

Contents in Context

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Are Arctic Ocean ecosystems exceptionally vulnerable to global emissions of mercury?

A call for emphasised research on methylation and the consequences of climate change

R. W. Macdonald and L. L. Loseto

Environ. Chem. **2010**, 7, 133

Mercury is a global contaminant that has entered Arctic food webs in sufficient quantity to put at risk the health of top predators and humans that consume them. Recent research has discovered a photochemical process unique to the Arctic that leads to mercury deposition on frozen surfaces after polar sunrise, but the connection between mercury deposition and entry into food webs remains tenuous and poorly understood. We propose here that the Arctic Ocean's sensitivity to the global mercury cycle depends far more on neglected post-deposition processes that lead to methylation within the ice–ocean system, and the vulnerability of these processes to changes occurring in the cryosphere.

Validation of a portable flow injection–chemiluminescence (FI-CL) method for the determination of dissolved iron in Atlantic open ocean and shelf waters by comparison with isotope dilution–inductively coupled plasma mass spectrometry (ID-ICPMS)

Simon J. Ussher, Ivan Petrov, Christophe R. Quétel and Paul J. Worsfold

Environ. Chem. **2010**, 7, 139

The importance of iron as a limiting micronutrient for primary production in the marine environment and its complex marine biogeochemical cycle necessitate accurate methods for the determination of iron in seawater. Current analytical challenges include the detection of trace concentrations (sub-nanomolar) and the high potential for contamination and matrix interferences. To improve confidence in dissolved iron data, intercomparison exercises of commonly used analytical methods are required that demonstrate their applicability to different water masses.

Assessment of the pollution potential of mercury contaminated biosolids

Cristina Lomonte, Johannes Fritsche, Emilia Bramanti, Augustine Doronila, David Gregory, Alan J. M. Baker and Spas D. Kolev

Environ. Chem. **2010**, 7, 146

The re-use of biosolids (sewage sludge) is becoming increasingly popular especially for land applications as soil improvers, fertilisers and composts. However, some biosolids are contaminated with toxic heavy metals and mercury is arguably of the highest environmental and public health concern. Studies on mobility, availability and emissions of mercury from biosolids were carried out to assess the biosolids potential for contamination of the environment and to evaluate applicable techniques for a future remediation.

Aeolian iron mobilisation by dust–acid interactions and their implications for soluble iron deposition to the ocean: a test involving potential anthropogenic organic acidic species

Chao Luo and Yuan Gao

Environ. Chem. **2010**, 7, 153

Studying the input of atmospheric soluble iron to the ocean is important as the soluble form of iron is bioavailable for phytoplankton uptake in the surface ocean to support photosynthesis. In this paper, the effect of organic acidic species on atmospheric iron dissolution is addressed through a global model for the first time. The new results contribute to a better understanding of iron dissolution processes in the atmosphere and the role of atmospheric iron in ocean biogeochemical cycles.

A comparative evaluation of water uptake on several mineral dust sources

Juan G. Navea, Haihan Chen, Min Huang, Gregory R. Carmichel and Vicki H. Grassian

Environ. Chem. **2010**, 7, 162

Dust particles produced from wind blown soils are of global significance as these dust particles not only impact visibility, as evident in the recent 2009 Australian dust storm, but also atmospheric chemistry, climate and biogeochemical cycles. The amount of water vapour in the atmosphere (relative humidity) can play a role in these global processes yet there are few studies and little quantitative data on water–dust particle interactions. The focus of this research is on quantifying water–dust particle interactions for several dust sources including Asia and Africa where dust storms are most prevalent.

Assessing the effect of marine isoprene and ship emissions on ozone, using modelling and measurements from the South Atlantic Ocean

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Environ. Chem. **2010**, 7, 171

Air over the remote Southern Atlantic Ocean is amongst the cleanest anywhere on the planet. Yet in summer a large-scale natural phytoplankton bloom emits numerous natural reactive compounds into the overlying air. The productive waters also support a large squid fishing fleet, which emits significant amounts of NO and NO₂. The combination of these natural and man-made emissions can efficiently produce ozone, an important atmospheric oxidant.

**Anisole nitration during gamma-irradiation of aqueous nitrite and nitrate solutions:
free radical versus ionic mechanisms**

Gracy Elias, Bruce J. Mincher, Stephen P. Mezyk, Thomas D. Cullen and Leigh R. Martin

Environ. Chem. **2010**, 7, 183

The nitration of aromatic compounds is an important source of toxic, carcinogenic, and mutagenic species in the atmosphere. Gas phase nitration typically occurs by free radical reactions. Condensed-phase free radical reactions may also be relevant in fog and cloud water in polluted areas, in urban aerosols with low pH, in water treatment using advanced oxidation processes such as e-beam irradiation, and in nuclear waste treatment applications. This paper discusses research towards an improved understanding of nitration of aromatic compounds in the condensed phase under conditions conducive to free radical formation.

**Delineation of sediment sources to a coastal wetland in the Great Barrier Reef catchment:
influence of climate variability and land clearing since European arrival**

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Environ. Chem. **2010**, 7, 190

Undisturbed sediments provide a record to past events in a catchment. In this study we examine changes in sources of sediment and their variation over the past century due to changes in climate and extensive modification of the catchment after European settlement. We also highlight how multiple lines of forensic evidence acquired from the sediments can be used to reconstruct catchment history over a range of timescales.

Arsenic speciation in marine organisms from Antarctic coastal environments

Marco Grotti, Cristina Lagomarsino, Walter Goessler and Kevin A. Francesconi

Environ. Chem. **2010**, 7, 207

In studies on trace element accumulation and transformation, it is difficult to distinguish the relative contribution of natural and anthropogenic sources. Antarctic ecosystems provide the opportunity to investigate the natural cycles of the elements, because the food webs are relatively simple and trace element contamination from anthropogenic sources is negligible. We report the arsenic species in various tissues from a range of Antarctic organisms, and compare the patterns of arsenicals with those from similar studies in temperate and tropical waters.

**Assessment of metal–extracellular polymeric substances interactions by asymmetrical
flow field-flow fractionation coupled to inductively coupled plasma mass spectrometry**

Enrica Alasonati, Stephane Dubascoux, Gaetane Lespes and Vera I. Slaveykova

Environ. Chem. **2010**, 7, 215

Extracellular polymeric substances (EPS) are soluble polymers that are liberated from microorganisms and represent an important component of the natural organic matter in the aquatic and terrestrial environment. These substances affect nutrient and toxic metal cycling, both owing to their metal binding properties and their effect on aggregation and sedimentation. In order to obtain more information on their role in metal transport, EPS size (molar mass) distributions and the associated Ca, Cd and Pb were measured by using asymmetrical flow field-flow fractionation coupled to inductively coupled plasma mass spectrometry.