tension 11,6 % beträgt. Die dominierenden syntethischen nach NW einfallenden Störungen nehmen 11,2 %, die nach SE einfallenden antithetischen Störungen nehmen lediglich 0,4 % der horizontalen Extension auf. DECKER & PERESSON (1996) geben aufgrund der geometrischen Verhältnisse der beobachteten Störungsmuster mit der Schichtung ein *fault bend folding* Modell als wahrscheinlichsten Kollapsmechanismus für den hangenden Block an. Eine Restauration des Profils konnte jedoch aufgrund der unbekannten Lage und Geometrie der listrischen Abschiebung nicht durchgeführt werden. Das Softwarepaket "PHIL" (PetroDynamics Inc.) bietet die Möglichkeit, durch Definition von Subsidenzraten für Punkte auf Zeitlinien die Sedimentgeometrie innerhalb des hangenden Blocks der listrischen Abschiebung zu simulieren. Die Angabe von Subsidenzraten für die Modellierung in "PHIL" erfordert eine chronostratigraphische Einstufung des *growth strata* Profils. Nach der Arbeit von KOVAC et al. (1998) wird die vorhandene biostratigraphische Einstufung (Mollusken-Biozonen) mit absoluten Sedimentaltern korreliert werden.

Das Poster präsentiert eine durch *forward modelling* entstandene Simulation der *rollover-anticline growth strata* in der Kiesgrube "Kaufer" und bietet darüberhinaus die Möglichkeit die Interaktion von tektonischen Ereignissen mit Sedimentation zu veranschaulichen.

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^{40}Ar/^{39}Ar Ages of detrital white mica (Molasse Zone, Austria) multi- versus single-grain dating

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The investigation is focused on ^{40}Ar/^{39}Ar multi- and single-grain dating of detrital white mica from the northern Alpine Molasse basin. The studied area is situated between Salzburg in the south and river Inn in the north.

Dating of detrital white mica taken from nonmetamorphic sedimentary rocks is a powerfull tool for determination of tectonostratigraphic units in the presumed source area. The recorded Ar/Ar-ages are interpretated as cooling age of the source rocks through 350-420 °C. Precisely dateable detrital minerals in well known sedimentary basins are thus be a powerful tool to reconstruct the timing of geodynamic evolution in the hinterland. ^{40}Ar/^{39}Ar dating of detrital white mica gives strong constraints for uplift and exhumation in mountain belts.

Classical multi-grain age determination (few to hundreds of mineral grains in one bulk grain sample) requires a uniform source rock for a meaningful interpretation. Multi-grain samples that comprise several age groups give a mixed age without directly geological meaning. Unlike that single-grain age determination opens up the vistas to obtain significant ^{40}Ar/^{39}Ar ages for each single grain.

For this study detrital white mica were taken from sandstone samples covering the whole Molasse sequences from the upper Eocene (Limnic beds and Limestone-sandstone Formation) to the Pannonian (Kobernaußer Schotter).

The sediment input into the Molasse basin originated from two main source areas: In the Upper Eocene (Priabonian) sediments derived from the Variscan Bohemian Massif in the north. In the Egerian, sediment input from the rising Alpine mountain belt in the south started and increased rapidly in time.

The following major conclusions can be drawn:

a) Multi-grain samples mostly show mixed ages. This indicates that mica within one sample are derived from different source rocks. So multi-grain samples are insufficient for precise age determination in this rocks due to the mixture of variable proportions of grains from different sources.

b) In the units close to the base (Priabonian), we got uniform Variscan single-grain (300-320 Ma) and multi-grain ages (295 Ma and 319 Ma) with no influence of younger detrital mica.

c) In post-Priabonian sediments we observe Variscan single grain ages (270 Ma, 290-330 Ma) which are well known from southern part of theBohemian Massif (FRANK & SCHARBERT 1993) and from Austroalpine Units (FRANK et al. 1987), questionable Triassic/Jurassic single grain ages (~230 Ma) and early Alpine single ages (140-70 Ma). Younger ages that we expect in the uppermost units (Süßwassermolasse) have not been detected yet.

d) Minimum single grain ages of detrital mica decrease in age from Priabonian (Variscan ages: 300-320 Ma to Egerian (early Alpine ages: 70-90 Ma). These ages reflect the change of the main sediment source from the Bohemian Massif in the north to the Alpine Mountain Belt in the south.

e) The time interval between cooling through the closure temperature (350-420°C) of mica and the deposition of the detrital mica decreases rapidly from the Priabonian (up to 250 Ma) to the Egerian (c. 50 Ma).

f) Ar/Ar single grain dating yield additional age groups (e.g.: 230 Ma age, see point c) that are not recognizable by the Ar/Ar-multi grain method.

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^{40}Ar/^{39}Ar-dating of detrital white mica from sandstones in the Moravo-Silesian basin, Czech Republic

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The Moravo-Silesian Zone (MSZ) in the Czech Republic, situated at the eastern margin of the Bohemian massif, is interpreted to represent the south-easternmost part of the Variscan Rhenohercynian Zone, from which the MSZ is displaced by the NW-SE striking Odra Lineament. The crystalline basement of the Proterozoic Bruno-Vistulicum is discordantly overlain by a mainly late Palaeozoic sedimentary cover sequence, characterized by early to middle Devonian terrestic clastics (Old Red), late Devonian parauthochthonos shallow marine platform sediments (limestomes and clastic sediments), clastic deep marine synorogenic through sediments (Culm) and shallow marine to terrestic sediments (paralic to terrestric molasse). The Culm basin of the MSZ in the Czech Republic is a NNE-SSW trending belt from 30 km south of Brno in the south to the line Krnov-Ostrava at the Poland border. The Culm succession, underlain by Emsian to Eifelian clastic sediments of the Old Red, ranges from supposed Middle Viseán in the western parts to early Namurian A in the eastern parts. These uncomplete Palaeozoic sedimentary succession is underlain by the autochthonous Proterozoic (Cadomian) basement of the Bruno-Vistulicum, that is overthrusted in the west by the allochthonous Moldanubian units along the westward dipping Moldanubian thrust and the Ramzová thrust.

Single- and multi-grain ^{40}Ar/^{39}Ar-ages of detrital white mica from pre-, syn-, and postorogenic sandstones of the Variscan Moravo-Silesian Zone (MSZ) at the easternmost margin of the Bohemian Massif display a wide range of age groups from Precambrian to late Viséan.

Early to middle Devonian Old Red sandstones indicate a source area having a uniform Precambrian to early Cambrian age population (545-520 Ma) significantly younger than well-known zircon U-Pb ages (590-570 Ma) from the supposed Moravian source area. Viséan greywackes from the Moravo-Silesian Culm (syn-orogenic flysch) basin display similar age patterns in both the Drahany and the Jeseniky sub-basin. Early greywackes show a very heterogenous and mainly old age spectrum (347 Ma, 370 Ma, 430-450 Ma, 460-480 Ma, 515-520 Ma, 540-565 Ma, and 590 Ma). ^{40}Ar/^{39}Ar ages in younger greywackes indicate the input of young mica from newly exhumed metamorphic units. These late Variscan ages (340-320 Ma) are well-known from metamorphic and magmatic rocks in the westerly adjacent Moravian and Moldanubian zone in the hinterland (Frank & Scharbert 1993, Dallmeyer et al. 1992, Fritz et al. 1996, Friedl 1997). These relations constrain the uplift and exhumation of the rising mountain belt in the Moldanubian source area. First estimations show minimum exhumation rates (MER) of some km/Ma for micas found in both subbasins in the middle Viséan. In the upper Viséan MER decreases to 1/10 of the former value (< 1km/Ma). Both Ar/Ar age groups of detrital mica and exhumation rates point out the mutual origin of the Jeseniky Mountains and the Drahany Uplands as one N-S trending sedimentary basin (see also Hartley & Otava 2000).

Postorogenic sandstones from the Boskovice trough mainly bear late Variscan detrital mica (350-310 Ma). In the Permo-Carboniferous sediments two different age patterns were detected: in the western part Upper Carboniferous sediments shows 350-310 Ma ages. This suggest a continuation of the Culm-sedimentation through time and the exhumation of younger tectono-stratigraphic units in the western hinterland. In eastern parts early Permian sediments with 345-325 Ma ages occur, similar to detrial mica ages in the Upper Viséan Culm. These rocks are resediments of sandstones accumulated in Visán time above the Brno Massif, and were deposited in the eastern part of the Boskovice trough during the Lower Permian.

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Sedimentology and the Energy Industry

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Almost 90 percent of the primary energy supply to the economies of the world comes from oil (39 %), gas (24 %) and coal (27 %). The exploration for and the production of oil, gas and coal requires an accurate understanding of sediments. After all, the organic matter that is the source of oil, gas and coal is part of sediments, it matures in sediments; oil and gas migrate through sedimentary rocks, are trapped in sediments and are extracted by man from sediments. Knowledge of the three dimensional distributions of lithology, mineralogy, fossils, porosity, permeability, thermal maturity and pore fill and the comprehension of how these special distributions change over geologic time is of essence to the energy industry.

It is not surprising then that the energy industry plays an important role in the development and progress of sedimentology. The industry assembled an enormous data base on sedimentary rocks from field studies, millions of wells and millions of kilometres of seismic lines and has the computer capabilities to handle, process and display these data in 3D and 4D.

The past saw mutually beneficial collaboration between industry and academia in describing and classifying sedimentary rocks and their pore content, in deducing the physical and chemical processes that govern deposition and diagenesis of sediments, and in characterising and predicting sedimentary environments and their spacial settings. The results of this collaboration are truly fascinating and stretch from highly accurate and fast laboratory methods, over predictive modelling of sediment distributions and hydrocarbon migration pathways in basins through geologic time, to sequence stratigraphy.

Today progress in sedimentology comes increasingly from multidisciplinary teams that bring together sedimentologists, palaeontologists, petrophysicists and seismologists. The daily relentless effort in industry to link the seismic properties of sediments (such as p- and s- wave velocity, density, amplitude, coherency, frequency and phase) to the rock properties of sediments (such as mineralogy, lithology, environment of deposition, porosity, pore fill, pressure and permeability) and back to the seismic properties in thousands of iterations (inverse and forward modelling) is paying off. Some universities are part of these exciting developments, we wish more would join. The University of Leoben contributed important data on clay anisotropy.

We are now able to illuminate the subsurface in ways unthought of only a few years ago. Based on interdisciplinary team efforts we can not only accurately map subsurface structures like anticlines, normal and reverse faults below salt domes and salt overhangs, in three dimensions we also are able to map sedimentary bodies and their pore contents (oil, gas or water) with great accuracy. This gives industry the confidence to drill extremely expensive wells (costing $50 million plus each) in more than 1500 m of water aiming, for instance, for a gas bearing turbidite channel which is located underneath a salt overhang more than 7000 m below the seabed. Sedimentologists can be proud of their part in making this possible.

Oil, gas and coal have become commodities in the world markets. To ensure the future vitality of the energy industry ways will need to be found to keep finding cost, development costs and production costs as low as possible while oil and gas operations expand into high cost areas such as deep water. In the future the energy industry will need to accurately predict subsurface lithofaces variations, thermal maturity, pore content and fluid flow in 3D and 4D with resolutions of less than 10 metres at a depth of more than 10 kilometres. The linkage of sedimentology with 3D multicomponent seismic (3D/4C) appears very promissing for the future, We will need age datings with an accuracy of better than 10,000 years in sediments more than 500 million years old. High resolution and high accuracy would be wasted in sedimentology and elsewhere if we would not also develop our capabilities for 3D visualization. Today's immersive visualization systems are just a beginning. Soon multidisciplinary teams of scientists and engineers will be jointly diving and climbing through the 3 dimensional virtual reality of sediment bodies and their pore spaces seeing every minute detail. The future of the oil, gas and coal industry ultimately depends on