

Decline and Recovery of Foraminifera at the Northern Tethyan Margin during the Cenomanian–Turonian OAE-2.

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The Oceanic Anoxic Event-2 at the Cenomanian-Turonian boundary is one of the major paleoceanographic events during the Cretaceous. We present the results and interpretations of foraminiferal assemblage censuses across OAE-2 from a key section situated at the northern Tethyan margin (Rehkogelgraben, Ultrahelvetic Zone, Austria). The section investigated is the only known nearly complete boundary section enclosing black shale layers in the Eastern Alps. $\delta^{13}\text{C}$ excursions at C/T-boundary were measured for calcareous and organic matter of limestones, marls and nearly carbonate free black shales.

Planktic foraminifera are particularly frequent in the Late Cenomanian (56,000 individuals/gram dry sediment, ind/gr). Their number decreases to 0.8 ind/gr during the OAE, and even 0.5 ind/gr immediately after the black shale deposition in the basal Turonian. Their number increased to about 12,000 ind/gr in the Early Turonian. About 70-80% of the Cenomanian assemblages are Hedbergellids (*Muricohedbergella*). Their percentages decrease during the OAE and vary between 10 and 50% in the Early Turonian. The fraction of Heterohelicids decreases already during the Late Cenomanian from 15 to 2%, is low during the OAE and varies strongly in the Early Turonian (2–15%). *Whiteinella* occurs with 6 to 19% in Late Cenomanian samples, varies between 0 and 30% during the OAE and continues with about 30% in the Turonian. „Boreal” species (e.g., *W. baltica*) have their highest fractions (19%) during the late OAE and the basal Turonian. Percentages of *Praeglobotruncana* are low during Late Cenomanian (1-5%) and the OAE (0-4%) and increase noticeably in the Turonian (6->50%). Rotaliporids occur with 0.7 to 2.5% in Late Cenomanian samples.

Frequency of benthic foraminifera varies between 0.6 ind/gr during the OAE and more than 5,800 ind/gr in the late Cenomanian. The majority (number) of benthics is part of the 0.063 to 0.125 mm fraction (about 95%). Benthic foraminiferal recovery after OAE-2 appears to be slow and the frequency remains less than 500 ind/gr during the *W. archaeocretacea*-Zone. Pre-OAE levels are reached during the *H. helvetica*-Zone.

Well developed *K*-selected Late Cenomanian assemblages with abundant Rotaliporids (although dominated by Hedbergellids) are replaced by *r*-selected assemblages with low total numbers and relatively high fractions of *Schackoina* and *W. baltica*. Recovery of the planktic ecosystem is represented by increasing numbers of larger and partly keeled species of the genera *Praeglobotruncana*, *Whiteinella*, *Dicarinella*, and *Helvetoglobotruncana*. Frequency of benthic species and assemblage composition are very similar before and after the OAE. We interpret the drastic decline, slow recovery and final return to pre-crisis levels as direct consequences of changes in the oceanic environment. Our data point to a collapse of stable nutrient supply and subsequent food chains together with a rise and intensification of the oxygen minimum zone, resulting in the observed foraminiferal assemblages in the northern Tethys Ocean.