

PhD project: Critical zone functioning in semi-arid environments

About the position

Arid and semiarid zones encompass 1/3 of the global landmass and ~70 % of Australia and are frequently characterised by deep groundwater tables and extensive unsaturated zones supporting local vegetation during long dry periods. The project will focus on the uppermost part of the Fortescue River catchment on the southern side of the Hamersley Range in the Pilbara region, WA. The area is covered with an elevated alluvial plain system with a thick unsaturated zone and water table down to <20 m bgl and bushland with several high priority plant species. This region has an extensive groundwater monitoring system and local infrastructure made available by the project industrial partner. Our initial studies in Pilbara have also provided an excellent foundation for the current project.

This project will aim to better understand critical zone functioning in semi-arid environments and specifically focus on (1) determination of evaporative losses from unsaturated zones with respect to sediment and soil properties and water table depths and (2) estimation of the infiltration rates and velocities in lithologically different unsaturated zones.

The West Australian Biogeochemistry Centre, School of Biological Sciences in collaboration with School of Agriculture and Environment and School of Earth Sciences of The University of Western Australia (UWA), are seeking a highly motivated PhD candidate to work on this project. The project is funded from a large-scale study conducted in Pilbara, Western Australia and financed by the Australian Research Council and the industrial partner Rio Tinto Iron Ore.

The PhD student will collaborate closely with the industrial project partner and spend substantial periods working at remote locations in Pilbara. Extensive soil characterisation, moisture evaporative fluxes and infiltration analyses, together with stable isotope composition analyses, will be the key methods used in this study. The project will also contribute to the development of stable isotope and hydrochemical methods and their integration with physical soil moisture monitoring in the unsaturated zone to probe its dynamics, aiming for numerical quantification of hydrological processes in the unsaturated zone. Multiple soil moisture probes and three weighing lysimeters will be available for direct observations and verification of the mathematical models.

Qualifications

Prospective candidates should have Masters or Honours degree (first class or equivalent) in hydrogeology, soil science, or related fields of earth and life sciences. Some previous experience with mathematical modelling, spatial analysis, Python or R programming is expected. Good interpersonal communication and the ability to work as part of a multidisciplinary team will be expected from the candidate. The ability for independent, organized work and advanced communication skills in English (oral and written) are essential. All fieldwork participants are subject of periodic drug and alcohol testing as per mining site requirements.

Scholarship

This is a full-time PhD position fully funded for 3 years with scholarship funded by ARC project conducted at UWA, with a total of 35,000 AUD + industrial top-up of minimum 5000 AUD per year (in total 40,000 AUD per year), possible extension to a maximum of 3.5 years in total.

How to apply and contact

Interested applicants are encouraged to contact principal supervisor Dr Greg Skrzypek at Grzegorz.Skrzypek@uwa.edu.au for more information. Please include a cover letter describing your interest in the field and project, CV, publications, an academic transcript, relevant supporting documents of prior research, and the names and contact details of two potential referees. The interdisciplinary project is hosted by School of biological Sciences but co-supervised by Dr Matthias Leopold from the School of Agriculture and Environment and Dr Jim McCallum from the School of Earth Sciences and other project partners.

Closing date

Applications close on 15 October 2023, 11.59 PM, AWST.

