US EPA AWARD: Aiding smoke forecasting & providing better information to help the public reduce their exposure.

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Abstract

Emerging Technology in Air Pollution Sensors: EPA Wildland Fire Sensors Challenge INTRODUCTION: This challenge seeks a field-ready prototype system capable of measuring constituents of smoke, including particulates, carbon monoxide, ozone, and carbon dioxide, over the wide range of levels expected during wildland fires.

The desired Measurements were: PM2.5, CO, CO2, O3.

Evaluating Low-cost Air Sensor Performance Near Wildfires

Wildfire smoke has been a huge public health issue on the west coast. As I mentioned, Washington state had a lot of poor air quality last summer due to Canadian wildfires.4According to the Washington State Department of Natural Resources, Washington has 2.7 million acres of unhealthy forests vulnerable to wildland fires in Eastern Washington alone.8Better air pollution sensors are a significant part of the solution to reduce the impacts and effects of inevitable wildfires.

The EPA and its federal partners launched the Wildland Fire Sensors Challenge to develop the emerging technology in air sensors. Scientists and engineers were encouraged to enter the challenge with their new devices, which had to include the following design parameters:

- Lightweight and portable
- Simple to operate
- Battery or self-powered
- Provide highly accurate measurements

Moreover, the devices were to transmit data wirelessly, include a compact microprocessor, self-operate for 15 days, and allow reporting of air pollution continuously and in real-time, while withstanding the smoldering heat and harsh field conditions of being used during a fire.6 The challenge specifically focused on measuring carbon monoxide (CO), ozone (O3), carbon dioxide (CO2) and particulate matter equal to or less than 2.5 micrometers in diameter (abbreviated as PM2.5). These pollutants are important because of their adverse interactions with the environment and human health. Measuring PM2.5 during a wildfire event is particularly important because PM2.5 can penetrate deep into the membranes of

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the lungs, causing damage.7 This is not as small as nanoscale - 2.5 micrometers is 2,500 nanometers - but nanoscale (or ultra-fine) pollution from smoke also has potential health effects.

NASA, one of the agency partners for the Challenge, is interested in the improved data collection of these air sensing devices in order to integrate satellites for faster wildfire detection, measuring fire intensity, and presence of trace gases and particulates. Ultimately, the improved devices will allow authorities to inform residents sooner and dispatch first responders earlier. Moreover, with the robust, real-time, and continuous data reporting, firefighters and first responders can prepare appropriately for different kinds of wildland fires.

Stimulating Technology Development

The EPA Wildland Fire Sensors Challenge has been a successful collaboration in stimulating technology development in improved air pollution detection and measurement detection devices. Wildfire smoke pollution is a serious concern for the environment and human health. Existing air quality monitoring stations include hardware that's heavy, expensive, and difficult to operate and maintain. These stations are also immobile, so they cannot be transported in close proximity to a wildland fire event. The Wildland Fire Sensors Challenge has been instrumental in developing easily and rapidly deployable air pollution sensors that are on their way to being manufactured for use at future wildland fire events. Additionally, these miniaturized devices transmit data wirelessly, continuously, and in real-time. This new technology will improve response to wildfires, ultimately reducing the effects of wildland fire smoke exposure.

Source: http://sustainable-nano.com/2019/04/05/wildland-fire-sensors-challenge/

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