

## Contents in Context

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#### Understanding the origin of clouds

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Clouds are an important part of our atmosphere and they have a critical role in controlling the amount of the sun's energy that reaches the earth's surface. In February 2006 the Precursors to Particles (P2P 2006) campaign occurred at the Cape Grim Baseline Air Pollution Station, Tasmania. Understanding exactly how clouds impact on our climate and ensuring that we can accurately model the current role and extent of clouds is critical to determine how any changes in climate will affect clouds and how clouds will affect climate in the future.

#### Precursors to Particles (P2P) at Cape Grim 2006: campaign overview

*Jill M. Cainey, Melita Keywood, Michael R. Grose, Paul Krummel, Ian E. Galbally, Paul Johnston, Rob W. Gillett, Mick Meyer, Paul Fraser, Paul Steele, Mike Harvey, Karin Kreher, Torsten Stein, Ossama Ibrahim, Zoran D. Ristovski, Graham Johnson, Cathie A. Fletcher, E. Keith Bigg and John L. Gras*

*Environ. Chem.* **2007**, 4, 143

Understanding the role of clouds in assessing the impact of climate change is a challenging issue and it is thought that plankton and seaweed contribute to the formation of clouds by emitting gases that lead to particle production necessary for cloud formation. Macro-algae (kelp) at Mace Head, Ireland, produce large quantities of iodine when exposed to sunlight at low tide and this iodine results in the rapid production of particles. Cape Grim, Tasmania, also has large colonies of kelp and the role of Bull Kelp (*Durvillaea potatorum*) in particle production was assessed.

#### Flux chamber study of particle formation from *Durvillaea potatorum*

*Jill M. Cainey, Melita Keywood, E. Keith Bigg, Michael R. Grose, Rob W. Gillett and Mick Meyer*

*Environ. Chem.* **2007**, 4, 151

Kelp at Mace Head, Ireland, produces large quantities of iodine when exposed to sunlight at low tide and this iodine results in the rapid production of particles. Cape Grim, Tasmania, also has large colonies of kelp (*Durvillaea potatorum*) but its role in particle formation appears limited. A flux chamber was used to better understand the response of *Durvillaea potatorum* to light stress and ozone.

#### Sources, nature and influence on climate of marine airborne particles

*E. Keith Bigg*

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A large uncertainty in climate models is the influence of airborne particles on the amount of sunlight clouds reflect back to space. To reduce the uncertainty the factors controlling sources and nature of marine airborne particles must be known, since oceans comprise 70% of the Earth's surface. This work describes previously unexplored features of the marine aerosol at a clean site exposed to the Southern Ocean and its environmental importance.

#### Hygroscopic and volatile properties of marine aerosol observed at Cape Grim during the P2P campaign

*Catherine A. Fletcher, Graham R. Johnson, Zoran D. Ristovski and Mike Harvey*

*Environ. Chem.* **2007**, 4, 162

The marine environment covers 71% of Earth's surface, and accounts for most of the planet's cloud cover. Water droplets in these clouds all form on pre-existing marine aerosol particles. The number, size and composition of these particles determine the cloud droplet size and consequently, the cloud's light scattering and precipitation behaviour. Marine aerosols therefore have a major influence on the planet's radiation balance and climate. The origin of marine aerosols is still not completely resolved. The newly developed VH-TDMA technique has been applied to marine aerosols coming from the southern ocean. The technique enabled new insights into the composition and structure of these aerosols. It has been found that organic mater constitutes 20–40% of these particles suppressing their hygroscopic growth.

#### Coastal marine methyl iodide source and links to new particle formation at Cape Grim during February 2006

*Michael R. Grose, Jill M. Cainey, Andrew McMinn and John A. E. Gibson*

*Environ. Chem.* **2007**, 4, 172

Emissions of methyl iodide of a biological origin from inshore and coastal waters can be an important component of the atmospheric budget of iodine. Iodine from this and other sources is important in the natural ozone cycle in the troposphere and stratosphere, and may play a role in the formation of new small particles that can then grow to seed clouds. The specific coastal ecology at each location is important to the magnitude and characteristics of this methyl iodide source.

**Volatile organic compounds in marine air at Cape Grim, Australia**

*Ian E. Galbally, Sarah J. Lawson, Ian A. Weeks, Simon T. Bentley, Rob W. Gillett, Mick Meyer and Allen H. Goldstein*

*Environ. Chem.* **2007**, *4*, 178

Gaseous organic compounds fuel the production of ozone in the background lower atmosphere. There have been no measurements of many of these compounds in the temperate and polar latitudes of the Southern Hemisphere. Here some first results are presented that show in general much lower concentrations than the Northern Hemisphere due in part to the lower land surfaces and biomass burning in the Southern Hemisphere.

**Ammonia/ammonium dissociation coefficient in seawater: A significant numerical correction**

*Thomas G. Bell, Martin T. Johnson, Timothy D. Jickells and Peter S. Liss*

*Environ. Chem.* **2007**, *4*, 183

Quantifying ammonia concentrations in natural waters is important for our understanding of environmental processes relating in particular to aquaculture toxicity and to the transfer of gaseous ammonia into the atmosphere where it plays a role in new particle formation and climate regulation. The proportion of ammonia present in natural waters is determined in part by variations in temperature and salinity; this work identifies that a previous equation for predicting ammonia concentrations over natural temperature and salinity ranges is incorrect and suggests alternative, more appropriate equations. A more accurate estimation of environmental ammonia concentrations is essential if improved estimates are to be made of the flux of ammonia into the atmosphere and the level of ammonia toxicity within aquacultures.

**Mapping of arsenic species and identification of a novel arsenosugar in giant clams *Tridacna maxima* and *Tridacna derasa* using advanced mass spectrometric techniques**

*Volker Nischwitz and Spiros A. Pergantis*

*Environ. Chem.* **2007**, *4*, 187

Arsenic is known to accumulate in various marine organisms. The high acute toxicity of inorganic arsenic species and the potential chronic toxicity of some organoarsenic species require detailed knowledge about the occurrence and metabolism of arsenic compounds in marine organisms. The application of advanced analytical techniques still allows, even after decades of arsenic speciation, the identification of novel species. In addition comprehensive mapping of all arsenic species present in marine organisms may allow for a more detailed understanding of arsenic metabolism.

**Uptake and translocation of inorganic and methylated arsenic species by plants**

*Andrea Raab, Paul N. Williams, Andrew Meharg and Jörg Feldmann*

*Environ. Chem.* **2007**, *4*, 197

The molecular occurrence of arsenic in soils can vary due to soil conditions and/or application of arsenic containing herbicides or fertilizer. Although large amounts of As-containing herbicides are used for different crops, there is still a lack of understanding how the molecular form of As determines the uptake of arsenic into plants and in particular the translocation into shoot and grain.

**Complexation of Tb<sup>III</sup> with size fractions of humic acid: evidence from luminescence sensitisation and anisotropy measurements**

*Jeremy Riggle and Ray von Wandruszka*

*Environ. Chem.* **2007**, *4*, 204

Organic ligands, especially those derived from humic acid (HA), play a major role in the fate and transport of metal ions in the environment. For the modeling of subsurface pollutant transport, it is important to understand which components of a heterogeneous humic material interact most strongly with multivalent cations.