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Microbial Methane Formation from Coal and Wood - Possible Sources for Biogenic Methane in Abandoned Coal Mines

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About seven percent of the global annual methane emissions originate from coal mining. Furthermore, during the last decade the use of coal bed methane has come into focus of the power producing industry. In Germany, the gas from active and abandoned mining areas is increasingly used for heat and power production, especially after the introduction of the “renewable energy law” in 2000. In many coal deposits worldwide, the analysis of the stable carbon isotopic composition of methane showed that the produced methane is a mixture of thermogenic and biogenic origin. However, the timepoint for the formation of the latter fraction is not known. Interestingly, time series of measurements show an increasing proportion of the biogenic, microbially produced methane during the last years, indicating a recent origin.

Incubations of mine timber and coal samples from abandoned coal mines under laboratory conditions showed over a period of nine months constant and significant microbial methane production. The stable carbon isotope signatures of the produced methane were in a similar negative range like the values of the gas samples collected in situ in the reservoir. Fluorescence-in-situ-hybridisation (FISH) microscopy revealed the presence of different types of methane producing Archaea. These could be further enriched with common methanogenic substrates, like acetate, hydrogen/carbon dioxide or methanol. Detailed molecularbiological studies are currently carried out to identify the microorganisms involved in this scientifically as well as economically

interesting process.