



PESTICIDES IN AIR AND SOIL IN AUSTRIA

Three projects. (Surrounding AIR, AustroPOPs, MONARPOP)

Monitoring of Pesticides in Austria

Investigated matrices

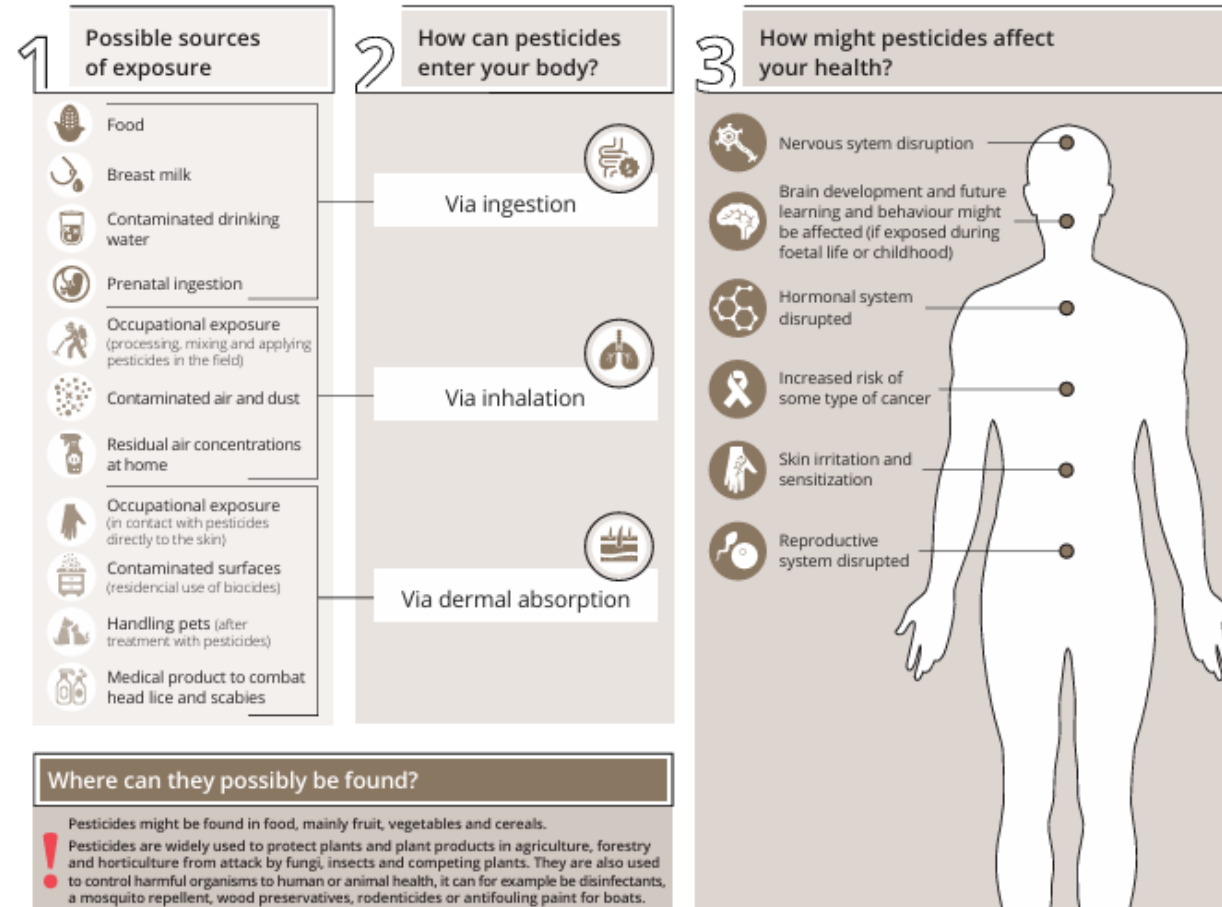
- **Water:** regular monitoring (ground water, surface water due to EU WFD; EU 2000/60/EG)
- **Feed/Food:** regular monitoring (EU 2017/625)
- **Biota:** some projects, alpine region (great crested grebe eggs, marmot, otter, bees, other insects ...)
- **Human:** HBM4EU; PARC (recently - urine of 200 children from Austria and more than 2000 from EU MS)
- **Air:** no regular pesticide monitoring (one project in arable land – newer pesticides; regularly measured on the summit of mountain Sonnblick SBO – OCP old ones)
- **Soil:** no regular pesticide monitoring (few projects, OCP MONARPOP; and AustroPOPs with selected pesticides)

Problems associated with Pesticides

HBM4EU Initiative

- Sources
- Pathways
- Effects

Figure 1. Overview of exposure sources, pathways and health effects associated with pesticides



Examples of negative effects of Pesticides to humans

- *Reproduction /Development*
 - prenatal pesticide exposure has long-term effects on reproductive function in boys (Wohlfahrt-Veje et al., 2012; Int J Andrology)
 - exposure to EDCs before/during pregnancy indicates that foetal contamination may be a risk factor for the development of male external genital malformation (Gaspari et al., 2012; Int J Andrology)
 - prenatal exposure to currently approved pesticides may cause earlier breast development in girls. The long-term consequences of these findings with regard to establishment of future reproductive function still remain unknown (Wohlfahrt-Veje et al., 2012; Int J Andrology)
 - link between Pyrethroid insecticides and ADHS in children (attention deficite hyperactivity disorder) (Purese et al., 2024)
- *Neurotoxicity*
 - link between pesticides and Parkinson ´s disease (Wang, Ritz et al. 2011)

Is accepted as occupational illness of farmers by insurances in certain countries (IT, FR, DE)

Pesticides in the AIR, 2024

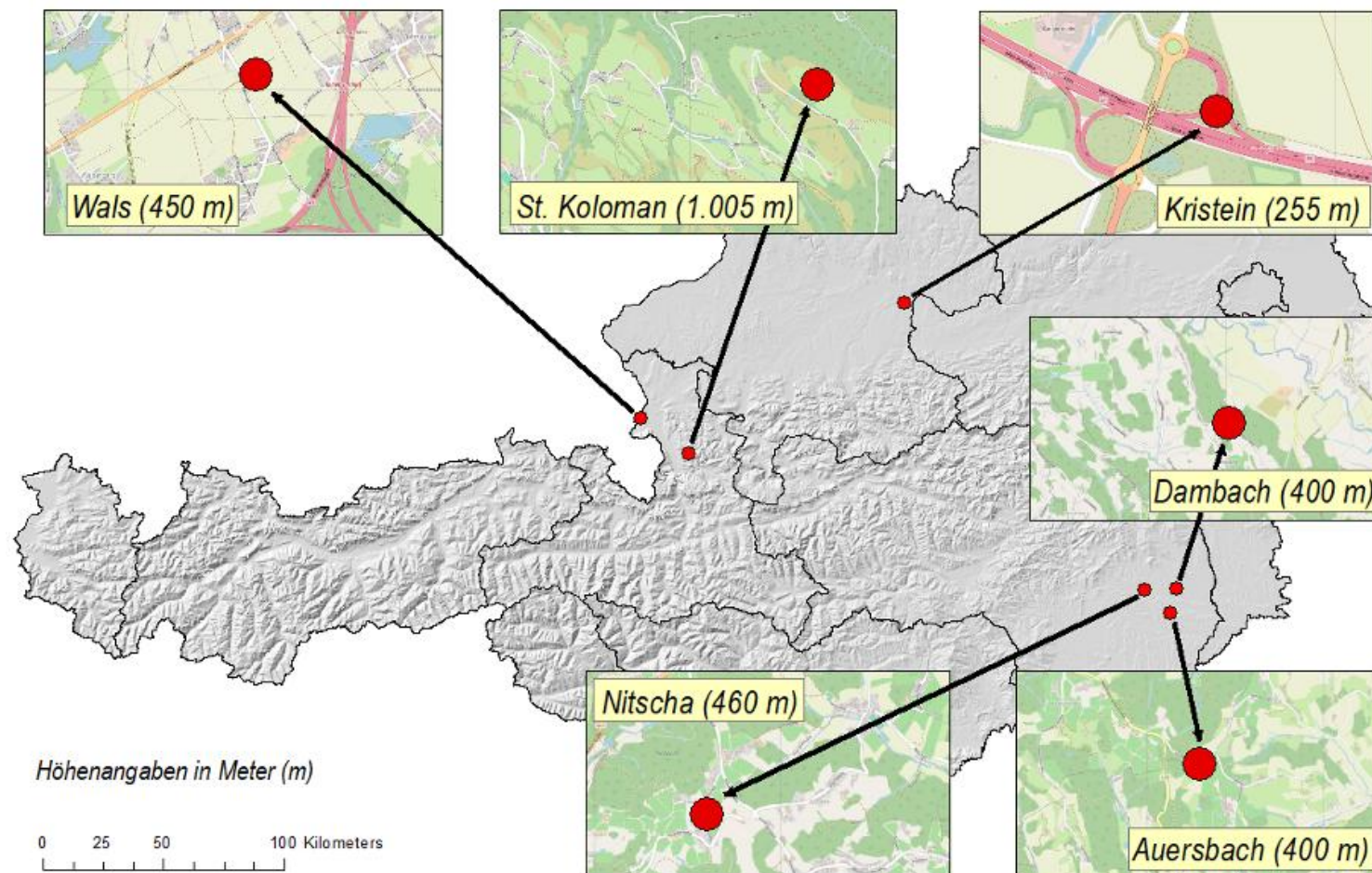
Project design



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- Three provinces: Styria (3 sites), Salzburg (2), Upper Austria (1)
- Passive sampling: 4 months of exposure (2) and (1)
- Selected area: orchards, vineyards, grassland, arable land
- Pesticide analysis: >700 pesticides, recent substances in use including glyphosate, AMPA and glufosinate

Sampling sites in Austria - AIR



Sampling Equipment

- Polyurethan foam (PUF)
for appr. 700 pesticides and metabolites
- Polyester foam (PEF)
 - for glyphosate, AMPA, glufosinate



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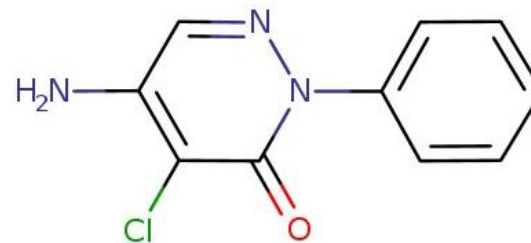
Results of samples in AIR

- **47** active substances and **4** metabolites
- 40,4 % herbicides
- 40,4 % fungicides
- 14,9 % insecticides
- 4,3 % repellents

green: approved
gray: not approved

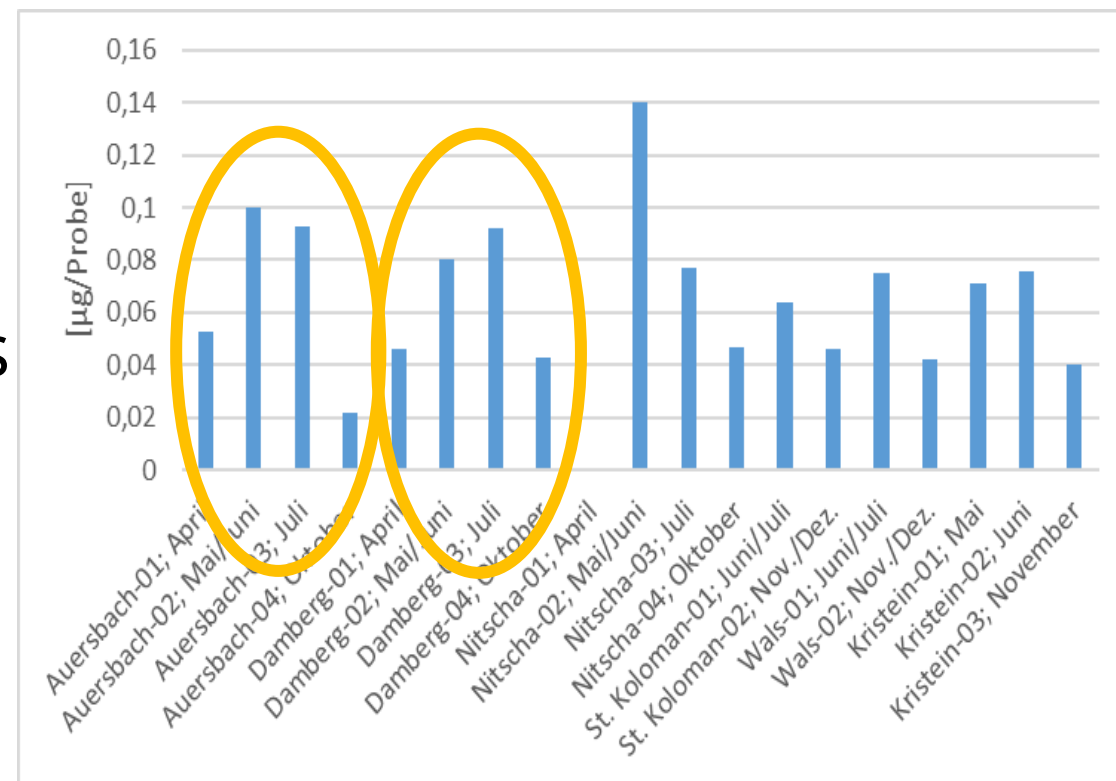
2,4-D	Glyphosat
3,5,6-Trichloro-2-pyridinol	Hexachlorbenzol
Acclonifen	Mandipropamid
Anthrachinon	MCPA
Benalaxyl	Metamitron
Boscalid	Metobromuron
Chloranthraniliprol	Metalaxyl
Chloridazon	Metolachlor
Chlorpyrifos	Metrafenon
Chlorpyrifos-methyl	Metribuzin
cis-Tefluthrin	Penconazol
Clomazon	Pendimethalin
Cymoxanil	Pentachlorbenzol
Cyprodinil	Phenmedipham
DEET	Pirimicarb
Dimethenamid	Pirimicarb-desmethyl-formamido
Dimethomorph	Propamocarb
Diphenylamin	Prosulfocarb
DNOC	Pymetrozin
Endosulfansulfat	Pyrimethanil
Ethofumesat	Spiroxamin
Fluazinam	Terbuthylazin
Fludioxonil	Terbuthylazin-desethyl
Flufenacet	Tri-allat
Fluopyram	Trifloxystrobin
	Zoxamid

Chloridazon



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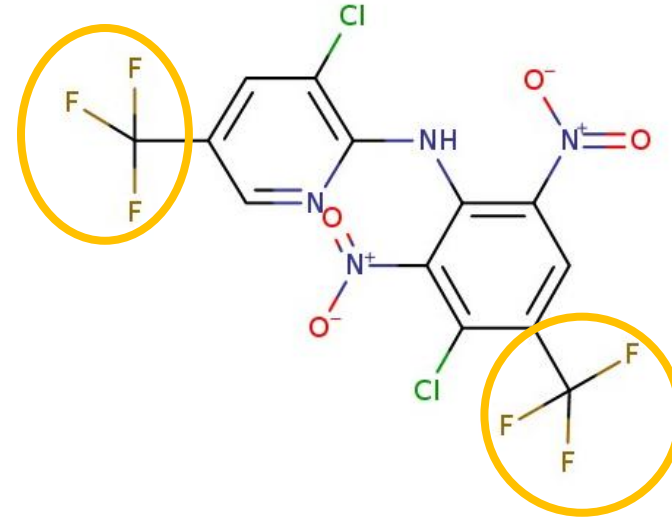
- Not approved since 2018
- Found at all sites, and sampling dates (except one)
- Concentration profile indicates use in the summer months.
- Hazardous properties:
(harmonised classification acc. CLP, 1272/2008)
 - Skin sens 1
 - Aquatic Acute 1
 - Aquatic Chronic 1



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Fluazinam

- Approved
- Found on 4 of 6 sites
- Hazardous properties:
harmonised classification acc.
CLP, 1272/2008
 - Eye Dam1
 - Skin Sens 1A
 - Acute Tox 4
 - Aquatic Acute 1
 - Aquatic Chronic1
 - Repr 1



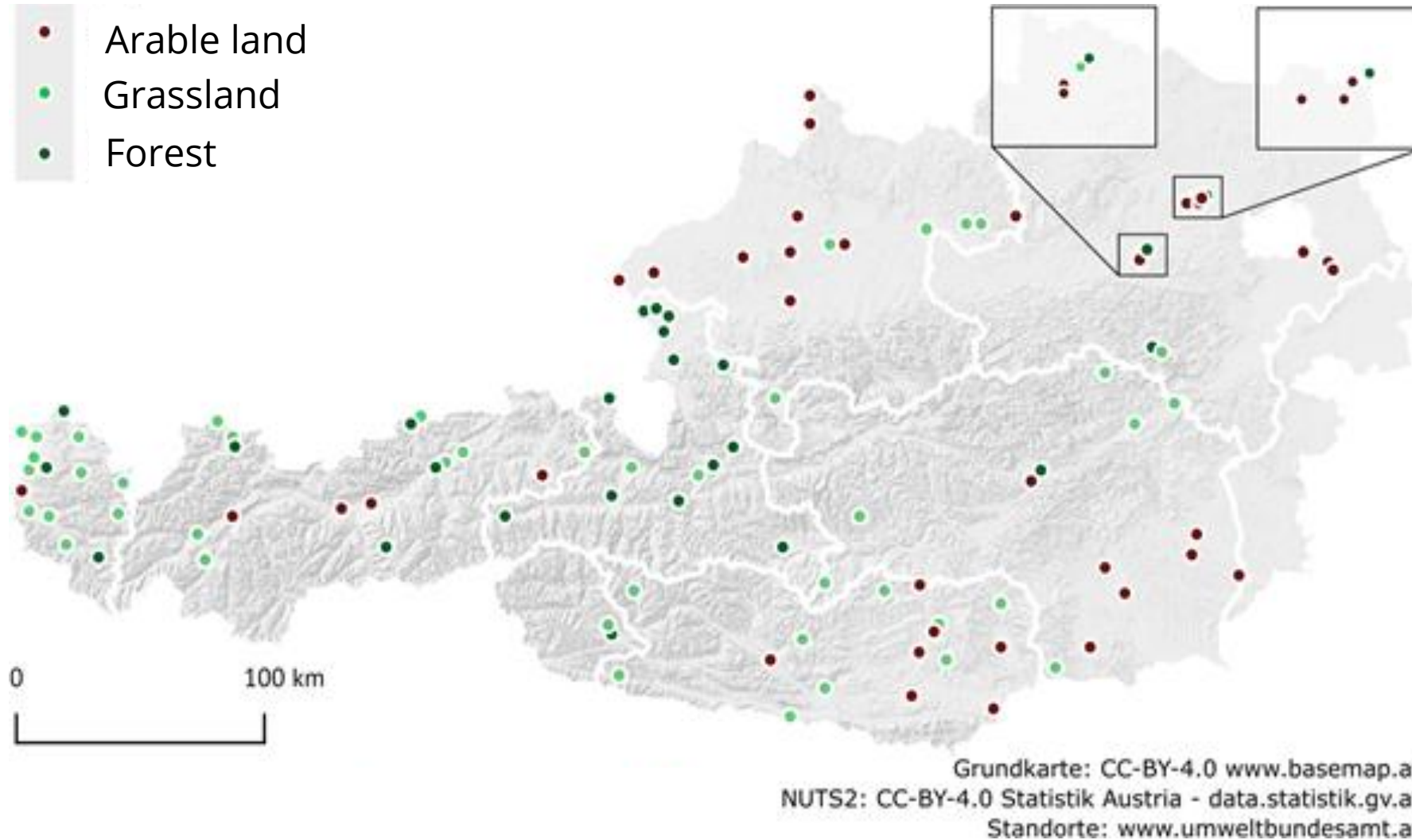
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PFAS-Pesticide → TFA harmonised
classification acc. CLP, 1272/2008:
Acute tox 4, Skin Corr 1A, Aquatic
Chronic 3
(proposed: Repr 1B, PMT, vPvM)

Summary Pesticides in AIR, 2024

- We detected 47 active substances, 11 of them are currently not approved
- Where do they come from?
 - long-range atmospheric transport
 - resuspension from soils contaminated with persistent pesticides such as HCB
 - use of pesticides that are not approved for use anymore?
- Further investigations needed to clarify sources of the respective pesticides
- Cooperation with stakeholders

SOIL: Project AustroPOPs, 2021



p,p-DDT

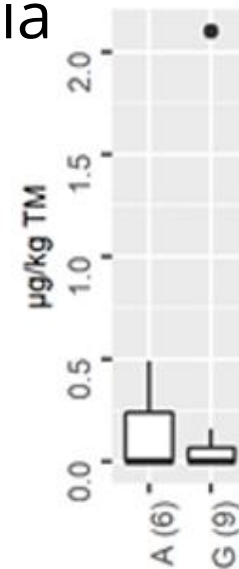
Arable land

Grassland

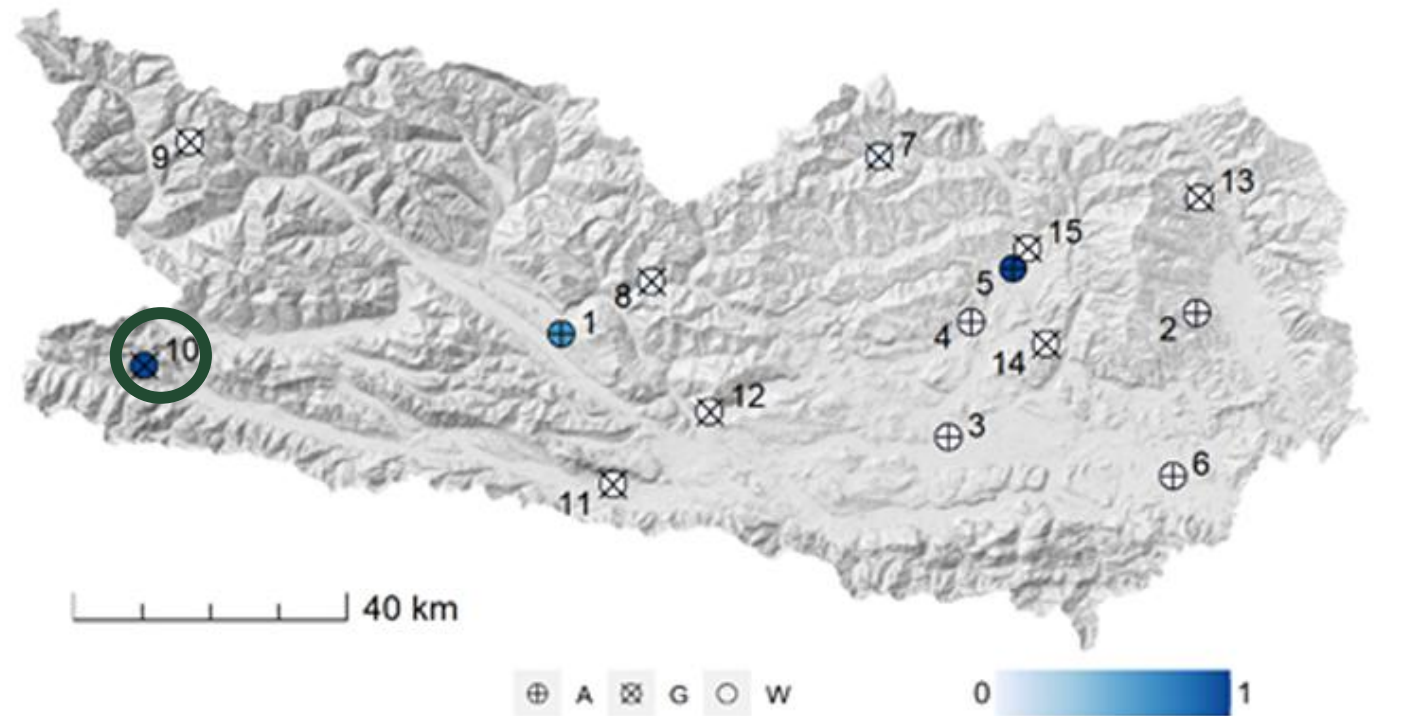
Forest

- Federal State of Carinthia

- highest concentration of p,p-DDT in grassland
- p,p-DDT is ubiquitous



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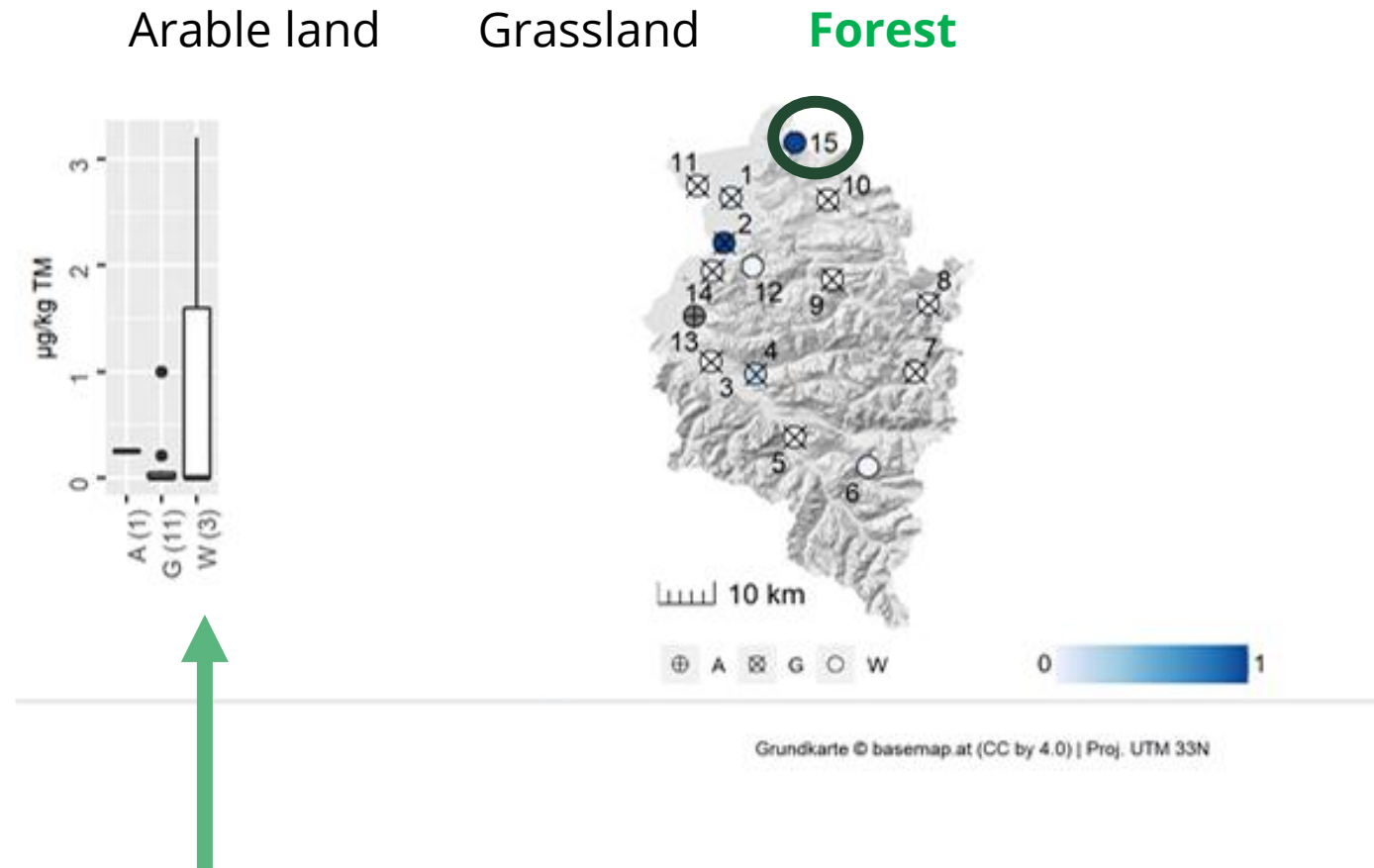


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p,p-DDE

- Federal State of Vorarlberg

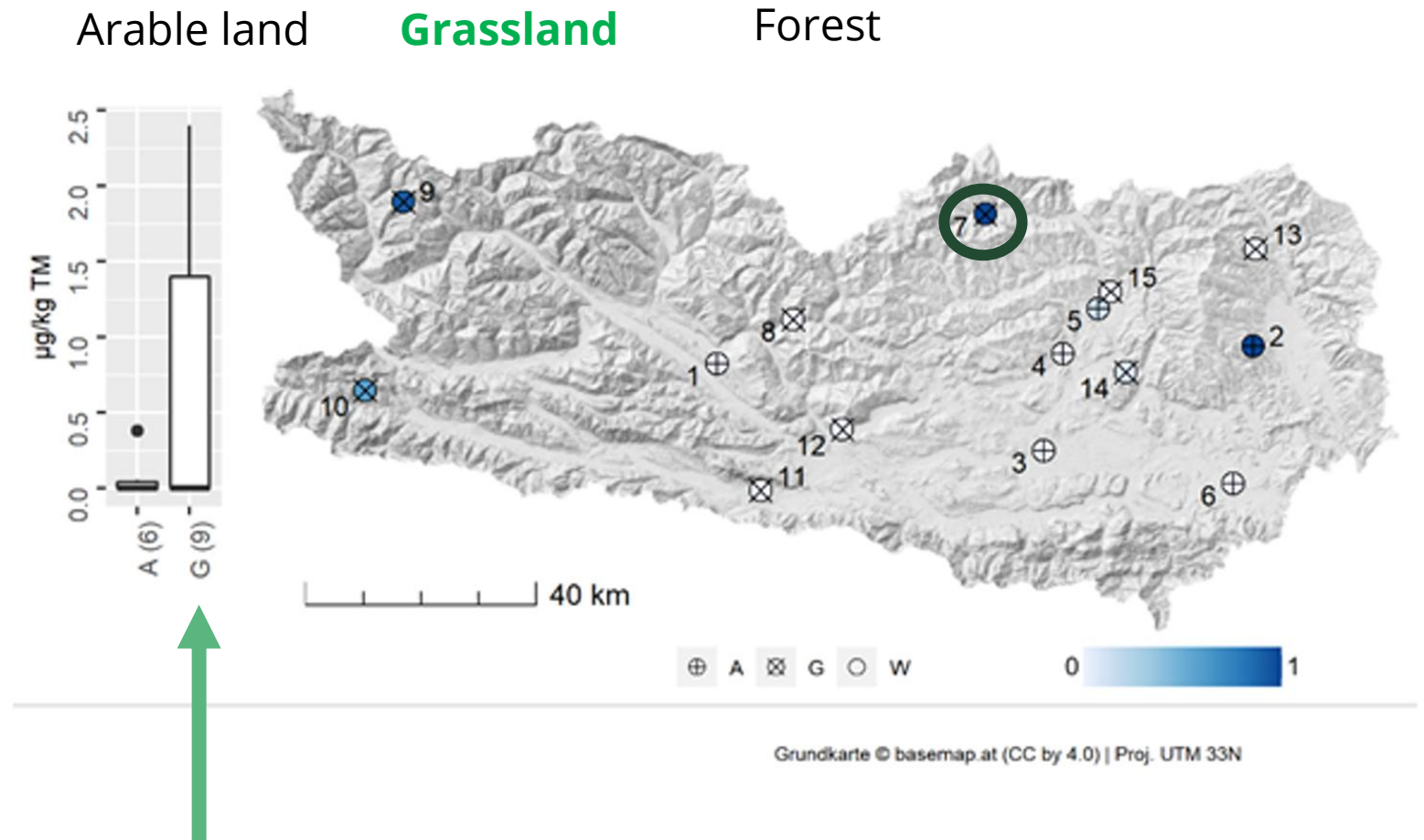
- highest concentration of p,p-DDE in forest
- metabolite of DDT



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HCB

- Federal State of Carinthia
 - highest concentration of HCB in grassland



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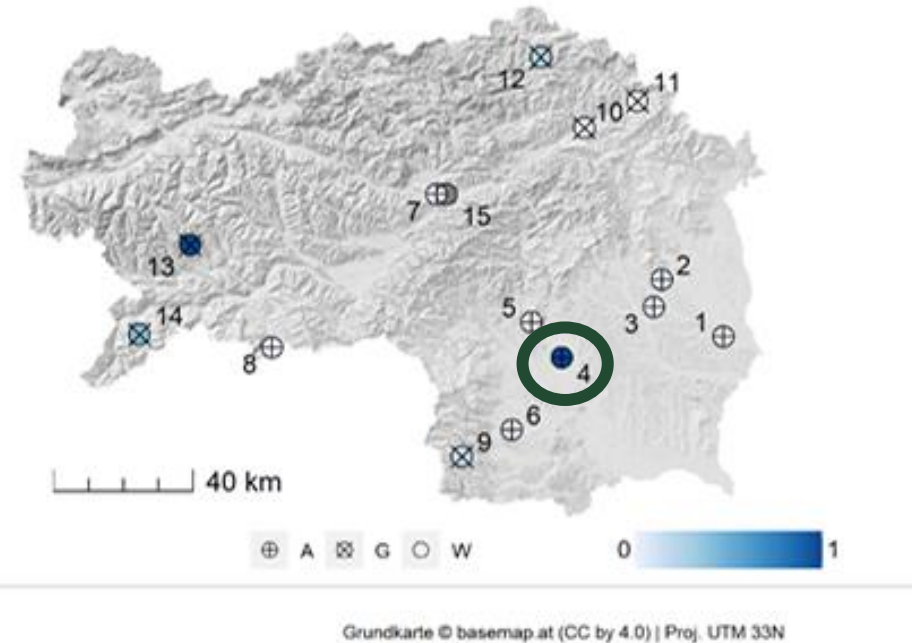
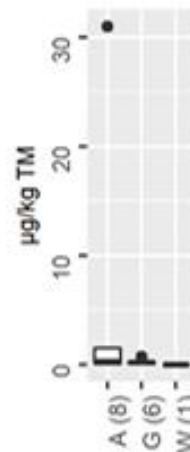
Pendimethalin

- Federal State of Styria
- highest concentration on arable land (31 µg/kg DM)
- a follow-up investigation was initiated

Arable land

Grassland

Forest



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Summary AustroPOPs, 2021

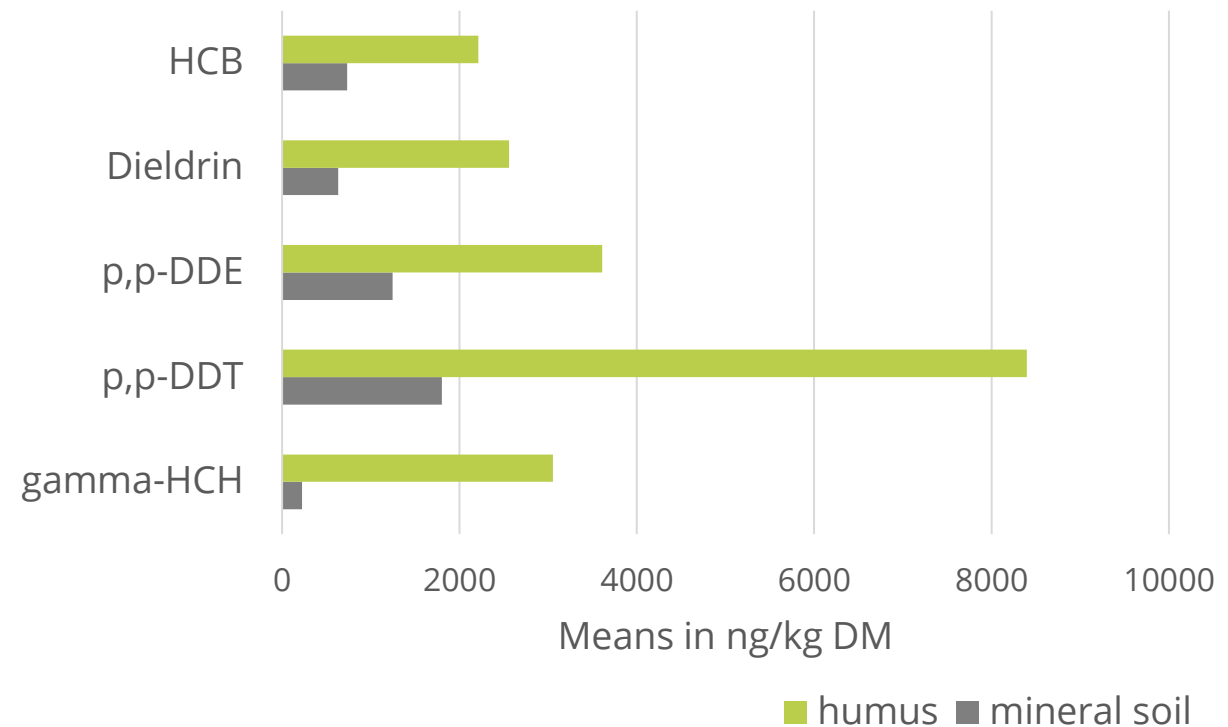
- >100 sites in Austria, arable land, grassland, forest
- each province selected their own sites, results are not comparable
- up to 8 pesticides were detected in Styria
 - OCP (o,p-DDT, p,p-DDT, p,p-DDE, HCB, PeCB, cis- and trans-chlordane) and Pendimethalin
- Based on the results a follow-up investigation was initiated (Pendimethalin)
(up to 60 µg/kg DM, not published)
- Question:
 - When is the best time for soil sampling? (winter?)

SOIL: MONARPOP, 2008

MONARPOP (2005-2008)

- „Monitoring network in the alpine region for persistent and other organic pollutants“
- 40 sites
- 5 countries (IT, DE, CH, SLO, AT)
- 7 high profiles
- 3 alpine summits (samplers)
 - Sonnblick (AT)
 - Zugspitze (DE)
 - Weißfluhjoch (CH)
- Spruce needles
- Humus
- Soil

OCP in humus and mineral soil



MONARPOP 2008 results

Highest concentrations found:

- Lindane: needles
- DDT: humus
- DDE: mineral soil

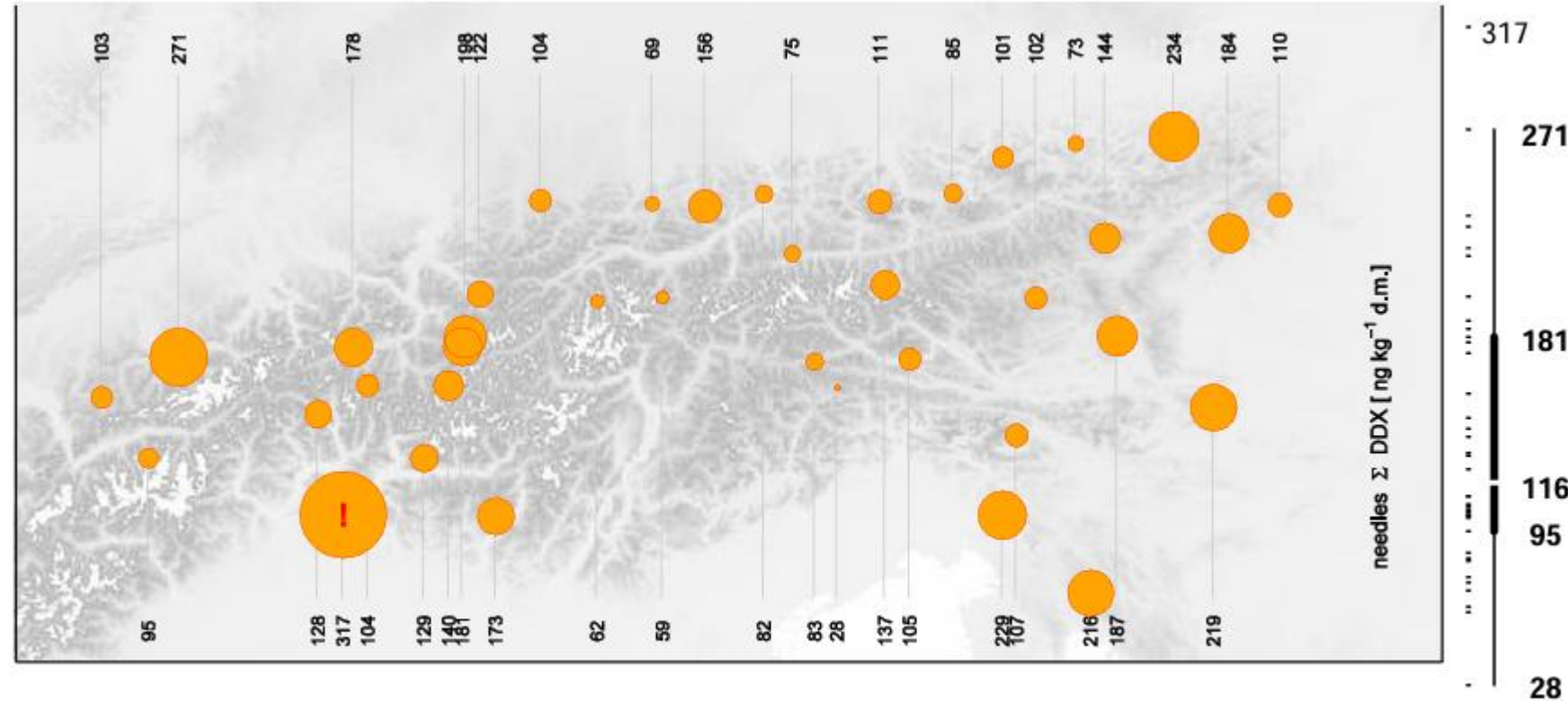


Figure 3-20: Needle DDX content (sum of DDT, DDD and DDE isomers)

MONARPOP, 2008

Summary MONARPOP, 2008

- 25 sites in Austrians forest (background sites)
- Only OCP, almost all could be detected
- Lindane highest in needles, DDT in humus and DDE in mineral soil
- In almost all hight profiles OCP concentration increased with altitude
- As part of a current study, we are repeating the analyses at selected sites to evaluate the effectiveness of the Stockholm Convention.



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Summary

- Pesticides were detected in both air and soil across Austria, including currently used substances and legacy pollutants such as DDT and HCB.
- Air monitoring identified 47 active substances, including several no longer approved pesticides, indicating multiple potential sources and transport pathways.
- Soil investigations (AustroPOPs and MONARPOP) confirmed the continued presence of persistent organic pollutants and highlighted regional differences in contamination patterns.

Conclusions

- Pesticides are used frequently and can be detected in environmental compartments in considerable concentrations (up to ~10-100 µg/kg DM in soil) .
- Persistent pesticides remain detectable decades after their use, demonstrating their long-term environmental persistence.
- The current use of pesticides with PBT, PMT and vPvB, vPvM (new hazardous classes) should be avoided, as well as highly hazardous pesticides.
- Monitoring of air and soil can be used to identify persistent substances and inform policy.
- Monitoring should be expanded and harmonized to improve understanding of pesticide sources, distribution, and trends.
- Monitoring supports risk assessment, stakeholder awareness, and the implementation of the Soil Monitoring Law (SML).

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Pesticides in Austria
Cremona, 2nd Sep 2026

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Pesticides in Austria
Cremona, 2nd of September 2026