



Federal Office for
Radiation Protection

Value of emission data for interpretation of detections in the national German Radioxenon network

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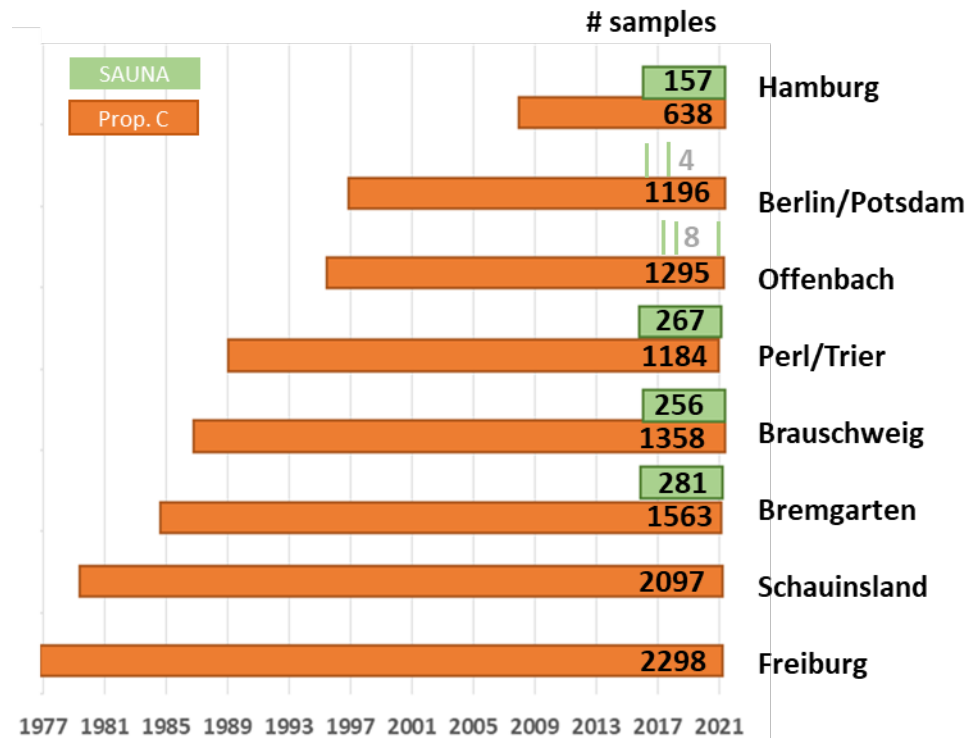
Bundesamt für Strahlenschutz, Germany

WOSMIP Remote II, 25 – 27 May 2021

virtual

The German Radioxenon network

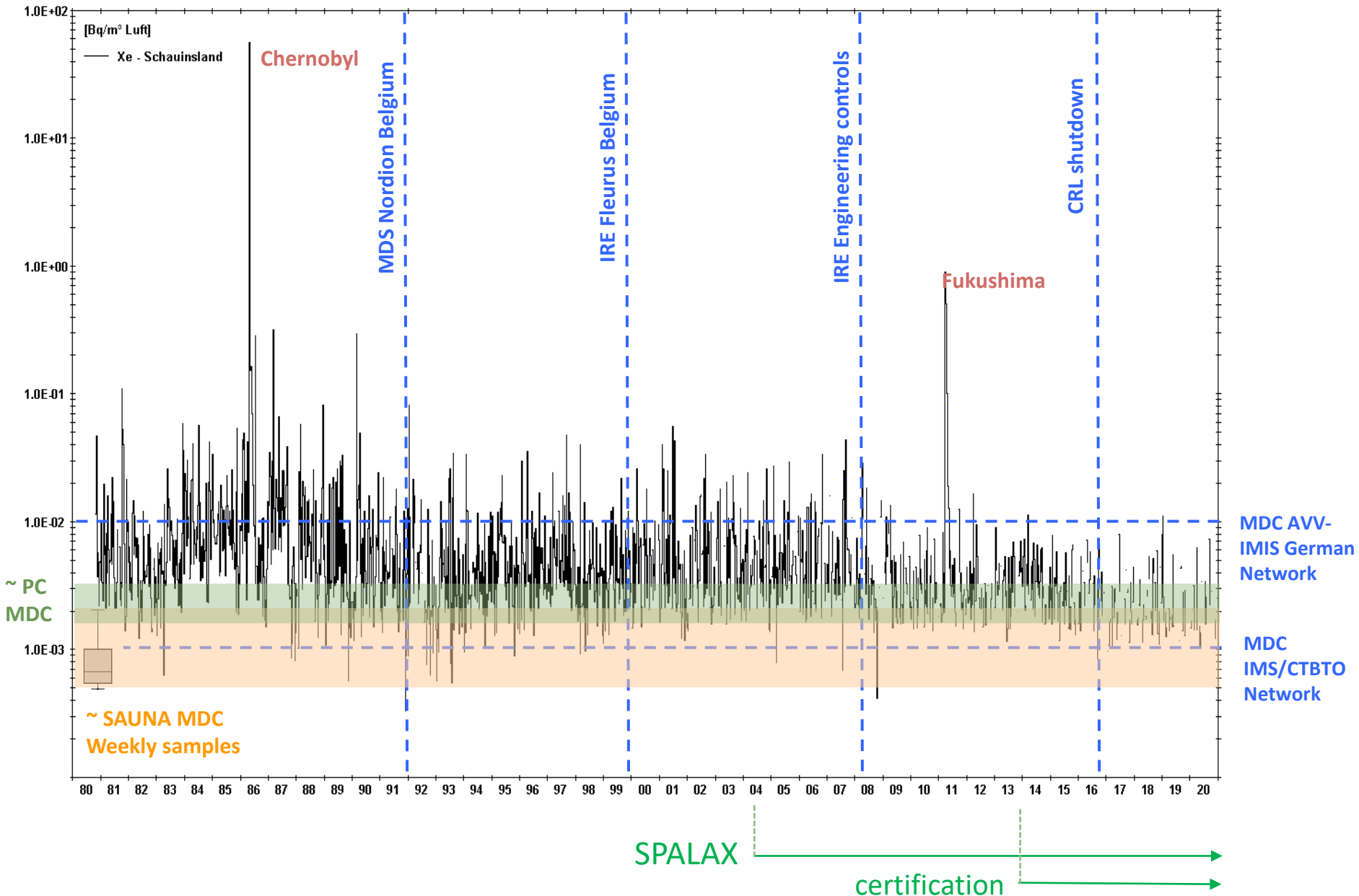
- Collection of weekly samples by collaborating institutions
- Kr/Xe separation and measurement at noble gas laboratory, Freiburg



Since 2006 weekly monitoring of Xe in air is embedded in German legislation (AVV – IMIS)



Historical data (^{133}Xe - proportional counters)



Methods



Proportional counters

8 custom built **proportional gas counters**, Pb-shielding & anticoincidence counters

MDA ^{133}Xe (2 m³ air, 36 h meas.):

≈ 8 mBq

$^{131\text{m}}\text{Xe}$ / ^{133}Xe



SAUNA - Lab

Xenon system with **β - γ coincidence detection system**

MDA ^{133}Xe (2 m³ air, 12 h meas.):

≈ 1 mBq

$^{131\text{m}}\text{Xe}$ / ^{133}Xe / $^{133\text{m}}\text{Xe}$ / ^{135}Xe



SPALAX

Système de Prélèvement Automatique en Ligne avec l'Analyse des radio-Xénons atmosphériques

High-res. HPGe gamma spectrometry

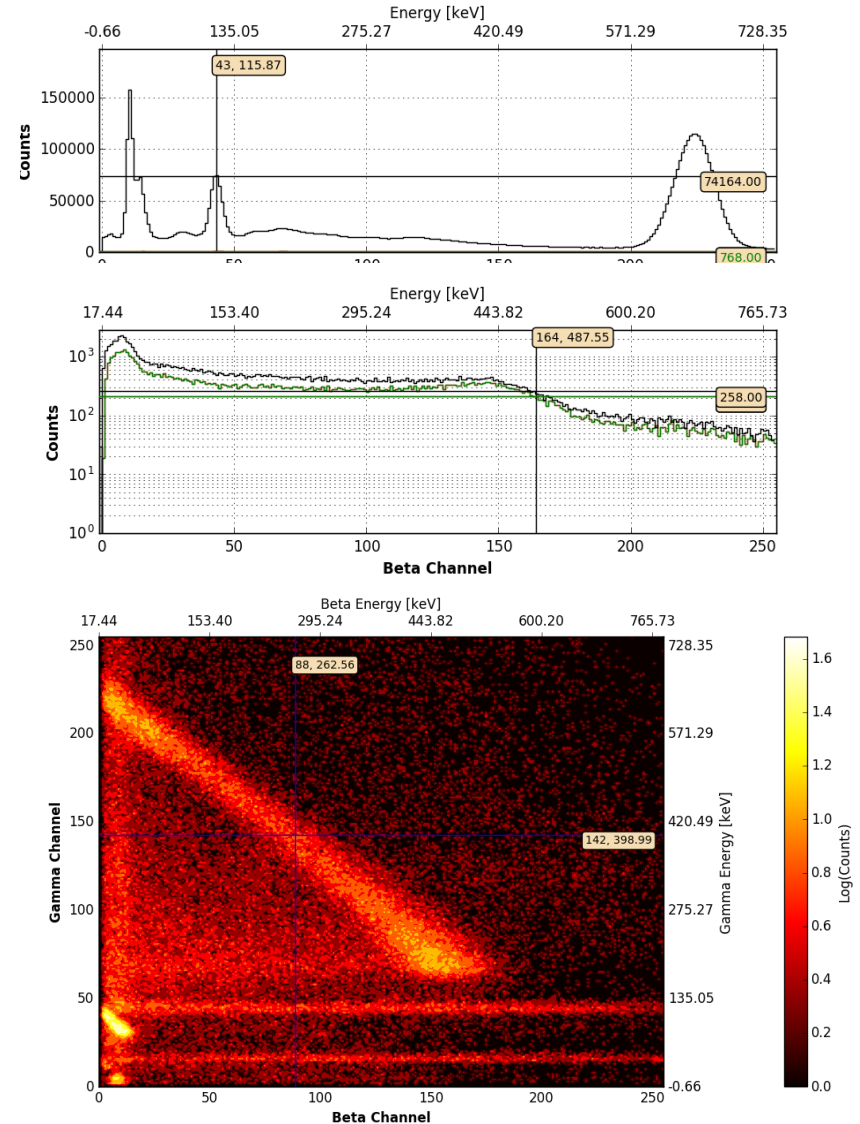
MDC ^{133}Xe (24 h sampling, 24 h meas.):

0.3 mBq/m³

$^{131\text{m}}\text{Xe}$ / ^{133}Xe / $^{133\text{m}}\text{Xe}$ / ^{135}Xe

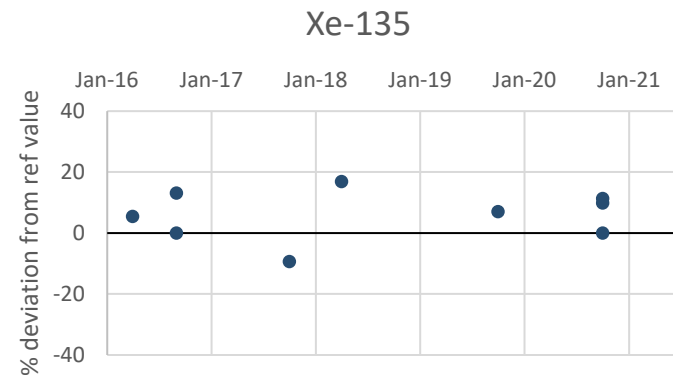
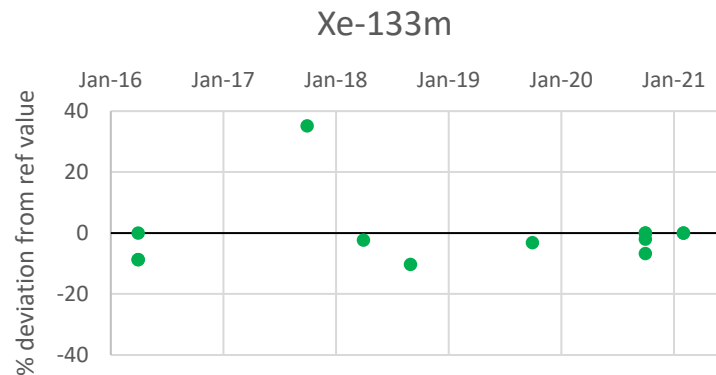
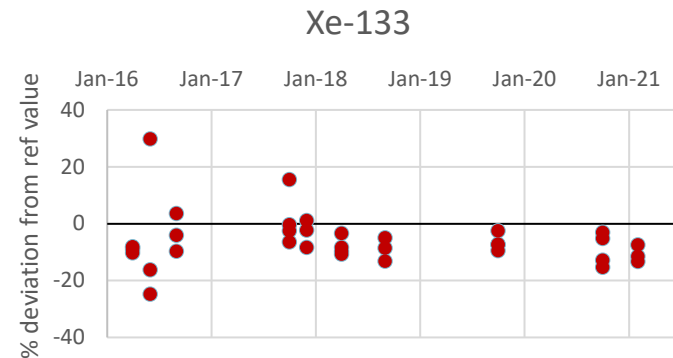
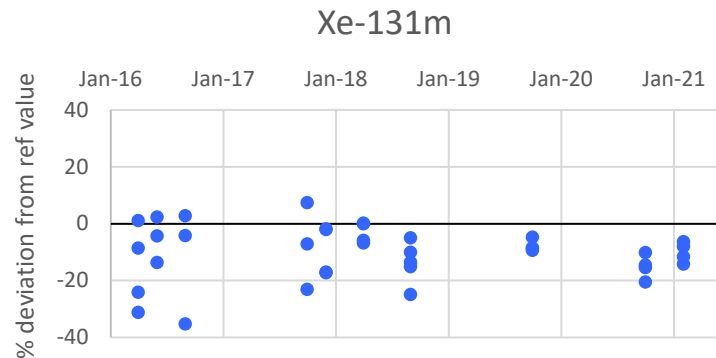
Sauna System Quality Control (internal)

- QC source (Cs-137 / Eu-154)
- γ : 662 keV - 123 keV - 43 keV - 32 keV
- β endpoint energy
- β beta spectrum fit
- β coincidence – Cs-137 scattering line
- Regular check on GC and sample flow
- Regular software updates



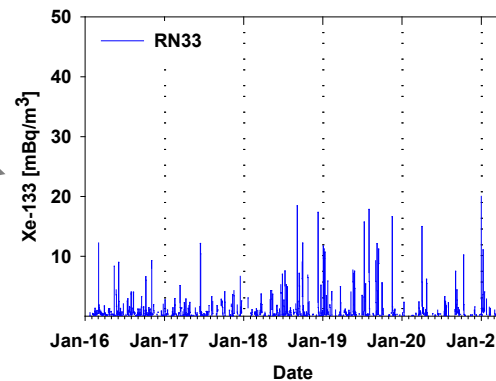
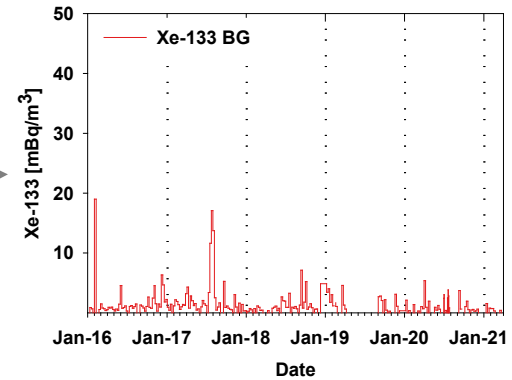
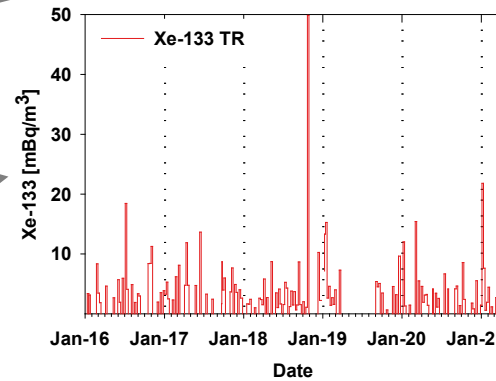
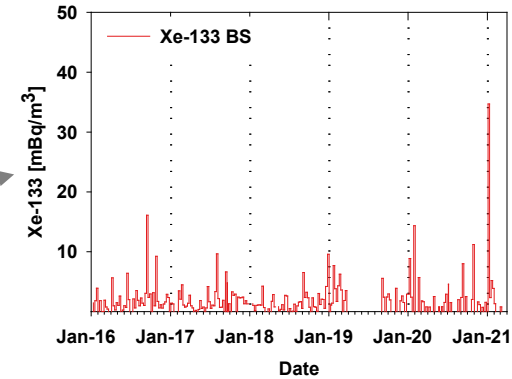
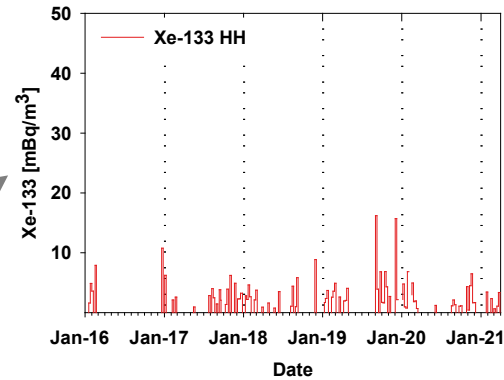
Sauna System Quality Control (PTEs)

- participation in Xe-PTEs organized by CTBTO's PTS since 2011
 - Official grading scheme: A/A-/B (includes false positives / false negatives)
 - Trends in activity concentrations:



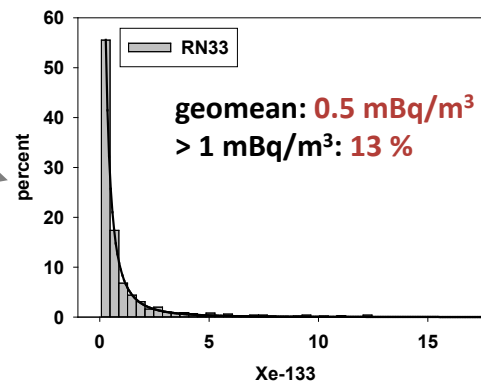
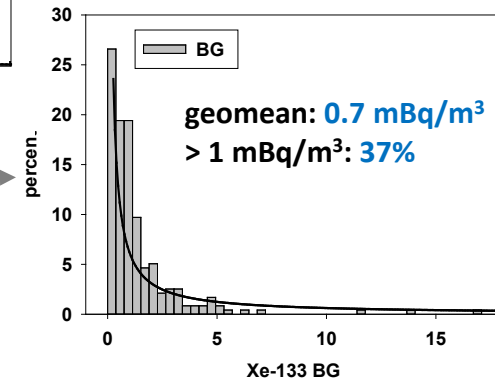
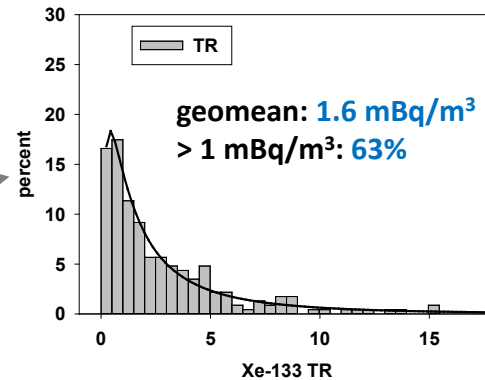
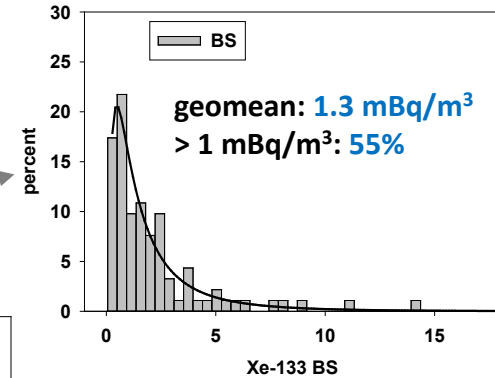
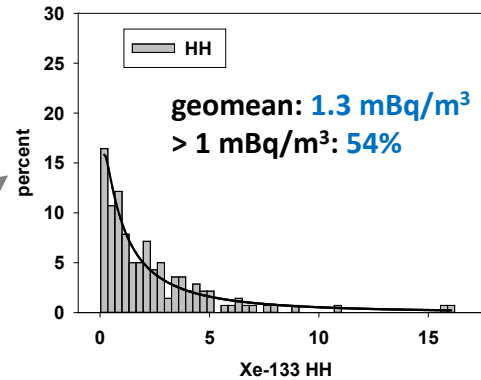


SAUNA data 2016-2021



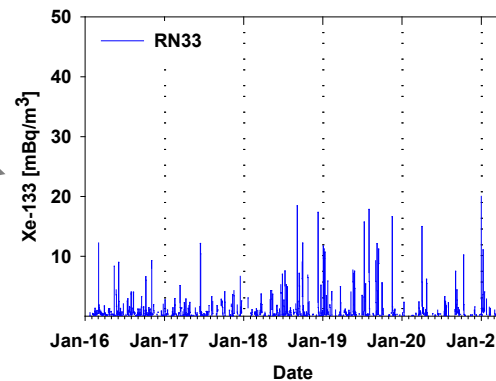
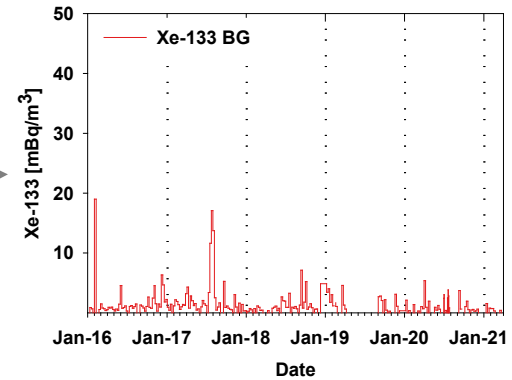
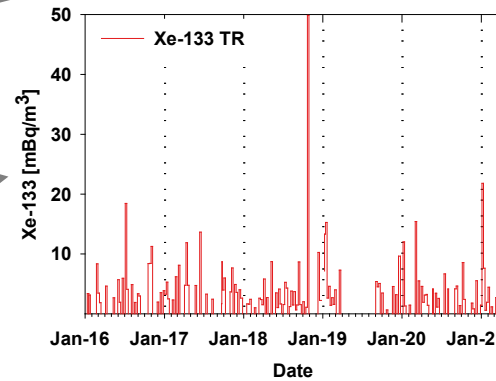
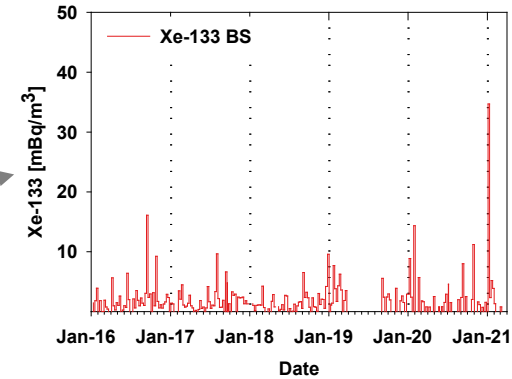
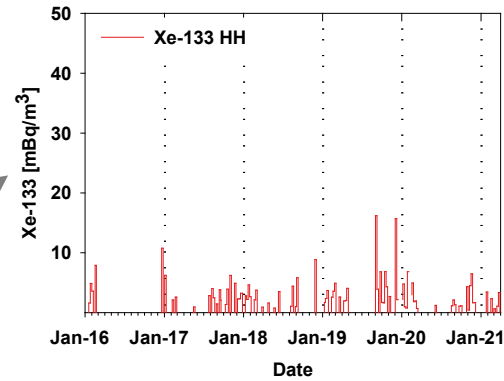
weekly sampling
daily sampling/SPALAX

SAUNA data 2016-2021

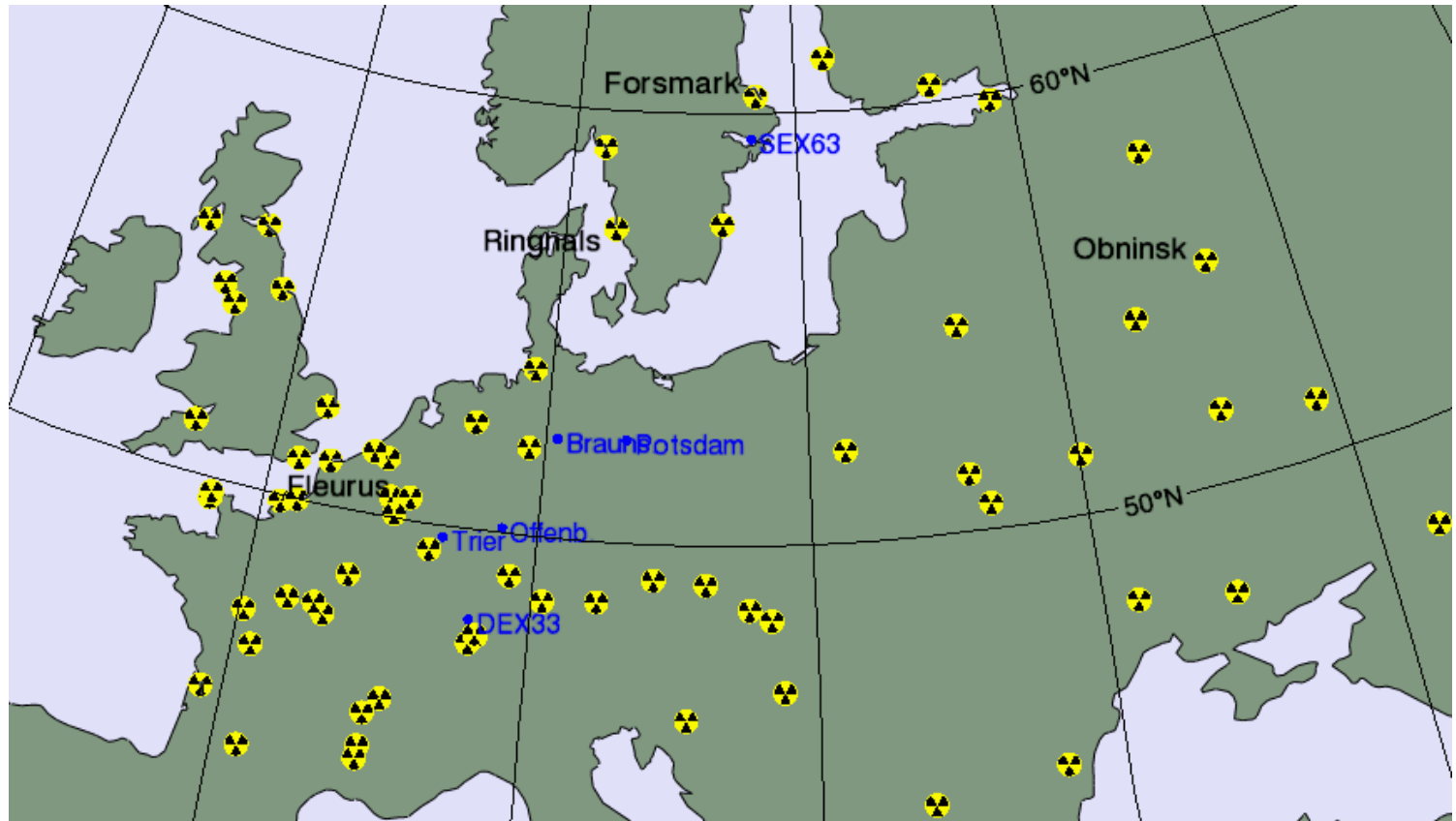


Amplitude / frequency of activity concentration
peaks generally higher in northern Germany

SAUNA data 2016-2021



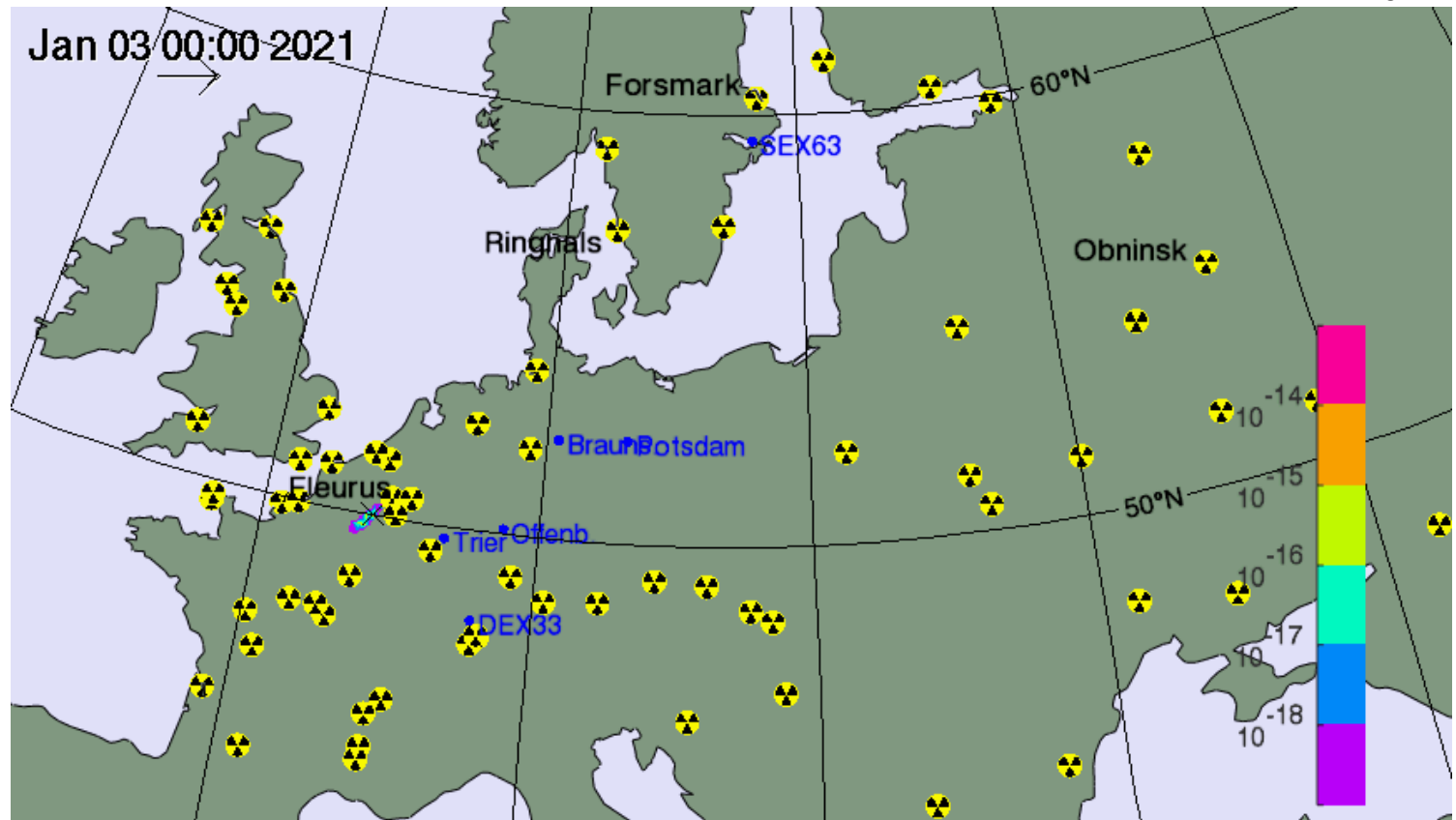
Event 2021



anomalous
Xe-detections
4.-11.1.2021

station	Trier	Braunschweig	Potsdam	Offenbach	DEX33	DEX33	SEX63
periode	4.-11.1.	4.-11.1.	4.-11.1.	4.-11.1.	9.-10.1.	10.-11.1.	10.1.
^{133}Xe [mBq/m ³]	21.8	34.7	18.5	13.3	3.8	11.5	17.9
$^{133\text{m}}\text{Xe}$ [mBq/m ³]	detected	detected	-	-	-	1.4	0.9
System	SAUNA	SAUNA	prop. counter	SAUNA	SPALAX	SPALAX	SAUNA

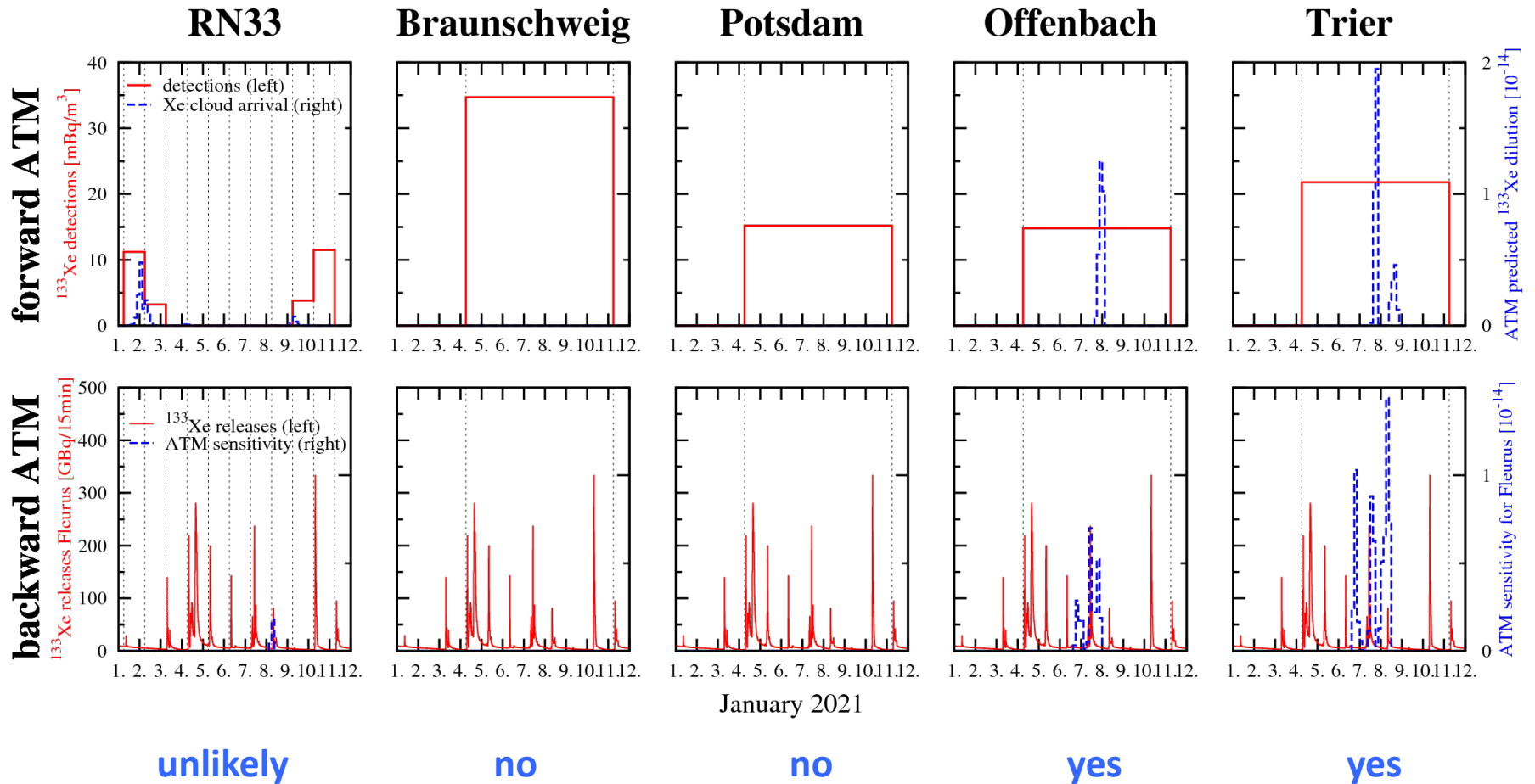
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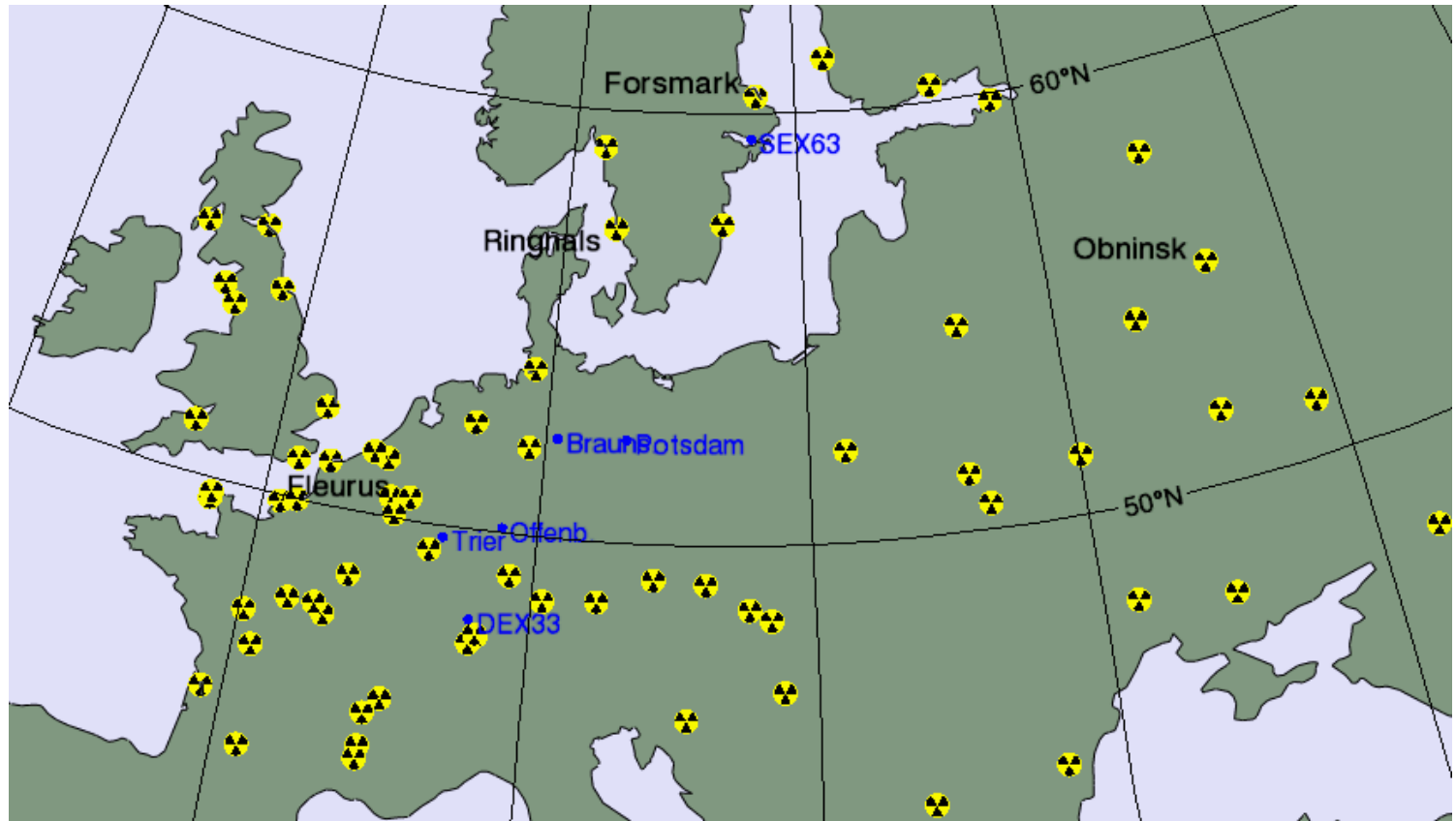
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System	SAUNA	SAUNA	prop. counter	SAUNA	SPALAX	SPALAX	SAUNA

Event 2021 – **Fleurus?**



Event 2021



anomalous
Xe-detections
4.-11.1.2021

station	Trier	Braunschweig	Potsdam	Offenbach	DEX33	DEX33	SEX63
periode	4.-11.1.	4.-11.1.	4.-11.1.	4.-11.1.	9.-10.1.	10.-11.1.	10.1.
^{133}Xe [mBq/m ³]	21.8	34.7	18.5	13.3	3.8	11.5	17.9
$^{133\text{m}}\text{Xe}$ [mBq/m ³]	detected	detected	-	-	-	1.4	0.9
System	SAUNA	SAUNA	prop. counter	SAUNA	SPALAX	SPALAX	SAUNA

Outlook

- Further investigation of the Jan 2021 event
- Xe - International: delivery and installation, 28 June 2021 at RN33
- SAUNA Accreditation: autumn 2021 (DIN EN ISO/IEC 17025)
- SAUNA Qb: Discussions on options with colleagues from FOI





**Federal Office for
Radiation Protection**

Legal Notice

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Contact for questions

SAUNA data 2016-2021



Station	Geom. mBqm ⁻³	Median mBqm ⁻³	% >Lc	% >1
Hamburg	1.3	1.4	67	54
Braunschweig	1.3	1.5	75	55
Trier	1.6	1.7	79	63
Bremgarten	0.7	0.8	69	37
RN 33	0.5	0.4	40	13

**Amplitude / frequency of activity concentration
peaks generally higher in northern Germany**