

## Contents in Context

### *Environmental Chemistry, Vol. 4(4), 2007*

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#### **Past atmospheric composition and chemistry from ice cores – progress and prospects**

*Eric W. Wolff, Manuel A. Hutterli and Anna E. Jones*

*Environ. Chem. 2007, 4, 211*

Investigating the past is often the only way we have of determining whether we have included all processes correctly into models, and then of verifying their behaviour. Ice cores provide an excellent way of finding out about the past. Air bubbles trapped in the ice allow us to directly access the concentration of stable trace gases, including important greenhouse gases. However, there are also tantalising possibilities to learn about aerosols and shorter-lived gases. This article describes some of the information we have already learnt from ice cores, but also describes the challenges that require understanding of atmospheric chemistry in the polar regions today in order to extract the full value of the records of the past trapped in the ice sheet.

#### **Omnipresence of biological material in the atmosphere**

*Ruprecht Jaenicke, Sabine Matthias-Maser and Sabine Gruber*

*Environ. Chem. 2007, 4, 217*

Atmospheric biological particles have been largely overlooked in the past. While some microorganisms have been studied, the majority of other biological particles have not. The presence of these particles might force us to view the atmospheric aerosol differently.

#### **Iron-binding ligands and their role in the ocean biogeochemistry of iron**

*Keith A. Hunter and Philip W. Boyd*

*Environ. Chem. 2007, 4, 221*

It is now well accepted that iron is an essential micronutrient for phytoplankton growth in many areas of the global ocean, even though this element is present in seawater in extremely low abundance. It is also known that most of the iron in seawater is present as complexes formed with ligands of natural organic matter whose nature and origin remain largely unknown. Here we consider how these iron-complexing ligands might have evolved during geological time, what factors may have given rise to their presence and the possible roles that they play in iron biogeochemistry.

#### **Global dust teleconnections: aerosol iron solubility and stable isotope composition**

*Matthieu Waeles, Alex R. Baker, Tim Jickells and Jurian Hoogewerff*

*Environ. Chem. 2007, 4, 233*

Iron is an essential component of many enzyme systems of marine plants (phytoplankton), but in large areas of the global ocean iron is in such short supply as to hinder phytoplankton growth. This is of major environmental interest because phytoplankton growth can remove carbon from the atmosphere. This contribution seeks to improve the understanding of how dust transported through, and processed within, the atmosphere helps to supply usable iron to the plants of the remote ocean.

#### **Major influence of BrO on the NO<sub>x</sub> and nitrate budgets in the Arctic spring, inferred from $\Delta^{17}\text{O}(\text{NO}_3^-)$ measurements during ozone depletion events**

*S. Morin, J. Savarino, S. Bekki, A. Cavender, P. B. Shepson and J. W. Bottenheim*

*Environ. Chem. 2007, 4, 238*

Ozone depletion events (ODEs) in the Arctic lower atmosphere drive profound changes in the chemistry of nitrogen oxides (NO<sub>x</sub>) because of the presence of bromine oxide (BrO). These are investigated using the isotopic composition of atmospheric nitrate (NO<sub>3</sub><sup>-</sup>), which is a ubiquitous species formed through the oxidation of nitrogen oxides. Since BrO is speculated to play a key role in the atmospheric chemistry of marine regions and in the free troposphere, our studies contribute to the improvement of the scientific knowledge on this new topic in atmospheric chemistry.

#### **Atmospheric variation of nitrous acid at different sites in Europe**

*Karin Acker and Detlev Möller*

*Environ. Chem. 2007, 4, 242*

Nitrous acid (HNO<sub>2</sub>) is an important source of the hydroxyl radical (OH<sup>•</sup>), the most important daytime oxidising species that contributes to the formation of ozone as well as of other secondary pollutants in the troposphere. Understanding the sources and sinks of HNO<sub>2</sub> is of crucial interest for accurately modelling the chemical composition of the troposphere and predicting future trace gas concentrations.

#### **An actual scenario that demonstrates sulcotrione photodegradation on maize leaves after spraying**

*Alexandra ter Halle, Agnès Piquet and Claire Richard*

*Environ. Chem. 2007, 4, 256*

Recent developments in environmental monitoring have revealed that pesticides are dispersed through all parts of the environment. Air, water and soil are all contaminated. In this context there are tightening regulations on pesticide use with the goal of limiting their environmental impact. We look here at how pesticides can actually break down very quickly after their application on leaves, due to the effect of sunlight, i.e. 'photodegradation'. Understanding this phenomenon could help to reduce application rates.

**Experimental determination of the dissolution kinetics of zero-valent iron in the presence of organic complexants**

*Eric M. Pierce, Dawn M. Wellman, Alexander M. Lodge and Elsa A. Rodriguez*

*Environ. Chem.* **2007**, 4, 260

Iron metal is being considered as a material to be used for the treatment of groundwater contaminated with toxic metals and organics. Although time-dependant information is available, predicting the long-term behaviour of this material has been complicated by the build-up of rust or other alteration phases on the surface of Fe metal. In addition to the build-up of rust, changes to important environmental factors also complicate these types of predictions. The research discussed in this paper uses a non-traditional experimental technique to isolate the impact of specific environmental factors (i.e. pH, temperature) and organic complexants on the dissolution of Fe metal.

**Comparing bulk extraction methods for chemically available polycyclic aromatic hydrocarbons with bioaccumulation in worms**

*Mickael Barthe and Émilien Pelletier*

*Environ. Chem.* **2007**, 4, 271

Determining the bioavailability of organic contaminants in sediments is a critical step in assessing the ecological risks of contamination in aquatic ecosystems. Standardised sediment bioaccumulation tests using benthic organisms are often performed to determine the relative bioavailability of sediment contamination. Unfortunately biological methods are time consuming, expensive and organisms are often difficult to maintain in good health in a laboratory exposure system. Contradictory results have been reported in the last decade and factors that affect the behaviour of extractants need to be examined for a large range of sediments. A study was conducted to determine the bioavailability of polycyclic aromatic hydrocarbons (PAHs) in sediment using worms and to compare the uptake by the biological samplers with mild solid/liquid extractions when exposed to unspiked low and highly contaminated marine and freshwater sediments.