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PROGRESS REPORT FOR AINGRA09057

PROJECT TITLE	Chemical composition, optical properties and environmental implications for Australian desert and urban aerosols	
INVESTIGATOR(S)	Institution and Department	
Chief Investigator	A/Professor Michael Box	Physics, The University of New South Wales
Other Investigators	Dr. G. P. Box (Physics, UNSW) Dr. R. M. Mitchell (CSIRO Marine and Atmospheric) Dr. M. Keywood (CSIRO Marine and Atmospheric) Dr. D. French (CSIRO Energy Technology) Dr. D. D. Cohen (ANSTO) Mr. E. Stelcer (ANSTO)	
Students	Mr. M. Radhi (Physics, UNSW)	
ANSTO Investigators	David Cohen	
Specialist Committee	E	

SCIENTIFIC OBJECTIVES

This project will enable us to complete the work which was started in 2008 under AINSE grants AINGRA08005 and AINGRA08006. Once completed, we expect to have obtained a complete picture of 2 major aerosol classes: desert dust and Sydney urban aerosol, including their seasonal and spatial variability.

PROGRESS REPORT and RESEARCH OUTCOMES

We used our accelerator time to process two sets of size-resolved aerosol filter samples. The first of these were collected on a field trip to Fowlers Gap, a UNSW field station north of Broken Hill. A paper is partially drafted, but we have been waiting on the results of Ion Chromatography analysis to complement the IBA results.

A higher priority arose last September when a massive dust storm swept across much of eastern Australia. We collected samples during the storm (for about 6 hours), and then for the following 24 hours, for comparison purposes. A second and smaller storm arrived a couple of days later. We again collected samples, and also over the following 24 hour period, for comparison. A summary of these results is presented below.

These results were presented at the AMOS conference in Canberra, in January, and also submitted for inclusion on the (web based) Proceedings. A somewhat longer version has been submitted to Air Quality and Climate Change. When we have also completed our analysis of the Fowlers Gap samples we will publish them, and also an overview paper comparing the results from previous field trips to Birdsville Qld, and Muloorina SA (analysed using previous AINSE Grants), plus the Fowlers Gap and Sydney results. This paper should be very valuable.

DATA

Table: Ratio of elements to Si, during Sydney dust storm

Element	1 st Dust	Day after	2 nd dust	Day after	Crust
Na	3.38E-02	3.18E-01	1.49E-01	6.77E-01	8.37E-02
Al	3.53E-01	2.99E-01	3.28E-01	3.00E-01	2.92E-01
P	5.67E-04	1.06E-02	3.39E-03	1.33E-02	3.72E-03
S	7.70E-03	8.81E-02	3.15E-02	1.48E-01	1.24E-03
Cl	3.19E-03	7.70E-02	6.30E-02	4.05E-01	5.14E-04
K	1.09E-01	7.24E-02	9.09E-02	6.89E-02	7.41E-02
Ca	5.19E-02	6.52E-02	6.27E-02	5.83E-02	1.47E-01
Ti	3.18E-02	2.15E-02	2.78E-02	1.75E-02	2.00E-02
V	1.02E-03	4.71E-04	1.63E-04	3.27E-04	4.26E-04
Cr	6.33E-04	9.42E-03	6.77E-03	6.22E-03	3.62E-04
Mn	6.26E-03	6.95E-03	6.12E-03	9.01E-03	3.37E-03
Fe	3.12E-01	2.87E-01	3.20E-01	2.47E-01	2.00E-01
Co	2.07E-03	1.77E-03	1.14E-03	1.80E-03	8.87E-05
Ni	1.61E-04	5.53E-03	3.06E-03	4.75E-03	2.98E-04
Cu	3.98E-03	3.06E-03	2.28E-03	2.13E-03	2.13E-04
Zn	1.45E-03	4.12E-03	2.90E-03	3.93E-03	2.48E-04
Br	1.23E-04	3.18E-03	1.59E-03	5.40E-03	8.51E-06
Sr	6.90E-04	2.36E-04	8.98E-04	3.44E-03	1.31E-03
Pb	3.69E-04	1.77E-03	1.18E-03	1.15E-03	5.32E-08
Cl/Na	9.46E-02	2.42E-01	4.24E-01	5.99E-01	6.14E-03
Fe/Al	8.83E-01	9.61E-01	9.75E-01	8.22E-01	6.84E-01

PUBLICATIONS / REPORTS arising as a result of your work.

The Great Sydney Dust Storm: Size-Resolved Chemical Composition and Comparison. M A Box, M Radhi and G P Box. Submitted to AMOS 2010 Proceedings (hosted on IOP web site). (s)

Size-resolved chemical composition of the Sydney dust storm. M Radhi, M A Box, G P Box, D D Cohen. Submitted to Air Quality and Climate Change. (s)

PhD STUDENTS

Mr Majed Radhi The Physical and Chemical Properties of Australian Continental Aerosols. Thesis submitted in December 2009. We expect the final report soon, and only minor changes.