



High-precision zircon dating of oceanic crustal accretion at the Vema Lithospheric Section, Mid-Atlantic Ridge

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Zircon dating of lower oceanic crust has significant potential to document crustal growth patterns of oceanic lithosphere. We present U/Pb zircon dates for gabbros sampled from the Vema Lithospheric Section (VLS) at 11°N along the Mid-Atlantic Ridge. The VLS exposes an intact crustal section that was uplifted as a result of plate flexure, providing an opportunity to document crustal growth along a typical, symmetrically spreading ridge segment. Single zircon grains were dated using thermal ionization mass spectrometry (TIMS), and attained a precision of 0.07-0.79% (ca. 10,000 to 100,000 years; 2). This is over an order of magnitude more precise than previous dating studies using ion microprobe. The zircon dates fall between 13.25 and 13.75 Ma, and define a linear array against spreading rate, which, together with the continuous nature of the lower crust and the scarcity of gabbroic plutons in the mantle section, provides evidence for regular, shallow, ridge-centered crustal accretion. This contrasts with previous zircon dating studies on oceanic core complexes, which found irregular age-distance relationships, with ages deviating by as much as 2.5 Ma from the magnetic age of the crust. This suggests two fundamentally different modes of crustal accretion occur along slow-spreading mid-ocean ridges.