Age and nature of the late early cretaceous zhaga formation, northern Tibet: Constraints on when the Bangong-Nujiang Neo-Tethys Ocean closed

Abstract

This article reports the depositional environment, provenance, and U-Pb zircon age constraints for the newly identified Zhaga Formation in northern Tibet and uses these to better understand the tectonic evolution of the Bangong–Nujiang suture. One transect across the Zhaga Formation was investigated. The Zhaga Formation is ~ 2 km thick, dominated by greywacke and conglomerate at the base, basalt and limestone in the middle, and greywacke and shale at the top. Greywacke in the Zhaga Formation typically contains 70–75% quartz, 5% feldspar, 3–5% rock debris, and >15% matrix, with normal grading and convolute bedding, basal flow structures, and distinct Bouma sequences interpreted as bathyal to abyssal turbidites. One rhyolite sample and one greywacke sample from the studied transect were collected for zircon U-Pb dating. The rhyolite yields a concordia age of 118 Ma, and the greywacke yields nine age peaks of 247, 330, 459, 541, 611, 941, 1590, 1871, and 2482 Ma, indicating that the Zhaga Formation formed during the late Early Cretaceous and the provenance of its detritus was the Qiangtang area. These data, combined with the Early Cretaceous ocean islands, indicates that the Bangong-Nujiang Neo-Tethys Ocean must have been open during the late Early Cretaceous. We conclude that the Bangong–Nujiang Neo-Tethys Ocean closed after the late Early Cretaceous and not during the Late Jurassic or the early Early Cretaceous as proposed by previous workers.