



How fast can you climb a mountain? Climate change, ant
assemblages and a centre of endemism

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ABSTRACT

Elevational transects across mountains, although at a smaller scale, provide compressed versions of regional and continental variation and might be the most cost-effective measure of ecosystem response to global climate change in the tropics. The pattern of ant diversity along a proposed long-term elevational transect across the western Soutpansberg mountains in the north-east South Africa, is investigated to see if it can be related to spatial and environmental variables and the indicator species for each vegetation type and aspect is identified. Ants were sampled with pitfalls laid in 2 X 5 grids, replicated 4 times in each elevation zone (44 in total). Habitat structure (5), temperature (6) and soil parameters (20) were collected in each replicate. A total of 75 ant species representing 27 genera in seven subfamilies were collected. The high diversity of ants in subfamily Myrmicinae and Formicinae is common in other South African ant studies. The species estimators for the whole transect converged closely to each other, indicating that sampling was representative. There was no clear pattern of species richness and density along the whole transect but a mid-elevational peak in species richness and density was found at the northern aspect. The southern aspect had no clear pattern and this can be explained by a clear north-south dichotomy, characterised by the presence of three biomes along the southern aspect and one on the northern aspect. Ant assemblage structure of site 08N was distinct from other sites. Ant diversity patterns and assemblage structure were largely determined by regional environmental factors (32 – 56%) followed by spatially structured environmental factors (5 – 46%) with local processes explaining very little variation (1 – 4 %). Temperature, mean monthly and absolute minimum, in conjunction with percentage sand in the soil, presence of stone in the soil and pH, consistently explained significant amounts of species density, abundance and assemblage structure in particular. Only two of the vegetation types, viz. Arid North Bushveld and Leached Sandveld, and also the northern aspect had significant IndVal values larger than 70. The recent climate change predictions suggest that there will be an increased density of thickets on the southern aspect as induced by elevated CO₂ levels and rainfall. This will increase species associated with the thicket. The lower elevational indicator species of the northern slope will move uphill at a rate proportional to their thermal tolerance following the regional increase in temperature due to steeper adiabatic lapse of this aspect. The findings of this study provide baseline data for long-term monitoring of the impacts of climate change on ant diversity of this mountain.