THE UNIVERSITY OF NEWCASTLE AUSTRALIA

This presentation participates in OSPP
EGU
Outstanding Student Poster & PICO Contest

Soil carbon and soil moisture dynamic redistribution in a banded ecosystem

J.P. Quijano Baron, P. M. Saco, D. Jaskierniak and J.F. Rodriguez

Discipline of Civil, Surveying and Environmental Engineering, The University of Newcastle, Callaghan, Australia

2020

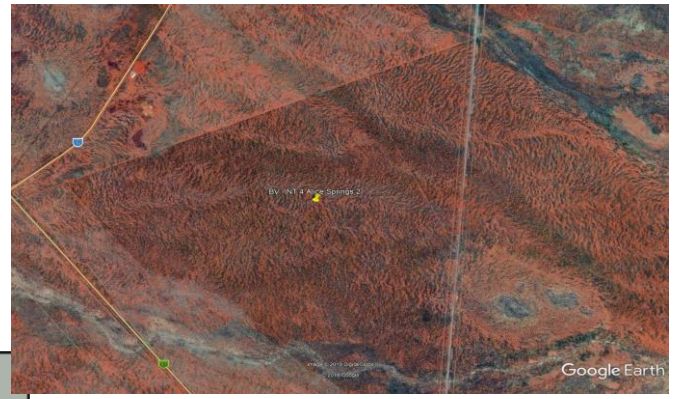
THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Contents

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Introduction

- Arid and semiarid environments accounts approximately 30% of the Earth's continental surface
- Vegetation patterns (e.g. banded vegetation): adaptive response of the system to resource redistribution and limitation.
- The patterns consist on alternating densely vegetated bands (or 'groves') and bare areas (or 'intergroves'),



THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Research Question

How can differences on the availability of resources explain the functionality of the banded vegetation systems?

Study Case – Bond Springs

- 25 km north of Alice Springs
- Acacia Aneura trees (Mulga)

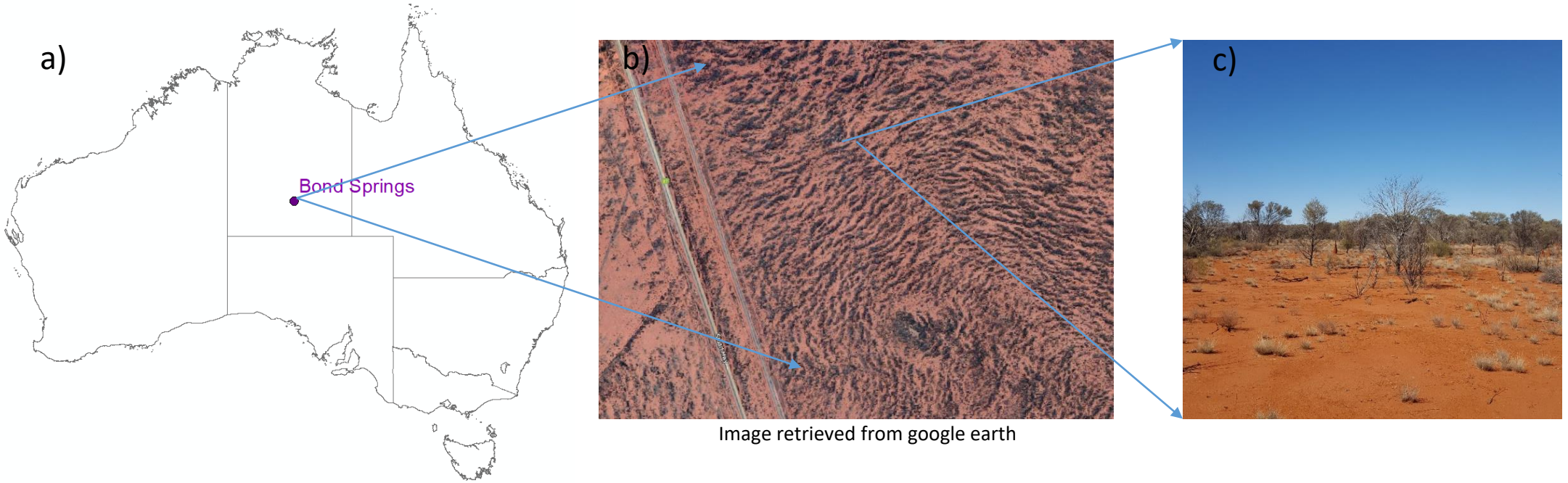
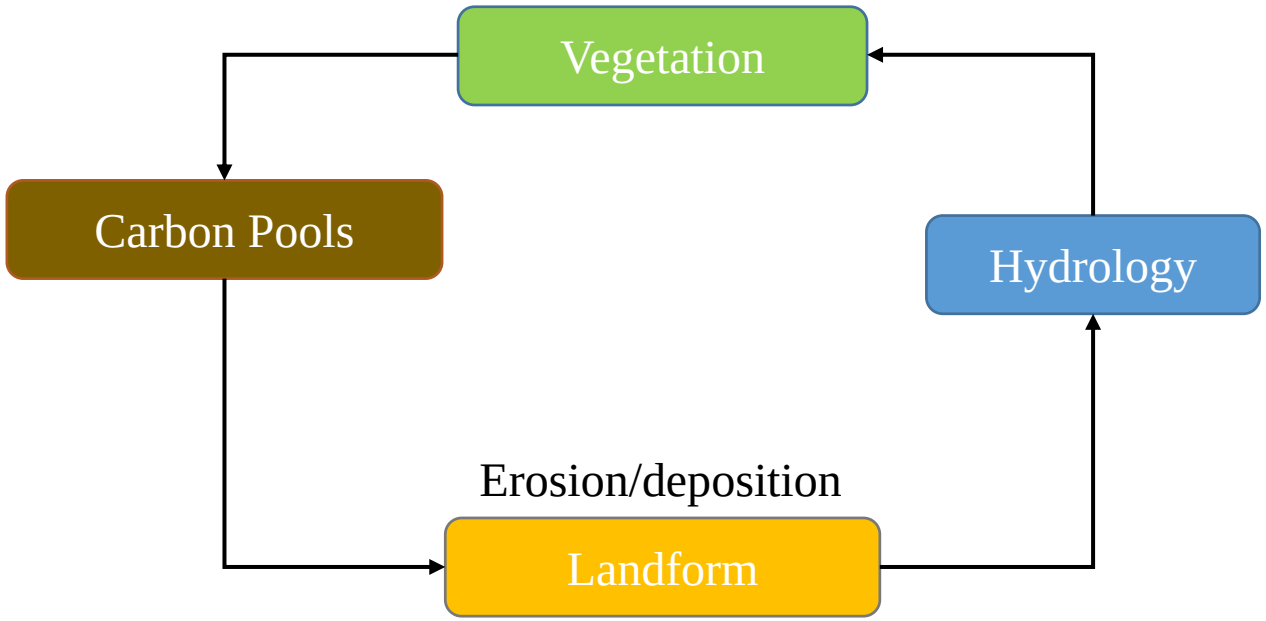


Image retrieved from google earth

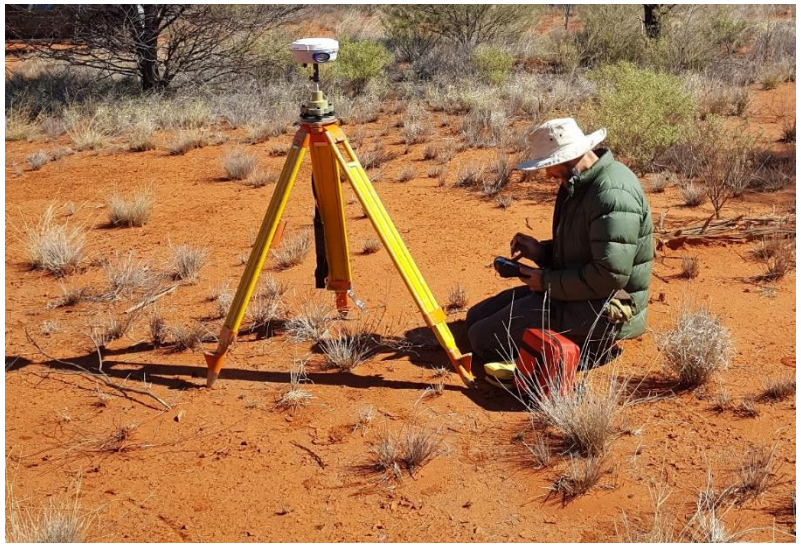
Model COPLAS

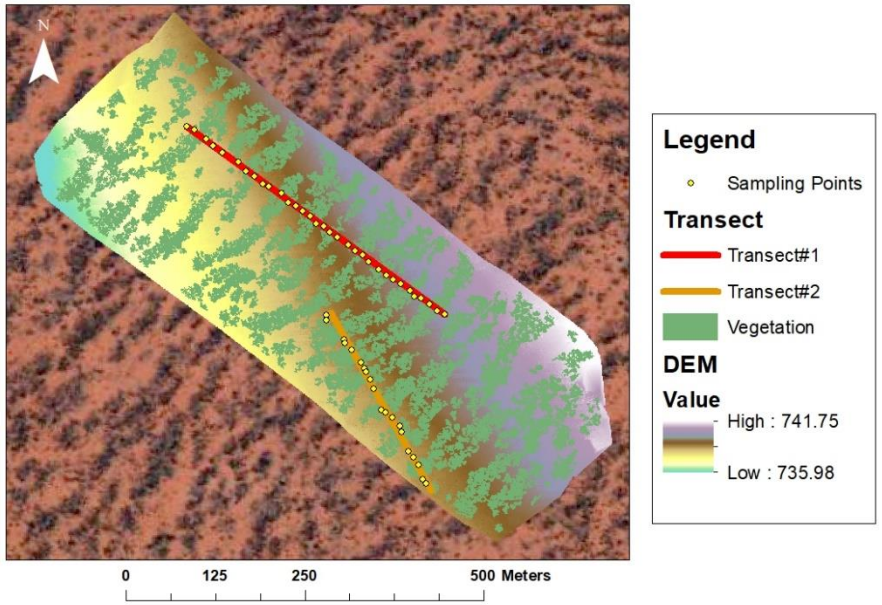
- It couples a Landform Evolution Model with dynamic vegetation and carbon pools modules



Fieldwork

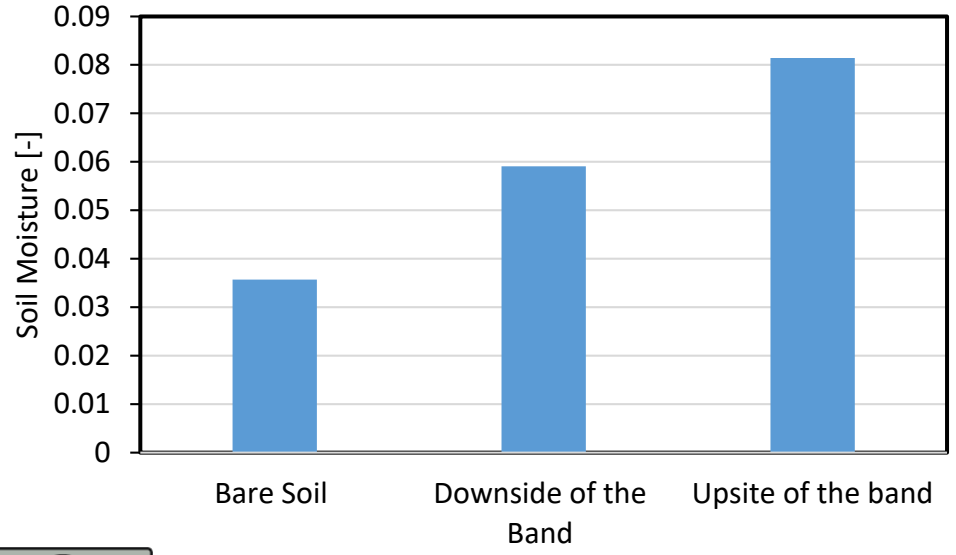
- 53 soil samples were taken: 15 uphill and 15 downhill the vegetated band, and 23 in bare soil.
- surveying with unmanned aerial vehicle
- 18 Litter samples: 9 uphill and 9 downhill the vegetated band
- Samples were collected in two transects

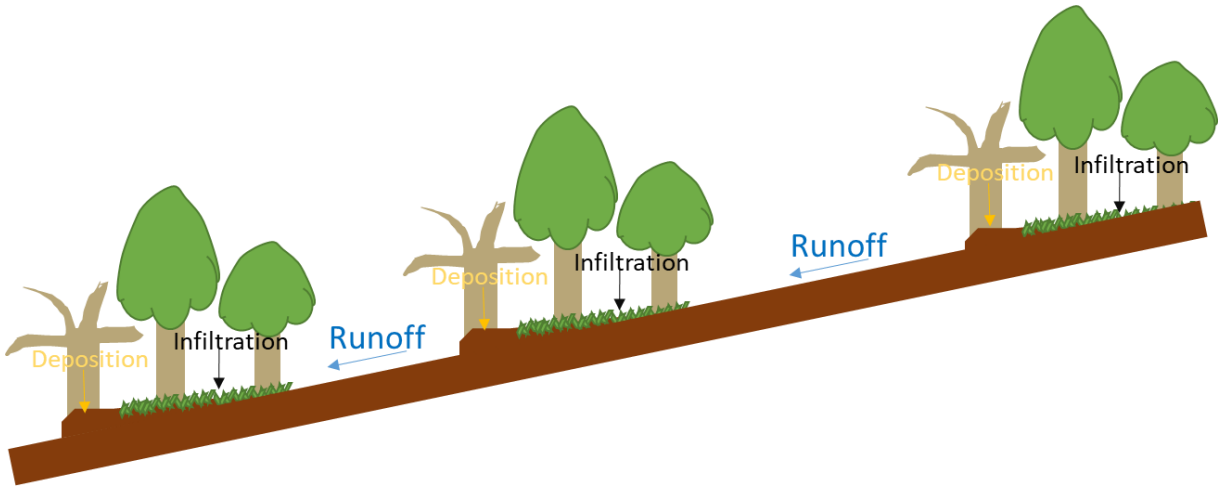




Preliminary results

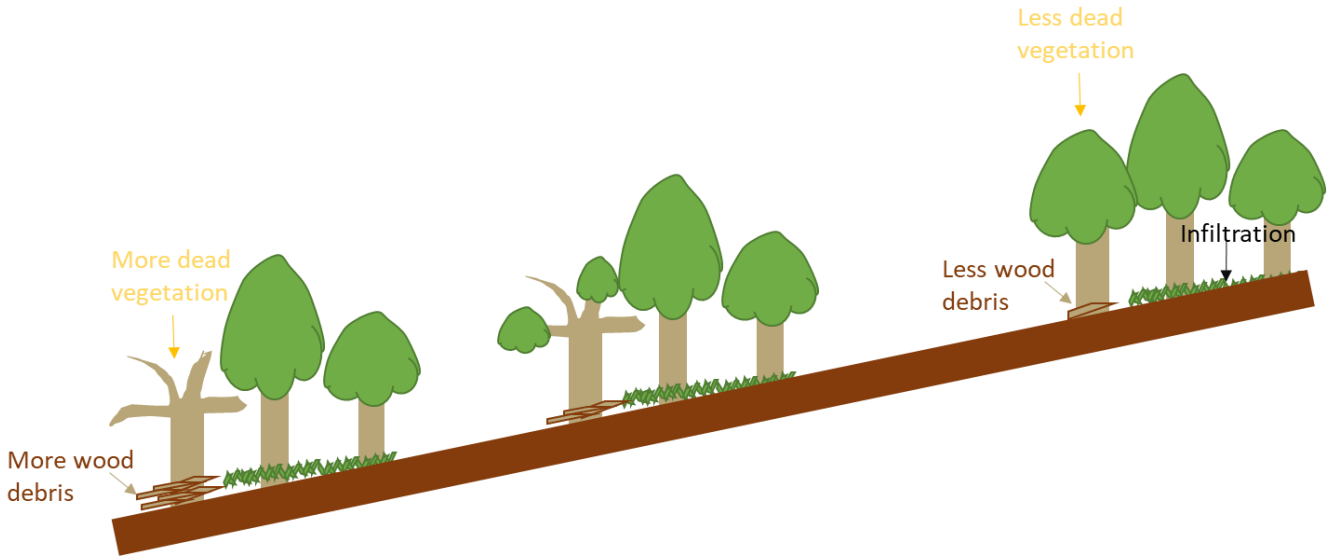
- We found that soil moisture uphill the bands is around 33% more than downhill, and close to 120% more than in bare soil.
- A portion of the runoff, generated from bare intercanopy patches, is redistributed downslope and infiltrated uphill the vegetated areas.

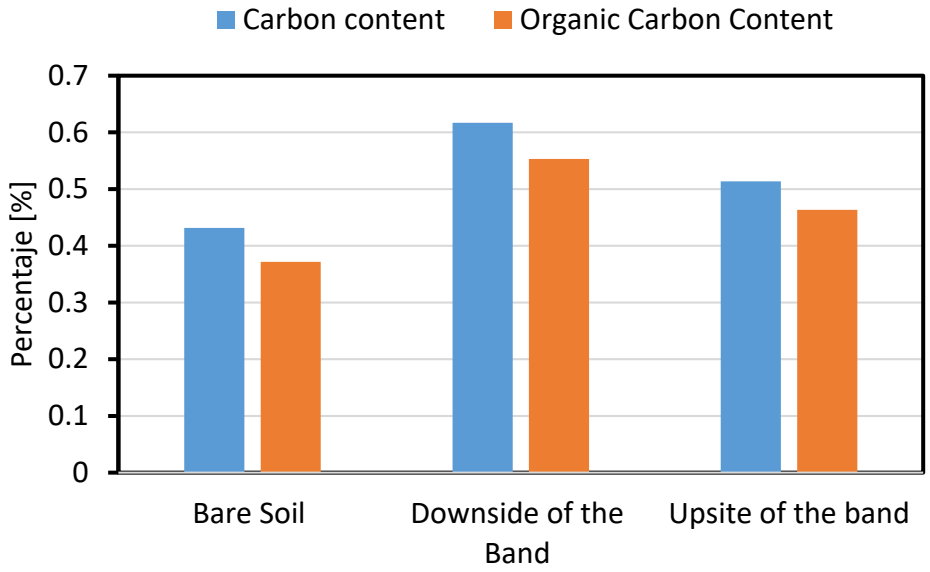




Preliminary results II

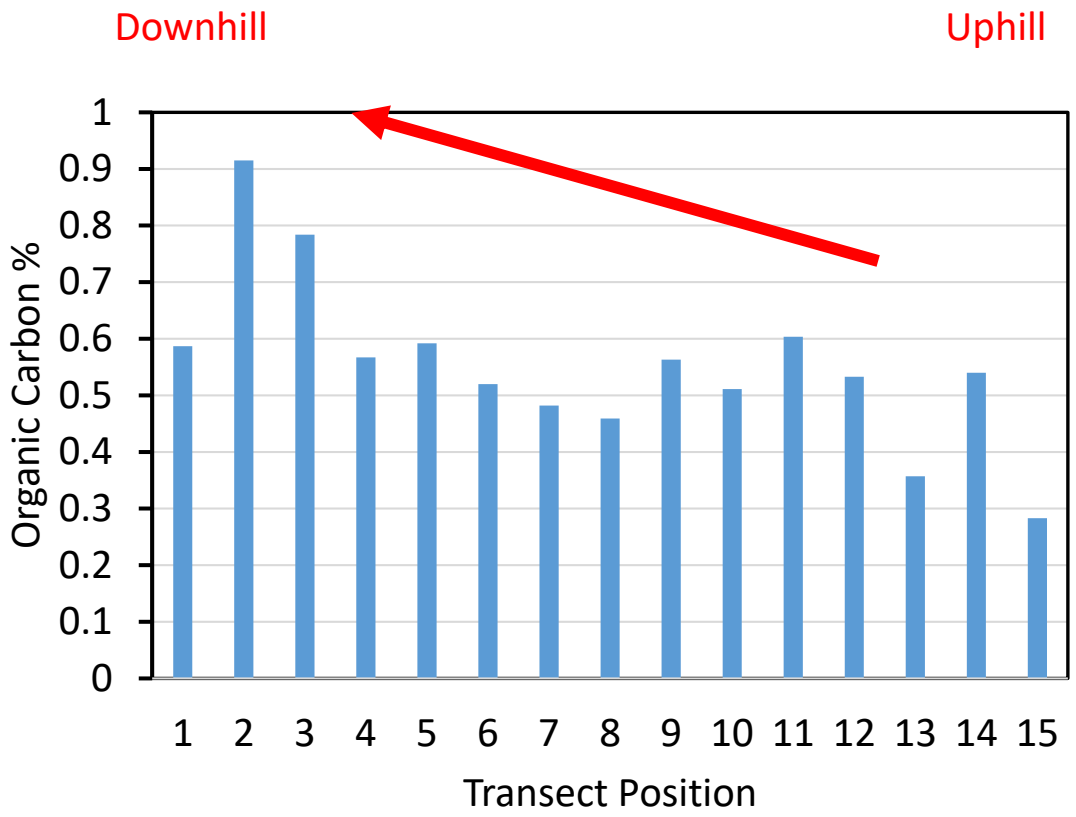
- Soil carbon is 20% more downhill than uphill the bands because of deposited alluvium and litter downhill and possible less microbial respiration and decomposition due smaller soil moisture content.





Preliminary results III

- Tendency of higher soil carbon concentrations going downhill the catchment.



THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Future work

- Comparison of carbon and soil moisture results with COPLAS
- Comparison of vegetation with satellite images

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Preliminary conclusion

- Heterogeneous distribution of resources in the area that could explain the ecosystem functionality
- Importance of modelling and measuring arid and semiarid ecosystems in order to understand their dynamic behaviour

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Thank You!

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Questions?

juan.quijanobaron@uon.edu.au