(Austria), Western Central Paratethys is presented. The zonation is based on an extensive database comprising data from more than twenty surface outcrops and exploratory drill holes. The presented zonation gives a detailed subdivision of the Lower, Middle and Upper Miocene successions. The proposed zonation is based on the first occurrences (FO) and last occurrences (LO) of selected dinoflagellate cyst species such as *Deflandrea phosphoritica*, *Thalassiphora pelagica*, *Apteodinium spiridoides, Hystrichosphaeropsis obscura*, *Nematosphaeropsis downiei, Cousteaudinium aubryae, Cordosphaeridium cantharellus*, *Exochosphaeridium insigne, Cannosphaeropsis passio, Sumatradinium soucouyantiae, Sumatradinium druggii, Cerebrocysta poulsenii, Palaeocystodinium miocaenicum, Distatodinium paradoxum, Operculodinium? borgerholtense, Labyrinthodinium truncatum/modicum, Unipontidinium aquaeductum, Selenopemphix armageddonensis* and *Spiniferites bentorii oblongus*. Many of the Lower and Middle Miocene stratigraphically most important taxa recorded from, e.g., the Mediterranean and the North Atlantic have been found. Due to the very restricted conditions which prevailed during the Late Miocene in the Central Paratethys most of the described dinoflagellates are endemic. Consequently, the herein described and defined dinocyst biozones for the Upper Miocene are new. The zonation is well correlated to the previously published Lower and Middle Miocene dinocyst zonations of the North Sea Basin, the North Atlantic and of Northwest Europe. This is the first study which is able to demonstrate the applicability of dinoflagellate cyst markers from Late Oligocene and the Miocene for a detailed stratigraphic correlation in the Western Central Paratethys.

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Kinematik der kretazischen Faltung in den westlichen nördlichen Kalkalpen

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Die Struktur der nördlichen Kalkalpen im Westen Österreichs wurde im Rätikon und in den Lechtaler Alpen neu untersucht. Der kalkalpine Deckenstapel umfasst im Untersuchungsgebiet vom Liegenden ins Hangende die Lechtaldecke, Inntaldecke und Krabachjochdecke. Die zeitliche Gliederung der tektonischen Bewegungen ist mit Hilfe von synorogenen Sedimenten möglich.

Die westliche Inntaldecke liegt als großräumige Synklinale mit Kilometer - Wellenlänge und Amplitude vor, in deren Kern die diskordant auflagernden Sedimente der Muttekopf Gosau erhalten sind. 10er bis 100er Meter große Falten sind in den Schenkeln der übergeordneten Falten vorhanden. Die Kinematik der kretazischen Faltung lässt sich als einheitlich NNW-vergente Verformung mit unterschiedlichen Amplituden beschreiben. Die Orientierung der Achsen dieser Antiklinal- und Synklinal- Strukturen kann durchwegs als WSW-ENE streichend beschrieben werden. Sie sind durch dextrale NW-SE streichende Transferstörungen segmentiert (Eisbacher & Brandner 1996).

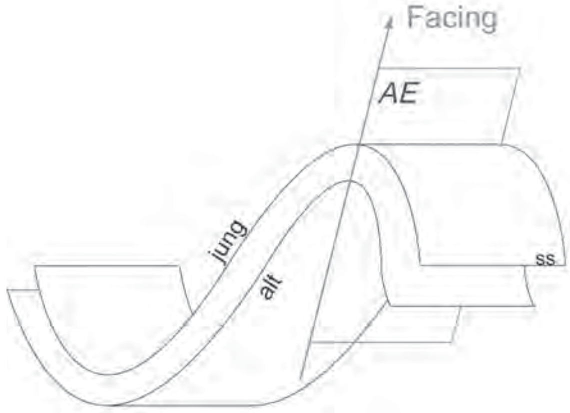

Abb. 1: Begriffserklärung des Facing mit der Jüngungsrichtung entlang der Achsenebene.

Für die Beschreibung dieser unterschiedlichen Faltensysteme wird meist mit dem Begriff „Facing“ gearbeitet, der die Jüngungsrichtung senkrecht zur Faltenachse, entlang der Achsenebene, beschreibt (siehe Abb. 1).

Durch dieses Kriterium konnte in den Arbeitsgebieten eine mehrphasige Überprägung von Falten festgestellt werden. Während der Deckenüberschiebung der Inntaldecke am Ende des Cenomans bilden sich nord-vergente Falten mit kleinen Amplituden. Diese können in der Inntaldecke sowie der Lechtaldecke auftreten. Das Facing ist nach Norden und oben gerichtet. Durch weitere Einengung und das

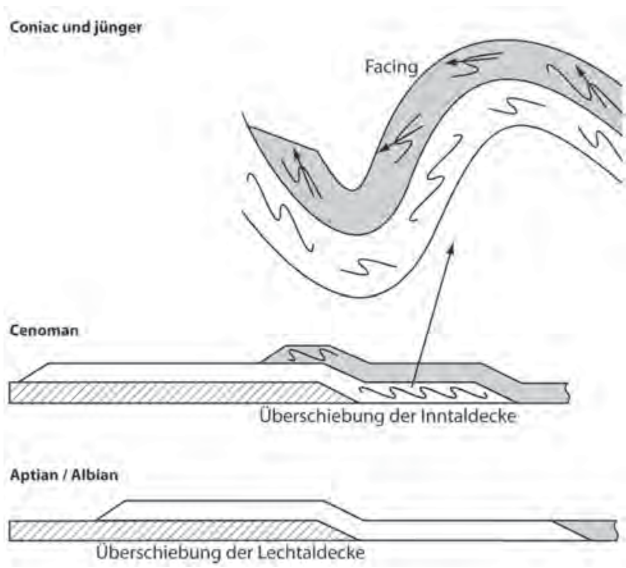

Abb. 2: Strukturentwicklung in der Lechtal- und Inntaldecke: Überschiebung im Cenoman, Verfaltung der Deckengrenze ab dem Coniac (modifiziert nach Ortner 2003).

Tieferlegen des Abscherhorizonts wird der Deckenbau durch Faltung mit großen Amplituden überprägt (siehe Abb. 2). Dieser Prozess geht mit der Ablagerung der syntektonischen Gosau Sedimente einher und beginnt unmittelbar nach der Überschiebung der Inntaldecke, ab dem Coniac (Ortner 2001, 2003). Eine ähnliche Faltungssequenz wurde auch im Rätikon beobachtet, wo südöstlich der zentralen Synklinale Faltenzüge mit Facing nach unten auftreten.

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Different generations of banded iron formations (BIF-s)

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Precambrian banded iron formations (BIF) are widely distributed in the world. In Europe, they occur within shields of the East European craton. Purpose of the presentation is the comparison of Olenegorsky and Kryvyj Rig iron deposits situated within banded iron formations. They represent different generations of iron ore accumulation.

The origin and evolution of the metamorphosed deposits are very intricate. They experienced many stages starting from deposition, deformation and metamorphism, post deformation processes, metasomatism, hydrothermal alteration and weathering.

The Kryvyj Rig iron-formation is situated in eastern Ukraine within the Ukrainian Shield, whereas the Olenegorsky deposit is located in the central part of the Kola Peninsula, within the Baltic Shield. Both of the deposits are associated with Precambrian Shields but the geological setting of each is quite different. The geology of Kola Peninsula is associated with exotic terranes and collage tectonics. Banded iron formations occur within Kola-Norwegian terrane, in the Imandra iron ore-bearing region. The largest accumulations of economic iron deposits are situated in the south-western part of the terrane within the Main Priimandrovskaya Structure, which is a part of Olenegorsky greenstone belt. Kryvyj Rig Belt, situated in Dniepropetrovsk province, is related to the boundary of two geoblocks, marked by Kryvyj Rig-Kremenchuk fault. Kryvyj Rig deposit is about 2390 Ma, whereas the age of Olenegorsky deposit ranges from 2790 to 2760 Ma. Olenegorsky iron ore deposit is classified as Algoma type, in contrast Kryvyj Rig deposit belongs to the Superior type or the transitional type between both mentioned.

The precursors of Kryvyj Rig deposit are rocks mostly of sedimentary origin, whereas Olenegorsky deposit is build mainly of primary volcanic associations. Common feature in both profiles is occurrence of basement complex, composed of granites and migmatites. Different degree of metamorphism makes analysis and comparison of the profiles difficult. Olenegorsky deposit beds, called iron quartzite formation, consists of metamorphosed rocks of primary terrigenous origin. From the bottom, the formation includes arkoses, mafic volcanic rocks, iron quartzites and andesitic porphyries, tuffs, picritic flows. Equivalent high-grade metamorphic rocks to precursors are: biotitic gneisses, amphibolites, iron quartzites, aluminous gneisses, leptites and gedritites. Kryvyj Rig formation is divided into three main deposit beds called: lower, middle and upper. The lower and upper deposit beds are built of arkosic sandstones, schists and conglomerates. The middle is mostly composed of jaspilites and schist.

The research revealed that the iron ores exploited in both deposits show different granulation and mineralogical composition. Common banded iron formations features as macro banding, micro banding and high iron content are preserved in both types of iron ore. The Kryvyj Rig ore bodies contain two types of ore: rich ore and poor ore. The rich one contains more than 46 % of iron, whereas the iron content of the poor one is about 20-45 % of iron. The highest content of iron in ore, exploited in Olenegorsky open pit, is more than 37 %. There are also zones of poor iron content. The Kryvyj Rig iron ore is fine laminated and is comprised of alternating microbands of hematite, magnetite, martite, red jasper or „Tiger Eye“. In contrast, the Olenegorsky iron ore is composed mainly of magnetite, andradite and white to gray quartz bands. Both deposits contain minor quantities of sulphides and native elements. Kryvyj Rig iron ore contains sulfur in amount of 0,16 %, whereas the Olenegorsky deposit sulfur content is 0,009 %. The iron ores are of a good quality and are not contaminated with arsenic, phosphorus, or manganese.

The comparison of Archean and Proterozoic iron formations lead to conclusion that there are many differences and similarities between them. The main difference is geological setting and the principal similarity is ore banding. The Precambrian iron deposits are economically very important, because they are the major source of global iron.

Fault drag as a tool to identify fault segments and rule out tectonic inversion: a case study from the Vienna Basin

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