Abstract

Methane is a non-toxic colourless gas created by decomposition of organic materials in anaerobic environments. Such processes take place at bottoms of rivers, dams and water reservoirs. The gas is then released to atmosphere where it contributes to the greenhouse effect. The aim of this thesis is to measure the ebullition flux of methane from selected water reservoirs Vranov and Vír (representing typical water reservoirs in the temperate area), analyze factors affecting ebullition, and compare the ebullition flux among these two reservoirs.

The data were obtained via device Simrad EK60 split beam, preprocessed in software Sonar 5, and subsequently analyzed in statistical software R.

While there is a great degree of variability of ebullition flux within segments of individual water reservoirs, the total ebullition flux is comparable in both water reservoirs (Vranov: 3,90 $ml \cdot m^{-2} \cdot d^{-1}$, Vír: 4,22 $ml \cdot m^{-2} \cdot d^{-1}$) and not significantly different from each other ($p = 0,40$). When analyzing possible factors affecting ebullition; the water depth and the distance from the dam, it is necessary to take into account that these two variables are highly correlated which may hinder our ability to separate their effects. Indeed, in both Vranov and Vir the effects of these variables, while significant when studied individually, are not found statistically significant when analyzed simultaneously. However, estimating the model on pooled data from both water reservoirs reveals that the primary factor effecting the ebullition flux is the water depth; the ebullition flux is significantly higher in segments with water depth 5-10 m ($p < 0,01$). Bubbles measured in Vranov seems to be significantly larger than those measured in Vír ($p = 0,00$). Largest bubbles account for the majority of the total measured flux (10 % of the largest bubbles account for 62,6 % and 67,4 % of total flux for Vranov and Vír respectively). We estimate that the quantity of released methane is 1,40 $mg \cdot m^{-2} \cdot d^{-1}$ and 1,48 $mg \cdot m^{-2} \cdot d^{-1}$ for Vranov and Vír respectively.

Measurements at local scale are critical for understanding the dynamics of methane in water reservoirs. It is of prime importance for measurements to be comparable and sufficiently detailed. Such detailed data then can be used for designing measures aimed to minimize ecological footprint of existing or newly created reservoirs.