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Ambient Air Quality (B)

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Contemporary developments in spectroscopic remote sensing and real time monitoring have opened up new possibilities for the detection and measurement of hazardous air pollutants, especially when environmental justice is at stake. This special issue documents how such developments have been applied in a novel field campaign in the Houston Ship Channel region of Texas known as the Benzene and other Toxics Exposure (BEE-TEX) study. BEE-TEX was first conceived in 2007 as a means to demonstrate the potential of Computer Aided Tomography (CAT) using Differential Optical Absorption Spectroscopy (DOAS), which was previously attempted only once by Laepple et al.[1] in Germany to measure mobile source plumes. However, funding and implementation of BEE-TEX were postponed several times by events beyond the participants' control, a delay which fortuitously enhanced the end result of the campaign, owing to many technical developments between 2007 and the ultimate performance period of the experiment in February 2015. These developments included the marriage of new tools for micro-scale air quality modeling and real-time measurement in a series of papers by Olaguer and various collaborators[2–7], the enhancement of Web technologies to enable real-time data broadcasting (Olaguer, this issue), the development of new Light Emitting Diode (LED) sources for remote sensing applications by Prof. Jochen Stutz and collaborators at UCLA, and the invention of a new *in vitro* technique to measure the response of living human lung cells to ambient air pollution (Vizuete et al., this issue). All these technologies were wed together in what proved to be a much richer experiment than the original one conceived in 2007.

There are three papers in this special issue documenting the design, implementation, and early results of the BEE-TEX study. The first is a general overview by Olaguer, including a discussion of the role of real time data broadcasting and source attribution in the field experiment. Unfortunately, a separate paper intended to discuss the specifics of the CAT scan implementation was never submitted due to the personal circumstances of the main author, Dr Stutz, so some details of this are provided in the overview. The second paper is a contribution by Aerodyne Research, Inc. (Yacovitch et al.) discussing mobile real-time measurements of various volatile organic compounds, including observed concentrations of 1,3-butadiene routinely exceeding the U.S. Environmental Protection Agency's E-5 lifetime cancer risk level in the Manchester neighborhood of Houston. The third paper is the contribution by Vizuete et al. noted earlier, which discusses the results of the first field trials of the cultured human lung cell exposure technique, including interesting genetic changes accompanying observed pollution events. Together, these three papers demonstrate how air quality monitoring and modeling, and their application to the assessment of human health impacts, may be revolutionized by the latest technologies.

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