

The climate in a world without ozone

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Ozone directly impacts the heating of the atmosphere and Earth surface through its interaction with long- and short-wave radiation. Changes in heating lead to adjustments in atmospheric dynamics and the hydrological cycle. We use the EC-Earth coupled global climate model in order to study the impact on climate of a total removal of the radiative effects of ozone. The global mean temperature drops 1.5 K, the stratospheric jets disappear, the tropospheric jets strengthen and extend upward in altitude. Mid-latitude storm-tracks intensify and atmospheric convection deepens. Despite the global mean cooling, the global mean precipitation is largely unaffected, although significant changes occur in the distribution of precipitation over land and sea. Changes in the Northern Hemisphere stationary planetary waves lead to a regional warming over Northeastern North America of about 3 K and a cooling over Siberia. We discuss the physical mechanisms responsible for the simulated changes in climate.

Key words: ozone, stratospheric jet, tropospheric jet, planetary waves, radiation budget