



Spotlight

2B Tech and the World of Multi-Pollutant Monitoring

AQSync and AQLite Headline a New Breed in Our Product Lineup



Recently, you may have noticed two new additions to the 2B Tech family of instruments: The AQLite and the AQSync.

While most new family arrivals (human or otherwise) are transformative, these are game changers! With the AQSync and AQLite, 2B Tech is now offering *monitoring packages* that expand the measurement suite by including other manufacturers' instruments alongside 2B Tech instruments.



Our new AQSync Air Quality Monitoring Station combines the "Best of the Best" instruments for measuring air pollution gases and particulate matter:

- FEM-quality absorbance measurements for O₃, NO₂, and NO
- NDIR absorbance for CO₂
- Optical particle counter with sheath flow and heated inlet for PM₁, PM_{2.5}, and PM₁₀
- Amperometry for CO
- Sonic anemometry and weather data
- Data access and instrument control via the Cloud
- Power-stingy requirements enable options for powering with battery or solar panel

Visit the [AQSync website](#) to watch a more in-depth webinar and view more detail about the instrument specifications.

The [AQLite](#) combines our FEM Ozone Monitor with a sensor package offering custom configurations that can include CO, CO₂, SO₂, NO₂, PM, temperature, pressure, and humidity.

Take your air quality monitoring to the next level with the AQSync and the AQLite!

[Request a Quote](#)

[Visit the AQSync Website](#)

[Visit the AQLite Website](#)

Air Pollution News

Declining U.S. Vehicle Emissions Translate into Saved Lives PM_{2.5}-Related Mortality from Transportation Emissions in 2017 Would Have Been 2.4 Times Larger without Actions Taken



From 2008 to 2017, emissions from U.S. vehicles declined in response to regulatory actions, even though in the number of vehicle miles traveled increased during that decade. A new study led by researchers at Harvard University quantified the benefits from the emissions reductions, in terms of human lives saved and associated economic benefits.

If per-mile emission factors had remained at 2008 levels, the analysis showed that 48,200 deaths from transportation-related emissions would have occurred in 2017 versus the actual number of 19,800. The estimated \$190B to \$480B economic benefit in 2017 arises mostly from reduced PM2.5-attributed mortality and to a lesser extent from reduced greenhouse gas emissions.

Though other studies have been done, this [new study published in Proceedings of the National Academy of Sciences](#) is perhaps the first to do a fine-scale assessment of changing factors such as the composition of the fleet (heavy-duty trucks vs. light-duty vehicles), vehicle miles traveled (VMT), population demographics, age-specific mortality, and baseline ambient PM2.5 levels.

The study used EPA National Emissions Inventory data at the county level to create four emissions scenarios: actual 2017 emissions, and three counterfactual scenarios in which county-level emissions factors for each vehicle type are the same as they were in 2008, 2011, and 2014. The analysis used VMT by vehicle type for each of 13 vehicle types currently used by the EPA. The study modeled how emissions of several pollutants affected PM concentrations at fine spatial scales. The authors assessed mortality attributable only to PM2.5, which is the largest monetized impact of air pollution according to the EPA's analysis of the costs and benefits of the Clean Air Act. To assess human impacts, age-specific mortality data and census data were used at the county level and at finer scale (1 km) for more densely populated areas. An epidemiological model of age-specific exposure mortality was used that accounted for recent findings that effects of PM are nonlinear with concentration (larger proportionate effects at lower concentrations), which better accounts for the situations most common in the U.S. Economic impacts were arrived at by applying Department of Health and Human Services valuation methods to the mortality figures.

In addition to the mortality and economic impacts findings, the detailed analysis showed, for example, that urban light-duty passenger vehicles are becoming increasingly more important and they cause a majority of both the public health and climate burden. Other interesting findings are that an aging population is causing mortality rates to increase, and the market share for larger and more polluting passenger vehicles is increasing.

The findings have implications for the design of the most effective future approaches to improving air quality. Although the devil is in the details, the bottom line is clear: Regulatory actions have had quantifiable benefits for public health.

[Health Benefits of Decreases in On-Road Transportation Emissions in the United States from 2008 to 2017](#), E.F. Choma, J.S. Evans, J.A. Gomez-Ibanez, Q. Di, J.D. Schwartz, J.K. Hammitt and J.D. Spengler, *Proceedings of the National Academy of Sciences* (2021), **118**, 51, e2107402118.

Case Study: 2B Tech Ozone Monitors Studying Rainforest Emissions in... Arizona? The Unique Atmospheric Chemistry (or lack thereof) of BIOSPHERE 2

By Jonathan Williams (MPIC-Mainz), edited by Chris Ennis (2B Tech)

A study in progress in Arizona will put 2B Tech's ozone analyzers to an extreme test: establishing extremely low levels or even the absence of ozone.

The test will come in the BIOSPHERE 2, a ~3-acre "world unto itself" with controlled ecosystems such as rainforest, savanna, coral reefs, desert, and others. Originally BIOSPHERE was hermetically sealed and had six human subjects sealed inside too, with the aim of finding out how a spaceship leaving earth could sustain life. In

existence for some 30 years and now operated by the University of Arizona, it continues to be "The World's Largest Earth Science Experiment."



Photo Credit: MPIC-Mainz

Aside from the original space travel objectives, BIOSPHERE now offers opportunities for environmental and climate research, including unique atmospheric experiments. The windows of the greenhouse-like enclosure act to filter out UV light, so there is practically no atmospheric chemistry. As explained by visiting researcher Jonathan Williams, "This is a helpful simplification because the changes we measure in the BIOSPHERE are directly attributable to the biotic emissions, without any alteration by OH or ozone oxidation."

Williams and colleagues at the Max Planck Institute for Chemistry in Mainz, Germany, are studying the VOC emissions from the actual Amazon rainforest using an instrumented tall tower and sorting out the myriad external effects that come with the environment, which can include anything from extreme weather, insect infestations, biomass burning, and more. The work in BIOSPHERE 2 is complementing those real-world experiments. Researchers become the "weather gods" in BIOSPHERE 2, able to control rainfall and other conditions to suit experimental objectives. And the simplicity of the atmospheric chemistry in BIOSPHERE is an enormous advantage.

Says Williams, "OH is not generated because UV light does not pass through the glass and little ozone enters the BIOSPHERE anyway according to our precursor/product ratios. This means that any oxygenated compounds we measure in the BIOSPHERE must be being directly emitted by the plants rather than by atmospheric oxidation. To confirm this requires a good low-level ozone measurement, which is where 2B Tech comes in."

The 2B Tech analyzers will enable researchers to document the "ozone-free" conditions of the BIOSPHERE-2 atmosphere.

The original BIOSPHERE experiment ended after two years because oxygen levels dropped to 15%, no longer safe for the human occupants. However, they did learn a lot about crop efficiency and carbon cycling. No doubt the new work by Williams and his colleagues will yield insights about rainforest emissions and the implications for air quality and climate.

[Link to BIOSPHERE 2 Website](#)

[The 2B Tech Ambient Ozone Monitors](#)

Employee Spotlight

Morgan Johnston: Doing the Job with Pizzazz

Meet 2B Tech's Purchasing Specialist and Production Manager

2B Tech's Morgan Johnston is serious about excelling at her job. But that doesn't stop her from making sure that she, and everyone around her, enjoys the workplace and has fun.

If you've called 2B Tech, chances are you've talked to Morgan. Since joining 2B Tech two years ago, she has answered calls, led the receiving department, served as our purchasing specialist, managed facilities issues, and helped out in manufacturing. If that seems like a lot of hats to wear... it is, but Morgan handles the multiplexing like a pro. A major part of her job has been as Purchasing Specialist, where she oversees an inventory of over 1,000 parts that go into making our lineup of 20-plus instruments. Over the past year, she and our Operations Manager navigated the tricky waters of multiple supply chain issues that seem to have become the new normal in the Covid pandemic era.



All of which is a perfect set-up for Morgan's new responsibilities, as the Production Manager for 2B Tech. Morgan's knowledge of the inventory, purchasing lead-times, and manufacturing work flow makes her uniquely suited to oversee the timelines and workload for our production department. This results in solid information for customers about delivery estimates for new instrument orders.

Morgan attended the University of Colorado and ultimately obtained her B.A. in History from George Mason University in Washington, D.C. She honed her skills in research, organization, problem solving, and detail work while in a few positions in the medical industry in D.C., before heading back to Colorado and joining 2B Tech. She lives with her husband along the foothills of Boulder, owns a frog-eating dog (who actually rules the house), and enjoys watching the local wildlife, which includes a favorite bobcat mother and baby. Morgan's a true animal-lover and can tell you all about penguins and octopuses, among other creatures. (Just ask the next time you call 2B Tech!)

We haven't completely figured out Morgan but we know she leads a rich inner life and has a freaky tendency to win office competitions and Fantasy Football. She picked the item featured in her photo above as her prize in the most recent competition, a fact that perhaps gives you a little insight into the fun side of Morgan!

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