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A dependence of the ozone formation rate on the surface air temperature

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Studying the formation and dynamics of ozone in the atmosphere is important for several reasons. First, the contribution of tropospheric ozone to the global greenhouse effect is only slightly less than that of water vapor, carbon dioxide, and methane. Second, tropospheric ozone is a strong poison that has negative effects on human health, animals, and vegetation. Third, as a potent oxidizer, ozone destroys almost all materials, including platinum group of metals and compounds. Fourth, ozone is formed from gaseous precursors as a result of photochemical processes, but not directly released into the atmosphere by any industrial enterprise.
In this work, data of measurements carried out in a background region are used to investigate the relationship between ozone formation rate in the atmosphere and air temperature. It has been found that this relationship is nonlinear. An analysis of possible reasons shows that the nonlinear character of this relationship may be due to a nonlinear increase in the reaction constants versus air temperature and a quadratic increase in the concentration of hydrocarbons with increasing temperature.
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