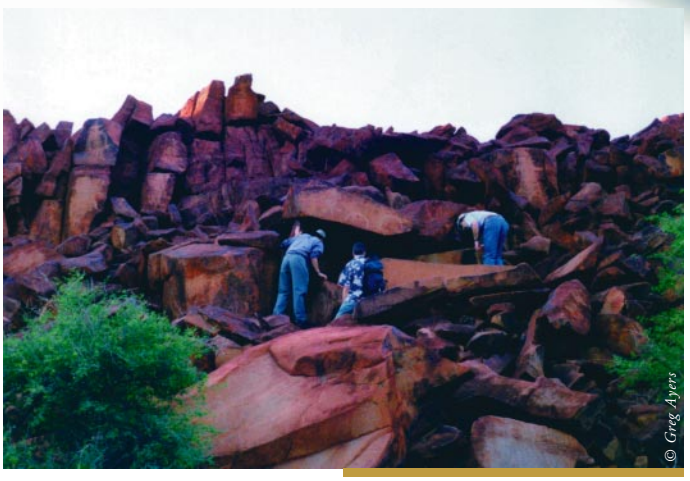
atmosphere
Newsletter of CSIRO Atmospheric Research
Issue 14
September 2004

Air pollution and rock art in Burrup

CSIRO has been commissioned by the Western Australian Government to complete the first ever study into the possible effects of industrial emissions on Aboriginal rock art on the Burrup Peninsula, in the Pilbara region of Australia's remote northwest.

In addition to housing internationally-significant collections of rock art, the area is home to a busy port and industries, including natural gas exploration and iron ore loading, which employ tens of thousands of people. Allegations have been made that increased rainwater acidity, dust deposition and enhanced gas concentrations have deteriorated the art over several decades, but no systematic study of the problem has been completed.

The four-year monitoring program, supported by the local Aboriginal communities, involves monitoring air pollutants by CSIRO Atmospheric Research, studies of colour changes by CSIRO Manufacturing and Infrastructure Technology, and investigation of the mineral composition of the rock surfaces by CSIRO Exploration and Mining. The project is in collaboration with Murdoch University, who are carrying out microbiological studies of the rock surface.



The Burrup Peninsula acts as an ancient, outdoor gallery housing hundreds of thousands of pieces of indigenous rock art.

The CSIRO Atmospheric Research component of the project, led by Mr Rob Gillett and involving Dr Greg Ayers, has established sampling systems in consultation with the local Aboriginal community at seven sites, from north Burrup, Gidley Island and Dolphin Island to close to the industrial areas. Ambient concentrations of a range of pollutants and dust in the air and on the rock surfaces are being measured along with the microclimate.

"At each site we will measure nitrogen dioxide, sulfur dioxide, ammonia, BTEX gases (benzene, toluene, ethylbenzene and xylenes), aerosols such as air pollutant particles and dust, as well as rain, temperature, humidity, wind speed and wind direction," says Mr Gillett.

"The collected gas, particle and weather data will be used to establish the origin of air pollutants and dust, to address concerns about possible effects of current and future industry emissions on the rock art of the Burrup Peninsula."

The study aims to investigate natural processes and emissions that might degrade the rock art, to monitor changes over time and propose management measures if required for ongoing preservation and conservation.

CSIRO instruments installed in July 2004 to monitor air pollution in the Burrup rock art region. CSIRO Atmospheric Research has conducted similar studies of acid deposition, corrosion and pollutant exposure in other Australian States as well as in many countries throughout Asia, including Indonesia, Malaysia, Thailand and India.

The engraved designs, known as petroglyphs, date back thousands of years and are considered to be the oldest rock art in the world.

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Customers take CSIRO's *FastTrack*

CSIRO has made significant improvements to the way Divisions engage with customers, particularly Small to Medium sized Enterprises. The introduction of the *FastTrack* system followed requests from customers through the Customer Value Survey to streamline the preparation of research contracts.

The system can be used in the majority of low-risk agreements such as confidentiality, consulting and testing. It enables a customer-friendly and consistent approach to generating agreements. *FastTrack* simplifies CSIRO contracts from up to 20 pages to a page or so of plain English. This has reduced the time involved in executing contracts to as little as 24 hours.

CSIRO Atmospheric Research was one of four Divisions to trial the online proposal generation system. Staff have been trained in using the new system since its introduction over the past year, and an improved version of *FastTrack* has just been released across all of CSIRO.

FastTrack benefits clients by minimising the reworking of legal terms that frustrates the finalising of contracts. In addition, the brief and clear setting out of essential details in the new contracts enables easier and faster checking and interpretation by clients. Feedback from customers and researchers has reflected the benefits of *FastTrack*'s simplified, shorter and less time-consuming approach.

LoFlo, a more precise and less costly carbon dioxide measurement and analysis system developed by CSIRO Atmospheric Research, is being supplied to the Max Plank Institute in Germany.

Applying our research

Significant recent and ongoing projects

Alcoa World Alumina
Evaluation of the meteorological and dispersion model, TAPM, for Wagerup

Australian Greenhouse Office
Extreme climate projections

Australian Greenhouse Office
Quantitative estimates of uncertainty in greenhouse gas emissions

NSW Greenhouse Office
Climate change in NSW

Gold Coast City Council
Extreme climate events and the Gold Coast

Max Plank Institute
Construction and delivery of a LoFlo carbon dioxide analyser

Victorian Department of Sustainability and Environment
Climate change projections for eastern Victoria

Renewable Power Ventures
Wind monitoring for Western Australian sites

Team Alinghi and America's Cup Management
Weather consultancy and site evaluation for America's Cup 2007

CSIRO is again working with the Alinghi team in the lead up to the America's Cup in Spain in 2007.

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Flying Flagships for the environment

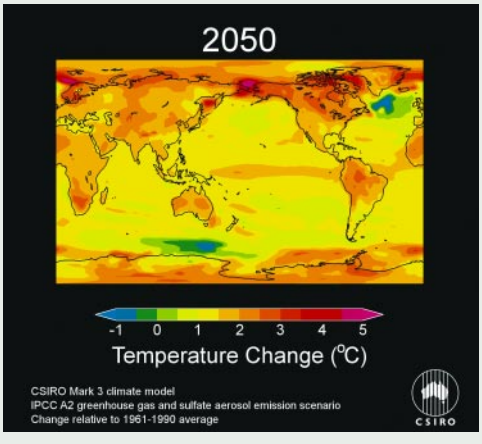
CSIRO's National Research Flagships tackle Australia's toughest challenges, setting audacious goals to be met by interdisciplinary teams. They were launched in 2003 after being developed through extensive consultation with government, industry, science partners and the community.

Of the six Flagships, CSIRO Atmospheric Research contributes to five that involve the environment: Water for a Healthy Country; Wealth from Oceans; Preventative Health; Energy Transformed; and Light Metals (the remaining Flagship is Food Futures).

For example, CSIRO Atmospheric research is coordinating the Water for a Healthy Country Flagship's Climate Variability and Change Program. This will apply climate projections in four target areas: the Murray River region; southwest Western Australia; the Great Barrier Reef; and city and urban areas. The Program builds on the wide-ranging work already underway in the cross-divisional CSIRO CLIMATE Program.

The climate component of the Water for a Healthy Country Flagship aims to understand longer-term climate variability to help deal with uncertainty of water supply and meet demand for water resources in both dry and wet years.

As part of another Flagship, Light Metals, in January 2004 CSIRO installed sensitive instrumentation at Cape Grim, Tasmania, that for the first time will enable continuous measurements of perfluorocarbons (PFCs) to be made in the southern hemisphere. PFCs are potent greenhouse gases, identified for inclusion in the Kyoto Protocol, that are emitted predominantly during aluminium production and are almost indestructible in the atmosphere. Data from the new instrument, combined with regional transport modelling, will provide ongoing estimates of regional PFC emissions to help better manage the greenhouse impact of the aluminium smelting industry, as well as contributing to the monitoring of global trends in PFCs. Monitoring PFC emissions is a Light Metals Flagship activity and part of the Advanced Global Atmospheric Gases Experiment, a global operation involving CSIRO, the Bureau of Meteorology, University of Bristol, Massachusetts Institute of Technology, Georgia Institute of Technology and the University of California in San Diego.



Results from CSIRO's Mark 3 climate model. The Water for a Healthy Country Flagship aims to achieve a tenfold increase in the social, economic and environmental benefits from water by 2025.

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Leading research in the wind

CSIRO scientists are playing an important role in developing the science and technology of wind resource assessment needed to harness the power of the wind.

Led by Dr Peter Coppin, CSIRO Atmospheric Research's Wind Energy Research Unit (WERU) in Canberra has expertise in wind monitoring, measurement and analysis using field measurements, wind tunnel experiments and computer simulations.

The origins of the wind-monitoring network installed and maintained by WERU go back more than a decade. During this time the network has grown from a few towers in the Crookwell area in NSW, the site of Australia's first grid-connected wind farm, to more than 70 towers around Australia, operated for a wide range of clients.

CSIRO Atmospheric Research's Wind Energy Research Unit operates a wind-monitoring network of more than 70 tall towers at the height of wind turbines, to help plan the harnessing of wind power.

Data from CSIRO's wind-monitoring network are remotely accessed and undergo stringent quality control steps before being stored in a sophisticated, secure database. Many standard types of statistical analysis and reports are available to the wind energy industry, with custom analyses and reports available on request for specific engineering or scientific purposes.

CSIRO's Wind Energy Research Unit specialises in tall tower monitoring at the height of wind turbine hubs (40-80m), with wind monitoring on tall towers having been completed at approximately 80 locations throughout Australia.

The windiest spots for wind turbines are found by CSIRO spin-off company WindLab Systems Pty Ltd, which capitalises on the leading-edge research at CSIRO. WindLab uses the world's best available wind resource mapping technology to identify how air accelerates and decelerates over complex land features and vegetation.

CSIRO Atmospheric Research is also conducting research into site-specific forecasts of wind energy generation. The forecasts use CSIRO's new computer model of the atmosphere, developed over many years by Dr John McGregor at CSIRO Atmospheric Research in Aspendale. The model was used to provide wind forecasts for the winning America's Cup syndicate, Alinghi, in New Zealand early last year. Daily, detailed wind predictions, combined with local terrain and wind farm characteristics, can be targetted to provide valuable information for wind generators and energy grid operators.

Wind forecasts under development at CSIRO would increase efficiency and reduce costs for suppliers of wind energy.

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Fires are low emitters

The first comprehensive field study of emissions from fires in forests, savanna and agricultural crops has demonstrated that they are lower emitters of dioxins than previously thought.

Dr Mick Meyer from CSIRO Atmospheric Research says previous studies have been based on laboratory simulations in combustion chambers, which the field studies proved have emissions that are qualitatively and quantitatively different to the real thing.

"Emission rates from all classes of fires were at the lower limit of ranges previously estimated by the United States and European Union environment agencies," he says. "At most, Australia's emissions from bushfires and agricultural fires are about a third of the previous estimate."

Dioxins are by-products of anthropogenic and natural combustion processes and remain in the air, soil and sediments for a long time. They make their way into food and our bodies, and have been linked to cancer and impacts on the nervous and reproductive systems.

While bushfires are Australia's major source of dioxins, the level is lower than previously thought.

The results, collected over the past three years, have led to a downward revision of Australia's estimated emissions of dioxins from bushfires by a factor of three. "Our results confirm the need to measure emissions in the field rather than in the lab, and they show the dangers of using laboratory-derived results to estimate national emissions from field fires," says Dr Meyer.

New instrumentation was developed for the study, which involved Dr Meyer and colleagues from CSIRO Atmospheric Research, CSIRO Manufacturing and Infrastructure Technology and CSIRO Sustainable Ecosystems, as well as collaborators at the National Research Centre for Environmental Toxicology, the Western Australia Department of Conservation and Land Management, and the University of Melbourne.

CSIRO scientists have completed the first comprehensive field study of emissions from fires in forests, savanna and agricultural crops to establish the first substantial set of direct field measurements of fire emissions in the world.

The study was funded by the Australian Government Department of the Environment and Heritage, who commissioned the study of dioxin emissions from bushfires as part of the Australian National Dioxins Program. The study has established the first substantial set of direct field measurements of fire emissions in the world.

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Web: www.deh.gov.au/industry/chemicals/dioxins/report-1

Echidna steps into the field

Despite rain, sleet and snow, a new forest measurement instrument performed well during validation trials in southern Tasmania this winter.

Conceived and developed by CSIRO scientists, ECHIDNA™ takes a hemispherical scan from the forest floor to assess and monitor forests. The instrument collects and stores information relating to trunk density, foliage distribution, canopy cover and other data. ECHIDNA™ can complement and calibrate data collected by airborne instruments, as well as improving ground-based measurements to assist forest management.

CSIRO's ECHIDNA™ in Tasmanian snow. The light-emitting instrument can measure forest canopies in poor weather conditions that would not be conducive to photographic measurements.

ECHIDNA™ is a lidar, an instrument similar in operation to radar that emits laser light instead of radio waves, then records the intensity of the returned waves after reflection and scattering by the surroundings. This allows the instrument to operate in conditions that are not conducive to related photographic techniques. ECHIDNA™ scans an arc across the top of the hemisphere using a rotating mirror, while a laser fires shots of light, and a receiver telescope collects the returned light wave. The complete system rotates on a tripod, allowing scanning of the entire hemisphere above the instrument. The data generated by ECHIDNA™ can be displayed as a hemispherical photograph. However, information about distance at each point makes the dataset three-dimensional. The instrument's operation and data recording are controlled by computer and the system is powered in the field by a small generator.

Further field experiments of the ECHIDNA™ are planned at sites near Coffs Harbour, Tumbarumba and Mount Gambier. Members of the CSIRO Canopy Lidar initiative are Dr David Jupp, Dr Jenny Lovell and Dr Glenn Newnham from the Earth Observation Centre at CSIRO Atmospheric Research in Canberra, and Dr Darius Culvenor from CSIRO Forestry and Forestry Products in Melbourne. The work is part of a project funded by the Forest and Wood Products Research and Development Corporation.

For more information please contact:

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Selected

Ayotte, K. W., and Hughes, D. E. (2004). Observations of boundary-layer wind-tunnel flow over isolated ridges of varying steepness and roughness. *Boundary-Layer Meteorology,* **112** (3): 525-556.

Borgas, M. S., and Yeung, P. K. (2004). Relative dispersion in isotropic turbulence. Part 2. A new stochastic model with reynolds-number dependence. *Journal of Fluid Mechanics,* **503:** 125-160 DOI: 10.1017/S0022112003007596.

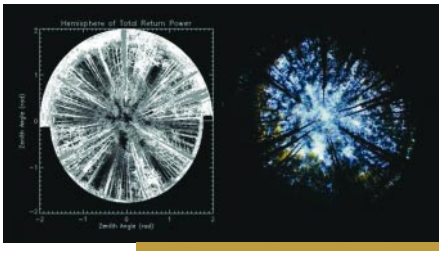
Cai, W. J., McPhaden, M. J., and Collier, M. A. (2004). Multidecadal fluctuations in the relationship between equatorial Pacific heat content anomalies and ENSO amplitude. *Geophysical Research Letters,* **31:** L01201, doi:10.1029/2003GL018714.

Cope, M. E., Hess, G. D., Lee, S. H., Tory, K., Azzi, M., Carras, J. N., Lilley, W., Manins, P. C., Nelson, P., Ng, Y. L., Puri, K., Wong, N., Walsh, S., and Young, M. (2004). The Australian Air Quality Forecasting System. Part I: project description and early outcomes. *Journal of Applied Meteorology,* **43** (5): 649-662 doi: 10.1175/2093.1.

Finnigan, J. J., and Belcher, S. E. (2004). Flow over a hill covered with a plant canopy. *Quarterly Journal of the Royal Meteorological Society,* **130** (596A): 1-29.

Hunt, B. G. (2004). The stationarity of global mean climate. *International Journal of Climatology,* **24** (7): 795-806, 10.1002/joc.1016.

Law, R. M., Rayner, P. J., and Wang, Y. P. (2004). Inversion of diurnally varying synthetic CO_2: Network optimization for an Australian test case. *Global Biogeochemical Cycles,* **18:** GB1044, doi:10.1029/2003GB002136.



Lidar image from ECHIDNA™ (left) and a similar hemispheric image from photographic equipment.

publications

Leuning, R., Raupach, M. R., Coppin, P. A., Cleugh, H. A., Isaac, P., Denmead, O. T., Dunin, F. X., Zegelin, S., and Hacker, J. (2004). Spatial and temporal variations in fluxes of energy, water vapour and carbon dioxide during OASIS 1994 and 1995. *Boundary-Layer Meteorology,* **110** (1): 3-38.

Luhar, A. K., and Hurley, P. J. (2004). Application of a prognostic model TAPM to sea-breeze flows, surface concentrations, and fumigating plumes. *Environmental Modelling and Software,* **19** (6): 591-601.

Pearman, G. I., and Grace, E. (2004). Green fields: risk of climate change. *Actuary Australia,* **87:** 4-6.

Suppiah, R. (2004). Trends in the southern oscillation phenomenon and Australian rainfall and changes in their relationship. *International Journal of Climatology,* **24** (3): 269-290.

Trudinger, C. M., Etheridge. D. M., Fraser, P. J., Krummel, P. B., and Sturrock, G. A. (2004). Law Dome firn reconstructions of methyl bromide, methyl chloride, chloroform and dichloromethane. *Geophysical Research Abstracts,* **6:** 07407 SRef-ID: 1607-7962/gra/EGU04-A-07407.

Walsh, K. J. E., Nguyen, K. C., and McGregor, J. L. (2004). Fine-resolution regional climate model simulations of the impact of climate change on tropical cyclones near Australia. *Climate Dynamics,* **22** (1): 47-56 doi:10.1007/s00382-003-0362-0.

Note: This is just a sample of the numerous papers recently published by CSIRO Atmospheric Research staff. For a full list of our publications, please visit www.dar.csiro.au/search/pubsearch.asp

Instruments installed by CSIRO Atmospheric research in stubble near Griffith are measuring nitrous oxide emissions from maize.

The true cost of corn chips and cereal

How much does a bowl of cereal cost? CSIRO Atmospheric Research has commenced a project to determine the true cost of cereal as part of an investigation of how much greenhouse gas is released from the production of cornflakes and corn chips.

Researchers from CSIRO Atmospheric Research and CSIRO Land and Water are measuring nitrous oxide and carbon dioxide emissions from irrigated maize in the Murrumbidgee Irrigation Area near Griffith, NSW.

This study aims to improve productivity and reduce greenhouse gases from the agricultural sector by understanding emissions from all points in the corn production chain.

The research involves collaboration between CSIRO, the CRC for Greenhouse Accounting and the University of Melbourne, with cooperation from the maize industry and funding through the Grains Research and Development Corporation and the Australian Greenhouse Office.

A-maize-ing: CSIRO researchers are investigating greenhouse gas emissions over the full lifecycle of corn production.

Emissions are being analysed over the full lifecycle of corn, from before the crop is sown until the point where corn products are available for sale on the supermarket shelf. The lifecycle analysis includes the energy and water used in planting, harvesting, transportation and processing of maize.

Agriculture, including land clearing, is responsible for about one quarter of Australia's greenhouse gas emissions.

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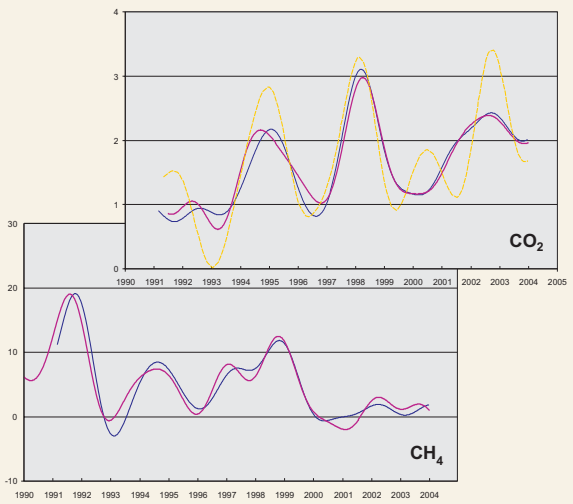
Global growth of carbon dioxide still rising

CSIRO Atmospheric Research has measured above-average growth in carbon dioxide levels in the global atmosphere, despite global attempts to reduce these emissions. The source of the increase is most likely from the burning of fossil fuels – coal, oil and gas.

Measurements at Cape Grim in Tasmania, Cape Ferguson in Queensland, sub-Antarctic Macquarie Island, Mawson in Antarctica, and the South Pole, show that carbon dioxide over the past two years has increased at near-record levels. The persistent increases measured over such a large region of the Southern Hemisphere ensure that they closely reflect the total global emissions. The results support independent findings by the National Oceanic and Atmospheric Administration in the United States using data from Mauna Loa in Hawaii.

The last time growth rates of this magnitude were observed was in 1998 when a huge input of carbon dioxide, attributed by CSIRO to the 1997–98 Indonesian wildfires, caused global levels to jump alarmingly. The difference between 2002–2003 increases and the last large increase in 1998 is that information from other trace gases in the atmosphere (including isotopes, hydrogen, methane and carbon monoxide) show that the source of the increase is most likely from the burning of fossil fuels rather than emissions from oceans, which are the world's biggest reservoir of carbon dioxide, or fires from burning forests.

Carbon dioxide concentration in the atmosphere has been steadily increasing due to human activities since the Industrial Revolution in the 1700s.



The growth rate of carbon dioxide peaked in 2002–2003 (top: yellow line shows Mauna Loa data, pink line shows Cape Grim data, blue line shows Antarctic data, in parts per million/year). However, unlike previous peaks, the increase in growth was not accompanied by gases such as methane linked to wildfires (bottom, in parts per billion/year).

The present atmospheric concentration of carbon dioxide has not been exceeded for at least the past 700,000 years.

Compared to the trend over the past 10 years, when carbon dioxide has increased in the atmosphere by about 13 billion tonnes per year, both 2002 and 2003 have seen above average global growth rates at 17 to 19 billion tonnes. Over the past 10 years only in 1998 was a higher growth rate observed.

The Cape Grim program to monitor and study global atmospheric composition is a joint responsibility of the Bureau of Meteorology and CSIRO, while the CSIRO network is operated in cooperation with the Bureau of Meteorology, the Australian Antarctic Division, Australian Institute of Marine Science, NOAA and other international research agencies.

Researchers at CSIRO's Gaslab have concluded that the source of the record carbon dioxide increase is most likely from fossil fuel burning.

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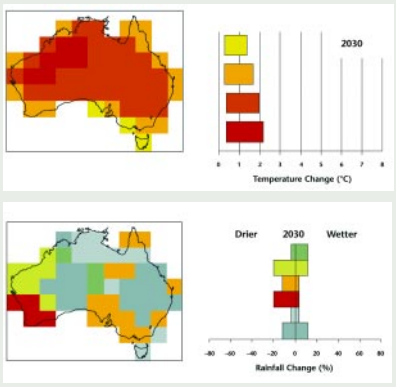
Climate changes in your backyard

The Climate Impact Group has completed many regional climate change assessments to underpin policy development. State and Territory studies recently completed include the Australian Capital Territory, the Northern Territory, South Australia, Tasmania, and Victoria – adding to previous studies for Queensland, New South Wales and Western Australia. Although there is considerable uncertainty about climate change at the regional to local scale, the science does show up regional differences that have been welcomed by decision-makers at high-level briefings.

This year the Northern Territory government released CSIRO's regional climate change report. Most of the Northern Territory has become hotter and wetter since 1950. In future, the warming will continue with uncertain changes in monsoon rainfall but drier conditions likely in the south, increased cyclone intensity and associated storm surge heights. The report, available at www.greenhouse.nt.gov.au, is the first step towards developing a plan for adapting to climate change, with the State Government beginning to work with industry and the community to reduce the risks to the Northern Territory.



Ranges of annual average warming (top) and rainfall change for around 2030 relative to 1990 from CSIRO's 2001 climate projections (coloured bars show changes for areas with corresponding colours on the map). CSIRO has also completed regional impact assessments for every State and Territory in Australia.

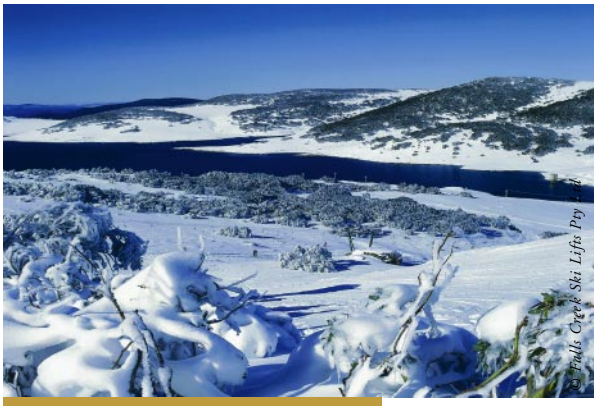
From www.dar.csiro.au/publications/projections2001.pdf

A new regional analysis of climate change was also completed for Victoria, showing that the State has already warmed by about half a degree Celsius since 1950. Victoria may warm by 0.2 to 1.6 degrees by 2030 and 0.7 to 5.0 degrees by 2070, compared to 1990, leading to more hot days, fewer frosts, more heavy rainfall and greater bushfire risk. The results were provided by CSIRO Atmospheric Research to a Victorian Government report available at www.greenhouse.vic.gov.au, and specific data for regions across the State have been presented at industry and community consultations around Victoria.

The expertise in climate science held by the Climate Impacts Group has been recognised by appointments such as Mr Kevin Hennessy to the NSW Greenhouse Advisory Panel. The Panel has been established to advise the NSW Greenhouse Office on broad policy and program directions to ensure that policy is informed by scientific, industry and broader community views. The Climate Impact Group is currently undertaking research for the NSW Greenhouse Office on past and future climate change.

In addition, Mr Kevin Hennessy and Dr Roger Jones have been accepted as Coordinating Lead Authors on the next major assessment report by the Intergovernmental Panel on Climate Change in 2007, with Dr Penny Whetton and Dr Ian Watterson as Lead Authors.

Human induced climate change is one of the major challenges confronting the world this century. The potential for climate change is real and addressing it will require changes to the way the world produces and uses energy.
The Hon. John Howard, Prime Minister
National Press Club
15 June 2004



CSIRO's Climate Impact Group has completed dozens of consultancy reports covering coastal communities, agriculture, horticulture, coral reefs, ski resorts, urban infrastructure, human health, urban water supply, and many more issues.

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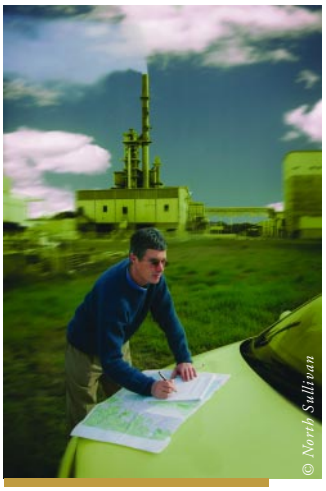
Air pollution health toll needs solutions

Air quality scientists, medical researchers and Government agency policy makers from around Australia met at CSIRO Atmospheric Research for a two-day course on risk management for air quality and health.

Each year on average, 2400 Australian deaths are linked to air quality and health issues – much more than the 1700 fatalities from road accidents. This number is mainly due to fine particles from vehicle exhaust, wood smoke and some industrial processes, and increases if long-term effects of air toxics on cancer are included.

Organisers of the course, Dr Tom Beer and Dr Bill Physick, said it is particularly important to consider atmospheric science and the management of dangerous and hazardous air pollutants in light of the National Environment Protection Measures.



CSIRO has decades of experience in air quality research – including gas and particle measurements, computer modelling, and risk assessment – placing the organisation in a unique position to bring together policy-relevant science within a risk assessment framework that integrates scientific and medical concerns.

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The course was part of a National Collaborative Program of workshops linked with a program of advanced short courses on the Atmospheric Environment and Health. The three-year Program is funded by the Commonwealth Department of Health and Ageing, led by the Australian National University's National Centre for Epidemiology and Population Health, in collaboration with the Bureau of Meteorology Research Centre, University of Sydney's School of Public Health, NSW Health, and Monash University's Department of Epidemiology and Preventive Medicine.

A telephone hook-up was arranged between former CSIRO Atmospheric Research senior scientist, Dr Martin Platt (left), and a presentation dinner in Italy, when he received ICLAS's most prestigious award. The award was accepted on Dr Platt's behalf by Dr Stuart Young (centre), and formally presented at a ceremony in Aspendale with Divisional Chief Dr Greg Ayers (right).

Awards

Dr Tom Beer, a senior scientist with CSIRO Atmospheric Research in Aspendale and an expert in environmental risk, has been elected Vice-President of the International Union of Geodesy and Geophysics (IUGG). The IUGG guides collaborative research into the nature of our planet and fosters information exchange between more than 5000 earth scientists in 65 countries. It also encourages the application of this research to societal needs, such as mineral resources, mitigation of natural hazards and environmental preservation. In an unrelated award, Dr Beer also received a Doctorate of Sciences (DSc) from the University of Canterbury, NZ.

Dr Michael Raupach, Head of the Earth Observation Centre at CSIRO Atmospheric Research's Canberra office, was elected as a Fellow of the Australian Academy of Technological Sciences and Engineering.

At the 22nd International Laser Radar Conference held in Italy, the International Coordination-group for Laser Atmospheric Studies (ICLAS) awarded Dr Martin Platt the ICLAS Lifetime Achievement Award, given to individuals who are international leaders and contributors to lidar research over a sustained period. Dr Platt joined the Division in 1969, in what was then the Meteorological Physics Division of CSIRO. He retired in 1997 and is now a Post-Retirement Fellow at CSIRO Atmospheric Research.

Dr Peter Rayner scored well in an analysis of recently updated citation data performed by ISI Essential Science Indicators, a compilation of science indicators and trend data. The results of the analysis indicate that Dr Rayner's work has entered the top 1% in terms of total citations earned in the field of Geosciences. His citation record includes 25 papers published in the past decade, cited a total of 479 times (excluding self citations) in the field of geosciences, which places him within the top 1% of scientists publishing in this field.

Australia's first school wind tunnel

Students at a Canberra school are the first in Australia to have their own wind tunnel to conduct experiments on fluid dynamics and the atmosphere.

With assistance from scientists and technicians from CSIRO Atmospheric Research and the University of Canberra, led by Dr Margi Bohm, students and teachers at Lake Ginninderra College built the wind tunnel over a period of four months. The project was supported by the ACT Government and a giant fan was donated by Fantech.

Lake Ginninderra College physics teacher Mr Norm Burmester said the construction of the eight-metre long wind tunnel was part of the school's Year 11-12 science curriculum and now enables students to graduate from working with scientists to working as scientists.

The wind tunnel under construction. Students have used the completed wind tunnel to examine how fire moves through pine forests and study the aerodynamics of sunglasses to improve their design for motorcycle riders.

Small benefits of ethanol

A CSIRO-led report has concluded that positive but small environmental benefits arise from the use of biofuels, including ethanol.

Dr Tom Beer, from CSIRO Atmospheric Research, led an analysis commissioned by the Department of Prime Minister and Cabinet into the environmental impact of using ethanol and biodiesel. The report, involving CSIRO, the Australian Bureau of Agricultural and Resource Economics (ABARE), and the Bureau of Transport and Regional Economics (BTRE), used existing studies and scientific reports to assess the net environmental, economic and regional benefits of replacing fossil fuels with biofuels.

CSIRO's results found some potential benefits from the pursuit of the Government's 350 ML biofuels target, that ethanol and biodiesel produced in Australia from renewable resources contribute at least 350 million litres to the total fuel supply by 2010. Environmental benefits include reduced greenhouse gas emissions and improved air quality. However, the report concluded that, particularly with the prospect of significantly cleaner petrol and diesel by 2010, the net environmental impacts of biofuels, while positive, are small overall.

In addition, ABARE's results found that the biofuels industry would require ongoing assistance and, in the absence of support, many biofuels would not be cost competitive with traditional fuels over the medium to longer term.

The report also covered other benefits, including health cost reductions from improved air quality, and potential regional employment benefits.

CSIRO has assessed biofuels as an alternative energy source, particularly ethanol/petrol blends and biodiesel, including an analysis over the entire life-cycle of ethanol.

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Profile: Jill Cainey, Cape Grim OiC

© Bill Main, NIWA

Dr Jill Cainey is Officer in Charge of the Cape Grim Baseline Air Pollution Station, on the northwest tip of Tasmania. The station has been making measurements of background levels of pollution for nearly 30 years.

The Cape Grim program, established by the Australian Government to monitor and study global atmospheric composition, is a joint responsibility of the Bureau of Meteorology and CSIRO.

Dr Cainey, from a small village near Bath in England, lives in Smithton in Tasmania, population 3,000. "I met my partner in Melbourne, a city of three million," she says. "We moved to Wellington, which has 300,000 people and now we're in Smithton, with 3,000 people. He's a city boy and concerned about where I'm going to drag him next."

Dr Cainey's love of nature extends to a frustration that she can't recycle more items, a tendency to nag people to install rainwater tanks, an interest in ornithology, all things outdoors and painting watercolour landscapes.


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Dr Cainey devotes time to explaining issues to school children and community groups, judging science fairs and generally spreading the word. She once considered teaching as a career.

"We have major environmental issues facing us and people are not going to understand the details of these if the scientists don't communicate them."

The Bureau of Meteorology and CSIRO supervise the Cape Grim program's two components:

1. The Cape Grim Baseline Air Pollution Station (CGBAPS) facility. The Bureau is responsible for the funding and management of the station's operation and liaison with the World Meteorological Organization and the United Nations Environment Programme on relevant policy and program coordination aspects.

2. The associated research component which combines the collaborative efforts of a number of Australian and international institutions. The major scientific leadership is centred on the relevant activities of CSIRO Atmospheric Research.

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