1.135 Tropospheric ozone trend during 1994-2007 in subtropical southern China .

Presenting Author:

Tao Wang, Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hong Kong, China, cetwang@polyu.edu.hk

Co-Authors:

Jianing Dai, Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hong Kong, China

Ka Se Lam, Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hong Kong, China

Steven Poon, Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hong Kong, China

Abstract:

Ozone (O_3) is a greenhouse gas and air pollutant. Understanding its abundance and change and driving factors are of great importance to climate research and air quality management. However, there has been limited research of long-term (>20 years) trend of tropospheric O_3 in fasting developing Asia. Here we present the measurements of surface O_3 from 1994 to 2017 carried out by the Hong Kong Polytechnic University at a coastal background site of Hong Kong. This is the longest and continuous record of surface O_3 in eastern China. Overall, ozone has shown statistically significant upward trend with a rate of 0.38 ppb/year, and the increase is shown in all four seasons. Hourly backward air trajectories are computed for the 24-year period, and the ozone data are classified into four air mass groups: aged continental, eastern China, central China, and marine origin. The ozone level exhibits a positive trend in all air groups. While the O_3 increase in continent-affected air masses is expected, the large increase in the maritime air (~2% per year) is interesting. The cause of the significant rise of maritime O_3 is discussed with an analysis of climate parameters (solar radiation, temperature, and relative humidity) and emission and satellite data on ozone precursors. The inter-annual variability of O_3 at this subtropical site are examined with the ENSO Index (Niño3.4) indicating enhanced surface O_3 during El Niño years. The rising surface O_3 is consistent with the trend of boundary-layer O_3 from monthly/weekly vertical profiles obtained by the Hong Kong Observatory. The increasing tropopopheric ozone have important implications to air quality, ecosystem, and climate in the subtropical region of East Asia.