

## **Spectroscopic Needs for Atmospheric Pollution Measurements**

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This article provides an overview of current results and capabilities for spectroscopic measurements of atmospheric pollution, particularly from Earth satellites. This is now a sizable field of research, with some dozen satellites now performing measurements or being planned or prepared for launch. Measurements of tropospheric chemical constituents, their sources, sinks, transport, and transformation, provide crucial information on tropospheric oxidation chemistry and pollution of the lower atmosphere, and are now being employed to improve global emission inventories of odd nitrogen ( $\text{NO}_x$ ) and volatile organic compounds (VOCs).

The presentation gives an overview of research in the field and gives a number of examples, primarily taken from research done at the Harvard-Smithsonian Center for Astrophysics, with additional input from our collaborators and colleagues. Examples include measurements of: formaldehyde (HCHO), the major proxy for VOCs; glyoxal (CHOCHO) a recent additional proxy for VOC emissions,  $\text{NO}_2$ , the major proxy for  $\text{NO}_x$ ; global distributions of tropospheric ozone and carbon monoxide,  $\text{SO}_2$  from volcanoes and from anthropogenic pollution, and the formation of enhanced BrO over the polar ice shelves. The needs for improved laboratory spectroscopic measurements for the various pollutants will be presented.