

# The Midlands Microcraton Mystery

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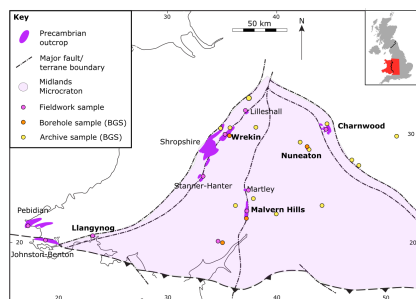
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The ‘Midlands Microcraton’ is a roughly triangular region in central Britain (Fig. 1). It contains most of England and Wales’s Precambrian outcrops. Throughout the Phanerozoic, the region has behaved as a coherent deformation-resistant block [1] and persisted as a long-lived topographic high [2]. Today, the area is observed to have 5-10 km thicker crust compared to its surroundings [3]. Together, these properties are described as ‘craton-like’. However, while globally most cratonic regions are thought to have dry, rheologically strong, high-grade metamorphic rocks extending from the surface to depth, the Precambrian rocks of the Midlands Microcraton are comprised of relatively hydrated arc volcanic and related sedimentary rocks, which show no evidence of high-grade metamorphism.

We aim to understand what factors enable the Midlands Microcraton to display craton-like properties, despite featuring atypical cratonic lithologies and lower metamorphic grades. We use new in-situ zircon and monazite U-Th-Pb geochronological data from key Microcraton sites to assess the Microcraton’s Precambrian and early Phanerozoic history. These data are integrated with field and petrological observations and phase equilibria modelling to assess the Pressure-Temperature-time paths experienced by Microcraton rocks, with the aim of understanding when and how the region acquired craton-like properties. This research aims to identify possible pathways for (micro)craton formation and will improve our understanding of how rheological strength contrasts develop in the crust.

### References:

- [1] Woodcock N and Soper H (2006), *The Geology of England and Wales* 131-146.
- [2] Pharaoh T (2018), *Proc Geol Assoc* 129, 278-328.
- [3] Bonadio R et al (2021), *Geophys J Int* 226, 2158-2188.
- [4] Pharaoh T and Carney J (2000), *Precambrian Rocks of England and Wales* 3-17.



**Figure 1** Map showing the location of the Midlands Microcraton (adapted from Pharaoh and Carney [4]). Areas of surface Precambrian outcrop are shown in dark purple. Sample locations used in this study, from fieldwork and British Geological Survey (BGS) archive material, are marked by coloured dots.