

Contents in Context

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Coupling between dimethylsulfide emissions and the ocean–atmosphere exchange of ammonia

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Dimethylsulfide (DMS) is recognised as a potentially significant climate-forcing gas, owing to its role in particle and cloud formation in the marine atmosphere, where it is the dominant source of acidity. Ammonia, the dominant naturally occurring base in the atmosphere, plays an important role in neutralising particles formed from DMS oxidation products and may even enhance the formation rate of new particles. A biogeochemical coupling has previously been proposed between DMS and ammonia fluxes from the ocean to the atmosphere, in the form of coproduction of the two gases in seawater. We revise this suggestion by introducing the concept of ‘co-emission’ of the gases, where DMS emission controls the rate of emission of ammonia from the ocean by acidifying the atmosphere.

Modelling the impact of possible snowpack emissions of O(³P) and NO₂ on photochemistry in the South Pole boundary layer

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The study of surface photochemical ozone production on the Antarctic continent has direct relevance to climate change and general air quality and is scientifically noteworthy given the otherwise pristine nature of this environmental region. The identification of possible direct ozone emissions from snow surfaces and their contribution to the already active photochemical pollution present there represents a unique physical phenomenon. This process could have wider global significance for other snow-covered regions and therefore for global climate change.

Modelling copper uptake by *Saccostrea glomerata* with diffusive gradients in a thin film measurements

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Organisms, like commercially available rock oysters, can be used to measure the uptake of contaminants (e.g. trace metals) and thereby provide a relative measure of water quality between sites or of water quality changes over time. However, these measurements cannot be directly compared with water quality guidelines, which require water concentrations and not tissue concentrations, to provide an absolute indication of water quality. The present study found that the amount of copper accumulated in oyster tissue was proportional to water copper concentrations measured by passive sampler devices, thereby allowing oyster copper accumulation to be interpreted in terms of biologically-available copper water concentrations and to be compared with the water quality guidelines.

Binding of vapour-phase mercury (Hg⁰) on chemically treated bauxite residues (red mud)

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Mercury (Hg) is a toxic, persistent pollutant that accumulates in the food chain. Atmospheric Hg is a global problem with many sources of emissions, of which anthropogenic sources are estimated to account for approximately one-third. Stationary combustion (coal combustion, municipal waste incinerators, etc.) are the largest worldwide sources of anthropogenic Hg emissions, and great effort has been taken to develop control technologies for capture of mercury from these sources. In the present study, Hg capture using bauxite residue (red mud) – a waste product from the aluminium industry – is evaluated and compared with other, more conventional sorbent materials.

Trace metal cycling in the Whau Estuary, Auckland, New Zealand

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Environ. Chem. **2008**, 5, 289

The accumulation of trace metals from urban runoff is a serious environmental concern. In the present paper we show that, in the case of the Whau Estuary, Auckland, New Zealand, there is a significant particulate Zn input, of which a significant amount of Zn is lost from the particulate phase into the dissolved phase within the water column, and via molecular diffusion across the water–sediment interface. The present study shows that changes in the chemical speciation of Zn, associated with changes in salinity, play a major role in regulating the recycling of this metal between the particulate and dissolved phases.

Determination of the adsorption mechanism of imidazolium-type ionic liquids onto kaolinite: implications for their fate and transport in the soil environment

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Environ. Chem. **2008**, 5, 299

The present paper looks at the possible spreading of a new class of chemicals, namely, ionic liquids in soils. These ionic liquids have gained increasing attention, and their environmental impact and fate needs to be determined before accidental release. The paper specifically focusses on the adhesion mechanisms of these chemicals onto a type of clay, kaolinite. It was found that a multilayer adhesion mechanism occurs. Sorption of ionic liquids on kaolinite indicates that these chemicals can modify the clay surfaces, which may lead to changes in its natural geochemical cycles.

Assessing toxicity of mining effluents: equilibrium- and kinetics-based metal speciation and algal bioassay

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The release of mining effluents exposes natural waters to excess metals and thereby threatens both human and environmental health. The present study explores the toxicity of aqueous mining effluents collected from a mining area in Sudbury (Ontario, Canada), using two different methods for determination of metal speciation, and an algal toxicity study. The results show reasonable correlation between metal speciation and the observed toxicity and suggest the importance of taking into account other factors related to water quality criteria such as nutrient concentrations, diluent water and presence of other toxic metals that can greatly influence the toxicological result.