

Early Paleozoic sandstones in the Southern Uplands terrane of Scotland were deposited during closure of the Iapetus Ocean between Laurentia and Avalonia. Their tectonic setting and sources are controversial, and different authors have supported subduction-accretion, extensional continental-margin development, or back-arc basin settings. We report new U-Pb detrital zircon ages from five Late Ordovician sandstones from the Northern Belt of the Southern Uplands and test models of their tectonic setting. The U-Pb zircon age distributions are dominated by peaks characteristic of sources in Laurentia and include grains as old as 3.6 Ga, older than any previously recorded in the British Caledonides SE of the Laurentian foreland. Discordant grains in one sample suggest derivation via erosion of metasedimentary rocks incorporated in the Grampian-Taconian orogen. Rare Neoproterozoic grains, previously interpreted as originating from a peri-Gondwanan terrane, may be derived from igneous rocks associated with Iapetan rifting. Only rare zircons are contemporary with the depositional ages. The results are difficult to reconcile with extensional continental-margin and back-arc models, but they support an active continental-margin subduction-accretion model. Close similarities with distributions from the Newfoundland Appalachians are consistent with sinistral transpression during closing of the Iapetus Ocean.