while kaolinite revealed an almost similar value for both experimental setups. The $\delta^{44/40}$Ca of the sink solution was between 0.26 and 1.27 ‰ lighter than the source, increasing towards the values of $\delta^{44/40}$Ca of the source over time. The first Ca passing the columns of illite and montmorillonite was lighter than the source and the fractionation of $\delta^{44/40}$Ca of the fluid released into the sink during diffusion through clay minerals depend on the clay column length and the mineral specific cation exchange capacity, and consequently on the total capacity of the clay columns. Modelling reveals that the transport and isotope fractionation does not follow a simple diffusion approach but rather indicates coupled transport reaction processes at the clay mineral surfaces.

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ICDP

Multi-level online gas monitoring at the Hartoušov mofette: concept and technical setup

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Mofettes are gas emission sites where CO_2 ascends through conduits from as deep as the mantle to the Earth's surface and as such provide natural windows to magmatic/volcanic processes at depth. The primary objective of our research on mofettes is to clarify the physical link between fluid properties, their pathways and swarm earthquakes in the intracontinental Eger Rift belonging to the European Cenozoic Rift system. The Cheb basin terminates the Eger Rift to the West and is known for recurring earthquake swarms. The Hartoušov mofette in the Cheb Basin with a daily CO_2 flux of up to 97 t has been chosen as a key site in the frame of the ICDP project: "Drilling the Eger Rift: Magmatic fluids driving the earthquake swarms and the deep biosphere."

Detailed measurements before, during and after drilling of a 300 m deep well will be carried out to realize possible influences of the drilling activity on the local and regional fluid regime. Our multi-level online approach can provide hints on the origin of temporal variations related to the opening of fault-valves, admixture of crustal fluids to a background mantle-flow or the release of hydrogen during fault rupturing. The suggested state-of-the-art fluid monitoring techniques allow for a high temporal resolution and are completely different from the discrete sampling approach used in the last decades in this region. Gas composition and its isotope signature will be continuously analysed in-situ at different depth levels. Unique in the world, ascending mantle fluids will be tracked along a vertical gradient in a set of drillings from a depth of a few hundred metres to the surface. Using a multi-valve system, it will be possible to collect gas samples from the surface, 30 m, 100 m, and 300 m depth with one set of instruments. Periodically, samples for noble gas isotope analysis will be collected.

IODP

Evolutive methods in cyclostratigraphy: probing for Milankovic cycles in continental (complex) settings

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Cyclostratigraphy is an integral part of many scientific studies on the age and duration of outcrop- and core material from sedimentary geoarchives. Yet, borehole data are not systematically assessed using cyclostratigraphic methods. This has various reasons, including (a) a specific resolution and commonly no possibility to increase data resolution after logging, (b) logging proxy data cannot be connected to the sedimentary environment as easily as core investigations, (c) commonly cyclostratigraphic studies focus on one lithostratigraphical unit, but borehole logs may comprise several (d) some data generated from core material (e.g. stable isotope ratios) cannot be acquired in boreholes directly.

To obtain a reliable understanding of (long) borehole logging datasets, a good understanding of the potential and specifics of relevant (time/depth) evolutive methods in cyclostratigraphy are an essential prerequisite. Therefore, initially we compare the suitability of several evolutive cyclostratigraphic methods using several artificial datasets consisting of modelled Milankovic signals and noise. The principles of spectral moments, and other types of signal characterizations, can be used for initial assessment of signal properties over the entire record. Wavelet analysis and evolutive harmonic analysis (EHA) represent windowed approaches of assessing cyclicity, where wavelet analysis can assess amplitude variations. Evolutive Astronomical Spectral Misfit (eAsm) and evolutive correlation analysis (eCOCO) assess the similarity of power spectra (eCOCO) and significant cyclic variations (ASM) in geological datasets against Milankovic targets. The timeOpt method investigates precession- and eccentricity amplitude modulations and aims at finding a best fit through assessing various sedimentation rates. The astronomical component estimation (ACE) approach can be used to extract Milankovic signals from datasets.

In a second step, we apply methods to several IODP and ICDP datasets, and compare the performance of selected methods in artificial and real cases.

Aim of this work is the comparison of different evolutive cyclostratigraphic methods for an understanding of which methods can resolve specific data challenges. This work represents a first step towards an assessment of method suitability for real cases.

IODP

Experiments on melt-peridotite interaction at crust-mantle boundary: Implications for heterogeneity in the lower crust

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The coherent cores of layered gabbros drilled by IODP Expedition 345 at the Hess Deep Rift validate the Penrose model for interpreting the structure of fast-spreading oceanic crust [Gillis et al. 2014]. One remarkable founding is the occurrence of orthopyroxene as an abundant phase in these deep-level cumulate rocks, which is however unexplainable by crystallization experiments from primary MORB melts and indicates significant modification of melt composition prior to the formation of cumulates. Interaction betwen melt and upper shallow mantle rocks has been proposed as a possible step that may effectly modifies melt composition prior to its migration into the crust [Coogan et al. 2012]. In this study, in combination with analysis of natural samples, we performed melt/rock interaction experiments using a starting glass representing upmoving MORB melt, which is similar to the primitive MORB composition estimated based on bulk crust of Hess Deep, and a natural lherzolite representing mantle rocks. The