

Insights into compound ground-level ozone and temperature events relevant for human health

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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 under climate change despite efforts for a rigorous air pollution control. High levels of ground-level ozone often prevail in combination with heat events, e.g., under persistent anticyclones in summer. Due to climate change heat events such as hot days and heat waves are also increasing. Thus, ground-level ozone pollution and thermal stress frequently occur simultaneously, show strong increases under climate change and can have additive or even synergistic effects on human health.

Heat stress plays a particular role in urban areas due to the urban heat island effect and the high number of people affected. Highest temperatures usually occur in densely built areas. Cities are also air pollution hot spots. Due to the formation of ground-level ozone as a secondary air pollutant from precursors, mainly nitrogen oxides and volatile organic compounds, concentrations are highest in suburban areas. The vulnerability of the urban population to heat and air pollution strongly depends on individual conditions such as age, gender and pre-existing health conditions as well as on factors of the living surrounding such as green and grey spaces.

The present contribution highlights relationships and changes of ground-level ozone and temperature with the atmospheric circulation under ongoing climate change. Spatial and temporal differences of the exposures in urban areas and important governing factors are regarded and human health outcomes are discussed. European areas serve as regional examples.

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