

# Exposure to natural background radiation: Personal dosimetry to validate an exposure model

Christophe Folly<sup>1</sup>, Antonella Mazzei<sup>1</sup>, Astrid Coste<sup>1</sup>, Christian Kreis<sup>1</sup>, Ben D. Spycher<sup>1</sup>

## 1. Background

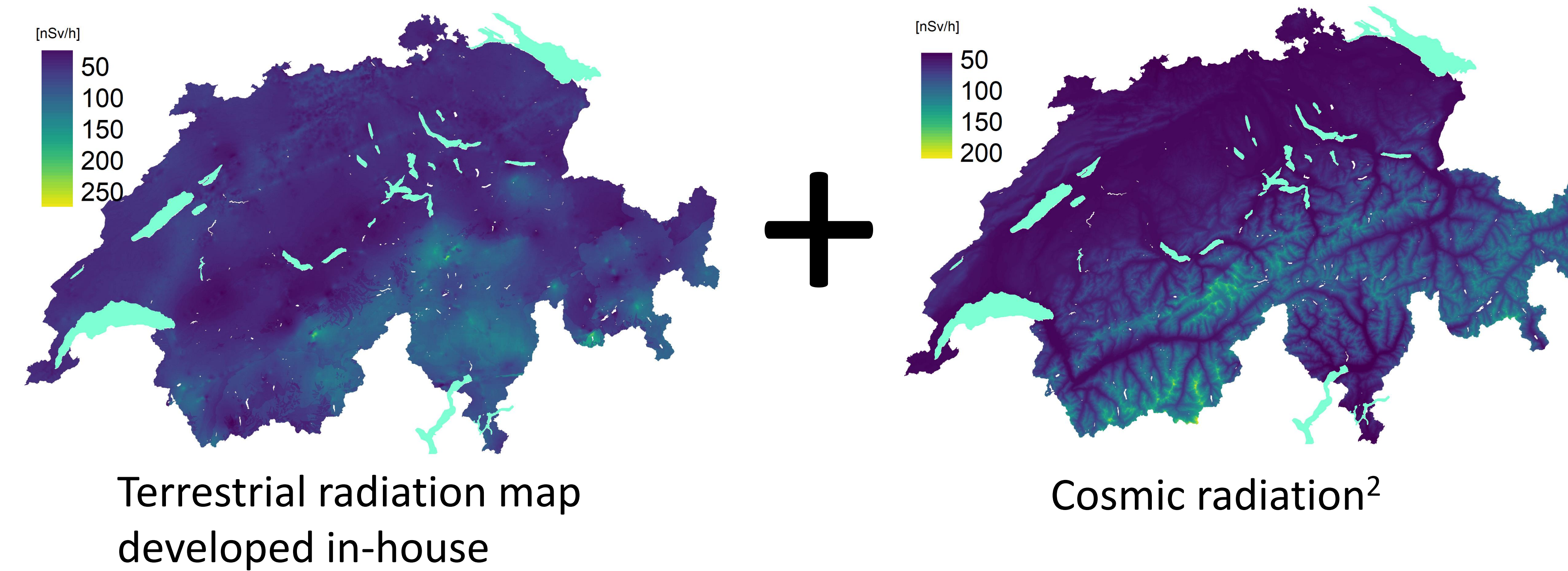
Low dose ionizing radiation from natural sources is ubiquitous, however effects on health are unclear.

We:

- 1) modeled exposure to natural background radiation in CH using a Bayesian spatial model.
- 2) conducted personal dosimetry in children.
- 3) validate our models for the use in epidemiological studies.

See Poster by Mazzei A. for application of exposure model to study cancer risk in children.

## 2. Exposure Model for CH



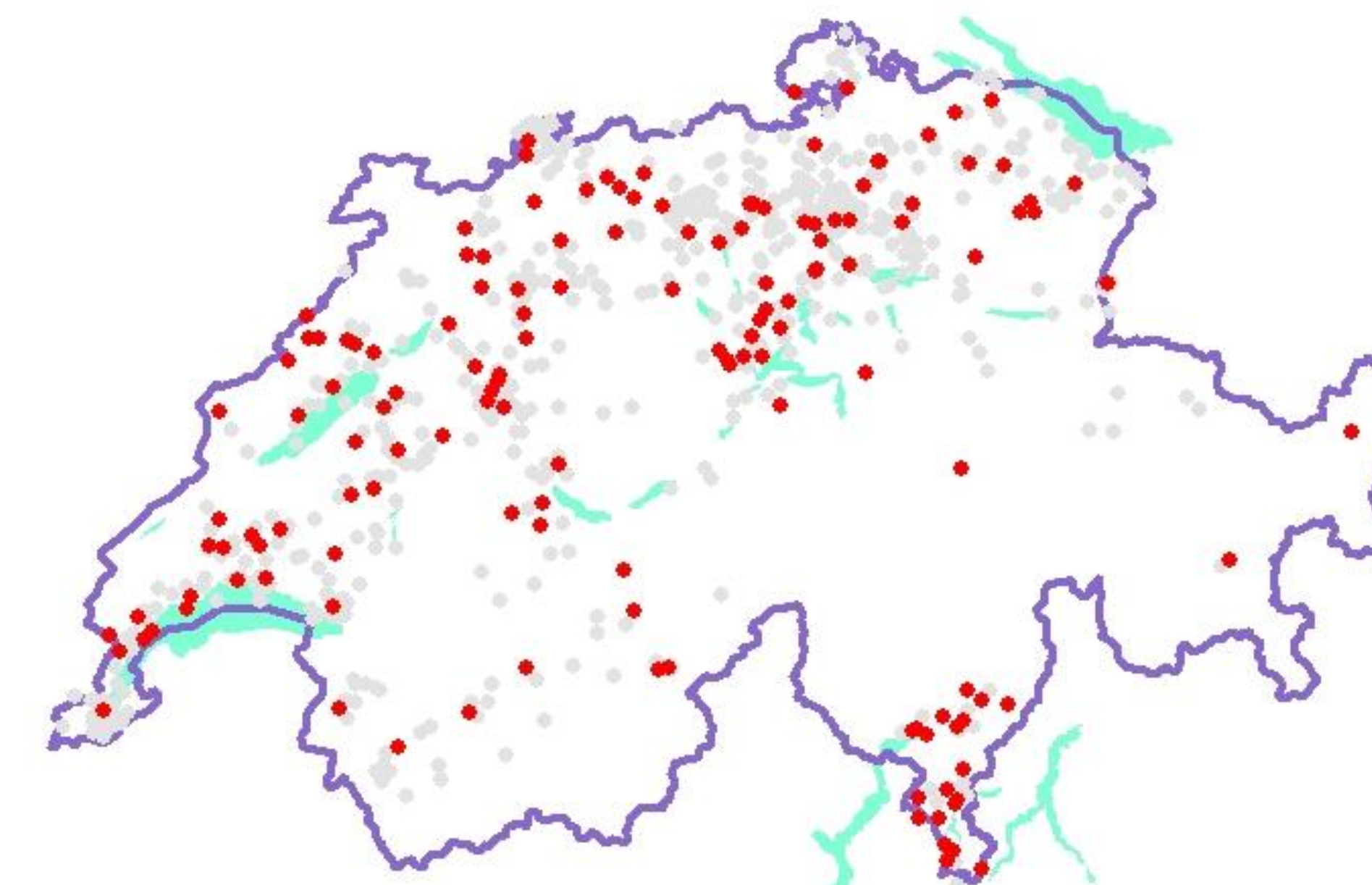
## 3. Personal dosimetry



Participants were recruited from responders of a nationwide survey.

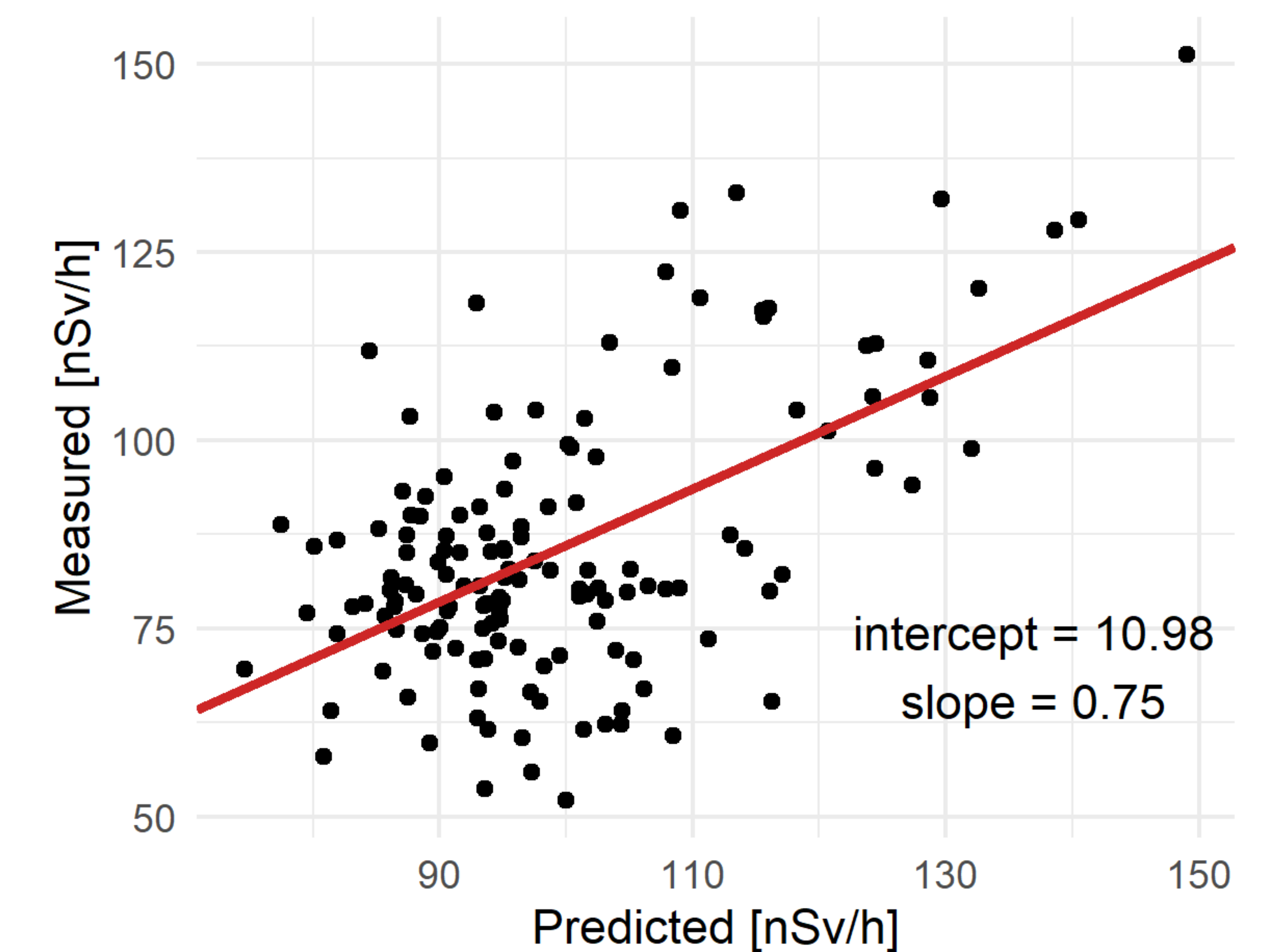
Personal dosimetry measurements were conducted amongst 143 children across Switzerland who carried a D-Shuttle<sup>4</sup> dosimeter for 5 days.

Strap and dosimeters (top) used to measure UV (left device) and ionizing radiation (right device).  
Sample of dosimetry measurements (right). Residential location of participants (red) and available survey responders (grey) are jittered for anonymization.



## 4. Validation

31.8% of exposure variation explained by model ( $R^2 = 0.318$ ).



Further improvements might be achieved by considering building characteristics and time spent indoors/outdoors.

### References:

1. Mazzei-Abba, A et al. (2019), Journal of Radiological Protection. doi:10.1088/1361-6498/ab5a38
2. Murith, C., Gurtner, A., (1994). In: BAG, Environmental Radioactivity and Radiation Exposure in Switzerland 1993, Swiss Federal Office of Public Health, Bern
3. Rybach, L et al. (2002), J Environ Radioact. 2002;62(3):277-86.
4. Musto, E. et al. (2019). Radiation Measurements, doi:10.1016/j.radmeas.2019.106208

u<sup>b</sup>

UNIVERSITÄT  
BERN

<sup>1</sup>Institute of Social and Preventive Medicine, University of Bern, Bern, Switzerland

**Contact:**  
[christophe.folly@ispm.unibe.ch](mailto:christophe.folly@ispm.unibe.ch)  
Institut für Sozial- und Präventivmedizin (ISPM)  
Mittelstrasse 43  
CH – 3012 Bern

Funding:

FNSNF  
FONDS NATIONAL SUISSE  
SCHWEIZERISCHER NATIONALFONDS  
FONDO NAZIONALE SVIZZERO  
SWISS NATIONAL SCIENCE FOUNDATION