

The Darwin Smoke Project



A research partnership of Charles Darwin University,
the NT Government and the Bureau of Meteorology

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Welcome to the first newsletter from the Darwin Smoke project, a unique multi-disciplinary research program that aims to identify causes and consequences of high air pollution episodes in the Darwin region. The project has several components:

- **Atmospheric Chemistry** – measuring the concentration of particles arising from smoke pollution in Darwin and Palmerston
- **Aero-biology** – measuring the amount of pollen and fungal spores in our air and identifying the predominant species
- **Meteorology** – measuring the daily temperature, rainfall and humidity, wind speed, direction and temperature inversions to help understand and predict the dispersal of smoke from savanna fires
- **Landscape Ecology** – examining how different land management affects the fuel loads and fire cycles in the savannas and examining the timing and geographic distribution of fires using satellite imagery
- **Epidemiology** – examining the impacts of environmental factors including smoke pollution, weather, fungi and pollen counts on the health of the population of Darwin

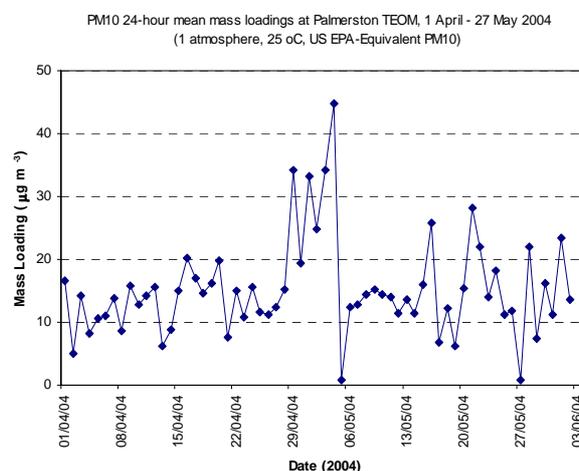
After many months of preparation the live phase of the project started in March 2004, with the commencement of health and environmental data collections.

Atmospheric Chemistry

The Team: A/Prof David Parry, Françoise Foti and Dr Tony Jong - Charles Darwin University, Dr John Gras – CSIRO Atmospheric Research. Contact – david.parry@cdu.edu.au

Aerosol sampling equipment location and setup:

At the Palmerston campus of Charles Darwin University a tapered element oscillating microbalance (TEOM) for measuring PM10 (ie particles 10 microns or less in diameter) with an Automatic Cartridge Collection Unit (ACCU) for measuring PM2.5 has been operating since 1 April 2004. A plot of the data from the TEOM is shown below: The peaks at the end of April and early May correspond to local fires during that time. The sudden drop in particle level in May was due to intense rain clearing the air and preventing further burning.



At the Casuarina campus of Charles Darwin University a Partisol Dichotomous Sampler is measuring PM10 and PM2.5 and in Darwin City a Microvol has been set up to measure PM10.



The Partisol aerosol sampler for measuring particulate air pollution on the roof of building 18 at CDU

Sporewatch samplers, for pollen sampling, have been co-located with the aerosol samplers at the Palmerston and Casuarina Campuses of Charles Darwin University. The pollen samples are collected on tape that is mounted and stained and sent to Dr Simon Haberle at the Australian National University for counting. The slides have shown a high density of fungal spores together with grass and eucalypt pollen.



The Sporewatch pollen counter on the roof of building 18 at CDU

Landscape Ecology

The team: Prof David Bowman and Don Franklin from the ARC Key Centre for Tropical Wildlife Management.

Contact – david.bowman@cdu.edu.au

The objective for this year's field season is to discover if land management is influencing the grass biomass. There is some evidence that since the cessation of

Aboriginal fire management grass, particularly annual tall grasses like Sorghum, have become more abundant driving a 'grass-fire cycle'. For instance a common observation is that there is lower grass biomass in Arnhem Land compared to surrounding Darwin.



We are undertaking a systematic assessment of the biomass of grass throughout north west Australia in a common vegetation type (stringbark or *E. tetradonta* forests). These data allow us to statistically partition out the effect of climate, soil type and land management on grass biomass. Next year we will undertake an intensive sampling around Darwin and some Aboriginal communities further increasing the scope and statistical power of our analysis.

Meteorology

The team: Jim Arthur, Ian Shepherd, and Dr Michael Foley, BOM Darwin and Alan Wain, BOM Melbourne

Contact – a.wain@bom.gov.au

On average, Darwin has been warmer and wetter than average over the period March to May. March was fairly typical, with the monsoon most vigorous around the middle of the month. By April the monsoon flow had relaxed, and rainfall in April was close to normal. May, on the other hand, was unusual. There were isolated heavy falls and a high number of rain days. In Darwin there were ten days of rain, the most in May since 1968 and mostly around the end of the month. This had the effect of dramatically reducing airborne particles in Darwin.

Satellite imagery and smoke dispersal modelling

Alan Wain is analysing board-scale satellite imagery to identify *hot spots* (sites indicative active fire fronts). Using a super-computer the hot spot data is combined with regional daily meteorological information to predict smoke dispersal from fires across the Top End. The actual measurements of air pollution made in this study will be used to refine and validate these models.

Epidemiology

The team: A/Prof Ross Bailie (Menzies), Prof Louis Pilotto (Flinders University), Dr Fay Johnston, (Centre for Remote Health), Dr Ros Webby (ANU and Darwin Centre for Disease Control), Anne Myerscough and Janelle Fisher (CDU).

Contact – fay.johnston@cdu.edu.au

The health studies are being conducted in collaboration with the NT Department of Health and Community Services. There are three main components. (1) Hospital studies which will examine daily presentations and admissions for respiratory and cardiovascular diseases, (2) The asthma cohort study which is tracking the daily symptoms, medication use and health care attendances of a group of Darwin people with asthma, and (3) Community based surveillance of presentations to GPs for influenza-like illness and hay fever, and daily pharmacy sales of treatments for hay fever.

Updates from the asthma and hay fever studies are in this newsletter. Data extraction from Royal Darwin Hospital has not yet commenced.

The Darwin Asthma Study



Volunteer Lucas Schober with Dr Fay Johnston.

The asthma cohort study started on 1 March 2003. 260 enthusiastic adults and children are enrolled in the study. The participants record a daily diary of asthma symptoms, medication use and health care attendance. This information is compared to the environmental recordings from pollen, particulate air pollution and meteorological variables measured in both Darwin and Palmerston.

For more information about the Darwin Smoke Project contact Trisha Butler at the Key Centre for Tropical Wildlife Management Charles Darwin University NT 0909 telephone 89466574 or email patricia.butler@cdu.edu.au

All participants completed an initial questionnaire and gave a saliva sample to test for cotinine, a marker of exposure to passive tobacco smoke. All adults also had a spirometry test pre and post salbutamol. The participants are phoned fortnightly during the 6 month period. The study will continue until the end of September 2004.

The study would not be possible without the assistance of many people. Thank you to the Top End Division of General Practice for financial assistance to employ a nurse to assist with spirometry. The Centre for Disease Control has also provided essential resources and financial assistance. Thank you to Asthma NT for the loan of their spirometer and invaluable knowledge.

The Darwin Pollen and Hay fever Study



The Darwin Pollen and Hay Fever Study will provide new information about the types of pollens present in the Darwin area and their impact on hayfever. Burkard Sporewatch Counters are measuring the aerobiology over Darwin and Palmerston daily, providing both a quantitative measure of pollens and fungal spores as and identifying predominant species. Hayfever levels in the Darwin population are being monitored through the sales of hayfever products at local pharmacies and consultations with General Practitioners.



A number of pharmacies in the Darwin, Palmerston and rural area are voluntarily recording daily sales of hayfever products. They are Darwin Mall Pharmacy, Barden's Galleria, Stuart Park Pharmacy, Nightcliff Chemmart, Hibiscus Amcal Pharmacy, Palmerston Soul Pattinson Pharmacy and Coolalinga Amcal Pharmacy. Thank you to you all!