Mantle source and crustal contamination of the anorthosites of the Kunene Intrusive Complex, NW Namibia

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Massif-type anorthosite complexes that commonly form huge intrusions with minor volumes of mafic and felsic rocks are characteristic features of the Proterozoic crust. Their evolution is generally discussed in terms of mantle derived parental melts or partial melting of mafic lower crust (e.g. [1-4]). Their apparent temporal restriction to the Proterozoic suggests unique tectono-thermal conditions during this period. However, the specific crust-forming processes are still subject of debate [1-3].

The 1.38 Ga Kunene Intrusive Complex, NW Namibia, mainly comprises two anorthosite bodies, i.e., a pyroxene-bearing anorthosite suite that is intruded by dominantly olivine-bearing anorthosites. The complex extends over 18,000 km^2 and experienced no metamorphic overprint after its emplacement. The isotope values of whole rock samples and plagioclase separates range between 6.0-7.5 ‰ $\delta^{18}O$, 0.70382-0.70423 $^{87}Sr/^{86}Sr(T)$ and -2.9-2.0 $\varepsilon Nd(T)$ for the pyroxene-bearing and 5.6-6.0 ‰ $\delta^{18}O$, 0.70284-0.70364 $^{87}Sr/^{86}Sr(T)$, 0.5-3.0 $\varepsilon Nd(T)$ for the olivine-bearing anorthosites that fits well with a mantle-origin of the parental melts. Trace element zoning profiles across cumulus plagioclase in combination with their isotopic composition reveal extensive crustal contamination prior and during formation of the early pyroxene-bearing anorthosites. The mantle-like isotopic composition of the most primitive anorthosites, the intrusion size of the Kunene Intrusive Complex and the emplacement unrelated to major orogenic events [5] point to a significant input of mantle derived magma to the Proterozoic crust.

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Determination of active microorganisms in the gas reservoir Altmark and their role in CO_2 turnover

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The almost depleted Altmark gas field operated by GDF SUEZ E&P Germany GmbH is located at the southern edge of the Northeast German Basin. The reservoir horizons belong to the Perminan Rotliegend formation (Saxon) and have an average depth of about 3300 m. The Altmark site is known to have favourable geological properties for the storage of natural gas and thus, is currently investigated by GDF SUEZ and the BMBF-Geotechnologien RECOBIO-2 project.

The gas field fluids are characterized by slightly acidic pH-values (5 to 6.5), low redox potentials (-300 to -100 mV) and high salinities. Iron is mainly present as ferrous iron (150 to 300 mg/L) and the sulphate concentration is in the range of the detection limit. The fluids were sampled at the wellheads and were chosen with respect to conveyance and chemical properties, i.e. a part of the sampled wells are continuously treated with chemical foams to enhance the gas lift. The microbial 16S rRNA diversity of all sampled gas field fluids was analysed by T-RFLP. The results showed a moderate bacterial diversity and a rather low archaeal occurrence. Microscopic analysis and CARD-FISH showed a variety of cell morphologies in the microbial communities. The potential CH_4 and CO_2 formation as well as the sulphate reduction rate was studied in cultivation experiments. Cultures with H_2/CO_2, acetate and methanol, respectively, and controls were made to determine the activities of the autochthonous microbial community in the gas field fluid.