Geophysical Research Abstracts
Vol. 12, EGU2010-8110, 2010
EGU General Assembly 2010

TRANSFER OF ORGANIC Br AND Cl FROM THE BIOSPHERE TO THE ATMOSPHERE DURING METEORITE IMPACTS: IMPLICATIONS FOR THE STRATOSPHERIC OZONE LAYER

Kostas Kourtidis

School of Engineering, Demokritus University of Thrace, Lab. of Atmospheric Pollution and Pollution Control Engineering of Atmospheric Pollutants, Dept. of Environmental Engineering, Xanthi, Greece (kourtidi@env.duth.gr, +30 25410 79379)

Following the Cretaceous / Tertiary (K/T) meteoritic impact some 65 Myr ago, large portions of aboveground terrestrial biomass were burned. As a result, large amounts of various trace gases were injected to the atmosphere, inducing a wide range of effects on climate and ecosystems. Here, it is commented on the emission to the atmosphere of methyl bromide (CH3Br) and methyl chloride (CH3Cl) from extensive biomass burning that followed the impact. Based on reported biomass burning emission rates, it is estimated that their emissions from global fires resulted in tropospheric mixing ratios of around 20-65.8 ppbv organic Cl and 110-390 pptv organic Br. The above calculated mixing ratios of active chlorine and bromine are more than an order of magnitude their present, anthropogenically perturbed level and, although the ocean ultimately might absorb them, we calculate here that they could still remain in the stratosphere for many years, substantially affecting the ozone layer. This would have lead to very serious increases in short wavelength UV radiation reaching the lowermost atmosphere. While impacts such as the K/T one occur at intervals of 10^7 yrs, more frequent, less massive events could ignite a smaller portion of the global forests. If one-tenth of the forests ignited during the K/T event are burned, CH3Cl and CH3Br levels might rise by 3.6-12 times and 1.1-3.9 times their present level, respectively, leading still to global ozone-hole conditions.