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16th Australian Organic Geochemistry Conference

7-10 December, 2010, Canberra, Australia

*Compiled by J. H. Chen, J. M. Hope, E. Grosjean, C. J. Boreham and
J. J. Brocks*

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Program and Abstracts

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General Information

Welcome

The Organising Committee of the 16th Australian Organic Geochemistry Conference welcomes you to Canberra. We wish you an enjoyable and pleasant stay in the tranquil and beautiful Capital City of Australia and an inspiring and thought-provoking conference.

Acknowledgements

The organizers of AOGC 2010 gratefully acknowledges the generous financial assistance received from Geoscience Australia (GA), the Research School of Earth Sciences (ANU), Total, Woodside, Beach Energy, Oil Search and Intertek/GeoTech for their contributions towards the student prizes, student travel grants, hire of the conference venue as well as the conference dinner and ice breaker. We also thank GA and ANU for contributing staff and resources, and GA for printing the conference volume as an officially available GA Record.

We also acknowledge and thank Josephine Magro and Robyn Petch (ANU) for administrative support; Patrick de Deckker (RSES, ANU) for guiding us on the field trip and preparing the field notes, AOGC 2008 chair Dave McKirdy for a lot of helpful advice and engraving the AOGC Medal.

Organising Committee

Jochen Brocks (Chair, ANU), Chris Boreham (Secretariat, GA);
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Janet Hope (ANU); Graham Logan (GA)

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Long-term Degradation of Lubricant Oil in Antarctic Sediments

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The idealised view of Antarctica as one of Earth's last remaining pristine environments is being tested as a result of a significant legacy of petroleum pollution on the continent. Lubricant oils used in machinery for Antarctic research and exploration are inevitably released to the environment via general usage or direct spills, causing some concern as to its impact.

A simulated marine spill has been carried out by the Australian Antarctic Division (AAD) over a five year period, in which sieved (500 µm) Antarctic sea-bed sediments were doped with various petroleum products and left in a shallow marine environment to examine the extent and rate of natural degradation. Of these pollutants, an unused Mobil lubricant oil (OW/40; Exxon Mobil) is being analysed qualitatively and quantitatively by gas chromatography-mass spectroscopy (GC-MS) to determine the extent of degradation of the oil and its components.

Replicate samples were collected over the time frame of the experiment (at 0, 5, 52, 64, 104 and 260 weeks after deployment), with the top 0–1 cm of sediment sampled at all time periods, in addition to depth profiles with samples from every 1 cm to ~10 cm depth at 5, 63 and 260 weeks. Sediment cores were frozen and sliced into 1 cm sections for solvent extraction (DCM:H₂O, 9:10), and each sample was spiked with a mixture of internal standards. The sample set was then analysed by GC-MS and the components of the lubricant oil were identified by retention time behaviour and mass spectral library searching and interpretation. Selected components were quantified relative to an internal standard.

The aim of this honours project is to achieve a full picture of the extent of degradation of each compound contained within the lubricant oil by both physical processes (such as water washing and evaporation) and biodegradation by native bacterial communities as a function of both depth in the sediment column and time of exposure.