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Modelling the Impacts of Climate Change on Tropospheric Ozone over three Centuries

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The ozone chemistry over three centuries has been simulated based on climate prediction from a global climate model and constant anthropogenic emissions in order to separate out the effects on air pollution from climate change. Four decades in different centuries have been simulated using the chemistry version of the atmospheric long-range transport model; the Danish Eulerian Hemispheric Model (DEHM) forced with meteorology predicted by the ECHAM5/MPI-OM coupled Atmosphere-Ocean General Circulation Model. The largest changes in both meteorology, ozone and its precursors is found in the 21st century, however, also significant changes are found in the 22nd century. At surface level the ozone concentration is predicted to increase due to climate change in areas where the ozone precursors are emitted. Elsewhere a significant decrease is predicted at the surface. In the free troposphere a general increase is found in the entire Northern Hemisphere except in the tropics, where the ozone concentration is decreasing. In the Arctic the ozone concentration will increase in the entire air column, which most likely is due to changes in transport. The change in temperature, humidity and the naturally emitted Volatile Organic Compounds (VOCs) are governing with respect to changes in ozone both in the past, present and future century.