

Methanotrophic Activity of Coalbed Rocks from “Bogdanka” Coal Mine (South-East Poland) – Zofia Stepniewska, Anna Pytlak

Summary

Methane is an atmospheric trace gas, which is estimated to contribute about 20% to global warming. Coal mining used to be regarded as attributing considerably to the anthropogenic emissions of that potent greenhouse gas. Recently discovered methanotrophic abilities of coalbed rocks brought a new argument to the discussion about the environmental impact of the mining industry. In the present work, we determined the methanotrophic activity and maximum capacity (V_{\max}) of methane oxidation originating from rocks surrounding seam 385/2 of the “Bogdanka” coal mine. Methane oxidation rates ranged from $0.231 \mu\text{M CH}_4 \text{ g}^{-1} \text{ day}^{-1}$ in the rock from the middle of the seam to $0.619 \mu\text{M CH}_4 \text{ g}^{-1} \text{ day}^{-1}$ in the bottom rock (4.4 m depth). Methanotrophic activity and V_{\max} increased with the distance to the coal body and with decreasing TOC content. Initial and terminal redox conditions ($E_h > 320 \text{ mV}$, pH 7.60–8.62) confirmed the oxic character of the methane oxidation process.