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Oxygen atom roaming and multiple dissociation pathways of NO₃

MICHAEL GRUBB, MICHELLE WARTER, KURT JOHNSON, SIMON NORTH,
Texas A&M University — The role of nitrate radical (NO₃) photolysis in atmospheric has long been known, but mysteries remain regarding the mechanism of the dissociation. In particular, the NO + O₂ channel has proven to be a challenge both theoretically and experimentally. High resolution velocity map ion imaging studies reveal that there are two distinct mechanisms to form the NO + O₂ products. Additionally, the dominant of these mechanisms appears to be the non-traditional state “roaming” mechanism recently identified in formaldehyde dissociation. The roaming mechanism involves large amplitude motion associated with a frustrated radical dissociation before roaming oxygen atom abstraction to form O₂. The identification of roaming in the NO₃ reaction may imply the widespread importance of this type of mechanism in atmospheric chemistry.

Michael Grubb
Texas A&M University

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