

## Abstract

RNDr. Terézia Eckertová: *Research of  $^{222}\text{Rn}$  for the determination of  $\text{CO}_2$  emissions into the atmosphere* [Dissertation thesis].

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Interest in  $\text{CO}_2$  released into the atmosphere due to tackling climate changes has intensified in recent years and better, faster and more accurate methods are being sought to estimate  $\text{CO}_2$  flows from its individual reservoirs. An emission from soil represents one of the largest natural fluxes of  $\text{CO}_2$  into the atmosphere and quantifying it would help distinguish this natural component from the anthropogenic ones found in the atmosphere. With similar transport properties as  $\text{CO}_2$  also escapes  $^{222}\text{Rn}$  from soil environment, which is constantly formed by the radioactive decay of  $^{226}\text{Ra}$  in soil grains. Part of this work is to perform simultaneous measurements of both gases in order to test the possibility of using  $^{222}\text{Rn}$  to determine an exhalation of  $\text{CO}_2$  from soil into the atmosphere, the so-called radon calibrated method (RCM). However, such testing requires a good knowledge of determining the exhalation of both gases independently, identifying the parameters that affect them and how they manifest over a longer time horizon. Therefore, various measurements of  $^{222}\text{Rn}$  and  $\text{CO}_2$  exhalation on different soil types, in different season are presented in this work and an influence of meteorological parameters, within fixed the parameter describing the characteristic of the soil environment, are analysed as well. The possibility of determining  $^{222}\text{Rn}$  exhalation using different theoretical relations is also tested, using different (semi)empirical approaches to determining the effective diffusion coefficient and diffusion length of  $^{222}\text{Rn}$ .

Although there are articles with a good perspective on the validity of the RCM, there is no more detailed study of this issue. The fundamental theme of this work is therefore to test the RCM method in the first place, on various soil types in different settings and during different season, i.e. to determine when and under what condition the RCM method is applicable and when not.