Gas from pollutants, forest fires at potentially toxic levels

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Forest fires and emission of air pollutants, which include fumes from vehicles running on diesel and slow burning of coal and charcoal, release isocyanic acid in the troposphere. In 2011, scientists first detected isocyanic acid in the ambient atmosphere at levels that are toxic to human populations; at concentrations exceeding 1 parts-per-billion by volume (ppbv), human beings could experience tissue decay when exposed to the toxin.

For the first time, using a chemical transport model designed to estimate the distribution and budget of isocyanic acid in the troposphere, Young et al. show that in several parts of the world, local emissions may increase the concentration of isocyanic acid in ambient atmosphere, thereby exposing large populations to potentially toxic levels of the acid.

Their research shows that regions that experience large forest fires, such as tropical Africa, Southeast Asia, Siberia, Canada, and the Amazon, or are heavily polluted, like China, are particularly vulnerable. In these regions, concentrations of isocyanic acid in the atmosphere exceeded the 1 ppbv limit for about 7-90 days per year. Their model also predicts that doubling the rate of air pollutant emission, particularly in heavily polluted regions of China, could increase the exposure of humans in the region to more than 170 days per year to isocyanic acid levels exceeding 1 ppbv.

On the basis of their study, the authors recommend more observations to improve estimates on global distribution of isocyanic acid in the

atmosphere, particularly in regions experiencing large wild fires, where their model predicts the highest acid concentrations. Further, the authors suggest that scientists need to conduct research into indoor air pollution from the use of cooking stoves, which likely expose women and children to high levels of isocyanic acid.

A GeoSpace guest blog post on this study is available at: bit.ly/JFG0wq .

More information: Isocyanic acid in a global chemistry transport model: Tropospheric distribution, budget, and identification of regions with potential health impacts, *Journal of Geophysical Research-Atmospheres*, doi:10.1029/2011JD017393, 2012

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