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New organic carbon and strontium isotope data for the Permian/Triassic boundary (PTB) from the Abadeh (Iran) and the Sosio Valley (Sicily, Italy) sections

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Isotopic composition of past seawater yields constrains on the evolution and interaction of biosphere and geosphere on geological time scales. This, in particular, is the case for $\delta^{13}C$ and $^{87}Sr/^{86}Sr$ compositions that reflect the interplay of biological and tectonic processes. The early reconnaissance studies (e.g. PETERMAN et al. 1970, VEIZER & HOEFS 1976) were recently superseded by high resolution curves that were based on low-Mg calcitic fossils, such as brachiopods and belemnites, from stratigraphically well defined sequences (e.g. KORTE 1999, BRUCKSCHEN et al. 1999, VEIZER et al. 1999). For intervals with scarce low-Mg skeletons, phosphatic conodonts were utilized. The samples were screened by optical (microscope, CL, SEM) and trace element techniques (ICP-AES, PIXE, BRUHN et al. 1997) for preservation of their textures and chemical/isotopic signals. As a further advance on these studies, we measured the $\delta^{13}C$ values of sedimentary total organic carbon (TOC) and the $^{87}Sr/^{86}Sr$ ratios of conodonts from the PTB in Iran (Abadeh section) and Sicily (Sosio Valley), both well defined by conodont biozonation.

For strontium isotopes, we analyzed conodonts with a CAI (conodont alteration index) of 1 in the Sosio Valley and a CAI of 2 to 2.5 in Abadeh. The $^{87}Sr/^{86}Sr$ record is characterized by an increase from 0.7074 in the uppermost Permian to 0.7082 in the upper Lower Triassic. The $\delta^{13}C$ values of TOC from the Abadeh section vary usually between -24 and -26 ‰ (PDB) during the upper Permian, but decrease to -28.8 ‰ just below the Permian-Triassic boundary. Subsequently, within the lowermost Triassic conodont zone (*parvus* zone), they rebound to -25 ‰, oscillating afterwards between -24 and -26 ‰ (PDB). The uppermost Upper Permian sediments of the Sosio Valley section also show depleted TOC $\delta^{13}C$ values of -28.2 ‰ (PDB), followed by an increase to -26 ‰ in the lowermost Triassic conodont zone.

The negative shift in carbon isotopes coincides with the biggest mass extinction in earth history (KOZUR 1998). This negative $\delta^{13}C$ shift may be due to re-oxidation of the extinct organic material. After the mass extinction in the uppermost Permian the $\delta^{13}C_{org}$ values increased by 2.5 ‰ during the lower Scythian. The Sr isotope record is generally related to tectonics and continental weathering, and the increase in $^{87}Sr/^{86}Sr$ ratios during the Upper Permian/Lower Triassic may reflect enhanced erosion and subsequent deposition of sediments rich in radiogenic strontium. This can be caused either by uplift of large continental areas or/and due to a world-wide drastic diminution of land plant cover on continents (also in wet climatic zones, world-wide Scythian coal-gap), a result of biotic crisis at the PTB.

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Seismic interpretation and structural modelling of the Rotliegend along the northern limit of the Northeast German Basin

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Following the cessation of compressive Variscan movement, Central Europe was characterized by a period of widespread basin formation accompanied by extensive magmatic activity (ZIEGLER 1990). In the study area, basin development is linked with activities along the TESZ, leading to a complex relationship between sedimentation and tectonics.

To study the Lower Permian basin morphologies and depositional architectures along-strike of the initial northern limit of the Northeast German Basin, an extensive database consisting of core material and a network of commercial seismic profiles have been used.

In the area several NW-SE-trending subbasins are developed. However, the internal structure of these basins and, therefore, the depositional pattern is controlled by the development of approximately N- to NE-trending half grabens reflecting E-W extension during this time. The observed structural style is interpreted as the brittle response to deep-seated ductile deformation along the NW-trending Trans-European Fault (BERTHELSEN 1992). Dextral crustal shearing had its near-surface expression in the development of N-trending normal faults.