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GEOLOOGIATEENISTUS

Radon risk assessment in so far insufficiently investigated administrative units in Estonia

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Agenda

- 1 Introduction
- 2 Methodology
- 3 Primary sources of radon
- 4 Rn-risk in Estonian administrative units
- 5 Conclusion

Introduction

- Estonia is considered as a high radon risk country
- Rn concentration in soil 5–600 kBq/m³, up to 2,000 kBq/m³
- According to several directives, indoor radon levels must be below the relevant national reference level (in Estonia 300 Bq/m³)

Eesti omavalitsuste radooniriski kaart

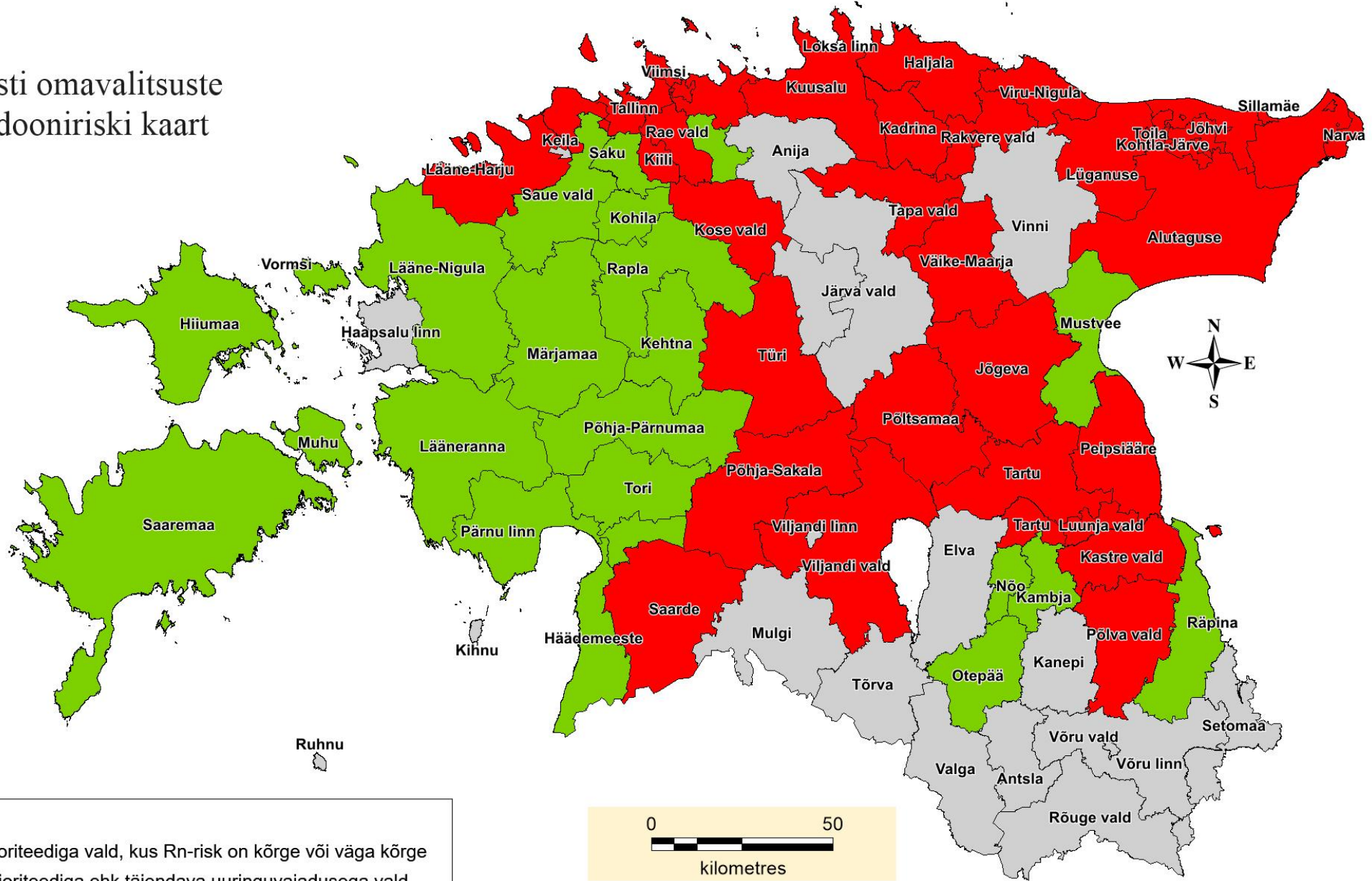


Figure 1. Estimated Rn-risk in Estonian administrative units (2018)

Methodology

- Two parallel methods – direct and indirect
- Direct – measuring from soil air



Photo 1. Emanometer Markus 10 on the left and RM-2 on the right for measuring radon directly from soil air

Methodology

- Indirect – calculating possible radon levels from the uranium concentration measured in the soil
- Higher concentration is used as the Rn-risk
- Soil measurements compared to long-term indoor measurements



Photo 2. Measuring radon indirectly with spectrometer

The sampling grid

- The number of study points must be adequate in terms of population density
- In populated towns one study point per km²
- In rural areas one study point per 20–35 km²
- Almost 22% of Estonia is covered by uninhabited wet areas

Primary sources of radon

- U-rich Lower-Ordovician graptolite argillite and Obolus sandstone (phosphorite), their fragments/ particles carried by glacier all over the country
- U-rich clastic crystalline rocks in tills
- Some layers of U-rich Devonian sedimentary rocks
- Possible occurrences of U mineralization of so far unknown sources

Estimated Rn-risk in Estonian administrative units



Legend

- high estimated Rn-risk
- low or average estimated Rn-risk
- incomplete information
- high estimated Rn-risk, studied in 2019-2021
- low or average estimated Rn-risk, studied in 2019-2021

Figure 2. Estonian administrative units after the second study stage (2021)

Administrative units with increased Rn-risk

- More than 10% of study points exceed 75 kBq/m³
- Concentrations from 50 to more than 250 kBq/m³
- All municipalities on the North-Estonian Klint zone
- Municipalities in Central Estonia in karst areas
- Municipalities in Central and South-Estonia due to Quaternary deposits (tills)

Eesti omavalitsuste radoonirisk kaart

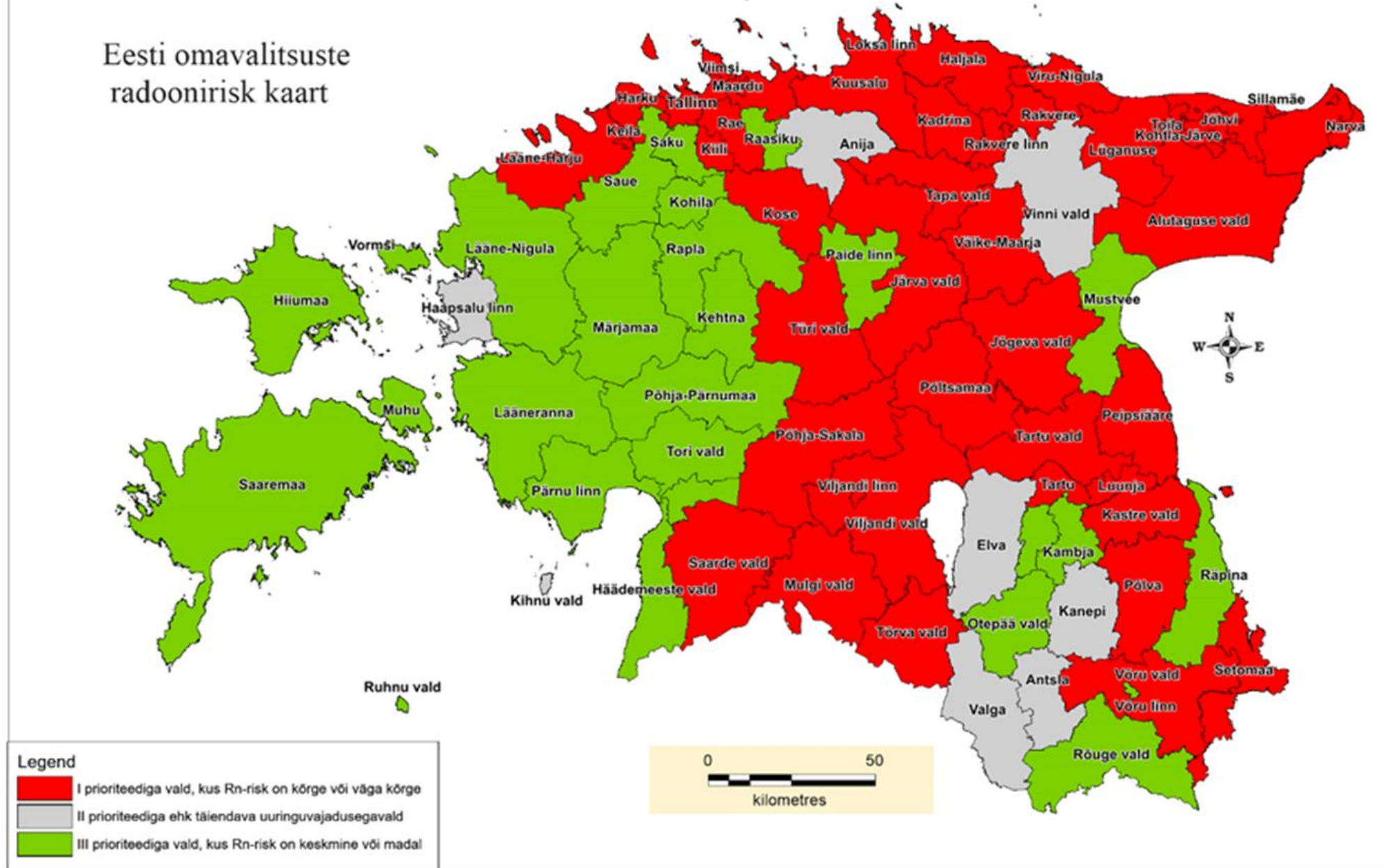


Figure 3. Estimated Rn-risk in Estonian administrative units (2021)

Administrative units with low or average Rn-risk

- Less than 10% of study points exceed 75 kBq/m³ of radon concentration in soil air
- Municipalities in Central and Western Estonia, a few in South-Estonia

Conclusion

- Radon is an ongoing problem in Estonia
 - 75% of population in high Rn-risk areas
 - 43 administrative units classified with high Rn-risk
- The study will be carried on for at least a few more years



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Thank you for listening!

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