Geophysical Research Abstracts
Vol. 12, EGU2010-12671, 2010
EGU General Assembly 2010

Quantification of global ozone exposure and resulting yield losses of major crop types due to ozone precursor emissions from the major industrialised regions of the northern hemisphere.

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Tropospheric ozone concentrations have increased steadily since the pre-industrial times, driven by anthropogenic emissions of nitrogen oxides (NOx) and organic compounds. Ozone in the troposphere is a greenhouse gas as well as a global air pollution problem, with harmful effects on human health and vegetation observed. It is this impact on the biopshere that has been an area of growing concern in recent years as ozone has been shown to play an important role in reduction of crop yields and suppression of the terrestrial carbon sink. Ozone-plant interactions are also important in determining the rate of dry deposition loss of ozone to the surface, controlling the damaging flux of ozone into vegetation. We have used the TOMCAT global atmospheric chemistry model to investigate the contributions of ozone precursor species (NOx) emissions from the different population areas of the northern hemisphere to exposure of vegetation and crops to harmful levels of ozone. The AOT40 exposure index is used to assess the contribution of NOx emissions from Europe, North America and East Asia to the global exposure of 8 major agricultural crop types to harmful ozone concentrations, and the resultant yield losses during the 2005 growing season.