wässer hinweist.
Wir entwickelten einen isotopengeologischen Modellierungsansatz, welcher auf der Isotopensystematik des Sauerstoffes basiert ($\delta^{18}O$ Werte der Speläotheme sowie Abschätzung des $\delta^{18}O$ Gehaltes des Paläo-Niederschlages), um eine Reihe von Hebungs- und Erosionsszenarien durchzuspielen. Diese zeigen, dass für die letzten 2 Mio Jahre nur Hebungsraten in der Größenordnung von $0.50 < x < 0.75$ mm möglich sind. In Kombination mit den paläoökologischen Daten, welche aus den Sintern gewonnen wurden (Pollenspektrum, Lamination und die $\delta^{18}O$ und $\delta^{13}C$ Werte), kann ein relativ genaues frühquartäres Landschaftsbild für diesen Abschnitt der Nördlichen Kalkalpen gezeichnet werden.

Endocrine disrupting alkylphenolic compounds in the Danube River

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The Danube River is the second largest river in Europe. Along its 2780 km, the Danube and many of its tributaries receive variously treated or untreated wastewaters from many sources, including agricultural, industrial and municipal.
Wastewater treatment plants (WTP) can be point sources for alkylphenolic compounds (alkylphenols and their lower ethoxylates), hydrophobic degradation products of alkylphenol polyethoxylates (APEOs), mostly used commercially as surfactants. Nonylphenol, its mono-and diethoxylates and octylphenol are known to have toxic and estrogen – mimicking potential to aquatic organisms and are therefore treated as priority substances of the OSPAR convention and by the European Council. Due to their hydrophobic nature, they are associated with organic matter in sediments and suspended particulate matter (SPM). Suspended particles especially play a significant role in the transport of these contaminants, while sediments may act as their sink (or source).
Alkylphenols were investigated for the first time in the Danube River in 2001, whereby relatively high concentrations were found in sediments and in suspended particulate matter. However, their hydrophobic predecessor compounds (mono- and diethoxylates) were not investigated until now. This study, therefore, focused on the contamination level and distribution pattern of six alkylphenolic compounds: octylphenol (OP), octylphenol monoethoxylate (OP1EO), octylphenol diethoxylate (OP2EO), nonylphenols (NPs), nonylphenol monoethoxylates (NP1EOs) and nonylphenol diethoxylates (NP2EOs) in surface sediments and suspended particulate matter.
Analyses of sediment and suspended matter samples showed that alkylphenolic compounds are still present in the Danube, with nonylphenols the most abundant in both investigated matrices. Our study also showed, for the first time, that nonylphenol mono-and diethoxylates have also accumulated in Danube sediments and in suspended particles. Sediment concentrations of nonylphenols and their lower ethoxylates (up to 2.8 mg/kg dry weight) reflect the input of alkylphenol polyethoxylates (APEOs), despite the „Restrictions Directive“ (Directive 76/769/EEC), „Detergent Regulation“ (NO. 648/2004), and the Water Framework Directive (Directive 2000/60/EC) issued by European Parliament. In comparison to the sediment concentrations, suspended particulate matter exhibited lower levels of alkylphenolic compounds (up to 0.18 mg/kg dry weight). Octylphenolic compounds were rarely found, if, then in significantly lower concentrations. The current study showed variation of alkylphenolic substances in the Danube River, which is expected due to varying sources, hydrodynamic conditions, as well as physico-chemical and biological processes along the large stretch of the Danube River. It provided evidence of noticeable sediment and suspended matter contamination, especially proximal to big cities and their associated large sewage treatment facilities.

Imbricates from different palaeogeographic origin and thermal overprint along the eastern Periadriatic Lineament (Karavank Mountains, Austria) - a document of their polyphase tectonic history

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According to the geological maps of the Austrian Geological Survey and others the east-west trending Periadriatic Lineament separate the Eastern Alps (Northern Karavank Mountains) and the Southern Alps/Dinarides (Southern Karavank Mountains) in the study area. Former structural investigations showed a laterally far less continuance due to strong segmentation along high-angle faults of limited displacement, numerous of them displacing the lineament also.
The geological structures of the Karavanks south of Maria Elend are dominated by E-W- to SE-NW-striking high-angle faults, separating from each other in so far 24 imbricates, crosscuted by faults striking in NW-SE direction. They are of variable size, stratigraphic range, facies, thickness, palaeogeographic origin and diagenetic/thermal overprint, which are tested by biostratigraphy (e.g., radiolarians, conodonts, algae, foraminifera, incertae sedis), microfacies analysis and measurements of the Conodont Colour Alteration Index (CAI). These individual imbricates, who derived from different palaeogeographic positions of Triassic-Europe by far tectonic transportation of crustal fragments, can be clearly distinguish by

1) their stratigraphic range, facies evolution and their palaeogeographic origin, and
2) their diagenetic/thermal overprint, and
3) a specific structural inventory, which strike not in the neighbouring imbricates.

These particular sets of structures restricted to individual tectonic entities were created before the amalgamation, and are thus transported structures. However, there are successions with affinities to most Triassic(-Jurassic) facies zones of the Northern Calcareous Alps (NCA), the Southern Alps, and the „Slovenian Trough“ south of the Julian Alps. An interesting fact is the diagenetic/metamorphic overprint of different imbricates in this area. To the north and northeast Late Carnian to Early Norian reef near sediments in tectonically isolated imbricates reach CAI values of CAI 5.5 to 6.0, corresponding to low grade metamorphism. These high CAI values of CAI 5.5 to 6.0 are comparable with the faciesequivalent thermally overprinted rocks of the so called Ultratirolic unit of the NCA (e.g. Mount Hochkönig, Tennengebirge and others) or some individual slide blocks in the Hallstatt Mélange in the area of the central NCA. The thermal overprint of these different tectonic slices in this region is therefore transported. Despite some knowledge about general trends in deformation within the study area, the fact that the amalgamation of the imbricates progressed from south to north and the imbricate zone

is often displaced by approximately NE-SW-striking and even younger NW-SE-oriented high-angle faults of limited displacement. The youngest movements are comparable with the lateral tectonic extrusion. This is also kinematically in a good correlation with data obtained from outcrops in Slovenia. In Oligocene extensive magmatism occurred, followed by dextral strike slip movements and major rotations. Lateral motions since the Turonian formed a mega-imbricate zone between the Dinarides (and Southern Alps) and the Eastern Alps contemporaneous with the movements of the Drau Range and the Transdanubian Range towards the east, to their present position.

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Late Triassic mass-flow deposits in hemipelagic „Slovenian Trough"-like sediments in the Karavank Mountains (Austria) triggered by Late Triassic strike-slip movements

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The polyphase tectonic evolution along the eastern Periadriatic Lineament in the Karavank Mountains has formed an imbricate, which is located between the Maria-Elend Sattel and the Rosenbach Alm and consist of Late Triassic to Middle/Late Jurassic hemipelagic dolomites to cherty limestones, similar to the sedimentary sequence know from the Slovenian Trough south of the Julian Alps.

Two laterally differing sequences are developed in the study area: The eastern sequence is characterized by ?Carnian dolomites discontinuously overlain by bioturbated, turbiditic Late Norian radiolarian-rich limestones and Rhaetian to Jurassic argillo-calcareous bioturbated, turbiditic wackestones. The western sequence is composed of Carnian dolomites, followed by a ~200 m thick succession of Early to Middle Norian cherty dolomites (= Baca dolomite in the Slovenian Trough), and is overlain by thin bedded limestones with chert-lenses of late Middle to Late Norian in age, with interbedded polymict mass-flow deposits in the upper part.

In the newly formed late Middle to Late Norian basin hemipelagic limestones of allochthonous origin occur in the interbedded Sevatian mass-flows. These resedimented breccia components consist only of different hemipelagic grey limestones and are dated by means of conodonts and radiolarians as Early to Middle Norian. The radiolarians and conodonts from the components of these polymict Late Triassic mass-flow deposits indicate clearly a mixture of Early to Late Norian components. We conclude that the breccia components derived from a palaeogeographically different source area with a complete Early to Late Norian hemipelagic carbonate succession without dolomites, which is not exposed in the studied area or in the Slovenian trough. The matrix of the mass-flows as well the directly overlying sediments is dated by means of conodonts and radiolarians as Sevatian. Upsection (Rhaetian to Middle Jurassic) a several 100 m thick, partly restricted hemipelagic sequence is deposited, which displays since the Late Norian the topography of a relatively deep marine pelagic depositional environment. The sequence in the western part, with radiolarian-rich turbidites and low bioturbation displayed a thinning and fining-upward trend due to the decrease in sediment supply as the Late Norian relief became buried. These sediments (Frauenkogel Formation, Hahnkogel Formation, Kahlkogel Formation) occur in both sequences (= different Late Triassic imbricates) and seal the Late Alaunian to Sevatian tectonic movements. The predominantly matrix-supported clast layers are interpreted as debris-flow deposits triggered by local(?) iterative tectonic pulses rather than by sea-level changes due to the late Middle to early Late Norian lasting breccia formation and mass movements.

Our results point out, that simple extensional tectonics with creation of asymmetric basins cannot explain the observed component composition of these mass-flows. In asymmetric extensional basins we expect breccia components similar to those of the underlying sedimentary succession (e.g. with Baca dolomite components). Our results show in contrast, the derivation of the breccia components from a palaeogeographically different source area. Thus we explain this imbricate in the Karavanks as a result of complex Late Triassic strike-slip movements by forming transtensional asymmetric basins.

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Austrian Tunnel Structures: Concrete Damage by Thaumasite Form of sulphate attack (TSA)

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Over the past years concrete deterioration by sulphate attack has been repeatedly reported from several tunnel structures (e.g. IDEN & HAGELIA 2003). Whereas the formation of thaumasite seems to be a guiding process in contrary to the formation of ettringite and gypsum. Using sulphate-resisting Portland cements (SRPC) with low C_3A content ettringite can be significantly reduced. Nevertheless thaumasite even appears in concretes with negligible availability of Al by consuming C-S-H phases and therefore resulting in a significant decrease of the concrete stability (BELLMANN & STARK 2007). Processes that lead to the formation of thaumasite have not yet been entirely understood. To gain new insights in the TSA case studies including the application of stable isotopes ($^{34}S/^{32}S$, $^{13}C/^{12}C$ and $^{18}O/^{16}O$) are carried out at Austrian railroad and highway tunnels.

In the Bosruck railroad tunnel shotcrete pieces were falling down causing safety issues for the highly frequented tunnel. The interlayer between the sooty brick wall lining and the shotcrete shows intense sulphate attack. Investigations by XRD revealed that the damaged horizon is composed mainly of thaumasite with small amounts of calcite, gypsum, and ettringite. The analysed local ground water is enriched in sulphate (> 6 mM SO_4^{2-}) due to the dissolution of local marine evaporites. The sulphate minerals of the damaged horizon and local evaporites comprise $\delta^{34}S_{CD}$ values from 14.8 to 22.2 and from 15 to 27‰ (SPÖTL & PAK 1996), respectively. Thus, the sulphate minerals from the damaged horizons indicate sulphate from local ground water. Soot relicts as a potential source of sulphur can be ruled out as the respective analysed $\delta^{34}S_{CD}$ values are between 3.4 and 4.1‰.

At the Tauern highway tunnel a second tube is currently under