

The Impact of Human Activities on the Chemistry of the Atmosphere

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There is now strong evidence that human activities have led to the accumulation of a variety of trace gases in the Earth's atmosphere, particularly during the past few decades. These global-scale changes in the chemical composition of the atmosphere may influence climate and have already led to significant depletion of the ozone layer of the stratosphere, which shields the earth's surface from damaging ultraviolet radiation from the sun. About half of the world's population will be living in urban areas in the first few decades of the 21st century, exposing millions of urban residents to harmful levels of air pollutants caused mainly by emissions from motor vehicles and industries. Slash-and-burn agricultural practices and forests fires also contribute to worsening air quality on broad regional scales. Emissions from all these fossil fuel and bio-mass burning activities have led to increases in the amount of atmospheric particulate matter, as well as in the concentration of species such as nitrogen oxides, volatile organic compounds and carbon monoxide. Emissions of these relatively short-lived compounds in turn lead to the formation of tropospheric ozone, which together with particulate matter may also contribute to climate change. This deteriorating air quality problem is expected to reach global proportions in the coming decades, with potentially detrimental effects on ecological systems and on human health. On the other hand, much remains to be learned before reliable predictions can be made of the chemical behavior of the atmosphere on a regional and global scale.