Temperature dependence of ozone reactivity observed at a suburban site in Japan

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Biogenic volatile organic compounds (BVOCs) have been focused on as precursors of tropospheric ozone (O_3) and secondary organic aerosols. Various species of BVOCs have C=C double bonds and can react with O_3. To capture BVOCs comprehensively, a total ozone reactivity (R_{O3}, the sum of k_i[VOC_i]) analyzer has been developed [1-5]. R_{O3} of sample BVOCs can be determined when decrease of O_3 due to BVOCs+O_3 is precisely monitored. In our previous studies, the detection limit of the analyzer reached 2 x10^{-5} s^{-1} (*S/N*=3, 60-s average, 50-s reaction) [5]. To apply the analyzer to field observations, measurement tests of R_{O3} in the ambient air were conducted in this study. The observation was conducted at a suburban site, Tokorozawa campus, Waseda University, Tokorozawa, Saitama, Japan, on July 6 and 7, 2016, and April 30, May 3, July 19, 20 and 21, 2017. Contribution of ambient NO on R_{O3} was corrected with observed NO concentration and correction factor considered [6]. As a result of the test, R_{O3} was significantly captured when the temperature was high during daytime in summer. Fig. 1 shows an example of correlation plot between the observed ozone reactivity (R_{O3}) and the ambient temperature. It was found that observed R_{O3} increased with temperature increasing. It was suggested that observed R_{O3} could be explained by temperature dependence of BVOCs emission from plants.

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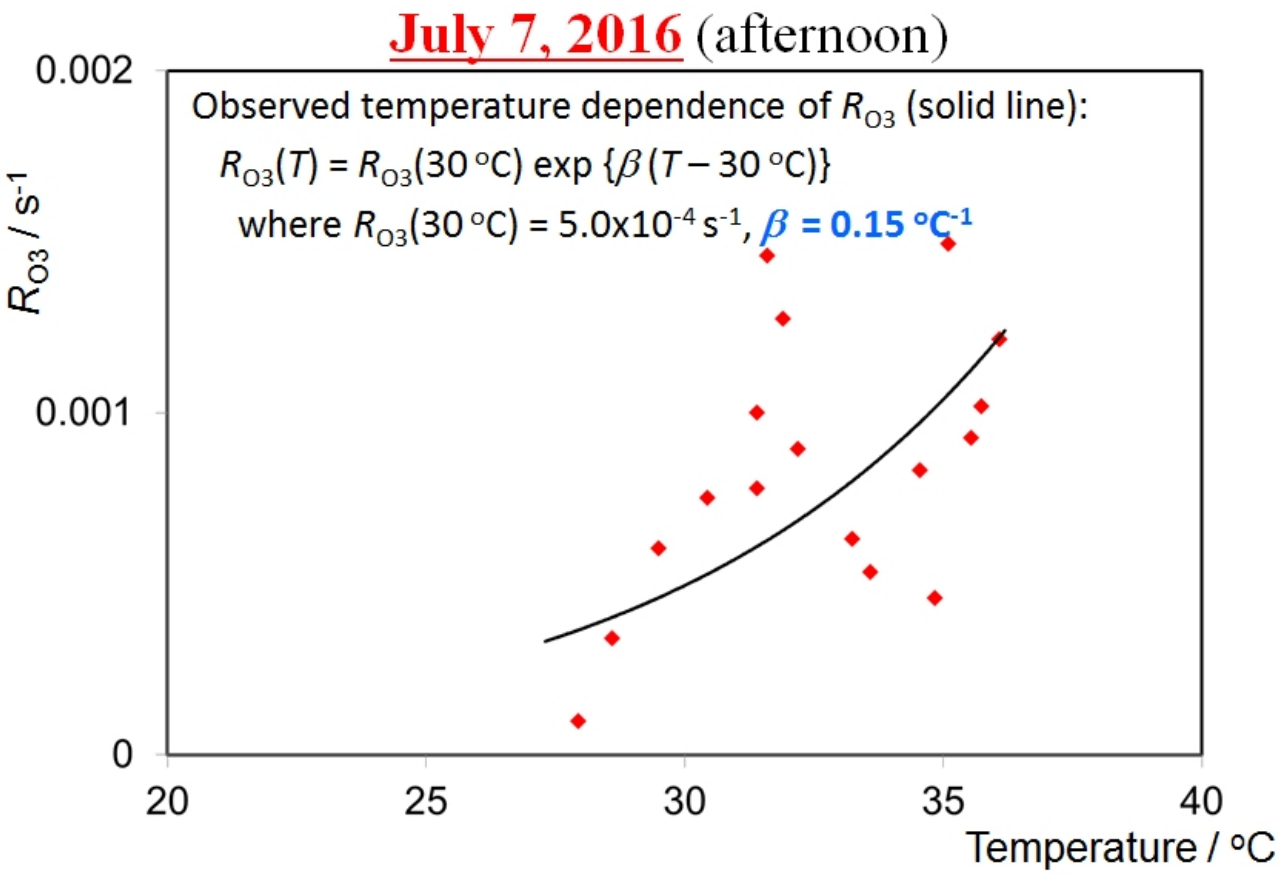

Fig.1 An example of correlation plot between the observed ozone reactivity (R_{O3}) and the ambient temperature.

