
New U-Pb age from the Shuijingtuo Formation (Yangtze Gorges area) and its implications for the Cambrian timescale

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Abstract

The Terreneuvian Series of the early Cambrian records the first major diversification phase of the canonical Cambrian explosion. However, a paucity of precise radio-isotopic ages for key stratigraphic horizons has resulted in a poor temporal calibration of fossil lowest occurrences (LO) and corresponding rates of evolution throughout the Terreneuvian. Here we present integrated SIMS and CA-ID-TIMS U-Pb analyses on zircons from the basal Shuijingtuo Formation in the Yangtze Gorges area, South China. The dating results provide a depositional age of 526.43 ± 0.54 Ma for the basal Shuijingtuo Formation, and compiled detrital zircon U-Pb dates from the Ediacaran-Cambrian transitional strata in the Yangtze Gorges area indicate their local provenances. The new high-precision date provides a minimum age constraint on the ZHUCE (Zhujiaping positive carbon isotope excursion) and LOs of *Watsonella crosbyi* and *Aldanella attleborensis* in South China, and allows correlation of ZHUCE with either 5.5p or 5p/I' in Siberia and Morocco. We construct two models of the Ediacaran-Cambrian transitional timescale based on the two alternative correlations of the ZHUCE. The first model correlates the ZHUCE with 5.5p and yields significantly diachronous LOs of *W. crosbyi* and *A. attleborensis* between the Siberian Platform and South China. In contrast, the second and our preferred model equates ZHUCE with 5p/I' and implies relatively synchronous LOs of *W. crosbyi* and *A. attleborensis* between the Siberian Platform and South China. In the preferred model, the couplet of ZHUCE/5p/I' and LOs of *W. crosbyi* and *A. attleborensis* serves as a reliable combination to bracket the base of Cambrian Stage 2.

Keywords: Cambrian, Geochronology, Yanjiahe, Shuijingtuo, ZHUCE, South China

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