 - a. Mark K. looking into improving checks to help correct datebased errors and applicable notes codes during processing of preliminary data to the web.
 - iii. External Audit items (Zac/Mark)
 - 1. General takeaways
 - a. Zac N. gave brief overview of the data related portion of the NADP external audit. Now waiting for the official report from

the audit team to begin addressing any findings or discuss recommendations.

- b. NTN Process Updates (Zac/Mark)
 - i. Since last meeting previous pre-screen efforts (i.e. developing search queries) replaced by new NTN Process.
 - 1. Mark K. reported that these efforts have been absorbed into the new preliminary data review process.
 - ii. OCR being researched by OIS for all of SLH outside of direct NADP PO control. This remains an important aspect for future improvements.
 - 1. Mark K. reported that WSLH (WI State Lab of Hygiene) is looking into these options and will likely end up being a WI State lab wide implementation if it happens.
 - Amy M. added that EHD (Environmental Health Division) at WSLH and some other groups have been moving to some other programs (OnBase) that we may gain some information from and see what could apply to NADP operations in supplies, shipping, sample login, data entry and billing. There may be some OCR functions that would help us save time & effort on our first and second data entry steps of the sample receiving process.
- c. MLN (Litterfall) notes codes & QR codes (Zac/Dana/Mark/Casey)
 - 1. Develop & implement notes codes & QRs
 - a. 2022 dataset reviewed and sent out
 - b. 2023 dataset to be reviewed possibly with QR and notes codes
 - i. Feedback on possible notes codes d, f, i, l, m, q
 - ii. MLN LIMS development work (Casey / Christa)
 - Casey L. reported that he and Chris Lepley from the mercury lab have continued to work on development of the MLN portion within LIMS as well as possible notes codes and lab qualifiers.
 - 2. Chris R. inquired about the timeline of 2023 MLN data completion and reporting?
 - a. Mark K. and Zac N. responded that we were not certain of the current status and that we would inquire with Christa Dahman (mercury lab supervisor) to get an update
 - i. Mark K. contacted Christa D. and received the following status update:
 - ii. Short answer: analytical data will be ready by mid-November
 - iii. Longer answer: We ran into a snag with an expired methylmercury standard back in July and no manufacturer was capable of producing one for us. We were able to obtain an aliquot of a certified standard from USGS MRL a couple of weeks ago and Chris L. is analyzing the last batch next week
- d. AMoN (Zac/Mark)
 - i. AMoN Web Review Process formalized
 - ii. Data being ported and tested in test environment prior to production.
 - iii. Test web to be updated for static AMoN table.
 - iv. Live data to be ported once web tests are completed.

- v. Live site to be updated once live data is ported.
 - 1. Mark K. working on building a finalized process for moving AMoN data to static table before publishing to the web.
 - 2. Casey L. continuing to work on the coding issues in the test environment.
 - 3. (Not discussed during meeting) The formal web review process will ensure samples with missing or invalid dates are handled to avoid anomalous data. The data manager will not be applying this process to data published proir to this change over. A high level data summary of pre-static data will be published on the AMON page so researchers are aware of some of these past anomalies. This will simply show the counts of invalid dates, etc.
- vi. Alpha sampler testing data workflow yet to be determined. Waiting on initial results and next steps in testing phase Initial test phase mid-late November to end about August 2025.
 - Zac N. reported that the AMON ALPHA sampler test sites will begin in mid-November. There will be 10 sites using duplicate ALPHA samplers alongside their current AMON Radiello samplers for a duration of nine months.
- vii. Updates on Travel Blank temperature and pressure adjustment study (Amanda Cole).
 - 1. Amanda C. gave a presentation on their work on formalizing a process for travel blank corrections and plans to correct for temperature & pressure differences at sites. Canadian site data previously showed that ambient temperatures do significantly impact passive sampling rates and therefore concentrations. The work utilized 2019 NADP AMoN data, first excluding outliers (identified using a 5 yr. overlay plot for samples and a 3*IQR threshold for blanks). A comparison of ambient concentration to blank values confirmed no relationship, which supported an approach that pools all network-wide TBs (travel blanks). To capture seasonal cycles in the TBs, they selected a moving window of 4 weeks before and 4 weeks after the sample period and subtracted the median TB value during that window from the sample loading. It was found that this blank subtraction changed the sample concentrations by up to 70% (lower concentrations).
 - a. Mark K. asked if this could provide any improvement or be of a significant impact to NADP AMoN data?
 - i. Amanda C. responded that yes, there is definitely the potential for some value added with the use of the TB corrections for temperature/pressure.
 - 2. Amanda C. detailed the next steps are future work on the temp/pressure corrections to passive sampling rates, mean seasonal corrections for TB & temp/pressure, and the possibility for this to be applied to the ALPHA sampler test data. Temperature correction will proceed using a gridded T product NASA Power, which compared well with on-site T data where available. Pressure correction will use the simple elevation-based correction used by CASTNET.
 - a. DMAG will discuss updates in our Spring 2025 meeting.
- e. Web Updates (Casey/Mark)
 - i. Precip Network page and code running in test environment.
 - ii. Network data export code corrected and running in test environment.
 - iii. Errors observed on Operator support precipitation page are currently being worked on.

- 1. First and last precipitation value errors due to web server offset errors.
- 2. Missing first day error due to web server offset errors.
- 3. Chart X axis alignment issues.
- 4. Chart not drawing, or drawing incorrectly.
- iv. Mark K. reported that this work is approximately 90% complete
- v. API Updates:
 - 1. Updated to provide Precip data export functionality.
 - 2. Corrections for various data export errors observed on live web site.
 - 3. <u>.CSV Output</u> option added for easy report generation.
 - 4. Documentation available by request.
 - 5. Test python script to demonstrate API available by request.
- vi. Misc. Updates.
- vii. Future Plans:
 - 1. Generate plan for exposing and announcing API to public.
 - 2. Consider future plans for API to support users.
 - a. Mark K. discussed how NADP needs to evaluate what researchers and other data users want/need.
 - 3. Web Corrections published to live site.
 - 4. Precipitation Network page completed and available on live site.
 - 5. Mark K. stated that some of these items were brought up at the external audit and will likely be addressed in the final report/response.
- f. Map Updates (Mark)
 - i. Charts and Maps
 - 1. Scripts successfully converted to Arc GIS Pro Python 3 (Thanks Greg Beachley and Tim Sharac).
 - 2. Concentration and deposition maps to be printed on each page. To include use "full" Canadian map.
 - 3. Rasters to remain capped to CONUS for 2023. Interpolation into Canada to be discussed before executing. No PRISM model in Canada at this time, so unable to produce Deposition maps at this time.
 - 4. Open questions for Canadian concentration raster production:
 - a. Do we use the basic 500 KM interpolation as per the lower 48, or use a different method (i.e. similar to MDN)?
 - b. Do we wish to allow all interpolated data to extend into Canada, or crop where no Canadian sites provide continuity?
 - 5. Mark K. showed some map examples and discussed the following:
 - a. There have been some big changes to the maps/charts
 i. Updates to maps and scripts
 - b. Canadian map inclusion now with points on the map for sites (used to only be a list)
 - c. Precip and deposition interpolation could be on future NADP maps (but not this year). During a first review, Mark had some questions.
 - i. Should we extend our interpolation over the Great Lakes regions? Amanda and Greg both agree that we should not. The lakes have a significant effect on the chemistry, which would not be reflected accurately. In addition, there are Canadian monitoring sites (not NADP) on the northern edge of the lakes which would not agree with the interpolated results.

- ii. Is 500km protocol sufficient for Canadian sites? The MDN maps use a combination of 500 and 250 km interpolation to balance map coverage with uncertainty for isolated or edge points. Mark will reach out to Bob and members of MELD to see if he can learn more about the history of the MDN maps. He would like to know how/why they developed a different interpolation method.
- iii. One of the purposes of these maps is to provide year to year trend comparison at a glance through consistent data application. Changing the interpolation method for the whole map would impact the CONUS portion in future years. Using a different Canadian vs CONUS protocol could make the maps confusing.
- d. Amanda C. asked about the urban sites protocol (not included in interpolation) and how it may also apply to sites in industrial areas (i.e. northern AB sites near oil sands or BC site near a refinery).
 - Rating sites for industrial activity, population, emissions and other infrastructure. Environment Canada rates sites by multiple rating criteria of 1, 2A, 2B, or 3, depending on what might affect the sites chemistry. This was also applied in the global precipitation chemistry assessment (Vet et al., 2014).
 - ii. Mark K. responded that NADP does not consider industrial sites as they do for urban sites
 - Rating of all network sites for additional criteria would be a labor & time intensive undertaking. Amanda will share the available site ratings used in the production of the kriging interpolation maps for North America, as reported in the AQA reports.
- e. Tim S. stated that if Mark K. wanted further input, he can send some on to the group for review and comment.
 - i. He also stated that maps are binary, and so in the Canadian maps, it's possible that some AB sites would be excluded from the maps (red) and some could be interpolated (green).
- ii. Future Adjustments (target Fall 2024)
 - 1. Rebuild 2016 and 2017 NH4 maps to reflect updates from Dec 2022/Jan 2023.
 - 2. Rebuild maps with missing IDW precip data missing since 2016. New grids posted adjacent to existing grids.
 - a. Mark K does not have a lot of historical data to reference for this, and is uncertain that the scripts he has are correct. He plans to work with Greg B. and Tim S. to ensure he is executing the IDW correctly.
 - 3. Animations to be completed after NH4 and IDW issues resolved.
- iii. Monitoring map status:
 - 1. Running Criteria report stalled due to incomplete date issues with unreviewed data. To re-evaluate with new NTN process.

- a. Mark was using MDN samples with his first attempt. He will check to see if the new process used by NTN, with the earlier date review, will allow this to move forward.
- 2. Continuity risk map / running sample count report No actions taken at this time.
- 3. NEXT STEPS: finalize monitoring tools. Develop plan on how to monitor and alert sponsors, etc on higher risk sites.
- g. Data Products Updates (Mark) no updates.
- 4. Additional Discussion Topics (Various)
 - a. Updating web page to highlight using the Data Request form to serve non-qualified data requests for event based research (train derailment, forest fire study, etc)?
- 5. DMAG moving forward (Various)
 - a. Mark to take the role of DMAG Chair. Zac and Mark to possibly switch off every 1 or 2 years.