Citizen measurement of radioactivity: challenges and opportunities.

Jean-Marc BERTHO
For the OpenRadiation consortium

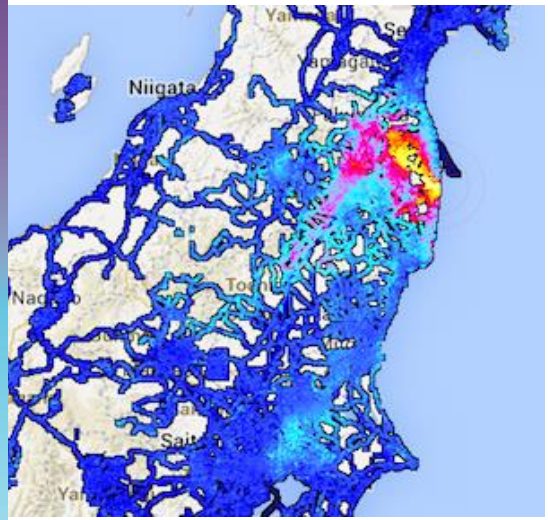
The origins of citizen measurements

- During 1990s', citizen measurements of radioactivity was tested for the first time in settlements close to the Chornobyl exclusion area, in the framework of the Ethos project.
- Objective: to promote a practical radiation protection culture among the residents of the affected area

- The Ethos project approach:
  - first listen to inhabitants' concerns through dialogue
  - second residents develop and conduct specific projects together with experts
  - Jointly decide and implement radioprotection actions
- These actions increased confidence in daily living conditions, which in turn decreases potential health consequences.

open radiation

March 11, 2011: The Fukushima NPP accident



Safecast 2012

- Following the Fukushima NPP accident, several citizen initiatives have arisen rapidly to measure ambient radioactivity: the Suetsugi community experience. The main motivation was a loss of confidence into national authorities.
- Moreover, new tools emerged during this period: interactive mapping of results, communication through social media, which resulted in large data sharing.
- The measurement of radioactivity in such a situation appears as a tool for adversarial debate. Radioactivity measurements turned then to a political object.
- However, the general objectives of citizen measurements remain the same: Allowing everyone to self-evaluate its own risks and providing field data in real time.

Consequently, ICRP recommend support citizen initiatives of radioactivity measurements

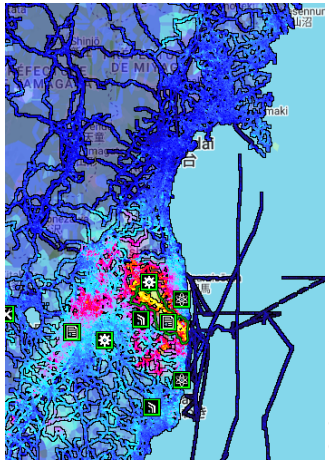
open radiation

Current uses of citizen measurements

Three different situations :

- Places where there is no issue with environmental radioactivity: France (OpenRadiation), Spain (OpenRed),
- Places where consequences of nuclear accident are already measurable: Japan, Belarus, Ukraine (Safecast, OpenRadiation, SaveDnipro)
- Places where there are no actual issues but potential threats of radiological consequences of war actions. Ukraine and countries close to Ukraine: Czechia, Slovakia, Poland (CzechRad).

In each of these 3 situations there are common challenges and opportunities



The debate about the reliability of detectors

- The technology chosen, a Geiger-Müller tube, is a long-standing proven method and stable over time
- The measuring devices are very easy to use

However:

- For citizen, no duty to make their detector calibrated or simply tested with a reference source
- No scientific publication by reputable scientists about intercomparison of citizen detectors vs. professional detectors

⇒ *A persistent doubt among professionals*

⇒ *An easy argument to not taking into account citizen measurement*

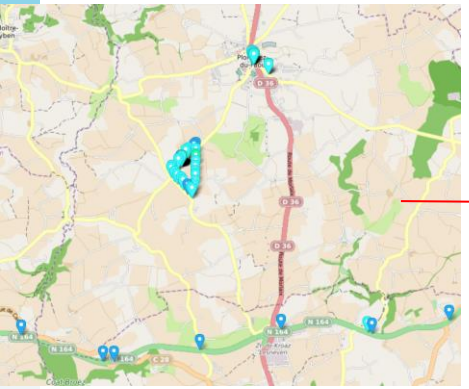
- Citizen have the responsibility to ensure that their detectors are working correctly by regular testing with usual objects: granite stone, historical objects, fixed beacons, etc…
- And to ensure that published information are accurate

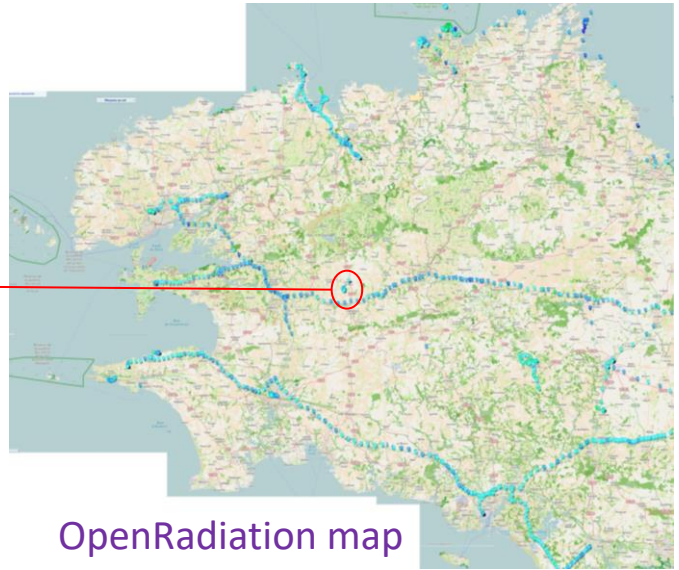
open radiation

And from the decision-maker point of view?

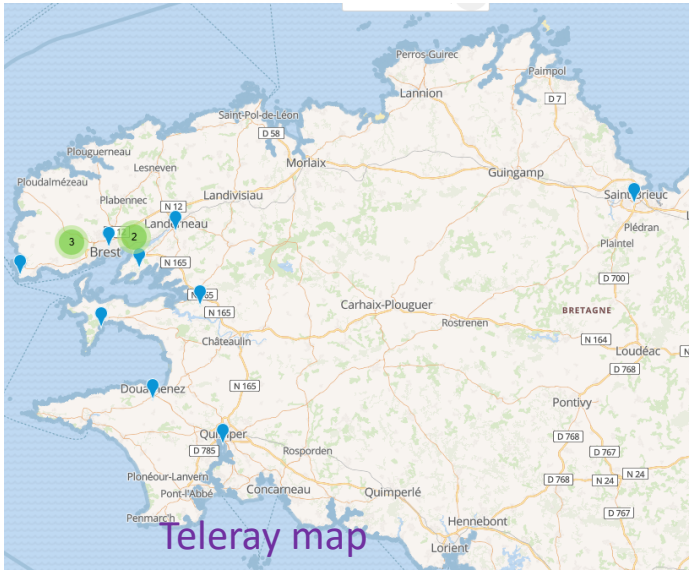
- Citizen measurement can be considered as useless, inaccurate and providing confusing data
- In extreme cases, could be considered as a political tool : the measurement result itself is not any more important
- There are already existing, official measurement networks

However, objectives and tools are different!





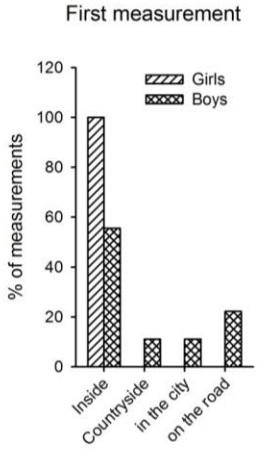
OpenRadiation map

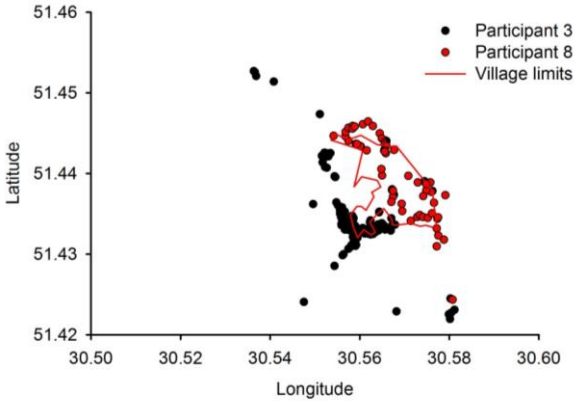


Teleray map

Measurements in Komaryn

- Measure of ambient dose rates by a group of pupils (between 14- and 17-year-old) in a village close to the Chornobyl exclusion zone in Belarus
- Principle: Measure what you want, where you want, when you want
- Two advices:
  - If possible, make measurements 1m above the ground
  - Don’t put yourself into danger!
- Data harvest, co-analysis and co-interpretation of the results
- Allowed to detect some hot spots, to explain them and to implement protective actions



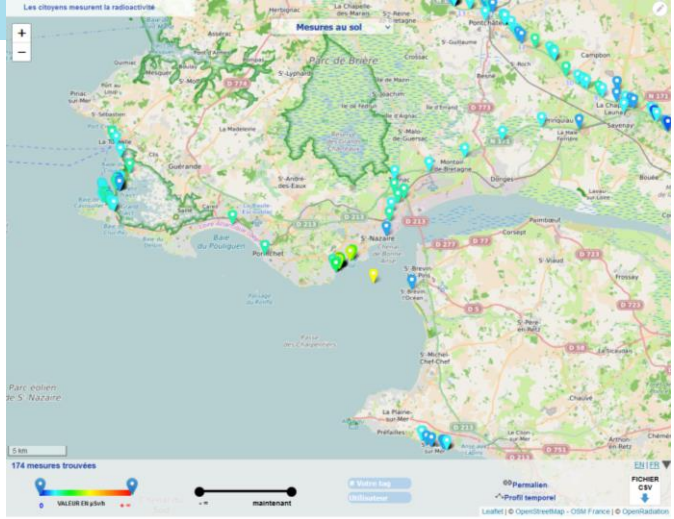


Most important: knowledge about radiological situation by the 2nd generation after the accident

Environmental monitoring, France

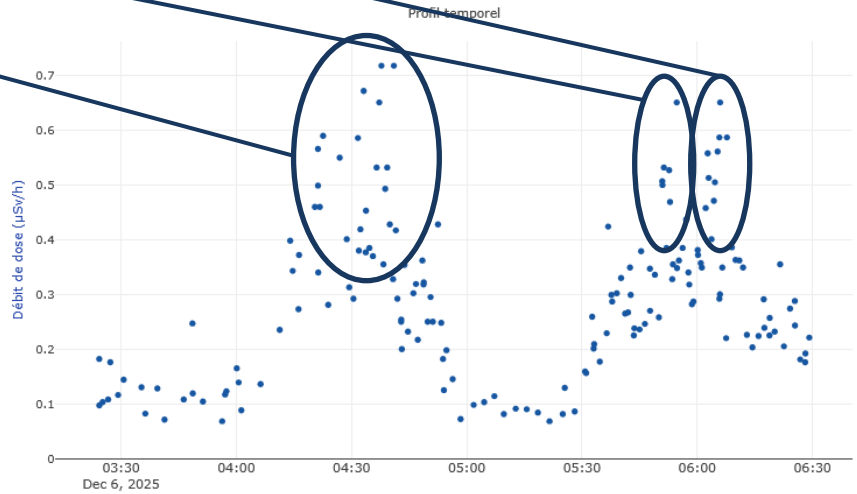
- Ambient dose rates along the north bank of the Loire river more elevated as compared to what is observed in the countryside.
- Measurements from a contributor, made in May 2023.
- The highest dose rates are on the Trebezy beach, in the city of Saint Nazaire
- Confirmation of elevated ambient dose rates by an NGO (CRIIRAD) in September 2023, with a hotspot at 78,5 µSv/h
- IRSN characterized the origin of this hotspot: presence of monazite, a naturally occurring mineral enriched in thorium and uranium
- No radiological threat for the population

The discovery of a true hot spot



And in Japan? The trail experience

- It’s easy to measure
- A small group of people with a limited number of detector is able to cover a large space: 170 measurements in 2h30.
- Dose rates in the range of 0,068-0,718 µSv/h



- Was this experience useful to you?
- Do you think using these data (or more data) in your current activity?

conclusions

- Citizen engaged in radioactivity measurements have a responsibility to provide accurate data.
- Citizen data are able to capture overall trends, but also local issues otherwise overlooked by official networks
- Measurement tools do have a tremendous educational value
- Decision-makers cannot overlook the quantity and quality of citizen-led data. They recognize the need to be prepared for using them.
- In Europe, the position of decision-makers is currently changing:

"we cannot expect from the citizen they reach the measurement quality of experts. Rather, we must cope with the uncertainties existing in citizen measurements"

open radiation

Thanks a lot for your attention !

ご親切にありがとうございます!
(Apologies… DeepL trad)

jean-marc.bertho@asnr.fr

www.openradiation.org