

# Altitudinal range expansion of the indigenous vascular flora of Marion Island

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Species ranges are expected to expand along their cooler boundaries in response to the rising temperatures associated with current global climate change<sup>1</sup>. This has been well documented for the poleward expansion of latitudinal ranges in the northern hemisphere<sup>2</sup>. However, fewer studies have tested for upslope altitudinal range expansion, with a paucity of studies from the southern hemisphere. This study, the first of its kind from the sub-Antarctic, reports that the indigenous vascular flora of Marion Island has expanded its elevational distribution upslope by a mean of 69.62 m (SE = 29.89, 22 species) since 1966, concurrent with a 1.3 °C increase in air temperatures on the island<sup>3,4</sup>. This was determined by repeating surveys of species' upper altitudinal boundaries conducted in 1965/66<sup>5</sup>. There was, however, some level of idiosyncrasy in species' altitudinal range shifts, with ten of the twenty-two species expanding their altitudinal ranges upslope by more than 60 m elevation, and three shifting downslope by a similar magnitude. In consequence, the species richness and community composition have changed across altitude, with the largest increases in species richness and shifts in community composition between 400 and 700 m a.s.l. These findings indicate that the sub-Antarctic vegetation is responsive to changes in climate, in agreement with previous experimental<sup>6</sup> and observational studies<sup>7,8</sup>. Furthermore, despite geographic, climatic and biological differences between the hemispheres<sup>9,10</sup>, these results suggest that upslope altitudinal range expansion could be a general biological response to warmer temperatures.

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