



Asia Pacific Mercury
Monitoring Network

The Asia Pacific Mercury Monitoring Network (APMMN): Support from North America (NADP)

APMMN Partners Meeting
Dec 10, 2025
Taipei, Taiwan

David Gay
National Atmospheric Deposition Program



National Atmospheric
Deposition Program

First of All, A Message from NADP...

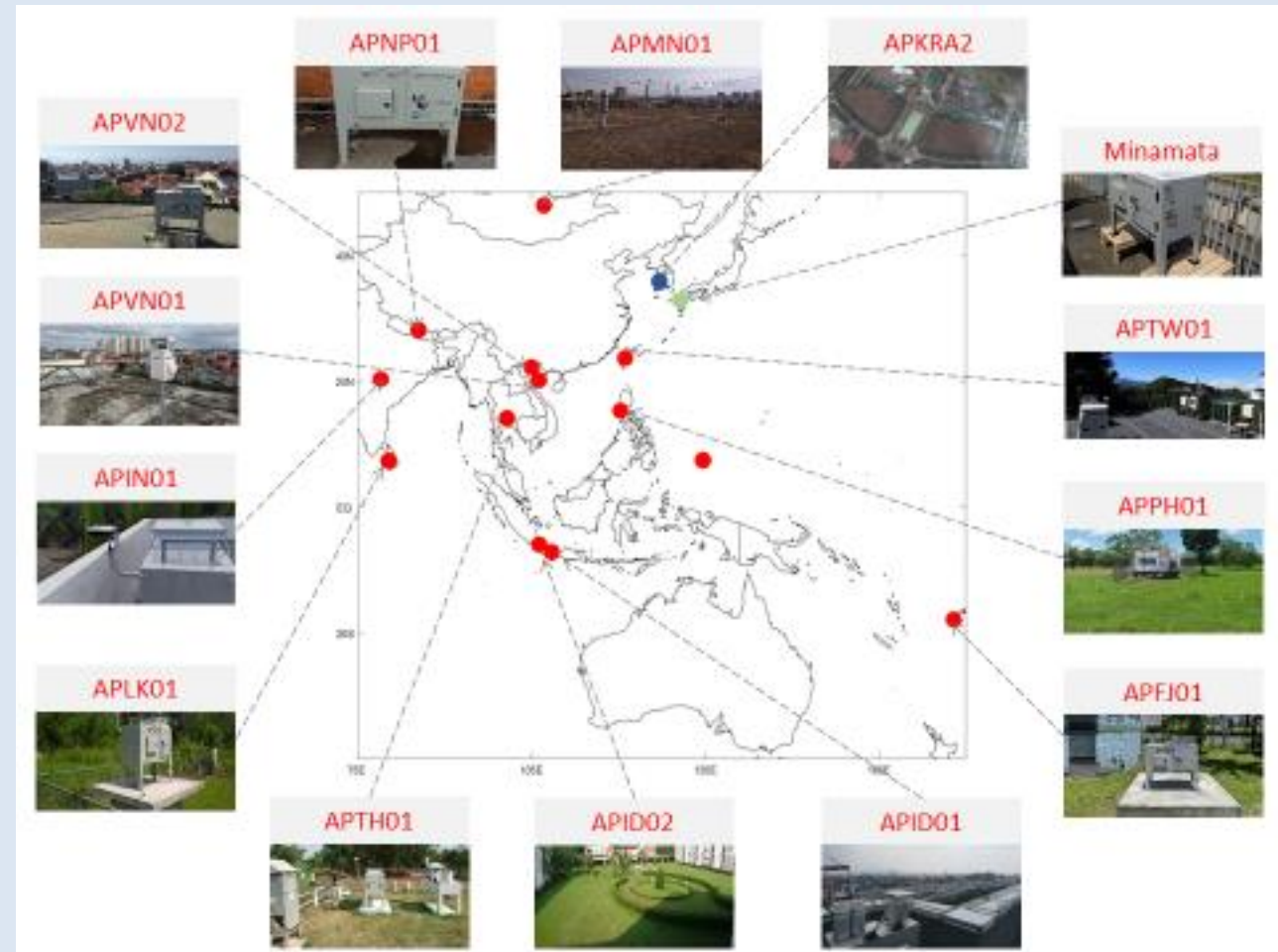
- NADP is happy to support the work that you are doing here
 - I have been helping with APMMN since 2012 and NADP supports my work
 - NADP encourages you to continue making measurements and improving your network
 - We stand ready to help in any reasonable way
- US EPA stand ready to help also



NADP members in US (Tennessee)

Continued Importance of Weekly Monitoring

- What APMMN is doing week to week is important, and it is needed
- It is good information to you to have
- And for the global effort to remove Hg from the environment
- We are doing the same in North America with MDN
- Together we are adding to the body of knowledge
- And the most important region is Asia, where a lack of information and measurements is most problematic
- So good for APMMN, keep it up



The Importance of Sharing the APMMN Data

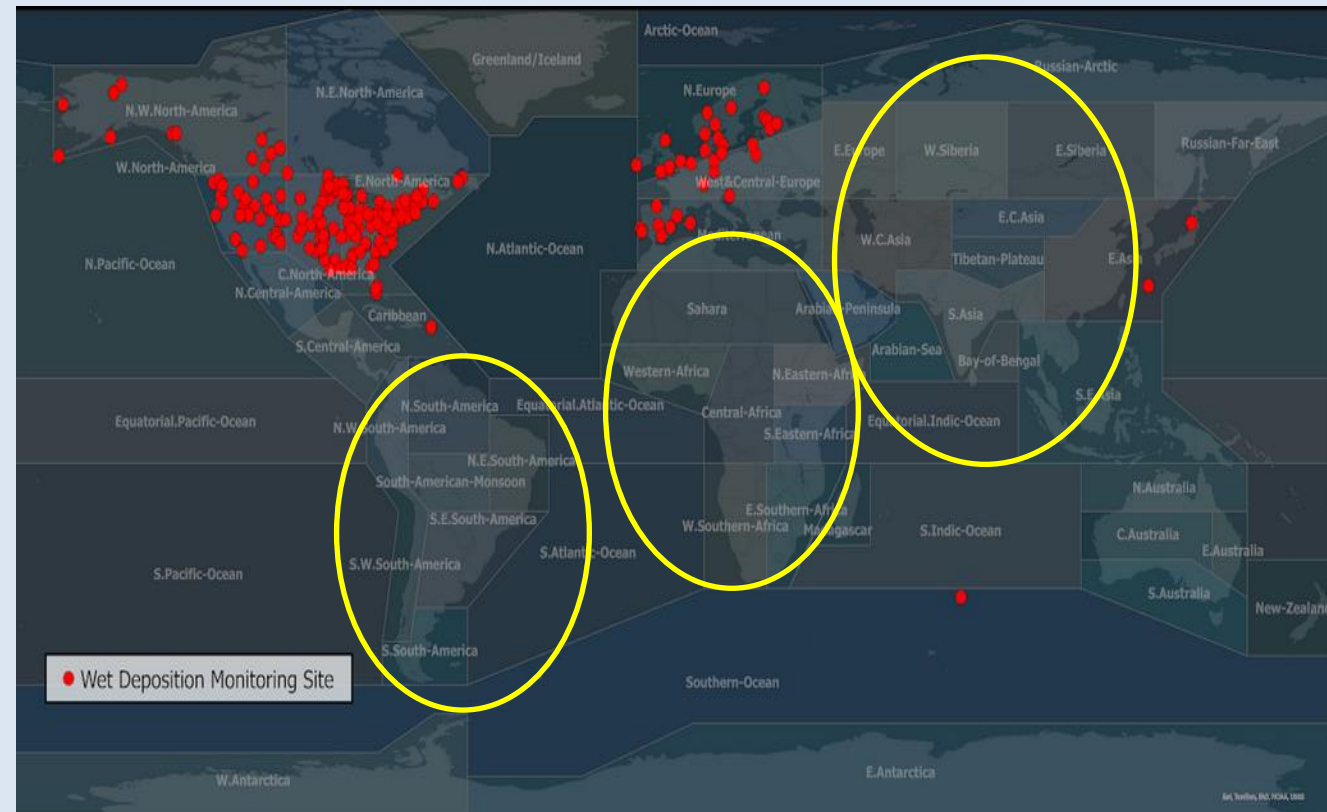
Data Sharing...

- We all know the value of monitoring
 - It provides us with information that we need to protect human health and monitor pollution movement in our environment
 - And running in a network makes sense
 - There are other sites to compare your measurements to
 - Standard operation, repeated measurements for trends
- But in this case, Mercury is a global pollutant.
 - So we need global monitoring...



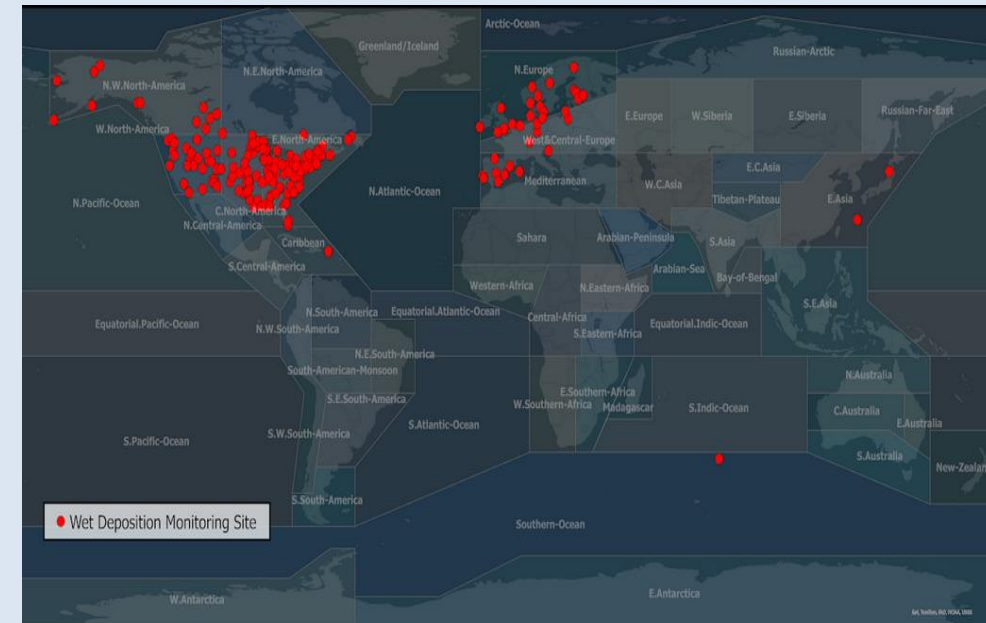
Data Sharing...

- The Minamata Effectiveness Evaluation is currently ongoing
 - <https://minamataconvention.org/en/documents/effectiveness-evaluation>
 - I am helping to run the atmospheric monitoring chapter to answer the question of “are atmospheric mercury concentrations going down?”
 - There is very little data in Asia
 - Just Japan



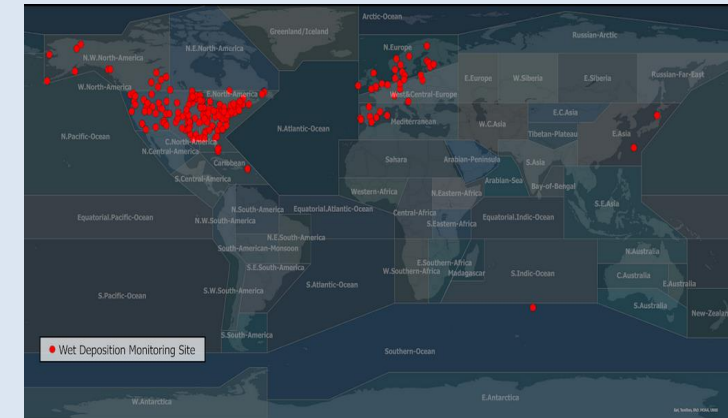
Data Sharing...

- I would encourage every Country here
 - Get the permissions needed to share your data
- add in your data to the Minamata Effectiveness Evaluation
- We need all of the data we can find
 - If you are willing, contact
- Sandy Steffen
 - Env. Climate Change Canada
 - Alexandra.Steffen@ec.gc.ca



Data Sharing...

- Another idea we may want to consider here
- Last year we voted to share the APMMN data
 - For all of those countries that voted in favor
- Maybe APMMN wants to vote here to share all of the APMMN data with the Minamata Effectiveness Evaluation?



Importance of Passive Hg Measurements

Why Is It Important to Measure Gaseous Passive Hg?

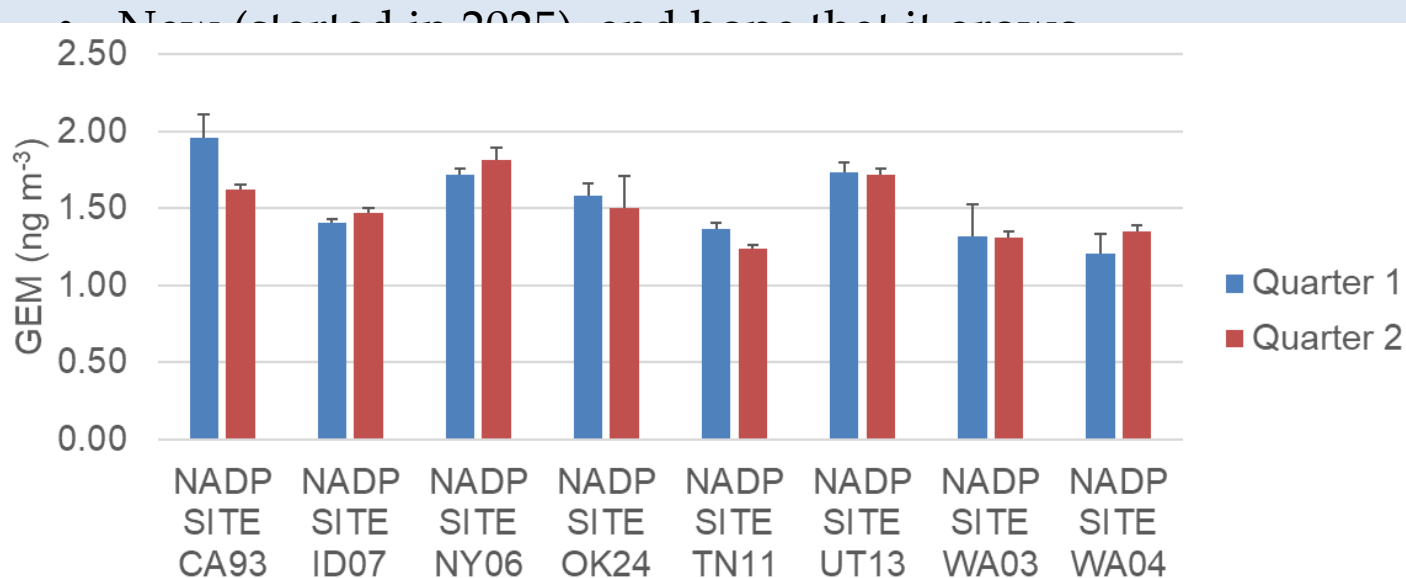
- Measuring gaseous Hg is important for making health determinations
- Also for determining if a downward trend is present
- This is what the Minamata Effectiveness Evaluation is attempting to do.
- Is Mercury in the environment decreasing?
- This is why your monthly measurements of Passive Hg are so important
- You are making regular measurements where none are being made
- And this is why the US is also building a Passive Network like APMMN



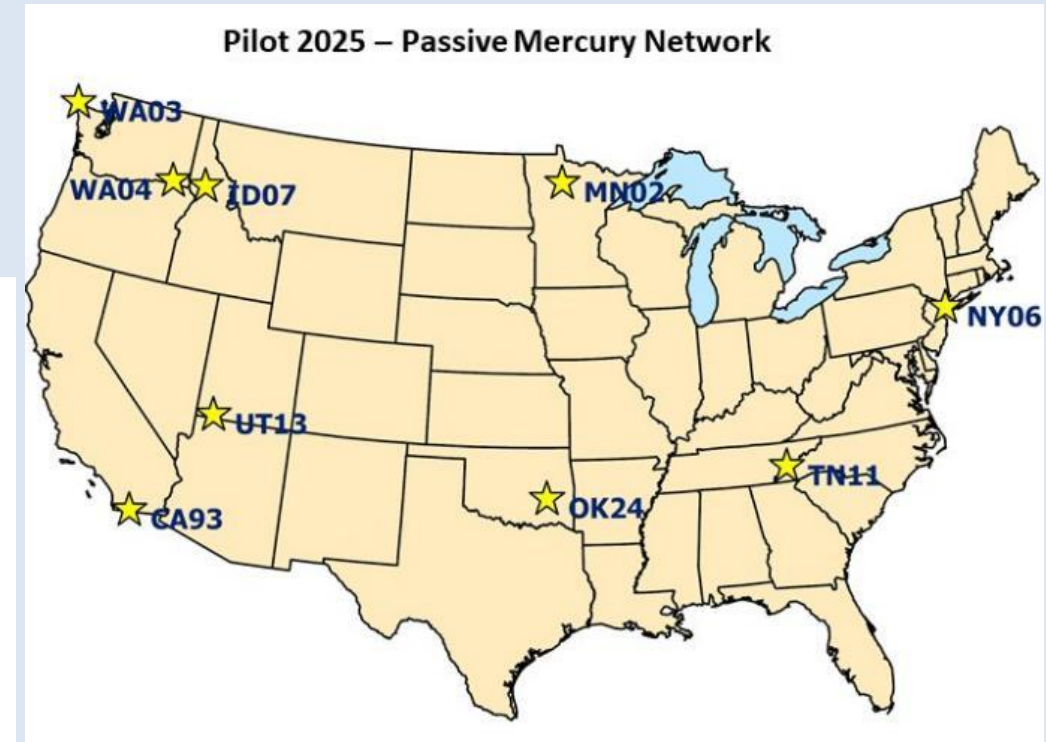
We are building a gaseous passive Hg network too

US Passive Hg Network in NADP

- 10 sites making measurements



- So results are average Hg concentration in the air for three months



CA93 - La Posta Tribe
ID07 - Nez Pierce
NY06 - NYDEC
OK24 - Choctaw Nation
TN11 - Great Smoky NP
WA03 - Makah Tribe near Olympic NP
WA04 - Tribes of the Umatilla
UT13 - Zion NP
MN02 - Red Lake Nation*
ME94 - Indian Township*

An Idea for APMMN and NADP Cooperation

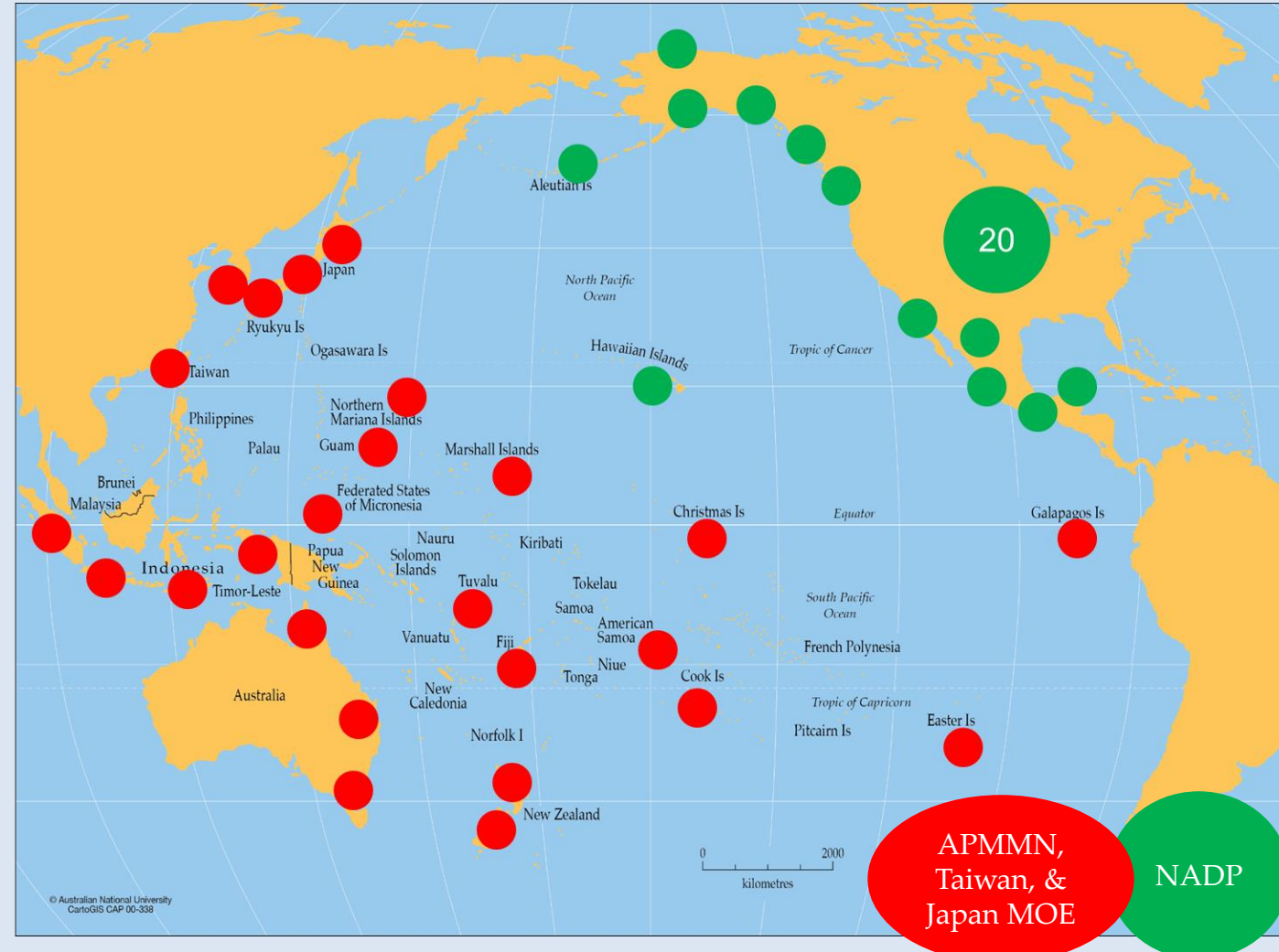
Tim mentioned this too

A Pacific Island Atmospheric Hg Network based on passive measure

- we have been talking about this for a couple of years now
- it is certainly data that Minamata can use for global monitoring

cover about 20% of the Northern Hemisphere

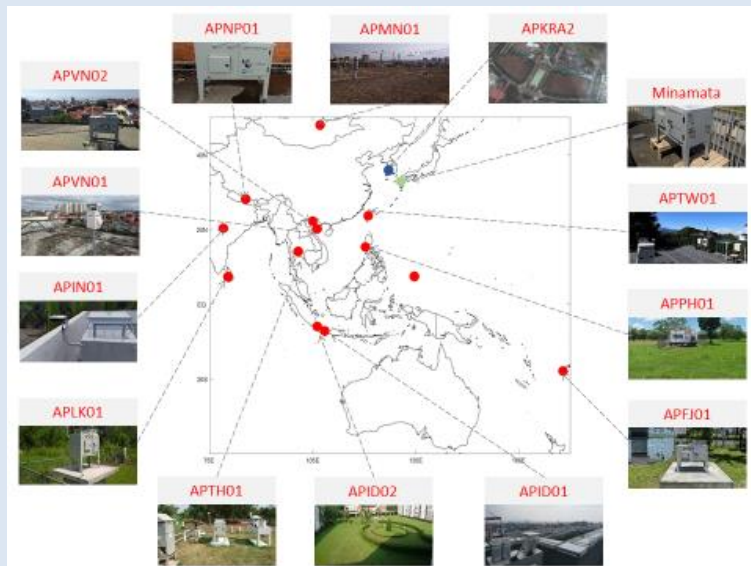
- I would propose it be done with the APMMN Passives
- It could be an AMNet effort and cooperation of all countries



One More Proposal

Propose Writing a Journal Article on APMMN Results

- A follow on to the introductory paper we published in 2019 about the start of the network
- A paper more focused on the field results
- With authors and data from all countries that wish to participate and release data



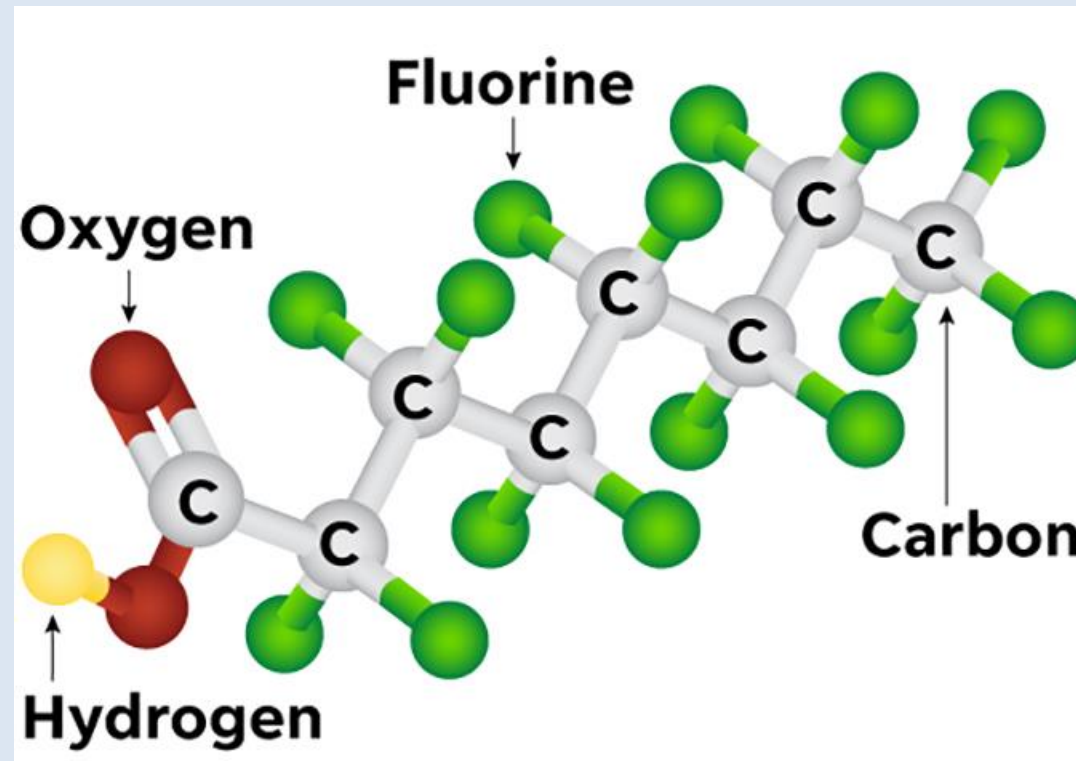
Communication

A New Monitoring Effort for Asia: The Asia Pacific Mercury Monitoring Network (APMMN)

Guey-Rong Sheu ^{1,*}, David A. Gay ^{2,*}, David Schmeltz ³, Mark Olson ², Shuenn-Chin Chang ⁴,
Da-Wei Lin ¹  and Ly Sy Phu Nguyen ¹ 

Other NADP News of Interest

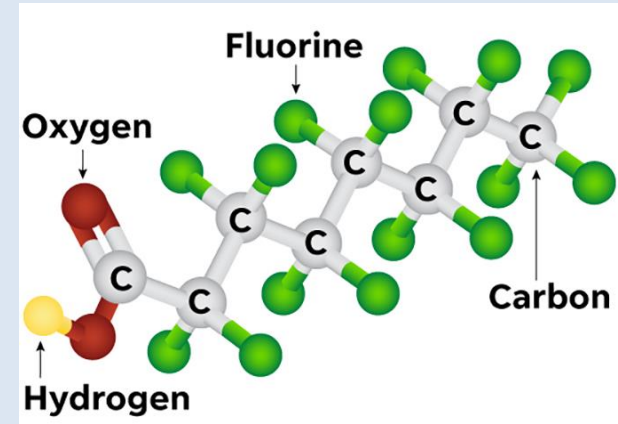
PolyFlouroAlkyl Substances (PFAS) Monitoring Network in the NADP



Perfluorooctanoic Acid (PFOA)

What is NADP Doing?

- PFAS compounds are readily found in air and in water, basically everywhere on the planet.
- NADP will start a new monitoring network for PFAS compounds in precipitation on April 7, 2026.
- We can measure 34 of these compounds in precipitation in our laboratories (and in air, sewage, soils/sediments, etc...)
- A network of PFAS compounds in precipitation using our NTN samples
 - PFAS sample is a subset of the normal sample
 - Currently have 20 sites running, and several others potentially starting.
 - It has been running as a pilot since 2021



Operating & Potential New Sites (EPA-ORD)

Current PFAS Sampling Sites (NADP NTN Locations)

Started September 2020:

ME96
NY98
NJ99
NC30 + NC96/NC97

Started October 2021:

KS97 Kickapoo Tribe*
WI06 UW Arboretum*
WI31 Devils Lake*

Started Fall 2022:

WY94 Grand Tetons NP
WA04 Confederated Tribes of the Umatilla

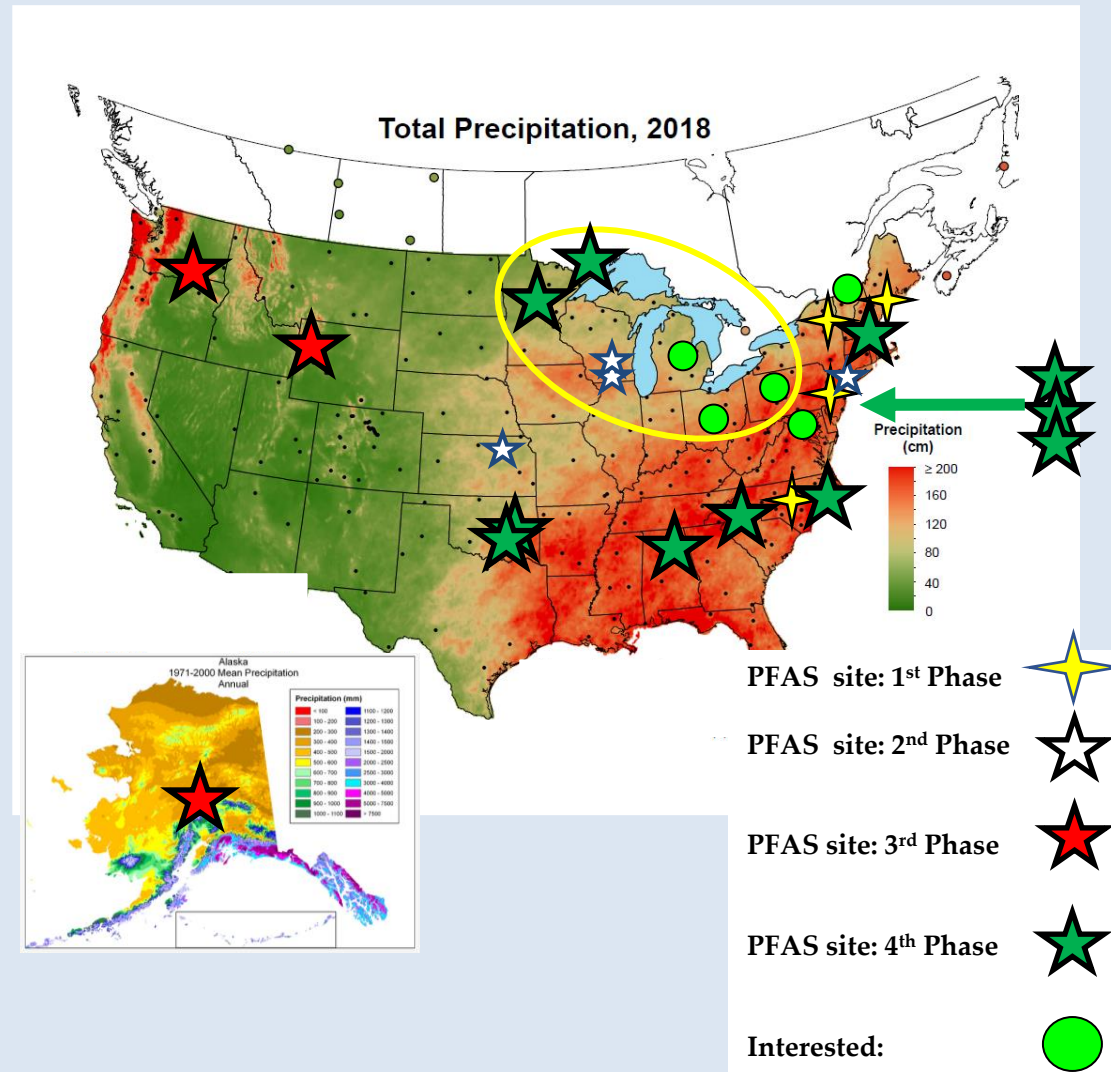
Started Mid-2023

AK03 Denali NP
NJXX Three more sites in NJ (NJ DEP supported)

2024

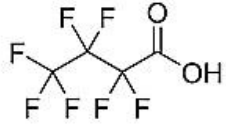
MN97 Grand Portage Band
AL99 Sand Mountain Research and Extension Center
NC25 Coweta Hydrologic Lab (USFS) NC 25
NJXX Two more sites in NJ (NJ DEP supported)
MN06 Leech Lake
OK96 and 97 Choctaw Nation in Oklahoma

Tribal
sites
in red

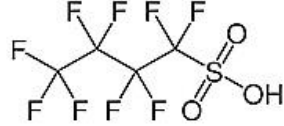


What Are PFAS Compounds?

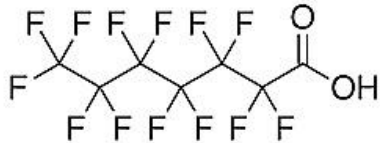
PolyFlouroAlkyl Substances



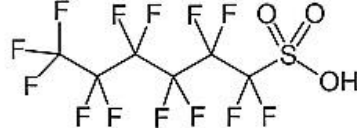
Perfluorobutanoic acid (PFBA)



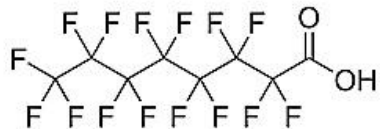
Perfluorobutane sulfonic acid (PFBS)



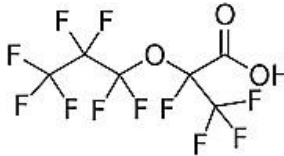
Perfluoroheptanoic acid (PFHpA)



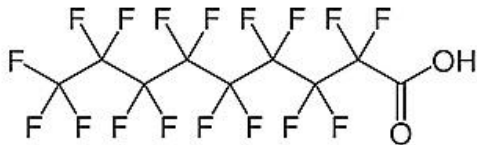
Perfluorohexane sulfonic acid (PFHxS)



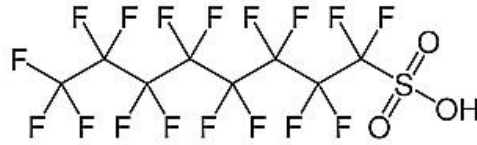
Perfluorooctanoic acid (PFOA)



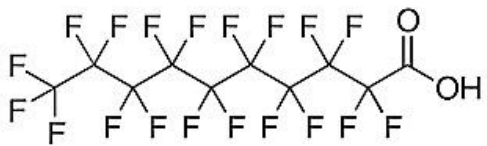
Hexafluoropropylene oxide dimer acid (HFPO-DA or GenX)



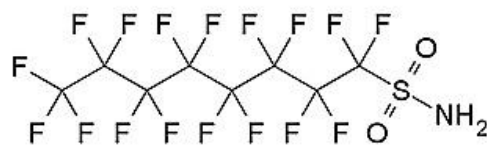
Perfluorononanoic acid (PFNA)



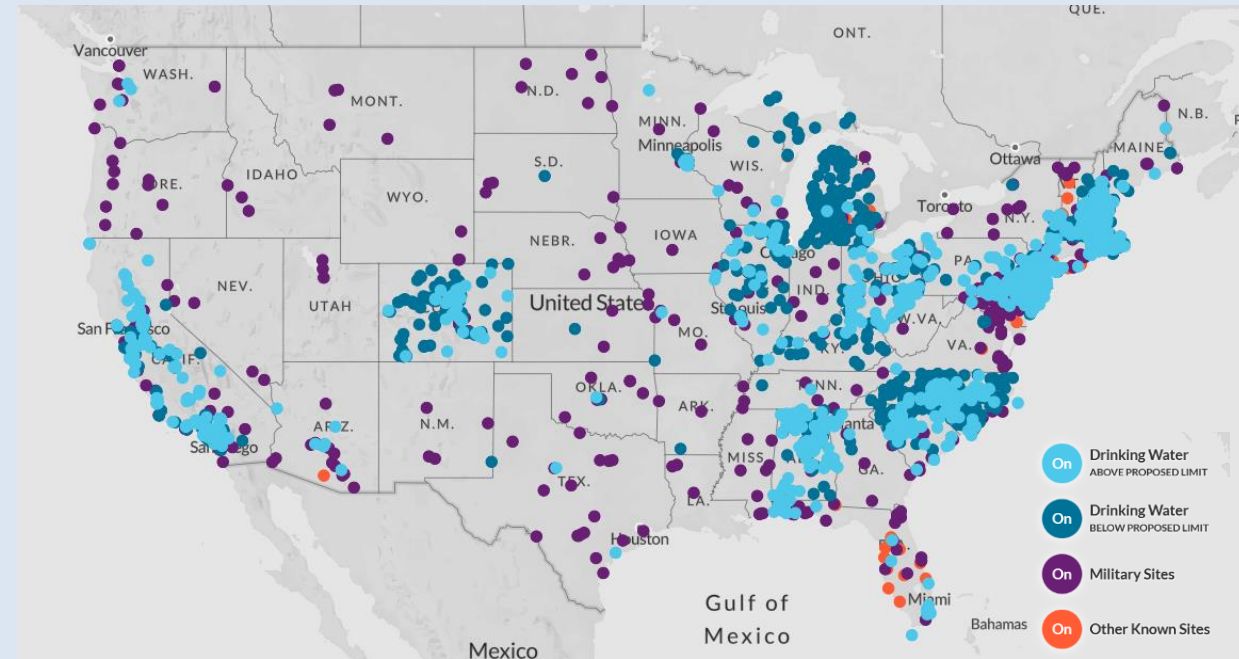
Perfluorooctane sulfonic acid (PFOS)



Perfluorodecanoic acid (PFDA)



Perfluorooctanesulfonamide (PFOSA)

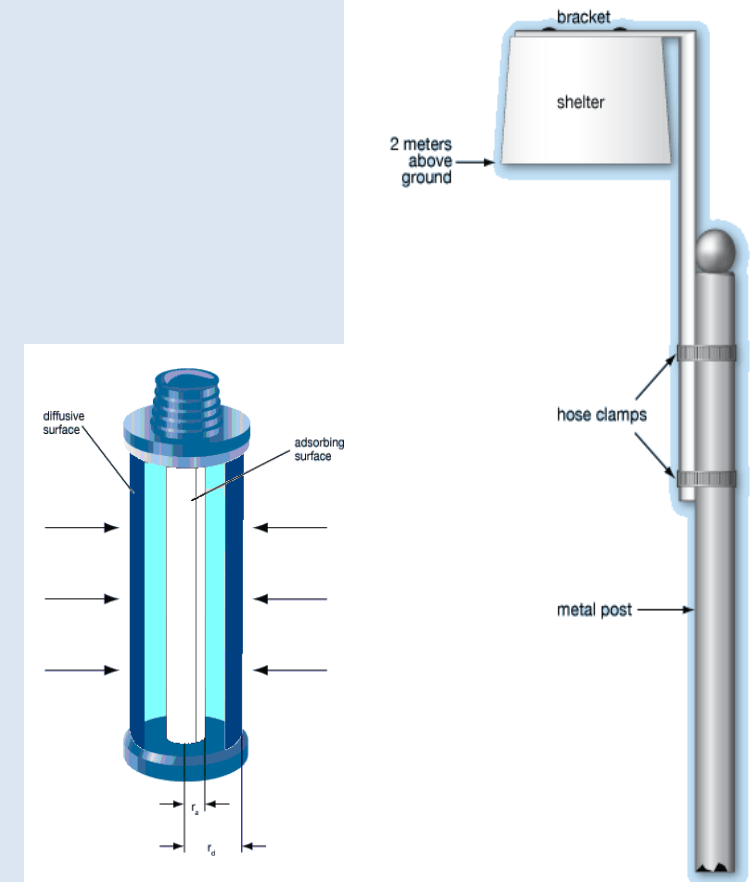


More Information?

- More information here: <https://nadp.slh.wisc.edu/pfas-sub-network/>

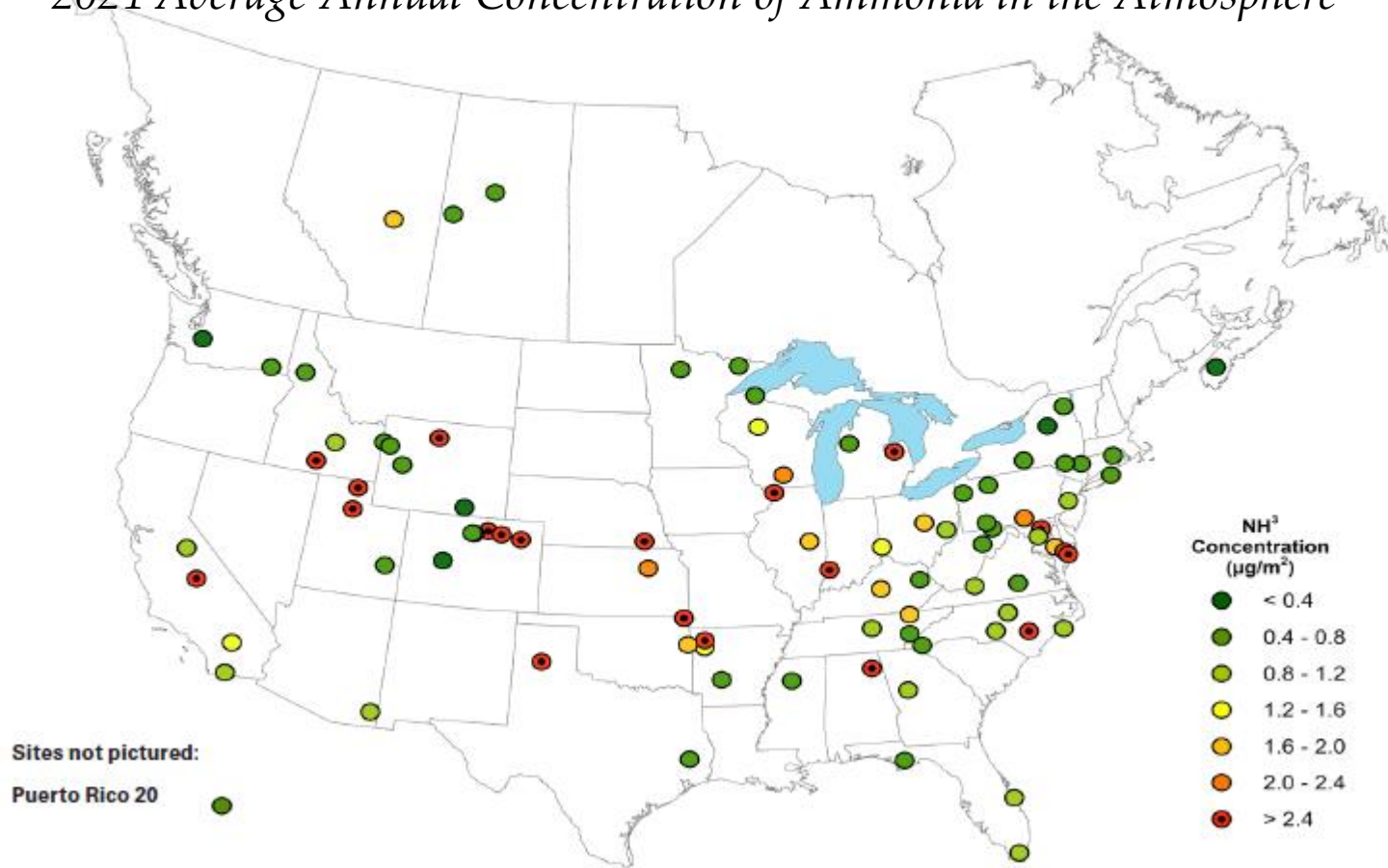
Ammonia Monitoring Network

- An additional type of network that is very important to air pollution chemistry
- Gaseous atmospheric ammonia (Detection = 0.5 ppb over 2 weeks)
- Network Started in 2010, and we have ~100 sites
- 2 week average concentration of ammonia in the atmosphere
- 50,000 observations through Dec, 2025
- Uses the Radiello passive device with phosphoric acid inside to trap
 - (considering using the Alpha passive device too)





2024 Average Annual Concentration of Ammonia in the Atmosphere



Dave says hi!

I think he is enjoying his retirement



4. Pacific Mercury Network of Passives (gaseous concentrations)

- A collaboration between Japan MOE and APMMN and NADP
- Using passive mercury collectors (MerPAS)
- a combined network to cover the Pacific for mercury gases
 - Regular MerPAS measurements
 - Also offer the Manual Method (Japan)
 - Become part of the regular 1st of the month passive measurements
 - Form a collaboration with all of the island nations in the Pacific, and the APMMN, and the NADP
 - To measure TGM over the Pacific, Asia and North America

- This Pacific network can be built up slowly
 - Start with 10 sites in the Pacific
 - Add sites as we can afford to do this.
- We could potentially estimate dry deposition using these values

- flux (F) = air concentration $\times$ dry deposition velocity (V_d)

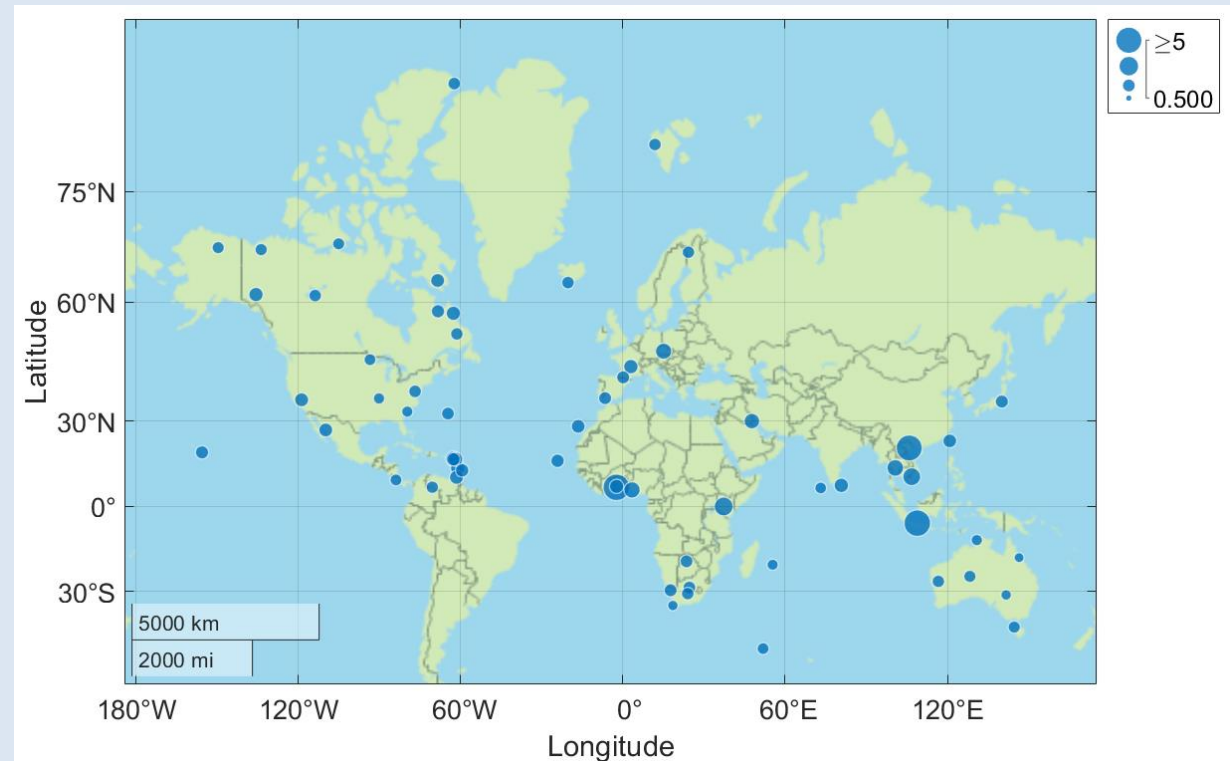
$$F = V_{\text{deposition}} * \text{Concentration}_{\text{air}}$$

where:
$$V_d = \frac{1}{R_a + R_b + R_c}$$

- R_a as aerodynamic resistance, R_b as quasi-laminar resistance, and R_c as canopy resistance

5. ECCC Global Passive Monitoring

- APMMN take over operation of the ECCC Global Passive Monitoring Network?
 - 100 active sites operating in 39 countries
 - Very important to continue for Minamata Protocol
- 400 samples per year
- Low cost
- High impact/visibility



Calendar Year 2026 Cost for Operation of Passive Hg Network

Cost Breakdown

	Network Mode	Trial Mode
PO Fee	\$ 575	\$ -
Analytical Fee	\$ 1,925	\$ 1,925
NED Fee	\$ -	\$ -
Shipping	incl. in price	incl. in price
Total	\$ 2,500	\$ 1,925
New site set up (one time): \$100		

Sampling Deployment

Deploy each
quarter:

- 2 Homemade NADP samples
- 1 Tekran MerPAS sample
- 1 Homemade NADP trip blank