

Calcareous nannofossil biostratigraphy and paleoceanography across the Toarcian Oceanic Anoxic Event cored at Colle di Sogno (Lombardy Basin, northern Italy)

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Calcareous nannofossil biostratigraphy was carried out in the upper Pliensbachian-lower Toarcian interval cored at Colle di Sogno (northern Italy). Semiquantitative analyses were performed on ~160 samples across the Domaro Limestone-Sogno Formation boundary that was recovered in two different boreholes (S1 and S3). Geochemistry evidenced the presence of the negative C isotopic excursion across the “fish level” black shale interval representative of the Toarcian Oceanic Anoxic Event (T-OAE).

Main and secondary events of the Tethyan zonation (Mattioli & Erba, 1999) were recognized, allowing the identification of Zones NJT 5 and NJT 6. The T-OAE C isotopic anomaly was constrained by the FO of *Carinolithus superbis* at the onset and the LO of *Mitrolithus jansae* at the end. Our results confirmed that the latter biohorizon is a primary stratigraphic event.

Semiquantitative and morphometric analyses were performed on *Schizosphaerella punctulata* and *M. jansae* to assess potential changes in abundance, size, and/or morphologies relative to the T-OAE. Both taxa displayed a major decrease in abundance at the onset of T-OAE and remained rare through the interval of perturbed conditions. Only *S. punctulata* showed a recovery at the end of the

T-OAE, while *M. jansae* barely survived the paleoenvironmental stress and disappeared soon after its termination.

Our results confirm that calcareous nannoplankton were influenced by paleoenvironmental changes associated with the T-OAE when increased nutrient availability, warming, and excess CO₂ led to a dramatic shift in assemblage composition. After a period of prolonged stability and oligotrophy that promoted a diversified calcareous phytoplankton community with abundant k-selected deep- and intermediate-dwellers, meso- to eutrophic conditions occurred that were locally associated with accelerated runoff and favored opportunistic taxa. After the T-OAE, paleoceanographic conditions, at least as far as the photic zone was concerned, only partially and gradually returned to a pre-perturbation state, suggesting that the deepening of the nutricline and re-establishment of stability required a long period after anoxia terminated.

References

- Mattioli, E. & Erba, E. 1999. Synthesis of calcareous nannofossil events in the Tethyan Lower and Middle Jurassic successions. *Rivista Italiana di Paleontologia e Stratigrafia*, **105**(3): 343–376.