

Research Forum

Non-CO₂ greenhouse gas fluxes in Australian landscapes

15-16 May 2007
University of Melbourne

Rationale

Non-CO₂ greenhouse gases (GHG) such as nitrous oxide and methane contribute to climate change and global warming. These non-CO₂ GHG can be emitted or consumed by soils in every Australian landscape, yet there is limited understanding as to the magnitude of these fluxes and the biological and biochemical processes involved.

This Research Forum will provide a platform to share and assess current research achievements and discuss future research needs to improve our understanding of non-CO₂ GHG fluxes in Australian landscapes. We will report and critically discuss the available methods for the measurement of non-CO₂ GHG fluxes. A major focus will be an assessment of the magnitude and variation of non-CO₂ GHG fluxes in different Australian landscapes and the processes that control these fluxes. We will then present and discuss the progress made with regards to modelling non-CO₂ GHG fluxes in Australia and the challenges of up-scaling to regional and national levels. At the end of the forum we will have a short workshop to identify the current knowledge gaps and suitable approaches to address them.

Timelines

5 Apr 07 – Deadline for abstracts

16 Apr 07 – Preliminary program sent out (decision about talks and posters announced)

20 Apr 07 – Deadline registration

Registration and payment

Registration is limited (approx. 70) and will be on a first-come, first-served basis.

Full and student registration fees cover the cost of the conference dinner, morning and afternoon tea as well as lunches during the two day event

Full registration: \$150

Student registration: \$100

Participant Registration deadline is **20 April 2007**.

A **registration form** can be downloaded from the Research Forum webpage (<http://www.forestscience.unimelb.edu.au/research/greenhouse/conference.html>) and can be found at the end of this document. Please fill out the registration form and send by email or fax to:

Stephen Livesley

School of Forest and Ecosystem Science

The University of Melbourne

Water Street, Creswick VIC 3363

Phone: 0439 615 772

Fax 03 5321 4166

E-mail: sjlive@unimelb.edu.au

Program

The Research forum will start on 8.30 am on Tue 15 May and will finish 16.00 on Wed 16 May 2007

We will discuss five major topics during the two day conference. There will be a keynote talk on the importance of non-CO₂ greenhouse gas fluxes in the Australian context and 22 oral presentations. There will be time and space for 25 poster presentations.

Topic 1 - Measuring non-CO₂ GHG fluxes

This session will focus on technical issues and challenges encountered in the methodology and measurement of non-CO₂ GHG fluxes in the field. The talks will outline advantages and disadvantages of the different techniques and will provide examples of successful applications and solutions to problems encountered.

3 invited talks plus discussion

Topic 2 – Non-CO₂ GHG fluxes in Australian landscapes

This session will give an overview of the magnitude and variation in non-CO₂ GHG fluxes in different Australian landscapes. The presentations will cover fluxes from managed (agriculture and forest) and natural ecosystems. These presentations may encompass such topics as temporal and spatial variability of fluxes, seasonal or annual budgets, problems encountered and challenges revealed or tackled.

5-8 talks plus discussion

Topic 3 – Processes controlling non-CO₂ GHG fluxes

Non-CO₂ GHG fluxes are controlled by a number of soil biological, physical and biochemical processes. Although many scientists measure GHG fluxes, the processes that control these fluxes are rarely investigated. This session will report on the challenges and the methodological opportunities for investigating some of the key processes that control non-CO₂ GHG fluxes.

5-7 talks plus discussion

Topic 4 – Modelling of non-CO₂ GHG fluxes

Modelling non-CO₂ GHG flux allows the prediction of emission rates in the future and the up-scaling from point based measurements to the landscape or regional level. In this session, different modelling approaches will be presented and discussed, from process-based modelling, GIS supported to inverse modelling approaches.

5-6 talks plus discussion

Topic 5 – Knowledge Gaps

This final session will be a workshop. We will break into several small working groups and discuss the issues that have emerged during the Research Forum. We will provide each group with specific questions or tasks that they work on. The groups will report back on their findings for a discussion in the larger group. One outcome of this session should be the identification of our current knowledge gaps and research priorities for the coming years.

1 hour group discussion plus 1 hour plenary discussion

Oral presentations

All talks will be 15 min + 5 min discussion. The presentations have to be in Powerpoint format and need to be submitted to the session chair prior to the start of the session.

Poster presentation

Poster presentation will be on day 1. The participants will be divided into groups to view the posters. Each participant presenting a poster will give a short 3-5 min presentation in front of his poster outlining the major findings of the research.

Poster size: 90 x 120 cm, portrait

Publication of Presentations

We intend to publish the papers presented at the Research Forum in a special issue of an international journal. All submitted manuscripts need to be of high standard and will undergo the normal peer reviewing process. All presenters of the Research Forum (oral or poster presentation) are invited to submit their presentation for publication. The journal and associated deadlines for submission will be announced shortly.

Transport from Melbourne airport

Skybus

Skybus offers a shuttle bus service from the airport to Melbourne CBD and city hotels.

This service operates 24 hours, 7 days.

Buses run every 10-15 minutes throughout the day and every 30-60 minutes overnight.

Skybus Hotel Shuttle operates from the city 0600-2200 Monday to Friday and 0730-1830 Saturday and Sunday.

Adult one way tickets cost \$15 / \$24 return

More information on: www.skybus.com.au or 03 9335 2811

Taxis

Taxis are available from the ground floor level of Melbourne Airport, outside the International Terminal and both domestic Terminals. Expect to pay around A\$35 to A\$40 for a one-way trip from Melbourne Airport to the Research Forum venue at the Zoo.

Venue

The Research Forum will take place at the Rainforest Room of the Melbourne Zoo. The Rainforest Room can be accessed through the Main entrance of the Zoo near Royal Parade.

The Rainforest Room is located beside a tranquil lake with views of the awe inspiring Japanese Garden and features a large private aviary full of Australian Rainforest birds. Providing a unique environment for your guests, the room has access to outdoor landings with wonderful Zoo views.



Transport to conference venue

Melbourne Zoo is located only minutes north from the city centre, within Royal Park. Car parking is available or visitors can take the tram or train to reach the Zoo.

Tram 55 runs from William Street Monday through Sunday. Take Stop 23 and walk to the Main Gate at the southern end of the Zoo.

Tram 19 runs from Elizabeth Street in the city along Royal Parade. Take Stop Nr 16, Walker Street and walk across to the Main Gate at the southern end of the Zoo.

Metlink tickets (valid in Buses, Trains and Trams) can be purchased at Newsagents, Metlink outlets and in trams and buses. A two hour ticket will cost \$3.20 for Zone 1 (Melbourne city and inner suburbs) and a daily ticket is \$6.10. More information at www.metlinkmelbourne.com.au



Accommodation

Participants of the Research Forum will have to organise their own accommodation. There are a few options available near the Zoo and we have organised special rates for these hotels. Please book you accommodation early to receive the best rates and mention the Research Forum.

Vibe Hotel Carlton ****, 441 Royal Parade, Parkville 3052 VIC

Phone: 03 9380 9222

Web: <http://www.vibehotels.com.au/>

Cost: Special conference deal: Single incl breakfast: \$135; Double incl breakfast: \$175

Ramada Inn Parkville ****, 539 Royal Parade, Parkville 3052 VIC

Phone: 03 9380 8131

Web: <http://www.ramadainn.com.au/>

Cost: Special conference deal: \$105 single, \$115 double

Melbourne's Princes Park Motor Inn****, Cnr Royal Parade and Park Street, Carlton North 3054 VIC

Phone: 03 9388 1000 or 1800 337 770

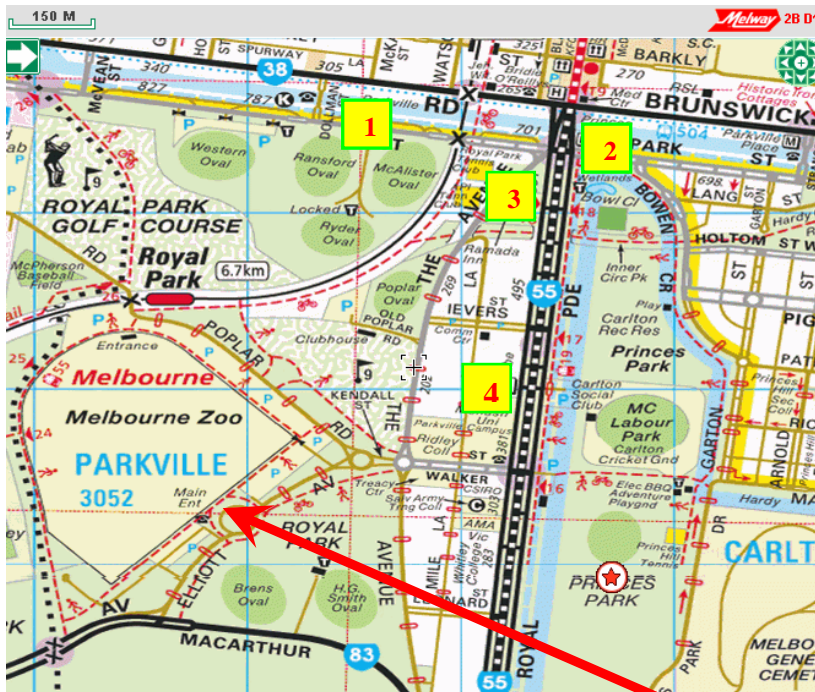
Web: <http://www.princespark.com/index.asp>

Parkville Motel ***, 759 Park Street, Brunswick 3056 VIC,

Phone: 03 9388 1500

Web: <http://www.parkvillemotel.com.au/>

Cost: \$85.50 if booked over internet



- 1 Parkville Motel
- 2 Melbourne's Princess Park Motor Inn
- 3 Ramada Inn Parkville
- 4 Vibe Hotel Carlton

Conference entry
from Main Zoo
Entrance

Non-CO₂ greenhouse gas fluxes in Australian landscapes
15-16 May 2007
The University of Melbourne

Abstract submission form

- 1) Topic *Measuring non-CO₂ GHG fluxes*
 Non-CO₂ GHG fluxes in Australian landscapes
 Processes controlling non-CO₂ GHG fluxes
 Modelling of non-CO₂ GHG fluxes

- 2) Oral presentation
 Poster presentation

3) Presenting author details

First Name
Family Name
Institution
Street
City / Suburb
State
Postcode
Phone
Email

4) Presentation details

Authors
Title

5) Manuscript submission to international journal for the Special Issue "Non-CO₂ greenhouse gas fluxes in Australian landscapes"

- I intend to submit a manuscript
 I will not submit a manuscript

Please use the template and the style of the abstract outlined on the next page.

Please send the abstract form and the abstract to:

Stephen Livesley
School of Forest and Ecosystem Science
The University of Melbourne
Water Street, Creswick VIC 3363
Phone: 0439 615 772
Fax 03 5321 4166
E-mail: sjlive@unimelb.edu.au

Abstract example:

Please use this abstract as a template and keep the style and format.

Please underline the presenting author

Do not exceed 300 words

Nitrous oxide and methane emissions under land-use change from grazed pasture to *Eucalyptus globulus* and *Pinus radiata* plantations in Australia.

Stephen J Livesley¹, Klaus Butterbach-Bahl², Ralf Kiese², Chris Weston¹ and Stefan K Arndt¹

School of Forest and Ecosystem Science, The University of Melbourne, Water Street Creswick VIC 3363, Australia — ²Institute for Meteorology Climate Research, Forschungszentrum Karlsruhe, Kreuzeckbahnstrasse 19, D-82467 Garmisch-Partenkirchen, Germany.

Methane and Nitrous oxide contribute more than 25% of Australia's greenhouse gas emissions, the majority of which comes from the agricultural sector. In the southern states of Australia, large areas have been converted from agricultural pastoral land to eucalyptus plantations. These recent LUC afforestations have the potential to reduce greenhouse gas emissions because of the net C sequestration benefit, reduced soil N₂O emissions as compared to agricultural land and increased soil CH₄ uptake as compared to agricultural land. We measured the temporal variability of GHG fluxes using an automated measurement system in four different land-use systems in Albany, Western Australia. The field sites consisted of a pine plantation, a blue gum plantation, an improved pasture and a remnant woodland.

The results revealed that N₂O emissions were significantly smaller in forested systems than pasture systems and CH₄ uptake was significantly greater in forested systems than pasture systems. We estimated that N₂O emissions can contribute up to 10% of the total GHG exchange in pasture systems. In forested systems, N₂O emissions were responsible for < 1% of soil-atmosphere GHG emissions. CH₄ was actually taken out of the atmosphere by the forest soils (offsetting only 1% of GHG emissions). Forest soils were twice as effective as pasture soils at CH₄ uptake.

Field and laboratory process studies revealed that N₂O emissions in forest systems seem to be dominated by nitrification processes, and were minimised by the dryer soil conditions and tighter nutrient coupling. Soil CH₄ uptake seemed to be greatly influenced by disturbance, soil moisture and the gas diffusion capacity of the topsoil.

In summary, we have evidence that afforestation of pasture systems is not only environmentally beneficial because of the carbon sequestration in biomass growth, but that it also reduces N₂O emissions and increases CH₄ uptake by the soil.