

Authors: Peng et al.

A New Parameterization of Photolysis Rates for Oxygenated Volatile Organic Compounds (OVOCs)

General comments

This study presents a novel and well-executed parameterization method for estimating the photolysis rate constants of oxygenated volatile organic compounds (OVOCs) based on molecular structure. By constructing a photolysis module that complements the MCM v3.3.1 mechanism, the authors successfully establish a structure–reactivity relationship that overcomes the longstanding limitation of insufficient quantum yield data. This allows for the estimation of photolysis rate constants for a wide range of compounds lacking experimental measurements. Furthermore, by integrating the updated photolysis mechanism, the study highlights the significant contribution of non-formaldehyde OVOCs to the daily average concentration of ROx radicals. Overall, this work introduces a creative and highly valuable approach for addressing a critical gap in atmospheric chemistry modeling. Some technical suggestions for improving the manuscript are provided below.

Specific comments

- (1) Line 28, Please note that 'photolysis rate' is different from 'photolysis rate constant.' It would be more appropriate to use 'photolysis rate constant' here and in other relevant parts of the manuscript.
- (2) Line 155, there is a Chinese-style period that needs to be replaced.
- (3) The Supplementary Information includes numerous tables and figures; however, several figures are not referenced in the main text. It is recommended that the authors incorporate appropriate citations and briefly discuss the relevance of these figures to enhance clarity and coherence.