

Summer 2016

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Join Us at the *2016 Best of Both Worlds Conference*  
*2B Tech is hosting the September 26-28 Conference in Estes Park, Colorado*



**We invite you to attend the international conference we will be hosting in Estes Park, Colorado, from September 26th - 28th called Best of Both Worlds. The conference is focused on Environmental Education (EE) and will feature talks about the state of EE in countries from around the world.**

The conference will include:

- Keynote addresses by Paula J. Ehrlich, President and CEO of the E.O. Wilson Biodiversity Foundation (speaking on the Half-Earth Project); Prof. Jimmy Adegoke, award-winning climate scientist at the University of Missouri-Kansas City; and Dr. Andrew Warnock, Director of the Education and Outreach Center of the College of Natural Sciences at Colorado State University.
- Over 25 presentations by international educators and scientists on programs and techniques in Environmental Education/Education for Sustainable Development (EE/ESD), and community partnerships in EE and ESD.
- STEM-focused interactive workshops, including mobile air pollution monitoring, aerial mapping, greening your school, and wildlife monitoring.
- Networking with conference participants from Malaysia, Brazil, South Africa, Uganda, and more.
- One professional development (PD) credit hour through the Colorado School of Mines.

Please visit [www.bobw2016.com](http://www.bobw2016.com) for more information and to register. Register **by August 15** to get the special group pricing for lodging at the YMCA of the Rockies.

We hope to see you in September!!



## Visit the 2B Tech Booth at These Upcoming Meetings

2B Tech will attend these meetings over the next few weeks. Please stop by our booth to get information about our instruments ...or just to say hello!

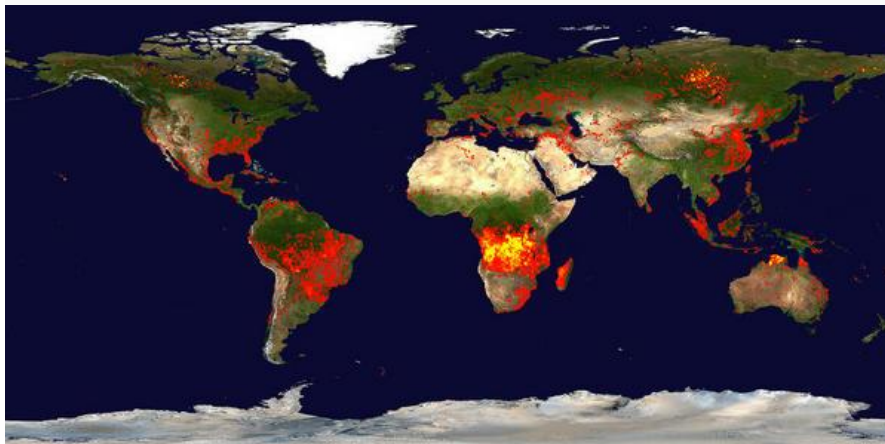
- **National Science Teachers Association / Science, Technology, Engineering & Math Conference**, Denver, Colorado, July 27-29.
- **National Ambient Air Monitoring Conference 2016**, St. Louis, Missouri, August 8-11.
- **International Ozone Association Conference & Exposition 2016**, Las Vegas, Nevada, August 28-31.
- **Towards a Molecular Understanding of Atmospheric Aerosols Conference**, Santa Cruz, California, August 28-September 2.
- **Best of Both Worlds 2016 Conference on Environmental Education and Sustainable Development**, Estes Park, Colorado, September 26-28.
- **International Global Atmospheric Chemistry (IGAC) 2016 Conference**, Breckenridge, Colorado, September 26-30.

## Air Pollution News

### Wildfires: Challenges for Air Quality and Climate

Dramatic pictures of flames advancing on landscapes and homes are in the news and mark the onset of another wildfire season in the Northern Hemisphere. In the U.S., several fires in western states have caused millions of dollars in damages, and weeks of hot, dry weather still lie ahead. In early July, Central Russia was peppered with fires and smoke, and thousands of fires were burning in central Africa. In a nutshell: "On Earth, something is always burning" (NASA Earth Observatory website, July 2016). While much of the most visible destruction of a wildfire is localized, the effects on the atmosphere, climate, and air quality are more widespread and can linger long after the fires are put out.

#### Global Fire Map

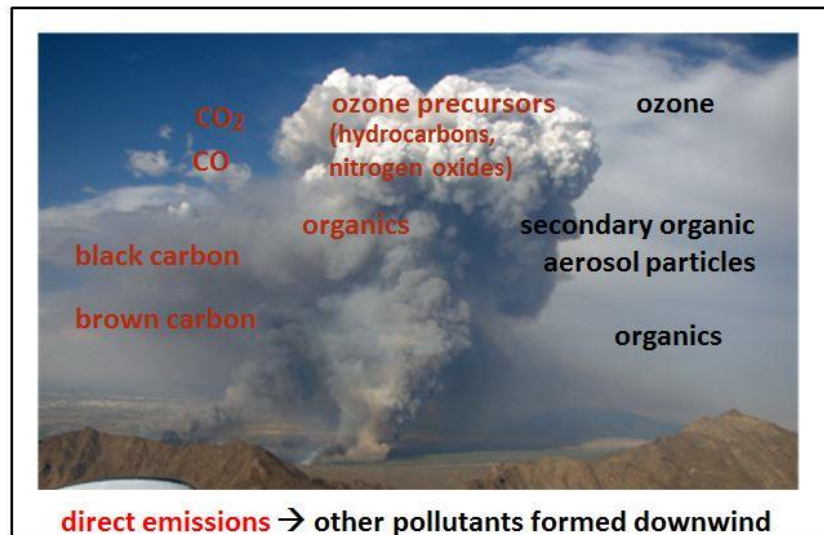


Satellite data show the global distribution of fire occurrences over the 10-day period of 29 June 2016 to 08 July 2016. Source: NASA, [MODIS Rapid Response System](#)

#### Direct Emissions from Wildfires: Particles and Gases

To reverse an old saying: Where there's fire, there's smoke. Certainly the most visible atmospheric emission from burning, smoke is a mixture of gases and particles. Black carbon (the major component of what is often called soot), brown carbon, dust, and organic carbon are the visible components in the billowing smoke plumes characteristic of wildfires. Biomass burning—both intentional and unintentional—is the largest single source of atmospheric black carbon, an extremely strong absorber of solar energy (pound for pound, it's a million times more effective at absorbing light than CO<sub>2</sub>). Black carbon's climate effects are also indirect, for example by reducing the reflectivity of a snowy surface when it deposits to the ground, or by interacting with clouds. Black carbon is an important constituent of ambient fine particles smaller than 2.5 microns in diameter (PM<sub>2.5</sub>), which have adverse impacts on human health, ecosystems, agriculture, and visibility. Brown carbon is a mixture of organic carbon compounds and is more strongly absorbing in the UV and less absorbing at visible wavelengths. It's produced in smoldering fires or from further breakdown of emissions from fires.

Carbon dioxide, carbon monoxide, hydrocarbons, and nitrogen oxides are emitted gases that are not visible but affect the atmosphere, air quality, and climate directly, as well as indirectly as they undergo chemical transformations in the atmosphere downwind of the fire. Fires even release mercury, a toxin that has natural and industrial origins, that has settled into soil and plant matter. (See the story below about the launch of our new instrument, the [HERMES Personal Mercury Monitor](#) for measuring atmospheric mercury.)



### Secondary Pollutants: Ozone and More

As the direct emissions from wildfires are transported away from the fire itself, they react in the atmosphere to make secondary pollutants that can broaden the effects of the fires. Ozone is one such byproduct. It is formed near the fire and also in the atmosphere downwind by the interaction of nitrogen oxides and hydrocarbons from the fires and in the ambient atmosphere. In the U.S., it's been shown that fires can tip the balance of ozone in downwind communities and trigger violations of the federal ozone standard, particularly in rural areas not typically in violation. A recent study estimated that global wildfires contribute about 170 Tg of ozone production each year, which is 3.5% of the global tropospheric ozone production (Jaffe and Widger, *Atmospheric Environment*, 2012). Secondary organic particles and gases are also produced as the emissions from a wildfire are dispersed, transported, and transformed. An example is isocyanic acid (HNCO), a gas that's been linked to

health effects and that has been found downwind of wildfires and in cigarette smoke. But the impact of wildfires on the chemistry of the atmosphere is complex, depending on conditions of the fire, the plume, and the atmosphere itself. There are many gaps in the scientific understanding of how gases and particles are transformed during the daytime, and even more uncertainty about the what happens during the nighttime processing of fire plumes.

### **Our Fire Future**

Wildfires are nature's way of regenerating ecosystems - periodic natural fires promote seed germination and overall ecosystem health. However, the warmer, drier climate projected by the Intergovernmental Panel on Climate Change (IPCC), along with the fire-control practices of the last century that have led to a buildup of fuels in forested areas, are literally a combustible mixture that is likely already increasing the frequency and size of fires. In addition, wildfires are happening earlier in the season, extending the fire season by one or two days with each advancing year. Indeed, springtime fires, increased fire frequency, and larger fires are becoming the "new normal." Even the ability of forests to recover from fires is likely changing, as the warming climate decreases the resiliency of ecosystems.

All of this increases the strain on firefighting resources and on the environment itself. And, it puts a premium on scientific research to understand more about how wildfires affect the atmosphere, climate, and air quality.

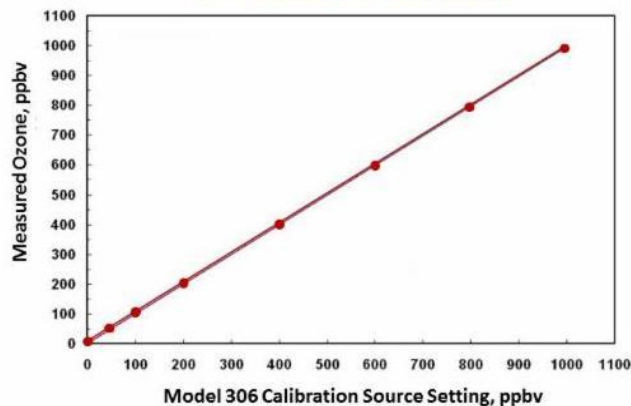
## **2B Technologies**

### **Promotion: The Model 306 Ozone Calibration Source™**

- Portable source of ozone for use in calibrating any ozone monitor
- Ozone concentration range: 0 ppbv and 30 - 1,000 ppbv
- Ozone mixing ratio is independent of ambient temperature, pressure, and humidity
- Calibrated against a NIST-traceable ozone standard



Calibration Curve:  
2B Tech Model 202 Ozone Monitor &  
Model 306 Calibration Source



- User can change calibration parameters, making it possible to use the Model 306 as a transfer standard for calibrating ozone instruments in the field
- Lightweight (5.6 lb) and extremely compact for easy field use

More information: <http://www.twobtech.com/model-306-ozone-cal-source.html>

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**MENTION THIS AD TO GET A 15% DISCOUNT ON A MODEL 306**

**OFFER ENDS September 16th 2016**

[sales@twobtech.com](mailto:sales@twobtech.com)

(303) 273-0559

[www.twobtech.com](http://www.twobtech.com)

## Employee Introductions

2B Technologies is pleased to announce three new members of the 2B Tech Team.

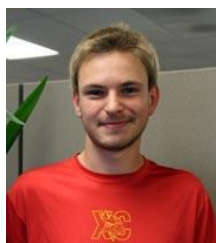
**Drew Meyers** and **David Kopala** are interns working on instrument development. Drew has a B.A. in Ecology and Evolutionary Biology from the University of Colorado Boulder, and is working toward his B.A. in Computer Science (expected May 2017, also from CU Boulder). David is a senior at Northglenn High School in Northglenn, Colorado.

**Tony Wiese** is 2B Tech's new Shipping and Manufacturing Assistant. He is carrying out all aspects of shipping and record keeping, and assisting in instrument manufacturing. Tony has been in Boulder for 3 years and studied history at the University of Colorado Boulder.

We welcome Drew, David, and Tony to 2B Tech!



Drew Meyers



David Kopala



Tony Weise

2B Technologies, 2100 Central Ave, Suite 105, Boulder, CO 80301

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