Drastic change in weathering processes during the Upper Triassic and its link to the emergence of pelagic calcification

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The Late Triassic time interval witnessed several important biological turnovers, extinctions and onset of new life forms. Among these events, the extinction around the Norian-Rhaethian Boundary (NRB) was of major importance and have been largely overlooked until now. The nectonic marine fauna have been the most affected, although some sensitive organism such as scleractinian corals or the newly appeared coccolithophorids were preserved. In order to better constrain the tectonic, climatic and oceanographic framework during this time of changes, we collected new $\delta^{13}C_{carb}$, $^{87}Sr/^{86}Sr$ and $\delta^{44/40}Ca$ dataset across the late Norian - Hettangian interval, established from carbonate successions in Austria, Turkey and Emirates. A characteristic change in the $^{87}Sr/^{86}Sr$ record is a sharp trend towards unradiogenic values, which started in the latest Norian and continued across the lower Rhaetian. The $\delta^{44/40}Ca$ shows as well a marked decrease at this level.The strong correlation between the strontium and calcium isotopic systems indicates that they are coupled through the same driving process. The $\delta^{13}C_{carb}$ is in contrary quite stable around this interval, at odd with several negative peaks in $\delta^{13}C_{org}$ as recorded in the literature. The $\delta^{44/40}Ca$ measurements helped to exclude the hypothesis that the early Rhaetian decrease in $^{87}Sr/^{86}Sr$ would have been driven by volcanism, elevated hydrothermal circulation or enhanced silicate weathering. Indeed, the two first of these processes seems to have a negligible effect on Ca-isotopes, while the second would result in a radiogenic $^{87}Sr/^{86}Sr$ trend, the opposite of the observed pattern. Instead, a large increase in chemical weathering of carbonates and evaporites as consequences of a major sea-level fall at the NRB is proposed. This new hypothesis could as well explain the stability of the carbon cycle during this interval as recorded in the $\delta^{13}C_{carb}$, and the variability of the $\delta^{13}C_{org}$ more prone to terrestrial influences.