4.065 Resolving the Persistent CO Underestimate in Atmospheric Chemistry Models.

Early Career Scientist

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Abstract:

Carbon monoxide (CO) is emitted from combustion and is the main sink of the hydroxyl radical (OH) in the troposphere. Observations of CO, combined with global chemical transport models (CTMs), can improve constraints on anthropogenic and natural combustion-related emissions with implications for greenhouse gas lifetimes and levels of background ozone. The long lifetime of CO makes it a useful tracer for identifying different sources of air pollution, but recent degradation of CO simulations hinders the use of CTMs for this purpose. Constraints on the global methane and methyl chloroform lifetimes indicate a general overestimate in modeled OH of up to 10 % across a suite of global CTMs (Naik et al., 2013) that may be the source of recent poor model CO performance. Similarly, models overestimate the ratio of OH in the Northern to Southern hemispheres (Patra et al., 2014) which may indicate poor understanding of OH drivers in the Northern hemisphere (Strode et al., 2015). Here, we use observations of CO and related species from the NASA Atmospheric Tomography Mission (ATom) combined with surface and satellite observations to improve our understanding of the persistent CO underestimate and OH overestimate in atmospheric chemistry models with the goal of improving confidence in model ability to assist in identifying sources of global pollution, simulate the lifetime of greenhouse gases, and estimate background concentrations of ozone.