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Carbon isotope stratigraphy of the Carnian Pluvial Event (early Late Triassic) in the northwestern Tethys

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In the Late Triassic (~230 Ma) a climate change from arid to markedly humid conditions, known as the Carnian Pluvial Event (CPE), is recorded in stratigraphic sections worldwide. In marine sedimentary basins, the arrival of huge amount of siliciclastic material, the establishment of anoxic conditions and a sudden change of the carbonate factory mark the CPE. Palaeobotanical analyses evidence a shift of floral associations towards more hygrophytic elements at different latitudes and massive resin production. The CPE is also closely associated with biological turnover among some marine groups and seems to be linked to major evolutionary innovations (e.g. dinosaurs radiation, nannoplankton appearance and gymnosperm turnover). Sedimentological and palynological data show that the CPE was multiphasic, with a least three humid pulses.

Organic $\delta^{13}C$ records from stratigraphic sections in the Dolomites (Italy), the Northern Calcareous Alps (Austria) and the Transdanubian Range (Hungary), which were located in the northwestern Tethys during the Carnian, show a 2–4‰ negative carbon isotope excursion (CIE) at the boundary between the *Trachyceras aonoides* and the *Austrotrachyceras austriacum* ammonoid zones, and the boundary between the *Concentricisporites bianulatus* and the *Aulisporites astigmosus* sporomorph assemblages. The negative CIE interrupts a long term positive Ladinian–Carnian trend that is a reproducible feature of the Triassic $\delta^{13}C$ curve and is recorded also by brachiopod calcite and bulk carbonates in other sections. The negative CIE is coincident with the expression of the CPE in the studied stratigraphic sections characterized by sudden change of sedimentation indicative of massive terrigenous input and oxygen depletion. The carbonate carbon isotope record from Dibona section in Italy does not show the negative CIE, which is on the contrary evident in the organic carbon isotope data. This suggests that carbonate diagenesis could have obliterated the original $\delta^{13}C$ signal.

We propose that intensification of Pangea megamonsoon activity linked to the injection of large amount of ^{13}C-depleted carbon into the atmosphere–ocean system caused a sudden increase of the continental runoff in the Carnian. Wrangellia LIP activity is the most likely “smoking gun” for the CPE.