First satellite detection of volcanogenic carbon monoxide

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Measuring and tracking the gases that vent from an erupting volcano is a project wrought with potential dangers and difficulties. On the ground measurements place researchers in harm's way, as do airborne sampling surveys. These approaches may also suffer from issues around accurately representing the spatial and temporal shifts in gas emissions rates. As such, satellite-based remote sensing techniques are becoming a favorite way to assess the dispersion and concentrations of various volcanic gases. Devising a functional remote sensing scheme, however, depends on identifying a satellite sensor that can reliably identify the chemical species in question and pick the volcanic emissions out from the background concentrations. Such efforts have so far been successful for only a few volcanic gases: sulfuric acid, hydrochloric acid, and hydrogen sulfide.

Working from satellite observational records from the 2010 Eyjafjallajökull and 2011 Grímsvötn eruptions, Martínez-Alonso et al. find that the Measurements of Pollution in the Troposphere sensor aboard NASA's Terra satellite and the Infrared Atmospheric Sounding Interferometer on the European Space Agency's Meteorological Operational satellite MetOp-A could be used to remotely detect volcanic carbon monoxide emissions. The two sensors measured atmospheric carbon monoxide in different ways and hence could be used to support the other's observations. The authors find that the remotely sensed volcanogenic carbon monoxide is not a misdiagnosis of atmospheric water vapor or aerosols. Further, their concentration measurements aligned with airborne surveys.

Based on their detections, the authors estimate that the global emission of volcanic carbon monoxide is approximately 5.5 teragrams per year, a small but not insignificant fraction of total annual emissions.

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