Changes in the Oxidative Power of the Atmosphere Due to Human Activities

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The measured changes in CH_4 and CO concentrations, and enhancements in NO_x emissions by fossil and biomass fuel burning have led to important changes in the global distributions of ozone and hydroxyl radicals. As part of a European effort on the three-dimensional modelling of tropospheric chemistry, estimates are made on the changes which have taken place in the global distributions of ozone and hydroxyl. Since pre-industrial times we find that ozone concentrations have increased in the northern hemisphere, but that on the other hand global average OH concentrations have declined, leading to a buildup of trace gases in the troposphere.

Measurements and Implications of Photochemically Active Trace Species in the Remote Atmosphere

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Much of the atmosphere over the Pacific Ocean region is still believed to be relatively free from direct anthropogenic influence and it therefore has some semblance of the background troposphere. By area, the ocean represents roughly 35% of the earth's surface. Due to the remoteness of the region, measurements of some photochemically important trace species also present an interesting challenge. In an effort to further our understanding of the abundances, budgets, photochemical transformations, and influence of long range transport processes, a five week study was conducted at the Geophysical Monitoring for Climatic Change (GMCC) station at the 11,000 ft level on Mauna Loa, Hawaii in the spring of 1988. During this experiment, called the Mauna Loa Observatory Photochemistry Experiment (MLOPEX), a variety of photochemically related trace species including NO_x, NO_y, HNO_3, NO_3^-, O_3, NMHCs, $J(NO_2)$, HOOH, H_2CO, PAN, organic nitrates and other peroxides were continuously measured in addition to many other measurements that are routinely made at the GMCC station. Results from this experiment will be presented and will be compared with photochemical models, with measurements made previously from aircraft programs in the Pacific, and with measurements made in continental regions. In particular, the ozone photochemical tendency, partitioning of total odd nitrogen, and implications for the abundance of peroxyl and hydroxyl radicals will be discussed.

In addition, and because thunderstorms may be significant source of odd nitrogen species to the global free troposphere, some results from recent aircraft flights within the anvils of thunderstorms will be presented.