O-07

Session 4) Isotopologues in Atmosphere: Ozone, MIF and $\Delta^{17}O$

Novel triple-oxygen isotope study indicates unprecedented ozone-particulate interaction pathways in atmospheric pollution chemistry

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Ozone plays a fundamental role in the chemistry of the atmosphere, mediating oxidation reactions in phases and phase boundaries. Here, we investigate the least-explored solid-phase heterogeneous processes to understand the reaction pathways of O_3 with airborne aerosols. Using triple oxygen isotope ratios as tracer, we found that the ozone reaction oxidizes organic particles and produces carbon dioxide, with oxygen atoms largely from O_3. Along with CO_2, an equal amount of O_2 from water decomposition is inferred. Chemical reaction kinetics, however, is yet to be identified. One hypothetical pathway is through Criegee intermediates, formed by the reaction of unsaturated hydrocarbons and ozone and catalyzed by metal oxides, reacting with aldehyde/ketone-like organic compounds. Inclusion of the process in a chemistry-transport model could yield a significant change in the ozone budget. The study shows the importance of ozone induced heterogeneous chemical reactions on aerosol surfaces occurring in polluted atmospheres.