

The onset of modern plate tectonics

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The transition from Precambrian times to the Palaeozoic is largely believed to be marked by a fundamental change in the behaviour of interacting plates. The onset of 'modern' plate tectonics is marked by the first appearance of blueschists, i.e. high-pressure, low-temperature rocks formed by steep subduction of cold oceanic crust. Ultrahigh-pressure metamorphism of continental crust is also good evidence for steep, rapid subduction. There is sparse evidence, however, of blueschists and possible ultrahigh-pressure continental crust as far back as c. 600 Ma. This could, therefore, mark the onset of modern plate tectonics or, alternatively, it could be related to preservation potential. Blueschists and ultrahigh-pressure rocks are notoriously difficult to preserve as they are highly metastable. Robust minerals, particularly rutile, tourmaline and zircon from within these rocks, however have a much larger preservation potential where they are eroded and deposited as detritus in later sediments. Both rutile and zircon can be dated by in-situ U-Pb techniques and all these minerals linked back to potential high/ultrahigh-pressure parental rocks through a combination of mineral chemistry (including trace elements and geothermobarometry) and inclusion phases (e.g. coesite and omphacite in zircon). This project aims to develop these techniques using state-of-the-art Laser Ablation ICP-MS and SEM imaging at Portsmouth and EPMA at Bristol. It will build on preliminary work on recent blueschists on Syros Island, Greece and extend the work back in time ultimately to the Precambrian to look for remnants of high/ultrahigh-pressure rocks older than the extant rock record. This is an exciting project with far-reaching implications and would suit an analytically minded student. It would equip a student for a future career in academia, but training in analytical techniques would be highly transferable to the mineral/oil extraction industries or a career in analytical geochemistry.

Candidates should send an application letter and full curriculum vitae to:

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