457-487, Burlington.

Improvement of the Danube branch "Hechtensprung" in Langenzersdorf (Lower Austria) due to the impoundment of the hydropower plant "Freudenau" in Vienna

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General Situation

The impoundment of the hydropower plant Freudenau in Vienna made it possible to make a connection with the old branch of the Danube, which was cut off by the regulation work at the last century (about 1875). The course of the river Danube was seriously changed by these cut-off measurements of the last century. This was the precondition for cut off the wet woods, which was followed by cultivation of the land by filling up the old river branches. The lower part of the Danube branch was filled up using the land for construction of the new motorway A22 twenty years ago. Only very few wood areas and former river branches were left, but no water flows through the old branches and much silt accumulated at their bed. At the time of the impoundment of the hydropower plant at the end of 1997 a new link to the old branch has been established at the river kilometre 1941 of the Danube, so that at higher water levels in the Danube (above 162,50), water flows through the old river branch. It flows back in the "Donaugraben". The mouth is at river kilometre 1940. The characteristic levels at the Danube show the influence of the impoundment of the hydropower plant.

Monitoring water levels

The water level can be measured very easily as well as the conductivity and temperature of the water. The mouth of the branch leads to a small brook called "Donaugraben" which drains the basin of Korneuburg ("Korneuburger Becken"). The water shows high conductivity due to the high amount of soluble material (mainly due to the high hardness of the water and the extensive use of fertilisers in the cultivated land; groundwater has a high ammonium content, so that there are even difficulties to use it further for drinking purposes). Weekly monitoring has been performed until 1999.

Conclusions

An analysis of the water table in the branch shows that at 70 % of the time, water of the Danube runs through the branch. In the mean time the water stands nearly motionless and changes its quality or the water of the Donaugraben flows through the branch in the opposite direction. It is important to conserve the last river branches to give animals and plants an environment to survive in this highly cultivated environment. The activity of beavers can be observed since the end of last year. Observation of the branch shows the sand and silt deposition at the time of floods of the Danube. In general the solution is positive from the environmental point of view.

	RNW 96	MW 96	HSW 96	HW 10[illegible]
Danube km 1941 Inflow of branch	161,79	162,67	165,12	167,63
Danube km 1940 Mouth of the	161,67	162,41	164,72	167,23
"Donaugraben" Difference	0,12	0,26	0,40	0,40

From KWD 1996, Wasserstraßendirektion; A 1030 Wien

Fluid flow episodes in periatlantic basins - constraints from clastic diagenesis

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Due to its negative effect on permeability, illite generation has economic importance particularly in deep clastic gas reservoirs. Beyond that, authigenic illite in deeply buried clastic sediments of all grain sizes records valuable information on the thermal and fluid flow evolution in sedimentary basins.

Geochronologic ages of authigenic illite in several basins bordering the Central Atlantic (periatlantic Triassic subsidence centres) frequently cluster around times of pronounced stretching within the continental crust. Depending on the age of the rift-drift transition of the Atlantic segments, illite ages spread from Late Triassic (Central Atlantic) through Late Jurassic (South Atlantic) to Late Cretaceous and Tertiary (Northern Atlantic).

Key issues are the significance of K/Ar- and other geochronological ages of authigenic illites, and the importance of fluid chemistry and temperature for illite precipitation. The frequent coincidence of K/Ar illite ages with time intervals of rapid subsidence, extensional tectonics, and fault activity in periatlantic basins provides evidence for episodic "fluid migration events". Fault activation in overpressured compartments appears to induce advective upward (cross-formational) and stratiform fluid movements, that result in thermal pulses and chemical disequilibria along conduits.

Case histories are presented here from the Southern Permian Basin of Central Europe, the Central European Mesozoic epicontinental basins (South Germany, Paris Basin), the Ebro Basin of Spain, the Essaouira-Agadir Basin of western Morocco, and the Newark Basins of northeastern USA.

Late Permian Rotliegend sandstones in the Southern Permian Basin (offshore UK, Netherlands, Northern Germany, Poland) are a prominent example of local illitisation with a marked influence on reservoir properties. The structural position is a major control on illitisation in Permian red bed sequences of Northern Germany. When juxtaposed against Carboniferous Coal Measures, the arkosic red beds typically show increased growth of clay minerals, bleaching, and bitumen impregnation. Mesodiagenetic growth of clay minerals is particularly intensive in close proximity (stratigra-phic or tectonic contact) to Carboniferous Coal Measures. 'Clay mineral aureoles' along these contacts show a distinct zonation with a narrow (<250 m) dickite/kaolinite zone, followed by a wide (>1 km) zone of illitization. Illites from these zoned aureoles show trends in morphology, crystallography, crystal chemistry, trace ele-ments, abundance, and K/Ar-ages. The spatial link between extensive illite formation in porous sandstone reservoirs and hydro-carbon-impregnation corroborates the importance of large scale fluid flow associated with HC-migration in this type of illitisation.

Illite isotopic ages from Late Permian arkoses (200-180 Ma, Late Triassic to Liassic) lay within a time interval, which was characterized by the initiation of halokinetic movements of Late Permian salt on top of deeper fault systems and the onset of oil generation in nearby Carboniferous lacustrine to marine black shales. Extensional tectonic movements during the opening of the Central Atlantic are suggested to have enabled fault controlled and cross-formational fluid flow from Coal Measures into Rotliegend sediments and clay mineral authigenesis during this period of time. Organic maturation products were likely to be involved in leaching of feldspar and cements.

Surface analog studies of fault-controlled illite generation and