PhD Opportunity: Detecting and quantifying methane emissions from a heterogeneous landscape using satellites and AI technologies

IMPORTANT ELIGIBILITY NOTE: The international tuition-fee scholarship is available only to international applicants who are already residing in Australia. It does not include a stipend.



The Research Institute for Environment and Livelihoods (RIEL) at Charles Darwin University (CDU) is seeking Expressions of Interest from highly motivated candidates for a PhD project focused on detecting and quantifying methane emissions using satellite remote sensing and artificial intelligence (AI).

The successful candidate will join a multidisciplinary research team involving researchers from across the University and government agencies. The project will use Earth observation technologies, including satellite data and, where appropriate, drone-based observations, together with AI-driven analytical methods to detect methane emission sources and quantify emission rates in the Beetaloo region of the Northern Territory, Australia.

The research will contribute to the development of a robust methane monitoring framework to support environmental stewardship, evidence-based decision-making and sustainable resource development. The project provides an opportunity to develop expertise at the intersection of remote sensing, geospatial science, environmental monitoring and machine learning.

Scholarship and financial support:

Australian citizens and permanent residents:

Eligible applicants may be considered for a competitive Research Training Program (RTP) stipend scholarship, together with a full RTP tuition-fee offset for up to 3 years. Selection is competitive and a stipend is not guaranteed.

A potential additional stipend top-up may also be available, subject to funding availability, eligibility and the University's approval process.

International applicants currently residing in Australia:

A full international tuition-fee waiver has already been allocated to this project for an eligible international PhD candidate who is currently residing in Australia. The scholarship covers tuition fees only for up to 3 years of full-time candidature. It does not include a living allowance or stipend.

Important: International applicants must already be living in Australia. The international tuition-fee scholarship is project-funded and does not provide a stipend or relocation assistance.

About the project:

Methane is a potent greenhouse gas and a major contributor to global warming. Anthropogenic emissions are increasing atmospheric methane concentrations. Oil and gas development in the Beetaloo region of the Northern Territory creates a need for robust and independent approaches to monitoring potential methane emissions. This project will leverage satellite observations and AI, including machine learning and deep learning methods, to detect methane plumes and investigate approaches to quantifying emission rates. Anticipated outcomes include the development of a methane monitoring approach capable of supporting detection and estimation across different spatial and temporal scales. The research will contribute to the Northern Territory Government–CDU regional monitoring program for the Beetaloo region.

About you:

- Strong analytical and problem-solving skills
- Curious and innovative
- Initiative and self-motivation
- Ability to work independently and collaboratively
- Attention to detail
- Commitment to research excellence

Benefits to you:

- Project-related research costs and support, professional development training, and access to a collaborative multidisciplinary research team.
- A professional development training program delivered alongside the PhD
- Play an integral role in a highly collaborative multidisciplinary research team
- Contribute to research with real-world impact
- Access to Student Support Services and Wellbeing Support Program
- Work with a University committed to changing people's lives for the better through training, education, and research

Selection criteria:

Essential

1. Academic Qualifications

- A First Class Honours degree, a Master's degree with a substantial research component, or an equivalent qualification in a relevant field such as Remote Sensing, GIS, Environmental Science, Atmospheric Science, Computer Science, Data Science, Physics, or a related discipline. Applicants must also meet CDU's Higher Degree by Research admission requirements.

2. Analytical and Technical Capability

- Strong analytical, quantitative and problem-solving skills.
- Some experience in data analysis, scientific computing or programming (for example, Python, R or JavaScript), or a demonstrated ability and willingness to develop these skills.
- Ability and willingness to learn how to work with large and complex environmental or geospatial datasets.

- 3. Research Capability and Communication

Ability to undertake independent research and critically engage with scientific literature.

- Good written and verbal communication skills.
- Ability to work independently and collaboratively as part of a multidisciplinary research team.
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4. Motivation and Research Interests

- A demonstrated interest in one or more areas relevant to the project, such as remote sensing, Earth observation, environmental monitoring, climate change, greenhouse gas monitoring or AI-driven environmental analysis.
- A clear statement describing research interests, career goals and motivation for undertaking this PhD, including an interest in developing new technical skills.

Desirable

- Experience with satellite remote sensing or Earth observation datasets, such as Sentinel or Landsat.
- Experience with Python, R, JavaScript, geospatial data processing or Google Earth Engine.
- Basic familiarity with artificial intelligence, machine learning or deep learning.
- Experience analysing spatial, temporal or other large environmental datasets, including through cloud-computing platforms.
- Experience with UAV/drone-based remote sensing.
- Research publications, conference presentations or relevant industry experience.

Eligibility Criteria

To be eligible to start a Higher Degree by Research (HDR) at CDU, you need to meet three requirements.
Academic performance. You need a Bachelor's or Master's degree with a Distinction GPA. You'll need to provide your academic transcripts as evidence.
Research experience. You need to have completed research training as part of your previous studies:
For a PhD: at least 40 credit points, one semester full-time of Post-graduate of (AQF Level 8) research training
If you don't meet these exact requirements, equivalent research experience may still be considered, as long as you can show a strong research track record.
English proficiency (international applicants only). You'll need to provide a certificate showing one of the following:

- IELTS: 6.5 overall, with no individual band below 6.0
- Duolingo English Test (accepted)
- Other tests — see the English language proficiency requirements for full details

Applicants must indicate whether they are international applicants currently residing in Australia, or Australian citizens/permanent residents. All applicants must meet CDU's HDR admission and English-language requirements, where applicable.

How to apply:

Email an expression of interest to Richard Crabbe (richard.crabbe@cdu.edu.au), including:

- **Cover email** — outlining your eligibility for the PhD program, your suitability (by addressing the selection criteria) for the project and why you're interested in this project.
- **Curriculum vitae** — Include your qualifications, relevant experience and your 4 best publications (if possible) with their quality indicators.

- **Postgraduate transcripts** — showing grading scheme, GPA, and all thesis/research units

Application closing date: Expressions of Interest will be considered until a suitable candidate is identified.

Commencement date: To be negotiated with the successful candidate, subject to admission and scholarship requirements.

Supervisory and Advisory Team: Richard Crabbe, Lindsay Hutley, Sami Azami

Enquiries: Dr Richard Crabbe (richard.crabbe@cdu.edu.au)

Diversity and Inclusion: At CDU, we actively celebrate our diversity. We innovate, embrace new ideas, and act with courage and kindness. We're about what we can give to the world rather than what we take, and we believe in the transformative power of education. We work hard to make sure every member of our university community feels that they truly belong. Understanding that it is through our focus on our people and leveraging our differences that will make CDU the most connected university in Australia, we are striving to ensure that our culture and our community are inclusive of all our staff, students and visitors. We are committed to maintaining a culture where everyone feels respected, safe, encouraged to speak up and supported in achieving their professional goals. You make CDU. And we want you to be exactly who you are.