

# **Climatic Influences on Tropospheric Ozone**

Xiao Lu

Sun Yat-sen University, China

## **Author list (excluding presenting author)**

### **Abstract**

Ozone is a greenhouse gas with an effective radiative forcing of 0.47 (0.24 to 0.70) W m<sup>-2</sup> (including stratospheric and tropospheric ozone, 1750-2019). It is also the major source of hydroxyl radical (OH), the most important oxidant in the atmosphere. At the surface, ozone is harmful to human health and can damage vegetation, leading to crop yield loss. While anthropogenic emissions have proven to be the major long-term driver of tropospheric ozone evolution, meteorological variations and climate change pose significant influences on tropospheric ozone at different spatiotemporal scales. These influences involve multiple processes by modulating: (1) climate-sensitive natural sources of ozone precursors such as lightning and the biosphere; (2) the partitioning and efficiency of chemical reactions; and (3) the transport of ozone and its precursors, as their lifetimes can range from hours in the polluted boundary layer to months in the free troposphere. This talk combines observations from multiple platforms and global to regional atmospheric chemical transport models to demonstrate: (1) how climate variability, such as the widening of the Hadley Circulation and the El Niño-Southern Oscillation, influences the interannual variability and trends of tropospheric ozone since 1990; and (2) the mechanisms determining the variability and trends in positive ozone-temperature sensitivity in polluted urban regions. These results reveal important interactions between climate and atmospheric chemistry and also guide ozone mitigation strategies in the future warming climate.

### **Early Career Scientist**

NO, I am not an early career scientist.

### **IGAC Activities**

GEIA: Global Emissions Initiative, TOAR: Tropospheric Ozone Assessment Report