

## **Drivers of changes in global hydroxyl radical between 1980 and 2014**

VAISHALI NAIK<sup>1</sup> AND LARRY HOROWITZ<sup>1</sup>

<sup>1</sup>NOAA Geophysical Fluid Dynamics Laboratory, Princeton, NJ 08540, USA

Atmospheric methane ( $\text{CH}_4$ ) concentrations have been increasing steadily since preindustrial times; after remaining flat for about a decade in the mid 1990s to early 2000s, growth has resumed since 2007. Recent studies suggest that increases in methane sources have caused this renewed increase atmospheric in methane levels, although there is disagreement as to whether natural or anthropogenic sources have driven this increase. Alternatively, decreases in concentrations of the hydroxyl radical (OH), the primary sink of methane, have been suggested to be the cause of increasing methane levels. An accurate understanding of the global methane budget and drivers of change is necessary to design effective strategies to reduce methane for mitigating near-term climate change and to predict the long-term evolution of methane abundances. In this study, we focus on the drivers of changes in global OH over the 1980-2014 period to shed light on the role of variations in the methane sink in driving changes in atmospheric methane concentrations. Using an updated version of the NOAA GFDL chemistry-climate model (GFDL-AM3), we perform simulations to isolate the roles of individual changes influencing OH, namely:  $\text{NO}_x$ , CO, NMVOC, and aerosol emissions; atmospheric methane abundance; meteorology; and stratospheric ozone. We will systematically analyze how changes in each of these individual factors have impacted the temporal and spatial distribution of OH over recent decades.