



New U/Pb ages from Nanpanjiang Basin (South China): implications for the age and definition of the Early-Middle Triassic boundary

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Understanding the patterns and rates of the biotic recovery following the end-Permian extinction requires detailed calibration of both biotic and environmental fluctuations by precise and accurate U-Pb age determinations on zircon from volcanic ash beds within biostratigraphically well dated marine sedimentary sections. Recent analytical developments in U-Pb dating include chemical abrasion pre-treatment of zircon as well as the use of the well calibrated 202Pb-205Pb-233U-235U EARTHTIME tracer solution, leading to <0.1% analytical uncertainties and external reproducibilities.

Utilizing these analytical techniques we report new data from the Jinya area in the Nanpanjiang Basin (South China) and compare them to radioisotopic and biochronologic data from Guandao in the same basin (Lehrmann et al. 2006, 2007)

The so-called “green-bean rock” (GBR) is an interval rich in volcanic ash beds which is customarily used as a mapping unit to separate Lower from Middle Triassic marine rocks in the Nanpanjiang Basin (Lehrmann et al. 2006). In Guandao, the first occurrence (FO) of the conodont *Chiosella timorensis* is used to define the base of the middle Triassic. The position of this FO in Guandao is somewhat unstable and underwent a downward shift of 2.6 m between the two consecutive reports of Lehrmann et al. (2006, 2007). The new position of the FO, still bracketed by the same ash layers PGD2 and PGD3 led to a minor readjustment of its linearly interpolated age to 247.24 Ma (Lehrmann et al. 2007).

In the basinal Luolou Fm., the GBR amounts to a ca. 3m thick series of composite, laterally transported ashes as indicated by internal sedimentary structures. Ammonoids bracketing the GBR in the Luolou Fm. invariably indicate a late Early Triassic age (Haugi Zone of the Spathian substage). A 13 m thick section straddling the transition between the Luolou Fm. and the overlying Baifeng Fm. was sampled along a new road cut at Monggan (3 km NNW of Jinya). In this section, the 3 m thick GBR occurs 3.4 m below the top of the Luolou Fm. (Galfetti et al. 2008). This stratigraphic position is consistent throughout the entire depositional area of the Luolou Fm. In Monggan, thin ash layers without any signs of lateral transport immediately below and above the GBR were sampled in addition to a sequence of samples taken from the base to the top of the GBR. Sample CHIN47 from a thin ash layer occurring 0.8 m below the base of the GBR yielded an age of 248.05 Ma, thus providing an estimate for the lower part of the Haugi Zone. CHIN45, another thin ash layer occurring 0.3 m above the top of the GBR yielded an age of 246.88 Ma, thus providing an estimate for the upper part of the Haugi Zone. A sequence of four samples within the 3 m thick GBR yielded an intermediate and well ordered series of ages ranging from 247.78 Ma at the base (CHIN46) to 247.02 Ma at the top (CHIN50). Taking the uncertainties into account, the minimal duration of the GBR is of 0.4 My (base with a minimal age of 247.6 Ma and top with a maximal age of 247.2).

Comparisons of these new U/Pb ages from Monggan with the interpolated age of the FO of *C. timorensis* in Guandao indicate that this FO falls between the minimal basal and the maximal top U/Pb ages of the GBR, the latter being in turn included within the late Early Triassic Haugi Zone. Hence, the FO of *C. timorensis* in Guandao is most probably within the time interval of the late Early Triassic Haugi Zone. Independent support for this correlation also comes from North America, where this conodont species occurs within the late Early Triassic

ammonoid Haugi Zone (Goudemand et al. in prep.). The new data from Monggan therefore indicate that the GBR cannot be used as a marker for the Lower-Middle Triassic boundary in the Nanpanjiang Basin (in contradiction to Lehrmann et al., 2006 and 2007).

Galfetti et al. 2008 *Sedimentary Geology* 204: 36-60

Lehrmann et al. 2006 *Geology* 34:1053-1056

Lehrmann et al 2007 *Forum GSA* doi: 10.1130/G23941Y.1