

# Factors affecting radon concentrations: case study in schools in Eastern Macedonia

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**PURPOSE** New set of measurements for indoor radon concentrations in schools; To investigate radon spatial variation as well as the effect of certain factors on these variations



Figure 1: The survey was conducted in 29 schools of 4 municipalities (colored green on the map) in Eastern Macedonia.

**Measurements:** The radon concentrations were measured with nuclear track detectors exposed in two ground floor rooms (classroom and assembly hall) of each school in period of one school year semester starting from January to June in 2016.



Figure 2: CR-39 nuclear track detectors used in the survey

## RESULTS

Table 1: Descriptive statistic of measured radon concentrations in 58 rooms of 29 schools

	No.	Minimum (Bq/m <sup>3</sup> )	Maximum (Bq/m <sup>3</sup> )	1st Quartile (Bq/m <sup>3</sup> )	Median (Bq/m <sup>3</sup> )	3rd Quartile (Bq/m <sup>3</sup> )	Arithmetic mean (Bq/m <sup>3</sup> )	Standard deviation (Bq/m <sup>3</sup> )	Variation coefficient	Geometric mean (Bq/m <sup>3</sup> )	Geometric standard deviation	Distribution	N >400 Bq/m <sup>3</sup>
C <sub>Rn</sub>	58	10	508	58	97	180	136	115	83%	96	2.47	log normal	3

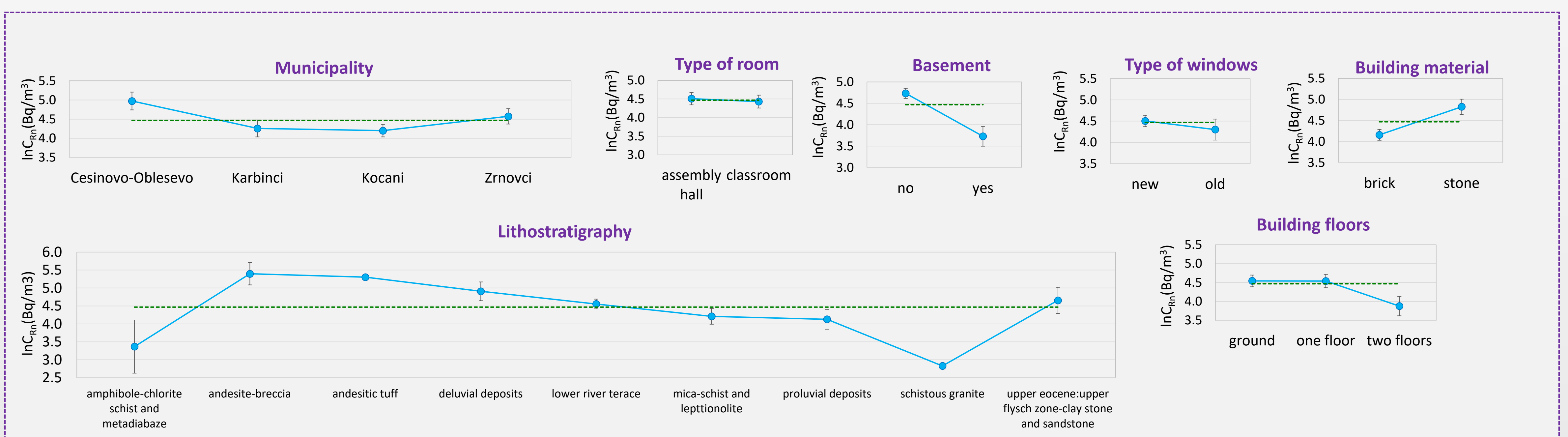


Figure 3 : The means of  $\ln(C_{Rn})$  with 95% LSD interval per factor; Dashed line represents overall mean value  $\ln(C_{Rn})$

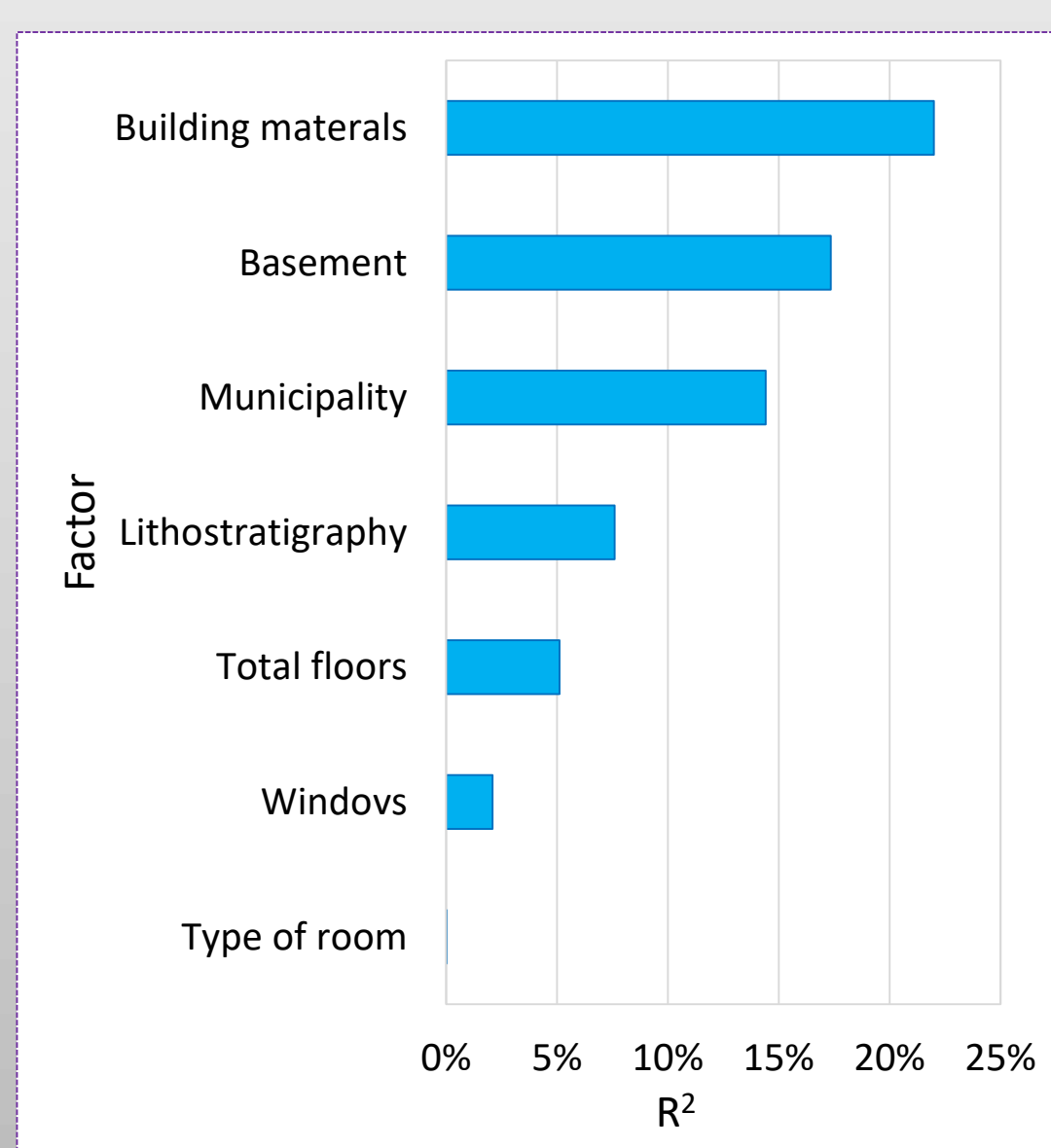


Figure 4: Spearman coefficient of determination represents relation level between a factor and  $\ln C_{Rn}$

## CONCLUSION

Although relatively small region under investigation, radon variations between municipalities were significant at 95% confidence level. According to measured concentrations, the municipalities were grouped into two groups (Figure 3, graph: municipality).

The variations due to lithostratigraphy was also significant, but the groups were not formed. These result indicates that the influence of geology in the investigated region is uniform and that variations are relate to the buildings characteristics.

The significance of the basement factor confirm the relation between indoor radon and geogenic radon potential. It is obvious from Figure 3 (graph: building materials) that the radon concentrations in stone buildings are higher than those made of bricks. Considering that this factor has the highest contribution in radon variations (Figure 4) we assume that stone despite geogenic radon is the additional source of indoor radon.

Although expected, in our case, type of windows does not affect the variations of radon, as well as type of room, altitude and the total number of floors.