Integrated Chronostratigraphy from Outcrop and Drill Core Samples (Late Triassic, Colorado Plateau)

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Integrating bio-, chemo-, magnetostratigaphic and geochronologic data from Late Triassic marine and terrestrial sedimentary archives has been notoriouly difficult because suitable sections lack recognizeable radioisotopically datable deposits, are often stratigraphically short, and contain fossil assemblages that are difficult to correlate. These complications result in a ca. 35 Ma interval from the upper Middle Triassic through the Late Triassic (ca. 238 to 202 Ma) for which the time scale is poorly calibrated.

Non-marine deposits of Late Triassic age in the southwestern US contain some of the richest fossil biotas, but are difficult to correlate globally because of a lack of robust geochronological data. Even local correlations are compromised by changing lithology over short distances and the lack of stratigaphically long sections [1]. Initial U-Pb zircon ages from redepostited layers taken from outcrops of the Chinle Formation in Arizona and New Mexico show promising results but often display a complex age inventory that can at best provide maximum ages which are difficult to integrate [2, 3], particularly if the stratigraphic order is not known.

We will present U-Pb single zircon CA-TIMS ages from outcrop that can now be integrated with complementary samples that are taken from a NSF/ICDP funded drill core through the Chinle Formation in Petrified Forest National Park. Using samples from the core will, for the first time, allow us to take advantage of an unambiguous stratigraphic order of a long record. In our approach, we seek to identify the youngest population of zircons from each layer by U-Pb LA-ICPMS analyses prior to CA-TIMS analyses. We will then use an objective statistical method to determine the probability distribution of the apparent age of each sample. These geochronological results will be combined with existing and new data from bio-, chemo- and magnetostratigraphy from outcrop and core. The resulting chronostratigraphic framework can then be integrated with terrestrial and marine records from elsewhere.

[1] Martz & Parker (2010), *PLoS ONE* 5(2), e9329 [2] Irmis *et al* (2011), *EPSL* **309** (3-4), 258-267 [3] Ramezani *et al* (2011), *GSA Bulletin* **123** (11-12), 2142-2159