

studied sedimentary record belongs to one 3rd order sedimentary sequence. Based on the stacking pattern trend a 3rd order maximum flooding surface can be interpreted at the boundary between the cycles Nr. 4 and 5. The upper two cycles and the alluvial-plain facies association can represent highstand and falling stage sedimentary systems tracts. The presence of a thick fluvial channel fill in the uppermost part of the section may indicate a 3rd order sedimentary sequence boundary at its base. This guess could fit with such sequence boundary, recognized within the upper part of the Pannonian zone E in seismic sections.

Facies association, key surfaces and high-frequency sequences (Pannonian zone E, Neogene Danube basin, Slovakia)

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Sandy-clayey sediments of the Pannonian zone E (sensu PAPP 1951) are biostratigraphically documented by the presence of bivalvia species *Congeria subglobosa subglobosa* PARTSCH, *C. subglobosa longitesta* PAPP, *Dreissenomya primiformis* PAPP, *Lymnocardium edlaueri* PAPP, *Didacna deserta* STOLICZKA and *Monodacna viennensis* PAPP in the Pezinok clay pit at the eastern margin of the Danube Basin.

The new sedimentological and paleontological data reveal the interrelation of the various sedimentary paleoenvironments and allow the distinction of seven facies associations: back-barrier transgressive, sandy transgressive, shallow offshore, beach ridge, marsh, lagoonal and alluvial plain. The composite alluvial plain facies association includes an alternation of four different lithofacies: floodplain clays and silty clays with abundant organic-rich layers and paleosol horizons, rhythmically bedded sandy silts and clayey silts, interpreted as levee accumulations, fining upwards succession of well-sorted sands, forming channel-fill and point-bar deposits and coarsening-upwards succession from silts to silts-sand alternations, interpreted as crevasse splay deposits.

The paleotopography and paleobathymetry of the basin, as it evolved through time, is reflected in sedimentary discontinuities - key surfaces, in the coastal plain to shelf environments: subaerial erosion surfaces - sequence boundaries, regressive erosion surfaces - subaqueous sediment bypass surfaces, maximum flooding surfaces, ravinement surfaces and transgressive surfaces. The generalized stacking pattern of the recognized key-surfaces-bound cycles (parasequences) display a relatively rising water level within the lower part of the section and relatively falling water level upwards in the section. These results can outline, that most studied sedimentary record belongs to one 3rd order sedimentary sequence, where the upper alluvial-plain facies association can represent its falling stage system tract. The presence of at least 3,5 m thick fluvial channel fill in the uppermost part of the section may indicate 3rd order sedimentary sequence at its base. This guess could fit with such sequence boundary, recognized within the upper part of the Pannonian zone E in seismic sections.

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Folgewirkungen geodynamischer Prozesse auf sequenzstratigraphische und paläogeographische Muster karbonatischer Schelfgebiete: Die Sinai-Halbinsel während des Turon-Coniac

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In diesem Beitrag werden auf der Basis sedimentologischer, biostratigraphischer und sequenzstratigraphischer Untersuchungen der Turon - Coniac-ablagerungen der Sinai-Halbinsel die Auswirkungen geodynamischer Prozesse auf die Sedimentation verfolgt. Unter Einbeziehung geologischer Detailkartierungen einer Faltenstruktur im nordöstlichen Sinai kann gezeigt werden, daß lokale Ablagerungsmuster der Turonsedimente initiale tektonische Bewegungen widerspiegeln, die sich in großräumige Konzepte einbinden lassen und die Bezüge zwischen tektonischen und faziellen Zusammenhänge für das Turon-Coniac der Sinai-Halbinsel herstellen lassen.

Das Arbeitsgebiet stellt den Ausschnitt eines gemischt karbonatischen und siliziklastischen Schelfsystems am passiven Kontinentalrand der Südtethys dar mit vorwiegend flachmarinen Ablagerungen der inneren Plattform, die im Turon durch ein flaches Intraschelfbecken (Eshet-Zenifim-Becken) differenziert werden. "Frühalpiner" Deformationen führten in der Region zur Inversion älterer Grabensysteme. Erste Kompressionsbewegungen zwischen der eurasischen und afrikanischen Platte während des Obercenoman - Turon dürften mit den initialen "Syrian Arc" Bewegungen zusammenfallen, die in der Folge entscheidende Auswirkungen auf das Sedimentationsgeschehen am Sinai während des Turon und Coniac hatten. Die tektonisch bedingten synsedimentären Umgestaltungen der Ablagerungssysteme sind hier z. T. in Faziesverzahnungen und Mächtigkeitsvariationen überliefert.

Die sequenzstratigraphischen Interpretationen basieren auf hochauflösenden Profilaufnahmen und Faziesinterpretationen innerhalb eines multibiostratigraphischen und lithostratigraphischen Gerüsts; großmaßstäbliche paläogeographische Karten veranschaulichen Verlagerungen verschiedener Fazieszonen in Raum und Zeit und dienen zur räumlich-zeitlichen Abschätzung verschiedener Parameter, u. a. geodynamischer Steuerungsprozesse.

Am Beispiel einer Antiklinal-Struktur des Syrischen Bogens im nordöstlichen Sinai (Areif El Naqa) werden kleinräumige tektonosedimentäre Interaktionen auf der Basis von geologischen Detailkartierungen erkennbar. Profilkorrelationen belegen hier ein lokales Ausdünnen der Turonsedimente die in Folge synsedimentärer Tektonik während des Initial-Stadiums der "Syrian Arc" Hebungen entlang der Faltenflanke interpretiert werden. Diese lokalen Ergebnisse werden mit der großräumigen tektonischen und sedimentären Entwicklung während des Turon-Coniac am Sinai in Bezug gesetzt. Dabei zeigen insbesondere laterale Fazies- und Mächtigkeitsunterschiede innerhalb einzelner sedimentärer Sequenzen durch lokale tektonische Prozesse hervorgerufene Gegensätze an, die in Hinblick auf ihren überregionalen Stellenwert bewertet werden.

Influence of maturity and base metal mineralization on the composition of organic matter in the Kupferschiefer of Poland

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Drill core samples from the Kupferschiefer of Poland were collected throughout the Zechstein basin. According to base metal content, metal facies, and distance to areas with oxidized Kupferschiefer (Rote Fäule) close to the mining districts in SW Poland, the samples are classified as Rote Fäule, mineralized or barren Kupferschiefer, respectively. The organic matter of these samples is characterized by Rock-Eval and GC-MS analysis.

Rock-Eval pyrolysis yields hydrogen and oxygen indices consistent with the classification of organic matter as type-II kerogen. Organic matter from highly mineralized samples adjacent to Rote Fäule and especially from Rote Fäule samples show low HI and high OI values, characteristic for type-III kerogen. The obtained relationship between Tmax and the present depth of the Kupferschiefer indicates that most of the barren samples from central and northern Poland fall close to the trendline that would be expected from type-II kerogen due to increasing thermal maturation, assuming common geothermal gradients (TEICHMÜLLER & DURAND 1983). Kupferschiefer samples from the mineralized and the Rote Fäule zones yield higher Tmax values despite its low present depths of burial. The depletion of organic matter in hydrogen together with the increase of Tmax data from the Kupferschiefer towards Rote Fäule is explained as the result of organic matter degradation by oxidizing brines in, and adjacent to, areas of Rote Fäule (PÜTTMANN et al. 1990).

With decreasing distance to Rote Fäule, the normalized yields of soluble organic matter (SOM) decrease, accompanied by an overall increase of the relative proportions of aromatic hydrocarbons in the SOM. The dominance of aromatics in the organic matter of Rote Fäule affected Kupferschiefer is consistent with the depletion of hydrogen, as indicated by low HI values.

Gas chromatography of the saturated hydrocarbon fractions from mineralized Kupferschiefer confirms the degradation of n-alkanes, preferably those of intermediate to high-molecular weight, during oxidative alteration, as already been recognized in previous studies (PÜTTMANN et al. 1989, 1990). Compositional changes of the aromatics towards Rote Fäule are characterized by the occurrence of polycyclic aromatic hydrocarbons and elevated ratios of phenanthrene to methylphenanthrenes that are attributed to demethylation reactions and resulted in a decrease of the methylphenanthrene index (MPI I; RADKE et al. 1982). The greater difference in vitrinite reflectance between values calculated from MPI I and measured data (SUN et al. 1995) within the Rote Fäule zone is caused by the depletion of methylphenanthrenes in the aromatics. Kupferschiefer samples from the barren zone of the Polish basin do not show these alteration pattern. The observed variations in organic matter composition with burial depth are consistent with changes due to increasing thermal maturation. Maturity assessment is achieved from MPI I and the methyl-dibenzothiophene ratio (MDR; RADKE et al. 1986). From the maturity versus depth relationship of the Kupferschiefer strata throughout the Polish basin, a continuous increase in vitrinite reflectance is obtained.

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Organic geochemistry of upper Triassic (Rhaetian) marls (Kössen Formation) within the Gailtal Alps (Eastern Alps, Austria)

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Bituminous marls of the upper Triassic (Rhaetian) Kössen Formation from the Gailtal Alps (Kärnten, Austria) are investigated by Leco-carbon analyser, Rock-Eval pyrolysis, and GC/MS in order to reconstruct their depositional environment and the thermal history of the sedimentary basin. The negative correlation of organic carbon with carbonate carbon contents obtained from most of the samples indicates that the organic matter input is diluted by variable extent of carbonate precipitation, as typically produced by planktonic productivity cycles within pelagic environments (RICKEN 1993). The samples plot close to the regression line for normal marine sediments (BERNER 1984) in the correlation diagram of the total sulfur content versus Corg.

Kerogen typing based on Rock-Eval pyrolysis data imply a major contribution of land plant detritus to the organic matter. However, the high maturity of the source rocks and high amounts of generated or migrated hydrocarbons may affect organic matter classification based on the results of pyrolysis. High normalized yields of soluble organic matter (SOM) and the general tendency of increasing relative proportions of saturated hydrocarbons in the SOM with the increase in SOM yields provide further evidence for the high extent of hydrocarbon generation within the sediments.

The n-alkane distribution profiles of most samples suggest a major contribution of algae to the biomass. In several of the samples, a dominance of mid- to long-chain n-alkanes within the saturated hydrocarbon fractions is observed. This shift in the position of maximum peak intensities towards the n-C₂₀ to n-C₂₅ range correlates with high normalized yields of the SOM. All samples are characterized by high n-C₁₇/pristane and n-C₁₈/phytane ratios, indicating the high maturation stage of organic matter. Samples characterized by n-alkane maxima in the mid-chain range show lower n-C₁₇/pristane ratios and lower relative abundances of alkylated naphthalenes in the aromatics compared with the rest of the sample set. These results most probably indicate the expulsion of low-molecular weight hydrocarbons from samples which have generated high amounts of n-alkanes.

Paleoenvironmental implications can be drawn by applying parameters for the characterization of n-alkane distribution (n-C₂₁₊₂₂/n-C₂₈₊₂₉ ratio; carbon preference index), as well as from the pristane / phytane ratios. According to these, a marine origin of organic matter deposited within carbonate source rocks under anoxic, evaporitic conditions could be proposed. However, all these parameters are known to be affected by maturation and by differences in the precursors for acyclic isoprenoids. Carbon preference indices close to 1.0 are consistent with the high maturity of organic matter from the samples.

The GC traces of the aromatic hydrocarbon fractions from several of the samples show high concentrations of alkylated dibenzothiophenes relative to the alkylated phenanthrenes of comparable boiling point. The occurrence of these sulfur-bearing aromatics argues for an early diagenetic incorporation of sulfur, produced through bacterial sulfate reduction, into the biomass. High contents of organic sulfur require insufficient amounts of reactable iron in the sediment, as observed in carbonate-rich marine sediments.