(A) Interpreted Palaeodrainage (Gallant and Dowling 2003); (B) Elevation Hillshade and Drainage (Geoscience Australia 2006 & 2009); and (C) Landscape Types (Smith, personal communication 2017).

Landscape Evolution in the Albany-Fraser Orogen & South Yilgarn Craton, WA

S. Pernreiter[1,2], I. González-Álvarez[1,3], J. Klump[1], G. Smith[1] and T. Ibrahimi[1]
[1]CSIRO, Mineral Resources, Discovery Program, Kensington 6151, Western Australia,
[2]Institute of Geology, University of Innsbruck, Innrain 52, A-6020 Innsbruck, Austria
[3]Centre for Exploration Targeting, University of Western Australia, Crawley, Western Australia

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The landscape in the south of Western Australia displays an interesting pattern which is not consistent with its current climate and latitude position. A closer look towards the landscape evolution, landscape features and processes is necessary to understand this inconsistency.

Landscape evolution is the result of the interaction of climatic conditions, geological characteristics and sedimentary dynamics through time (Ollier and Pain 1996; Ollier 2001; Goudie 2006; Fujioka and Chappell 2010; Pain *et al.* 2012). In regolith-dominated terrains (RDT), landscape morphologies and their stratigraphy record the 3D architecture of the overburden, and capture the relation of the surface and cover to basement geology (e.g., Butt and Zeegers 1992; Pain *et al.* 2012; Anand 2015; González-Álvarez *et al.* 2016, Butt *et al.* 2017).

Remote sensing datasets such as Digital Elevation Models (DEM) visualise the geomorphological features of the land surface. Combining of different surface geometrical features can be used to classify landscape types. Therefore, DEMs can be employed to map landscapes over large geographic areas (e.g., geological province, country or continental scale).

Project objective

In this study we tested the conceptual variability of landscape types in the Albany-Fraser Orogen and South Yilgarn Craton, using machine learning algorithms, DEM data and DEM-derived products (e.g., DEM Hillshade, Flatness Map), Bing© satellite images and field observations to assess how landscapes can be classified based on their specific surface geometric features.

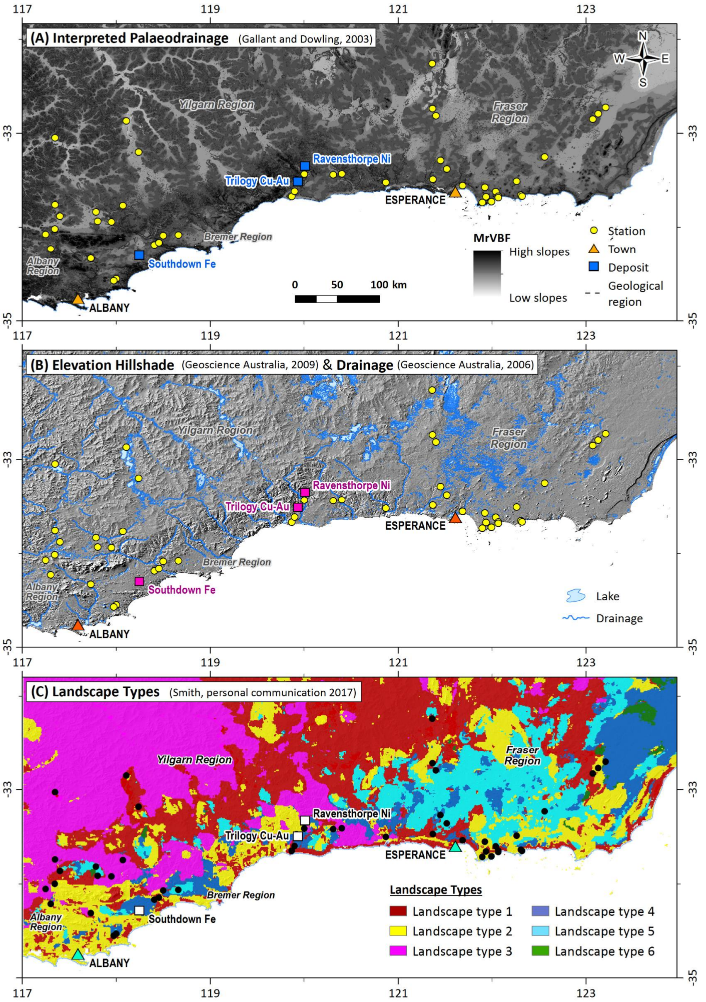

Figure 1: Geometrical patterns and features used to classify the south of WA into six landscape type domains. (A) Interpreted Palaeodrainage (Gallant and Dowling, 2003); (B) Elevation Hillshade and Drainage (Geoscience Australia 2006&2009); and (C) Landscape Types (Smith, personal communication 2017).

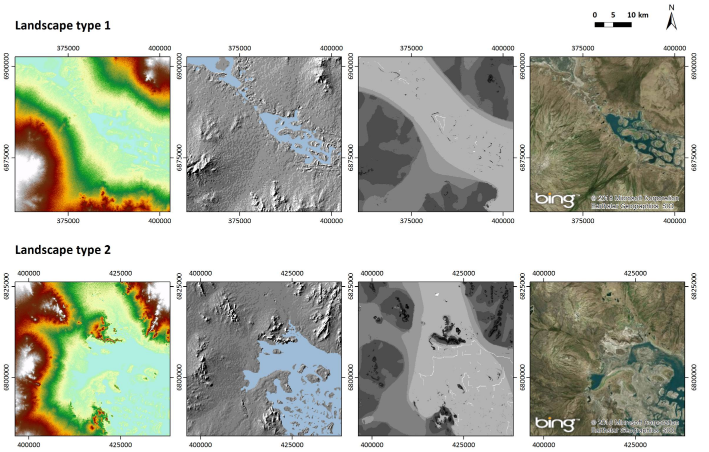

Figure 2: Example for use and comparison of DEM products for landscape type 1 and 2

[DEM: Geoscience Australia, 2009; DEM Hillshade: Geoscience Australia, 2009; Flatness Map: MrVBF; Gallant and Dowling, 2003; satellite Image: Bing ©2018]

Figure 3: Examples for field observations in type 1 (A): Indian Red, location 438971; 6247886 51H; and type 2 (B): Gold., location 423437; 6240340 51H.

Conclusions and outlook

- Landscape classification based just on DEM products was not able to capture all landscape variability observed.
- Mapping of large scale pattern changes was possible, mapping distinct boundaries very challenging.
- Another landscape category needs to be introduced for landscape types and patterns that doesn't fit into the previously defined ones.
- Algorithm interpretations need to be linked with field observations for accurate interpretation of geometrical surface features.
- The palaeodrainage patterns play the most important role in landscape evolution and characterizing the present landscape features.
- Landscape mapping in RDTs by the use of surface geometry will be a powerful tool to map and feature landscape types in any similar context such as West Africa, India, Brazil and large extensions of China.

FOR FURTHER INFORMATION
Sabine Pernreiter
e sabine.pernreiter@csiro.au
w www.csiro.au/MineralResources

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