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GEOLOOGIATEENISTUS

# Assessment of high indoor Rn-risk areas according to high Rn-risk lithotypes in soil

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**Following the implementation by Estonia, during 2018, of EU directive 2013/59/EURATOM, a more profound knowledge of Rn content in buildings but also in soil air has become more urgent.**

In this presentation an attempt is made to detect a relation between the **Rn activity concentration of soil air (RnCS)** as an indicator for **Rn activity concentration measured indoor (RnCH)** in buildings located on different types of soil.

One means in fulfilling this task is the Atlas of Radon Risk and Natural Radiation in Estonian Soil as published in 2017, that comprises the data of Rn in soil air compiled during 15 years and indoor Rn data compiled over an even longer period.



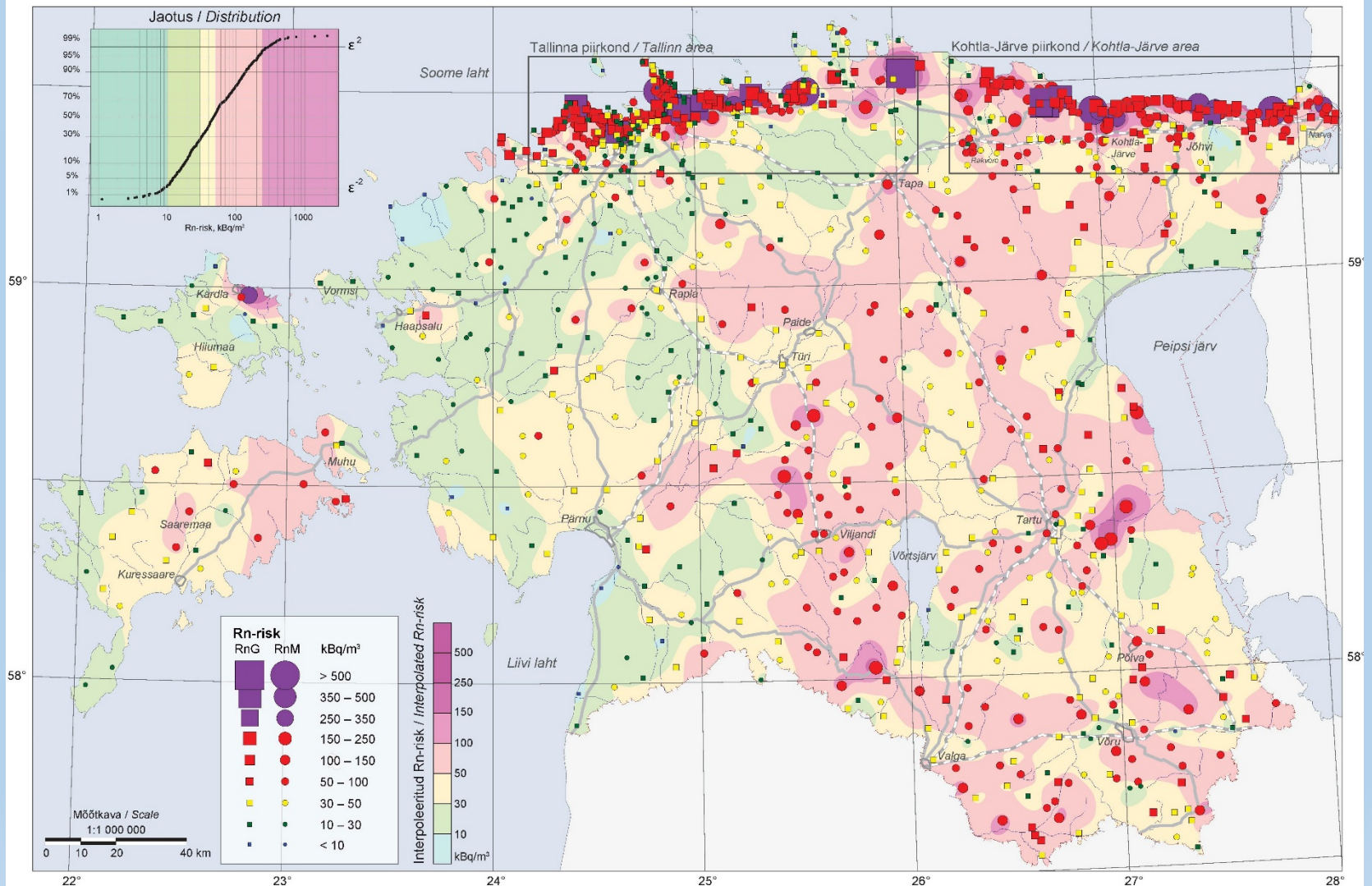
# Maximum $^{222}\text{Rn}$ content in Estonian soil air

Kaart 6.1 Maksimaalne  $^{222}\text{Rn}$ -sisaldus pinnaseõhus (kBq/m<sup>3</sup>)

Map 6.1 Maximum  $^{222}\text{Rn}$  concentration in soil air (kBq/m<sup>3</sup>)

Eesti pinnase Rn-riski kaart

Soil Rn risk map of Estonia

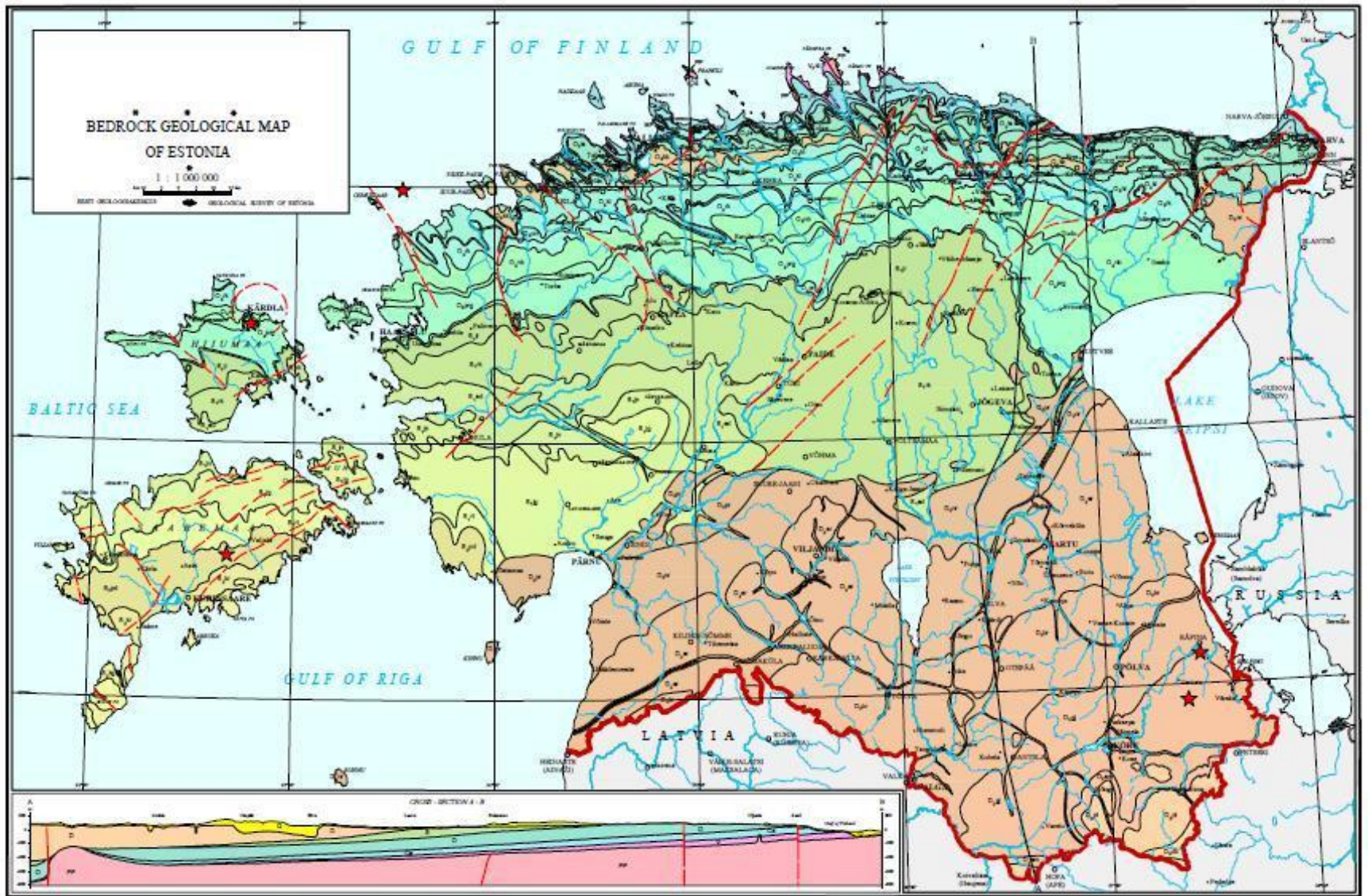


**Various U-rich rocks in the Estonian geological sequence are the source of Rn activity and natural radiation.**

**Phosphorite (content of eU 10–30 mg/kg)**

**Graptolite argillite (content of eU 100–300 mg/kg)**

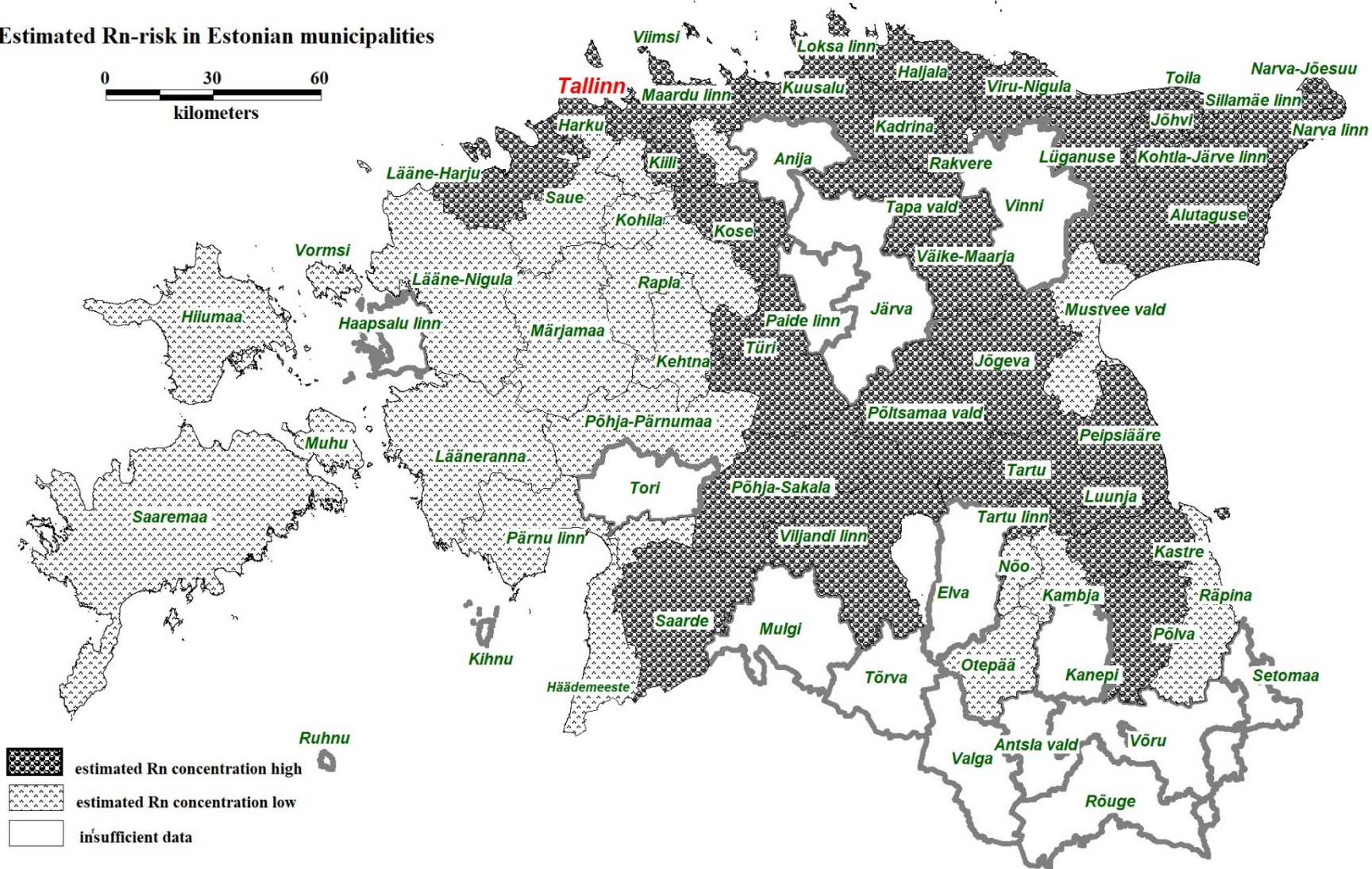
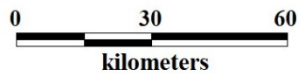




- In the database of outdoor Rn measurements there are nowadays 2950+ observation points registered, 925 are used in this work.
- In the database of indoor Rn, there are nowadays about 4000 measurements registered, 1628 are used in this work.
- The database is being renewed permanently.
- 2019- 2024 additional studies will be done in the communes where there is currently not enough data to **estimate whether there is a high or a normal indoor Rn risk.**
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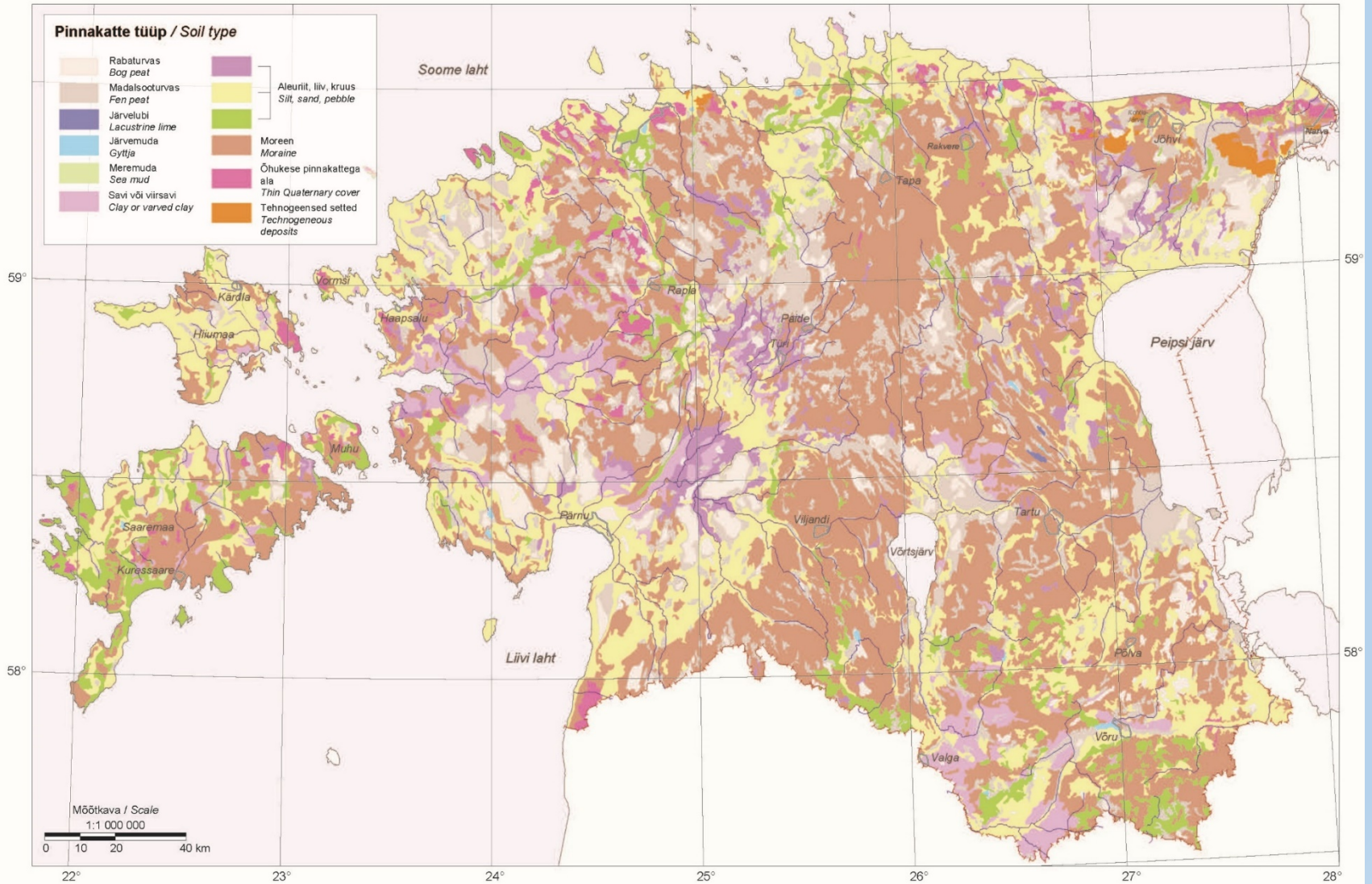
# Estimated Rn-risk in Estonian municipalities



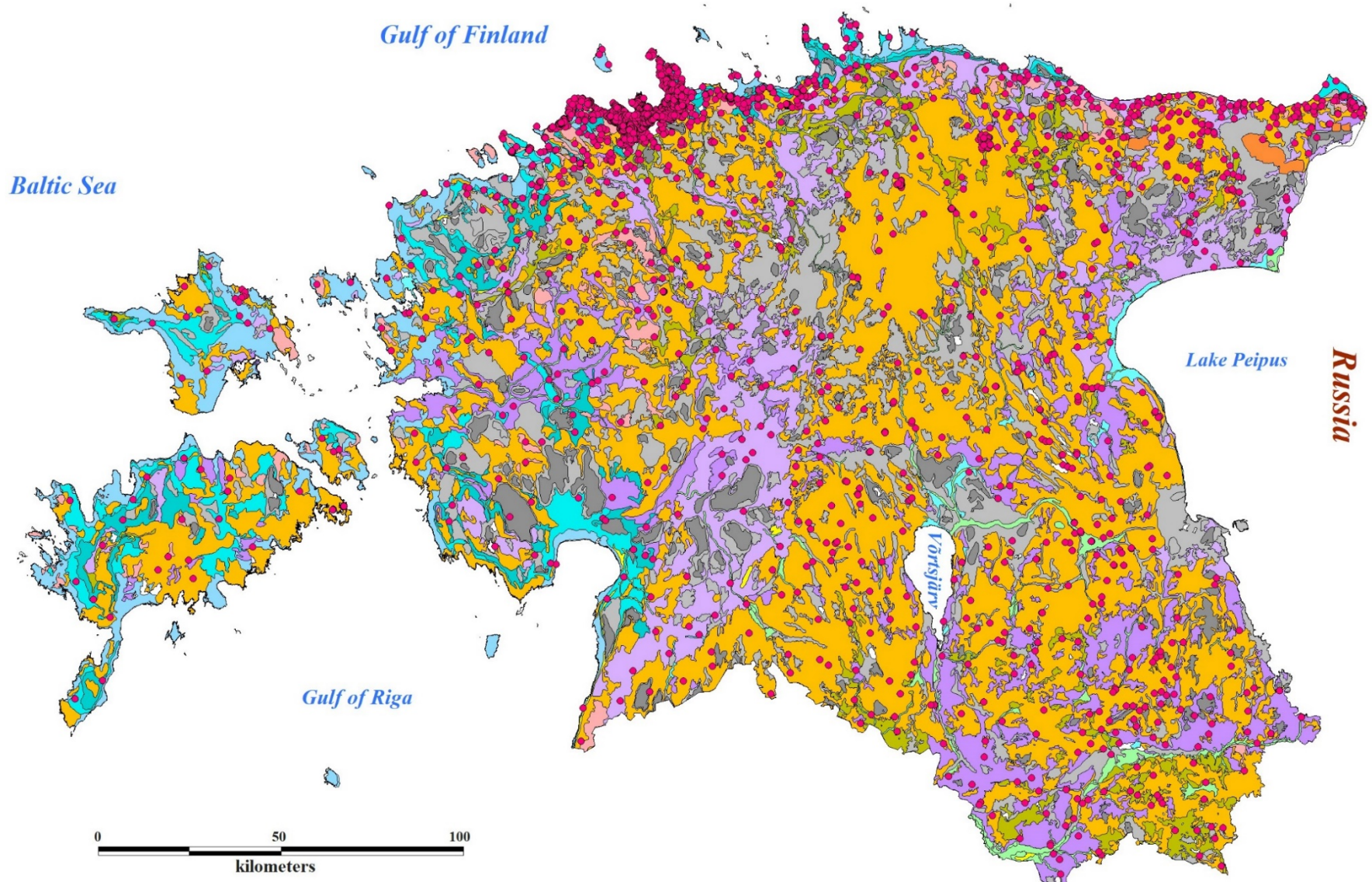
# Map of sedimentary cover

Kaart 4.2 Eesti pinnakatte kaart  
Map 4.2 Map of sedimentary cover of Estonia

Aluskaardid  
Base maps



# Study points of Rn (RnCS) in soil air by location



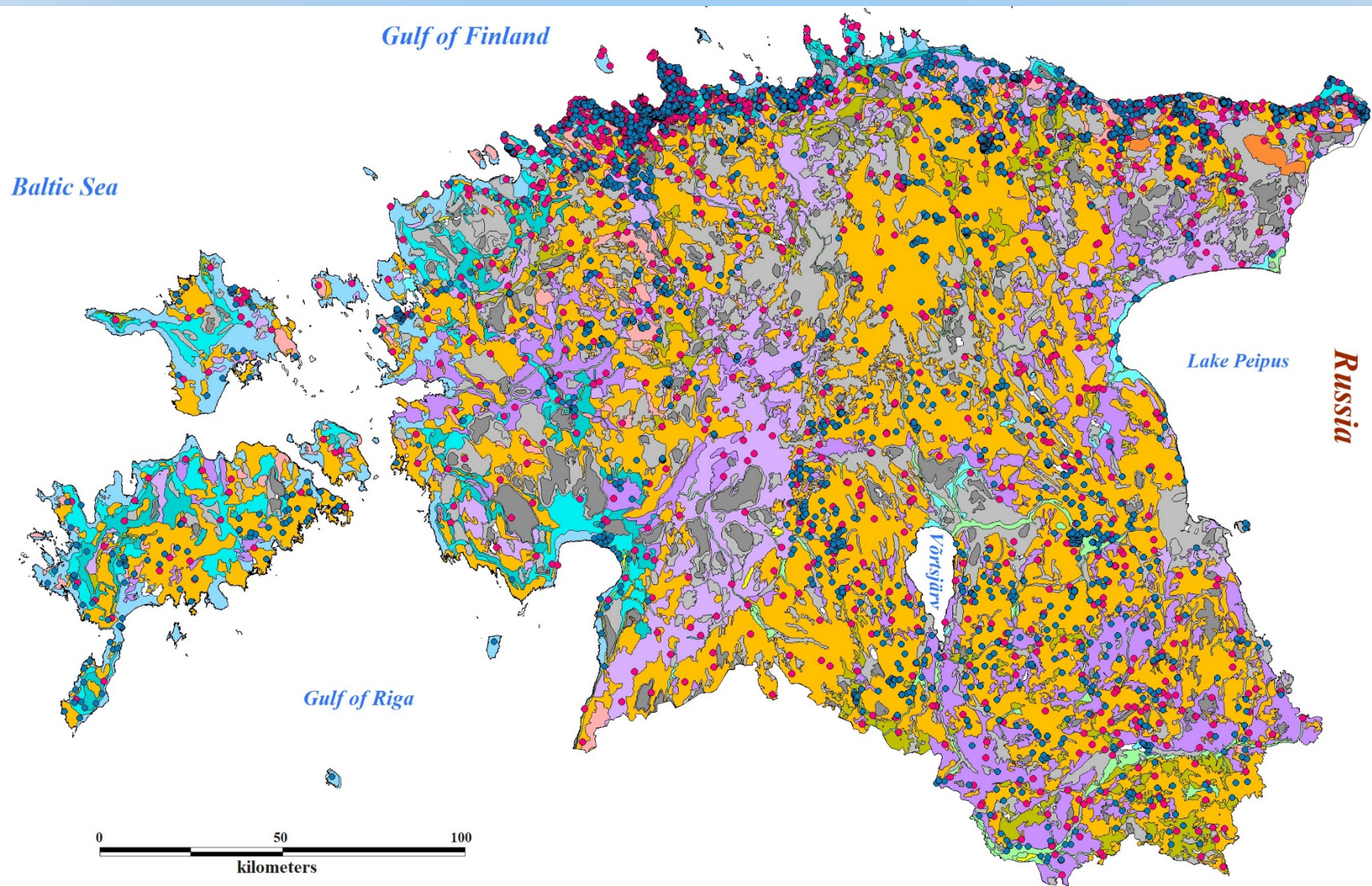


Table 2. RnCH measured on the main lithotypes of the Quaternary deposits of Estonia.

Building location	n	$X_{\min}$	$X_{\max}$	A	S	AG	CV=S/A
		kBq/m <sup>3</sup>	kBq/m <sup>3</sup>	kBq/m <sup>3</sup>	kBq/m <sup>3</sup>	kBq/m <sup>3</sup>	%
North Estonian till	316	8	<b>562</b>	<b>66</b>	<b>58</b>	<b>51</b>	88
South Estonian till	187	20	200	<b>62</b>	34	<b>55</b>	55
Glacioaquatic sediments	230	2	<b>1399</b>	59	<b>106</b>	40	<b>180</b>
Glaciofluvial sediments	103	5	239	53	46	39	87
Holocene marine sediments	89	1,1	171	27	30	18	<b>111</b>

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Building location	n	$X_{\min}$	$X_{\max}$	A	S	AG	CV=S/A
		Bq/m <sup>3</sup>	Bq/m <sup>3</sup>	Bq/m <sup>3</sup>	Bq/m <sup>3</sup>	Bq/m <sup>3</sup>	%
North Estonian till	1628	7	<b>2664</b>	<b>179</b>	<b>233</b>	<b>113</b>	<b>130</b>
South Estonian till	618	3	864	<b>111</b>	94	<b>82</b>	85
Glacioaquatic sediments	371	10	<b>2558</b>	104	<b>158</b>	71	<b>152</b>
Glaciofluvial sediments	254	9	697	109	105	76	96
Holocene marine sediments	668	6	955	88	86	62	98



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**Thank you for  
attention!**

