Fall 2018 Newsletter

2B Technologies

2B Buzz

The Multi-Channel 106 Ozone Monitor

Multiply Your Ozone Measurement Capability

If you're in the business of measuring ozone in multiple places, whether in an industrial setting, out in the field, or in the laboratory, the Multi-Channel Model 106 Ozone Monitor series would provide an economical approach.

The Multi-Channel configuration of our workhorse Model 106 Ozone Monitor enables you to use one instrument to sequentially measure up to six different gas streams. The sampling can be done automatically, using a sampling interval you specify. The Multi-Channel Ozone Monitor is inside a wall-mount enclosure that is suitable for mounting in your sampling system.

The Multi-Channel 106 Ozone Monitor: Measure at more than one place without moving an inch.

Limited-time discount offer!

We offer the Multi-Channel option on our Model 106-L (0-100 ppm), Model 106-M (0-1000 ppm), and Model 106-MH (0-10,000 ppm) Ozone Monitors, enabling you to choose the instrument that is right for the range of ozone concentrations you need to measure.

Request a quote today!

Mention this article to get a 10% discount on the Multi-Channel Model 106.
Offer ends 30 November 2018.

More Info About the Model 106 Ozone Monitors

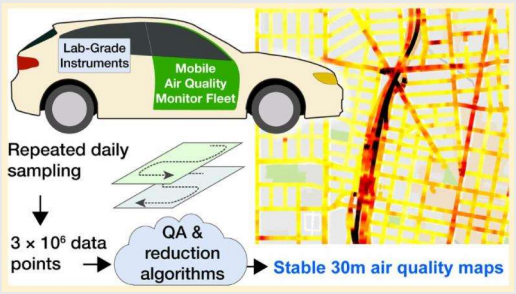
More Info About the Model 106 Multi-Channel Configuration

Air Pollution News

Google and Aclima Expand Their Partnership to Map Air Quality

50 Google Street View Vehicles to Carry Aclima's Mobile Sensing Platform

Hundreds of Google Street View vehicles are on the road every day in 80 countries around the world, gathering the images that have transformed mapping tools. But now, fifty of the vehicles will glimpse not only the streets and environs, but also make measurements of multiple air quality and climate-related species as they travel through Houston, Mexico City, and Sydney, Australia.



From Apte et al., Environmental Science & Technology (2017) 51, 6999-7008.

Measurements will give a street-by-street view of CO_2, CO, NO, NO_2, O_3, and $PM_{2.5}$, aggregated into a publicly available data set through Google BigQuery and available in greater detail to researchers upon request.

The project is an expansion, announced September 12, of a partnership between Google and San Francisco-based air quality tech company Aclima. The two companies have been working on a demonstration of the concept for several years in California, gathering data from a few vehicles outfitted with Aclima's sensor package. That work led to a publication in 2017 in *Environmental Science & Technology*. The research revealed the fine-scale spatial distribution of air pollution captured by repeated measurements in a 30 square-kilometer area of Oakland, and showed that air pollution concentrations could change by factors of 5 to 8 within the same city block.

Thus the air quality issue, always recognized as a local problem, enters the realm of the hyperlocal.

High-Resolution Air Pollution Mapping with Google Street View Cars: Exploiting Big Data, J.S. Apte, K.P. Messier, S. Gani, M. Brauer, T.W. Kirchstetter, M.M. Lunden, J.D. Marshall, C.J. Portier, R.C.H. Vermeulen and S.P. Hamburg, Environmental Science & Technology (2017) 51, 6999-7008.

Aclima & Google Scale Air Quality Mapping to More Places Around the World, Aclima press release, 12 September 2018.

Case Study

Lower Weight and Power Requirements Make 2B Tech Monitors Ideal for Measurements from a Tower in China

Study Shows Nighttime Chemistry Aloft is Key to Daytime Haze Pollution Below

To understand pollution at ground level, sometimes it's necessary to look up.

And to consider what happens at night.

Those are some of the findings of a recent study in Beijing, where wintertime haze is often at severe levels that affect health and visibility. Researchers zeroed in on a widespread heavy-haze episode that occurred for several days in December 2016.

Of specific interest in the study was the particulate nitrate (pNO_3^-) component of the particulate matter (PM) pollution. This component is anywhere from 15 to 40 percent of the $PM_{2.5}$ mass concentration in China. The usual summertime pathway for making pNO_3^- is via the reaction of OH with NO_2, but at night and in the winter this pathway is negligible. Another pathway for making pNO_3^- is heterogeneous hydrolysis of N_2O_5 ($N_2O_5 + H_2O \rightarrow 2\ HNO_3$). The role of this pathway in winter is not well understood, but prior modeling and field research has shown that it is probably

Wintertime haze in Beijing was the focus of this study using 2B Tech NOx and O3 instruments on the tower pictured at right.

important above ground. Researchers Haichao Wang, Keding Lu, and colleagues at Peking University and the China National Monitoring Centre conducted a study to look at the chemistry and meteorology both at the ground and aloft, using a moving cabin on a tower platform and 2B Tech's Model 405 nm (NO, NO_2, NO_x) and Model 106-L (O_3) to make the vertical measurements up to about 250 meters.

The researchers found that the nighttime atmosphere is chemically quiet near the ground, because ozone is reacted away by the abundant nitric oxide (NO) emissions from surface sources such as vehicles, power plants, and industry. Also N_2O_5 can't accumulate near the ground, because its precursors are reacted away by the NO and VOCs emitted by the sources. Higher up and away from those sources, though, the precursors can persist and N_2O_5 can accumulate at night. Above about 150 meters, the authors' measurements identified a reactive layer above Beijing where particulate nitrate can be produced rapidly at night via the N_2O_5 hydrolysis pathway. Model simulations in the study showed that downward mixing can bring over half of this pNO_3^- to the surface as the nocturnal boundary layer breaks up in the morning, providing a mechanism that helps explain the severe wintertime haze episodes that have become characteristic of urban Beijing.

The authors point out that based on their findings, understanding the nighttime reactive nitrogen chemistry aloft would be a possible first step to alleviate the haze problem for the city.

Fast particulate nitrate formation via N_2O_5 uptake aloft in winter in Beijing, H. Wang, K. Lu, X. Chen, Q. Zhu, Z. Wu, Y. Wu, and K. Sun, *Atmospheric Chemistry and Physics*, **18**, 10483-10495, 2018 (https://www.atmos-chem-phys.net/18/10483/2018/).

More Info About the 2B Tech Model 405 nm NO_2/NO/NOx Monitor

Meet Our Production Manager
Jackie Falkenstein

2B Tech's lineup has grown to include over a dozen instruments since the company began with the Model 202 ozone monitor nearly 20 years ago, and sales have now reached about two instruments per day. Both factors combine to make production an increasingly challenging part of the company's operations.

Leading that task is Jackie Falkenstein. She and a team of manufacturing experts build all of the air monitors made by 2B Technologies. Jackie makes sure that the parts, people, and procedures are in place to deliver instruments on time and ready to meet customer expectations for performance. Communication skills, attention to detail, and technical expertise are all critical to the job of Production Manager. For example, over a thousand different parts go into making 2B Tech's instruments, and Jackie makes sure that they're on hand so that manufacturing can proceed without delays. You're just as likely to find her soldering the circuit boards or assembling the plumbing of an instrument as working at her computer to oversee it all.

Jackie has a B.S. in Wildlife Sciences from Virginia Tech and a Masters in Education from the University of Pittsburgh. She applied both in outreach work she did at the Denver Zoo. She's been with 2B Technologies for 3 years, leading the production operations since 2016. She lives in Golden, CO, with her husband and two sons. They enjoy camping, skiing, and all the outdoor adventures Colorado has to offer.

Recently Published by 2B Technologies

Some of 2B Tech's innovations have been described in papers recently published in the peer-reviewed literature:

- The heated graphite scrubber is an innovation to minimize interferences in ozone measurements. It's used in our Model 211-G Ozone Monitor, recently approved as a Federal Equivalent Method (FEM).

See "Use of a heated graphite scrubber as a means of reducing interferences in UV absorbance measurements of atmospheric ozone," A.A. Turnipseed, P.C. Andersen, C.J. Williford, C.A. Ennis, and J.W. Birks, *Atmospheric Measurement Techniques* (2017) **10**, 2253-2269.

- The folded tubular photometer is at the heart of our Model 405 nm NO_2/NO/NO_x Monitor. It provides a long absorbance path length (2 meters) while maintaining low cell volumes, enabling sensitive measurements of ambient pollutants down to low part-per-billion levels.

See "Folded tubular photometer for atmospheric measurements of NO_2 and NO," J.W. Birks, P.C. Andersen, C.J. Williford, A.A. Turnipseed, S.E. Strunk, C.A. Ennis, and E. Mattson, *Atmospheric Measurement Techniques* (2018)
11, 2821-2835.

- The techniques used in our Model 306 Ozone Calibration Source are described in "Portable ozone calibration source independent of changes in temperature, pressure and humidity for research and regulatory applications," J.W. Birks, C.J. Williford, P.C. Andersen, A.A. Turnipseed, S. Strunk, and C.A. Ennis, *Atmospheric Measurement Techniques* (2018) **11**, 4797-4807.

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2100 Central Avenue, Suite 105| Boulder, Colorado USA
303-273-0559 | sales@twobtech.com