

Karbonate repräsentiert, überlagert von verschiedenen obereozänen Einheiten. An der Batinah Küste östlich des Oman Gebirges macht sich die Regression im unteren Eozän durch die eingeschränkte Fazies der Rusayl Formation bemerkbar. Diese wird von der offenermarinen, karbonatischen Schelffazies der Seeb Formation überlagert, die eine reichhaltige Alveolinen- und Nummulitenfauna beinhaltet. Westlich des Oman Gebirges ist die Rusayl Formation nicht entwickelt; die Jifnain Formation wird hier direkt von der Seeb Formation überlagert oder durch die faunistisch eingeschränkten Kalke und Mergel der Fahud Schichten.

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Ophioidetritic flysch sediments in the Central-Carpathian Paleogene Basin (Eastern Slovakia): petrofacial composition, clay diagenesis and plate-tectonic provenance

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Ophioidetritic sediments usually mark the zones of lithospheric subduction. Their occurrence is therefore important for geotectonic interpretation of orogenic belts, especially when the suture zones disappeared during the collision.

The flysch sediments in the northern side of the Central-Carpathian Paleogene Basin are significantly enriched in ophiolitic detritus. They even contain sediments, which represent the serpentinitic graywackes or detrital serpentinites. Serpentinitic sandstones occur as Zebra-type turbidites in the Upper Oligocene formations. Serpentinites form a colourless to olive green grains showing a typical mesh and loop structures. Among serpentinite fragments there are the coarse-flaky lizardites and fibrous chrysotiles as well. In petrofacial classifications, the serpentinites are attributed to the ophiolitic lithics (CRITELLI & INGERSOLL 1994) or to the volcanic-metavolcanic grain type category Lv (VALLONI 1985). Sandstones also contain a glassy shards and volcanic fragments with vitritic and vitrophyric structure. The proportions $Q_{25}F_{18}L_{67}$ express the average modal composition of the sandstones. The high content of detrital serpentinites and glassy clasts causes a prevalence of unstable lithic components (Lv = 62 %). Interstitial material of sandstones corresponds mainly to clay cement with minor pseudomatrix (crushed and altered lithic grains). Two distinct cement assemblages were observed: (1) saponite ± calcite ± dolomite ± opal-CT ± pyrite, which are restricted to quartz-rich graywackes, and (2) ordered mixed-layered chlorite/smectite + saponite ± calcite ± dolomite ± opal-CT ± pyrite characteristic for serpentinite-rich graywackes. Textural as well as compositional evidences suggest that both saponite and C/S originated by the interaction of the sediment with pore-fluids during burial as direct precipitates. It is inferred that a different bulk rock composition (Al content), and consequently, a different chemistry of pore-fluids played an important role during authigenesis.

In diagrams for determination of arenite provenances, the projection points of serpentinitic sandstones are concentrated in the field of magmatic-arc related sandstones (DICKINSON et al. 1983) or oceanic-arc related sandstones (VALLONI 1985). The oceanic-arc sources are also recorded by geochemical signals in mudrocks, providing a significantly elevated concentrations of Cr and Ni (Cr~150 ppm, Ni>100 ppm) and the high correlation in Cr/Ni ratios ($r = 0.90$). Such high values in mudrocks indicate the sutures after lithotectonic collision (GARVER et al. 1996). Serpentinitic sandstones are

generally also very rich in spinel detritus (up to 80 % in heavy mineral fraction), having apparently the same origin.

The provenance of serpentinitic sandstones should be related to ophiolitic sources, which were dragged out on the collisional edge of the Central Carpathian plate above the zone of subduction. Their occurrence indicates a suture zone of the Tertiary collision between the Central Carpathian Paleogene Basin and the Klippen Belt. The preservation of fragile clasts of serpentinites reveals the deposition from dilute turbidity currents. In high-density currents with dispersive pressure and grain collisions the serpentinites should be almost destroyed. Accumulation of these clasts could also result from flow-stripping processes and hydrodynamic separation, when the elevated fluid mass was able to concentrate the lighter serpentinite grains.

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Organic matter distribution and variations of isotopic composition of organic carbon in Cambrian siliciclastic rocks in Baltic region

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Cambrian rocks are widely represented on the territory of East Baltic region except some local positive structures and south-east part of Lithuania. Geology and lithology of Cambrian deposits were studied very detail. In the structural plan the studied area is subdivided into three regions: Northern, Eastern and Western (PASKEVICIUS 1997). The Cambrian rocks are presented by main types of siliciclastic rocks (sandstones, siltstones, claystones and argillites). These deposits were formed during some sedimentary cycles in the shallow water marine basins. The thickness of Cambrian rocks varies in wide limits depending on the dislocation in structural facies zones on the studied territory. In Northern Region the thickness of deposits is up to 80-100 m, in Eastern region ranges from 60 to 130 m and the highest thickness reaches up to 250 m in Western region.

100 rock samples from main stratigraphical units from Lower and Middle Cambrian successions were studied in order to estimate the variations of organic matter concentrations and isotope composition of organic carbon. Rocks were sampled from 21 boreholes located on the territory of the Baltic States (12 boreholes located in Estonia, 5 boreholes in Latvia and 4 boreholes in Lithuania). The studied Cambrian rocks from Estonian successions were represented mostly by siltstones and claystones, from Latvia by clayey siltstones and in rare cases by sandstones and from Lithuania

mostly by dark and black argillites. The total content of organic matter in the studied sediments is very low and varies from 0.1 up to 2 %. The average value in lower part of Lower Cambrian successions in Estonia is 0,79 %, in upper part of Lower Cambrian it increases up to 2,56 %. The spatial distribution of organic matter was studied in sediments of Lontova Stage of Lower Cambrian in Estonia and its content is characterised by small differences in values. The total content of organic matter in Lower and Middle Cambrian deposits in northern part of Western region (Latvia) is characterised by similar average values (0,66 % and 0,74 %). In Lower Cambrian dark argillites from southern part of Western region (Lithuania) it is 0,48 % and in Middle Cambrian sediments it reaches 0,59 %.

The isotope composition of organic carbon in Cambrian rocks in the studied area was studied for the first time. The obtained data showed that isotope composition of organic carbon is typical for dispersed organic matter of sapropelitic type from Cambrian sediments (SIDORENKO & SIDORENKO 1975).

In Northern region the isotope composition of organic carbon characterises by values $\delta^{13}C$ from -31,8 ‰ in Lower Cambrian sediments and up to -29,8 ‰ versus PDV in Middle Cambrian deposits. In the limits of every stratigraphical unit the fluctuations of $\delta^{13}C$ are very low. Organic carbon of Lower Cambrian sediments in the northern part of Western region has the $\delta^{13}C$ values from -30,9 ‰ up to -26,3 ‰ in Middle Cambrian. In the southern part of Western region the $\delta^{13}C$ values from -30,0 ‰ up to -27,9 ‰ were established. Study showed that isotope composition of organic carbon from lower parts of studied successions has the negative shift up to 2 ‰ in $\delta^{13}C$ relatively with isotope composition of organic carbon from deposits of Middle Cambrian. Isotope composition depends on the isotope distribution in the initial biomaterial as well as on the isotope fractionation during diagenesis.

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The Devonian sediments of Spitsbergen – an environmental study

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Devonian sediments mainly crop out within a N-S trending fault trough in the north-western part of Spitsbergen (Fig). The half-graben, bounded by the Raudfjorden Fault Zone (RFZ) in the W and by the Billefjorden Fault Zone (BFZ) in the E, represents a part of an extended molasse basin, mainly siliciclastic Old Red sediments were deposited.

Recent investigations within this area concentrate on the Wood Bay and Grey Hoek formations that built up an approx. 3500 m thick succession, ranging from the Early (Siegenian) to the Middle Devonian (Eifelian). According to their lithology, sedimentary structures and faunal assemblages, the formations are divided into several members that represent different depositional environments.

The **Wood Bay Formation** (ca. 2400 m) that generally can be described as a fining-upward succession, is subdivided into the Austfjorden (ca. 900 m), Dicksonfjorden (ca. 1400 m) and Verdalen members (ca. 100 m). The AUSTFJORDEN MEMBER mainly consists of yellow to light-grey weathering, calcareous conglom-

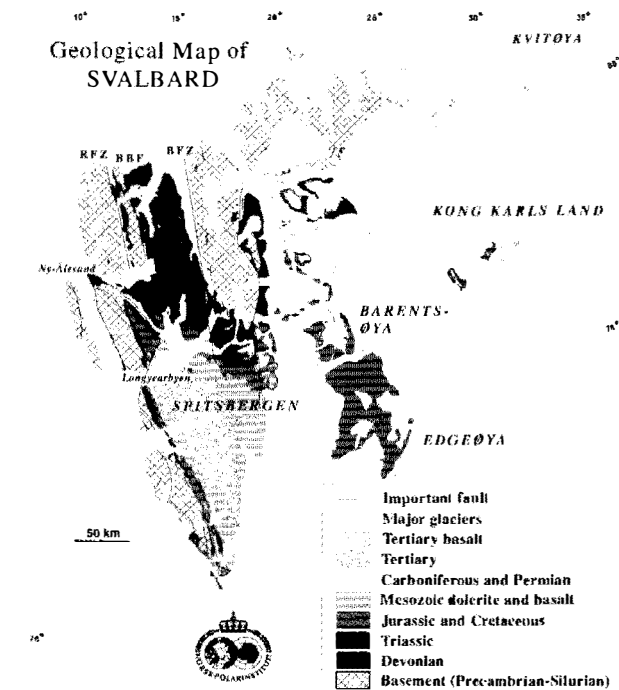


Fig. 1

erates and sandstones, displaying a fluvial high-energy environment, characterised by extended channels. The DICKSON-FJORDEN MEMBER is formed by red-brownish coloured conglomerates to claystones that are arranged in a repeated alternation of rhythmic successions. The depositional environment is characterised by braided rivers, overbank areas, floodplains and paleosols. The VERDALEN MEMBER consists of an interbedding of reddish sand- to siltstones and carbonates that may represent changing fluvial (siliciclastics) to marginal marine (carbonates) environments. The top of the entire formation is marked by a distinct colour-change from red to grey, displaying also the Middle/Lower Devonian boundary.

The **Grey Hoek Formation** (1000 m) that is conformably overlying the Wood Bay Formation, comprises the Skamdalen (ca. 80 m), Tavlefjellet (ca. 300 m) and Forkdalen members (ca. 600 m). The SKAMDALEN MEMBER is characterised by an interstratification of carbonates and grey silt- to claystones that may also represent changing lacustrine or lagoonal (siliciclastics) to marginal marine environments (carbonates). The TAVLEFJELLET MEMBER shows a monotonous succession of dark-grey to black calcareous claystones, occasionally intercalated with dark siltstones, reflecting broad coastal swamps within a marginal marine environment. The FORKDALEN MEMBER is characterised by claystone/quartzitic sandstone intercalations, also representing shallow lagoons, probably cut off from more typical marine conditions by sandy barriers.

The entire Devonian succession shows an increasing geomorphic maturity of the depositional area and a change from a typical Old Red fresh-water (Wood Bay Formation) to a marginal marine environment (Grey Hoek Formation). Further investigations will focus on the carbonates of the Verdalen and Skamdalen members that may possibly reflect first marine incursions within a continental depositional area.