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Health-relevant compound ground-level ozone and temperature events in Europe

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Ground-level ozone is a major air pollutant harmful for human health and there are concerns that ground-level ozone will increase over Europe under climate change despite efforts for a rigorous air pollution control. In addition, high levels of ground-level ozone often occur in combination with high air temperatures, for instance under persistent anticyclonic conditions in summer. Due to climate change heat events such as hot days and heat waves are also increasing. Thus, ground-level ozone health risks could combine with increased health risks from heat exposure.

Changes in the atmospheric chemistry from increased biogenic volatile organic compound emissions, faster chemistry kinetics, and faster peroxyacetyl nitrate decomposition as well as enhanced stratosphere-troposphere exchange, changes of the large-scale atmospheric circulation and synoptic patterns, increased stagnancy, and changes of atmospheric humidity may lead to increases of ground-level ozone in the scope of climate change. For Europe regional differences exist. For instance, over central Europe there is a strong relationship with meteorological conditions, while over southern and northern Europe the influence of ozone persistence and hence precursor emissions is comparably strong on ozone exceedances.

The present contribution comprises relationships of ground-level ozone and temperature with the atmospheric circulation, changes of health-relevant ground-level ozone and temperature events under future climate change as well as the connection of ground-level ozone and temperature with human health outcomes.