

Contents in Context

Environmental Chemistry, Vol. 3(4), 2006

Implications for Community Health from Exposure to Bushfire Air Toxics

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Environ. Chem. **2006**, 3, 235

Significant bushfires have recently occurred in Indonesia (1997), Europe (2002), Australia (2000–2001) and the USA (2003), and burned large areas over extended periods of time. They cause widespread and serious air pollution through the release of respirable particles and other toxic air contaminants. These large fire events have shown clear impacts on community health and have caused increasing concern about the impact of bushfire smoke, whether from accidental or planned fires, on the health of surrounding communities.

Airborne Measurements of Trace Organic Species in the Upper Troposphere Over Europe: the Impact of Deep Convection

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Environ. Chem. **2006**, 3, 244

In the upper troposphere, sources of HO_x such as acetone, peroxides, and aldehydes can play an important role in governing the production and destruction of ozone. Convection (over both land and sea) carries gases that can contribute to increased levels of HO_x to the upper troposphere. The chemical impact of convection on the continental upper troposphere over Europe is studied by sampling the upper troposphere. Mass spectrometry techniques are used to analyze the collected samples. Such a study should aid in understanding the impact meteorological events have on atmospheric chemistry.

Seasonal and Diurnal Cycles of Dimethylsulfide, Dimethylsulfoniopropionate and Dimethylsulfoxide at One Tree Reef Lagoon

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Environ. Chem. **2006**, 3, 260

Coral reefs have now been highlighted as significant sources of dimethylsulfide and other organic sulfur compounds, which may be important for the formation of clouds over the ocean and climate regulation. However, no studies have reported the seasonal and diurnal cycles of these organic sulfur substances in reef waters. This study describes the cycling of dimethylsulfide and related organic substances at One Tree Reef, in the southern part of the Great Barrier Reef, as well as their production from staghorn coral in chamber experiments. The results suggest that coral reefs are significant sources of dimethylsulfide to reef waters and possibly the reef atmosphere, but the effect of this substance on the radiative climate over the Great Barrier Reef is unknown.

Stable Carbon Isotope Analysis of Anthropogenic Volatile Halogenated C₁ and C₂ Organic Compounds

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Environ. Chem. **2006**, 3, 268

Volatile halogenated organic compounds (VHOCs), ubiquitous trace gases of natural or man-made origin, have gained increasing attention due to their adverse health effects on humans and wildlife, and their potential for catalytic ozone destruction. However, it is difficult to confront VHOC emission budgets as the processes responsible for the formation and degradation of these compounds are complex, and their emission and persistence are affected by variations in the environment and climate. In order to understand VHOCs and reduce their environmental impact, it is necessary to study the isotopic composition of VHOCs produced by different sources, in addition to their concentrations and fluxes in the environment. In this paper, the determination of the carbon isotope range of VHOCs produced by human activities adds useful basic information for future studies of their environmental fate.

Complexation of Lead in Model Solutions of Humic Acid: Heterogeneity and Effects of Competition with Copper, Nickel, and Zinc

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Environ. Chem. **2006**, 3, 276

Metal bioavailability and toxicity are often related to free metal concentration rather than total metal concentration. Humic substances are chemically and physically heterogeneous complexants for metals in natural waters, and play an important role in trace metal transport, fate, and bioavailability. Metal bioavailability, which depends on chemical speciation of metals, is greatly influenced by the presence of other trace metals and major cations in natural waters. In this work, the effects of heterogeneity of humic substances, and of competition of trace metals on lead speciation in model solutions have been studied to gain a better understanding of these effects on complexation of trace metal lead and its bioavailability.

Gaseous and Particulate Products from the Atmospheric Ozonolysis of a Biogenic Hydrocarbon, Sabinene

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Environ. Chem. **2006**, 3, 286

Volatile organic compounds (VOCs) are a source of ozone and secondary organic aerosols, which have significant effects in the lower troposphere and on human health. The emission rate of VOCs from plants exceeds anthropogenic emissions by a factor of ten. In order to understand how these plant-derived compounds influence global ozone budgets, studies into the atmospheric reactions of these compounds are needed. This study investigates the ozonolysis of sabinene, a VOC abundantly emitted by trees in Europe.

Carbon Capture and the Aluminium Industry: Preliminary Studies

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Environ. Chem. **2006**, 3, 297

Carbon dioxide concentrations in the atmosphere are rising every year by 1.5–3.0 ppm and there is now a general acceptance that increased efforts must be made to reduce industrial sources of this greenhouse gas. Carbonation of red mud wastes produced by aluminium refineries has been carried out to study the capacity of these wastes to capture carbon dioxide. Removal is very rapid, with the added carbon dioxide recorded as a large increase in bicarbonate alkalinity. Although these results can only be considered preliminary, the experiments indicate that these wastes can potentially remove up to 15 million tonnes of carbon dioxide produced in Australia per annum. Furthermore, the carbonated waste can be used in other industrial processes to add further value to these waste materials.

Arsenic Species in a Rocky Intertidal Marine Food Chain in NSW, Australia, revisited

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Environ. Chem. **2006**, 3, 304

The pathways by which arsenic is accumulated, biotransformed and transferred in aquatic ecosystems are relatively unknown. Examination of whole marine ecosystems rather than individual organisms provides greater insights into the biogeochemical cycling of arsenic. Rocky intertidal zones, which have a high abundance of organisms but low ecological diversity, are an important marine habitat. This study examines the cycling of arsenic within intertidal ecosystems to further understand its distribution and transfer.