Measuring global sulfur dioxide emissions with satellite sensors

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Atmospheric sulfur dioxide affects the weather by enhancing cloud formation, and long-term shifts in emissions can change the climate by increasing the planetary albedo. Sulfur dioxide emissions are the basis for acid rain, and the gas itself can cause respiratory problems. Despite its importance, the difficulties associated with accurately measuring sulfur dioxide mean that rates of emissions are generally not well understood. For readings made using satellite-borne spectrometers, the signal of sulfur dioxide is often swamped by that of ozone, which absorbs radiation at similar wavelengths. Using data filtering and analysis techniques, Fioletov et al. find that observations from three different satellites are consistent and could be used to detect large sources of sulfur dioxide emissions.

Satellites have previously been used to track emissions from individual point sources, such as volcanoes or large power plants. Global assessments have proven to be more elusive. By comparing observations from ultraviolet spectrometers carried by three different satellites, the authors identified 30 strong sources of sulfur dioxide emissions, ranging from smelters and oil refineries to factories, volcanoes, and power plants. With observations from 2004 to 2010, the authors calculated trends in emissions rates at these sites.

The development of an accurate method to remotely detect sulfur dioxide concentrations is important because otherwise scientists are reliant on reported emissions rates, which aren't always accurately disclosed.

More information: Application of OMI, SCIAMACHY, and GOME-2 satellite SO2 retrievals for detection of large emission sources , *Journal of Geophysical Research-Atmospheres*, DOI: 10.1002/jgrd.50826, 2013
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