ČESKÝ
HYDROMETEOROLOGICKÝ
ÚSTAV

Mixtures of xenobiotics in groundwater of the Czech Republic

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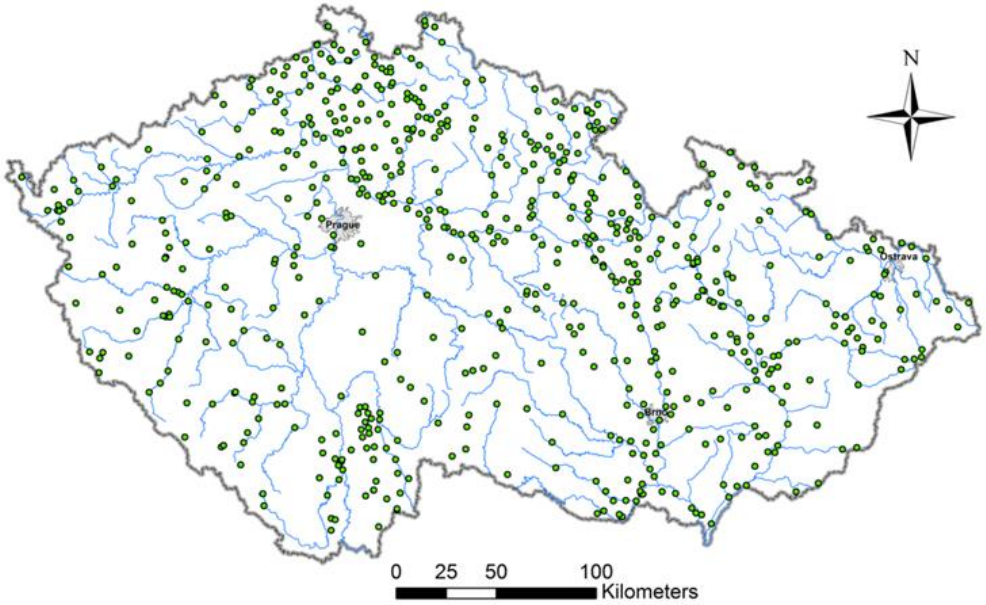
Ochrana vodných zdrojov 2019
Bratislava, 18.6.2019

Content

- CHMI monitoring
- Pesticides
- Other organic micropollutants

CHMI monitoring

- ~ 700 sites



- Surveillance monitoring (2x per 6 years)
- Same contaminants monitored at all sites

- Operational monitoring (4x per 6 years)
- According results of surveillance monitoring

(pesticides, pharm, benzotriazoles, PFCs all sites)





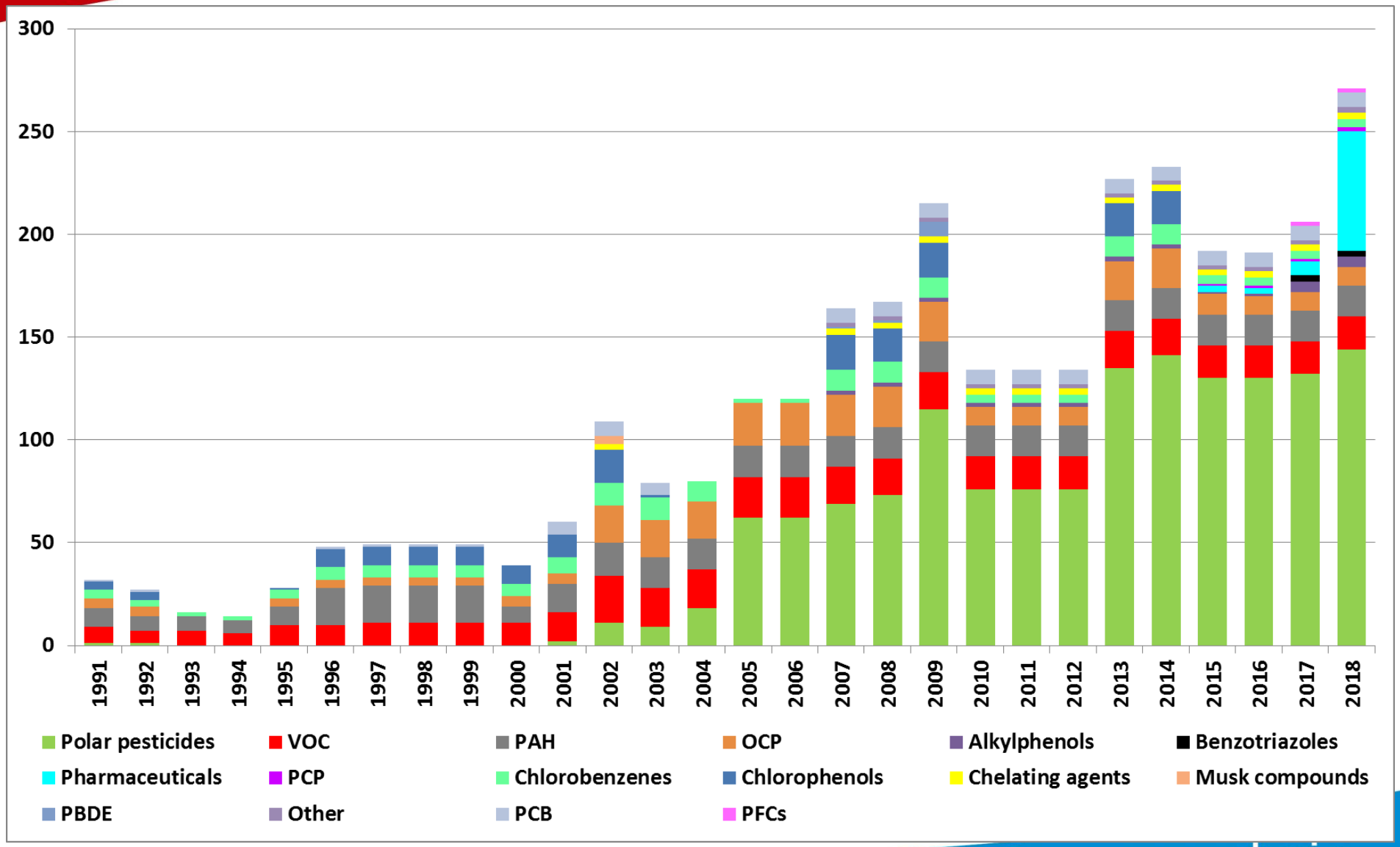




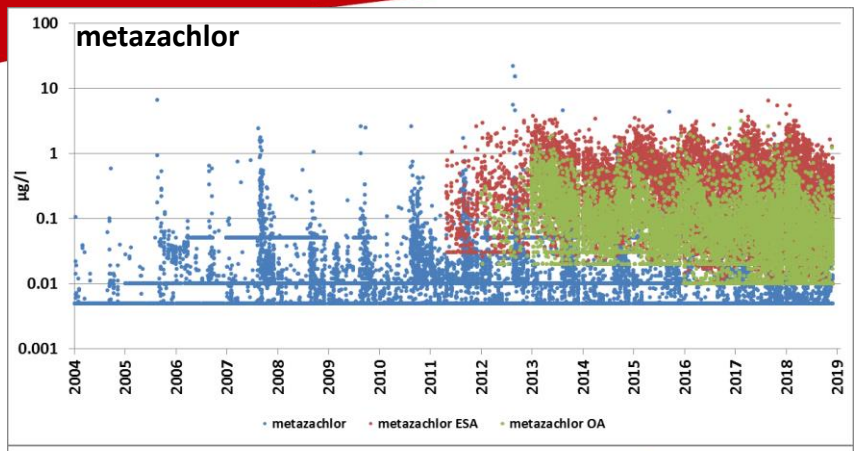


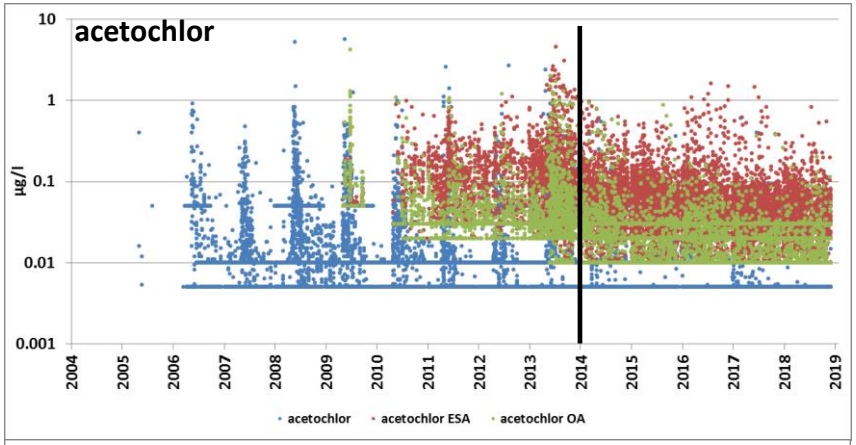


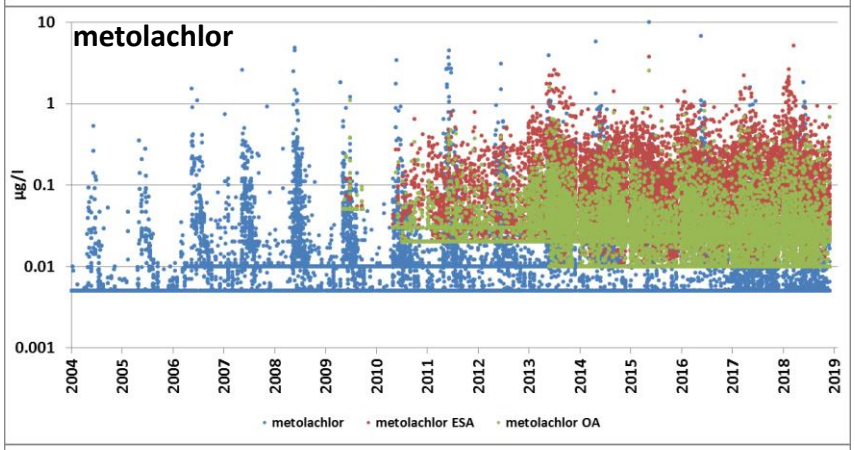

Monitoring of organic micropollutants

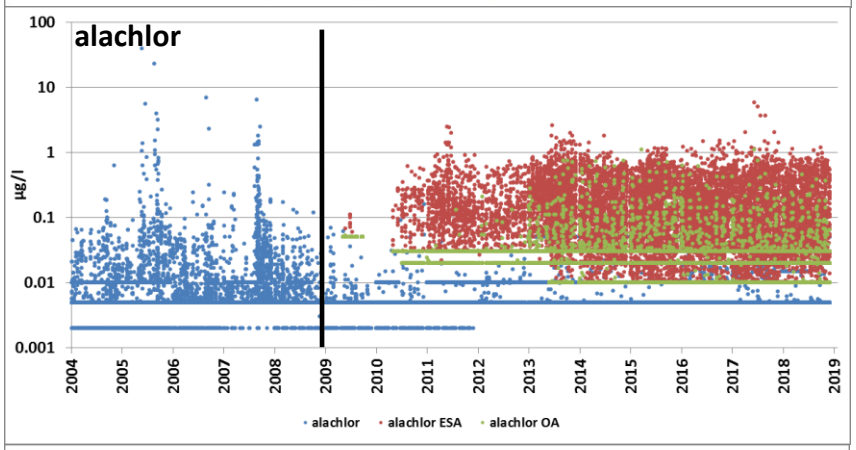


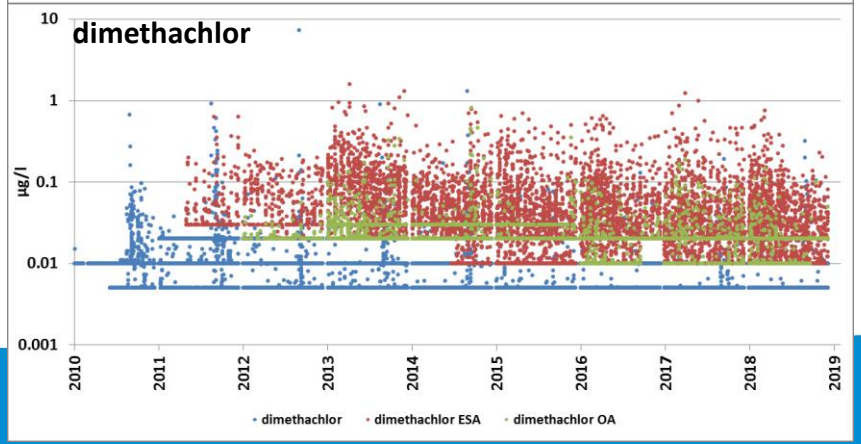
Pesticide concentrations in surface waters

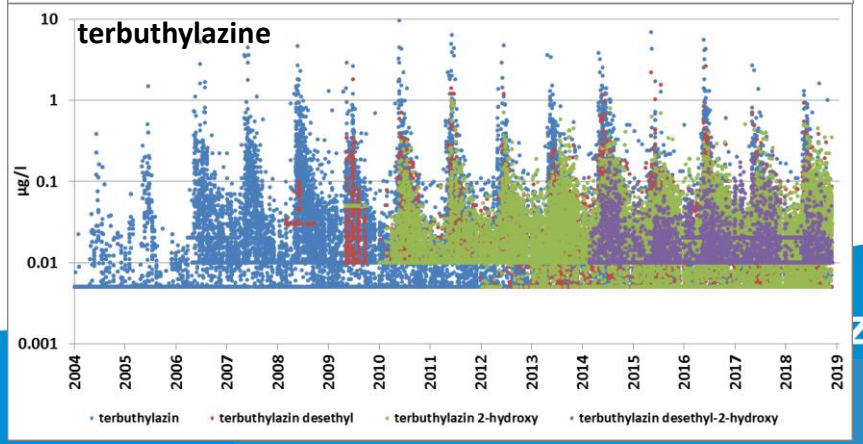




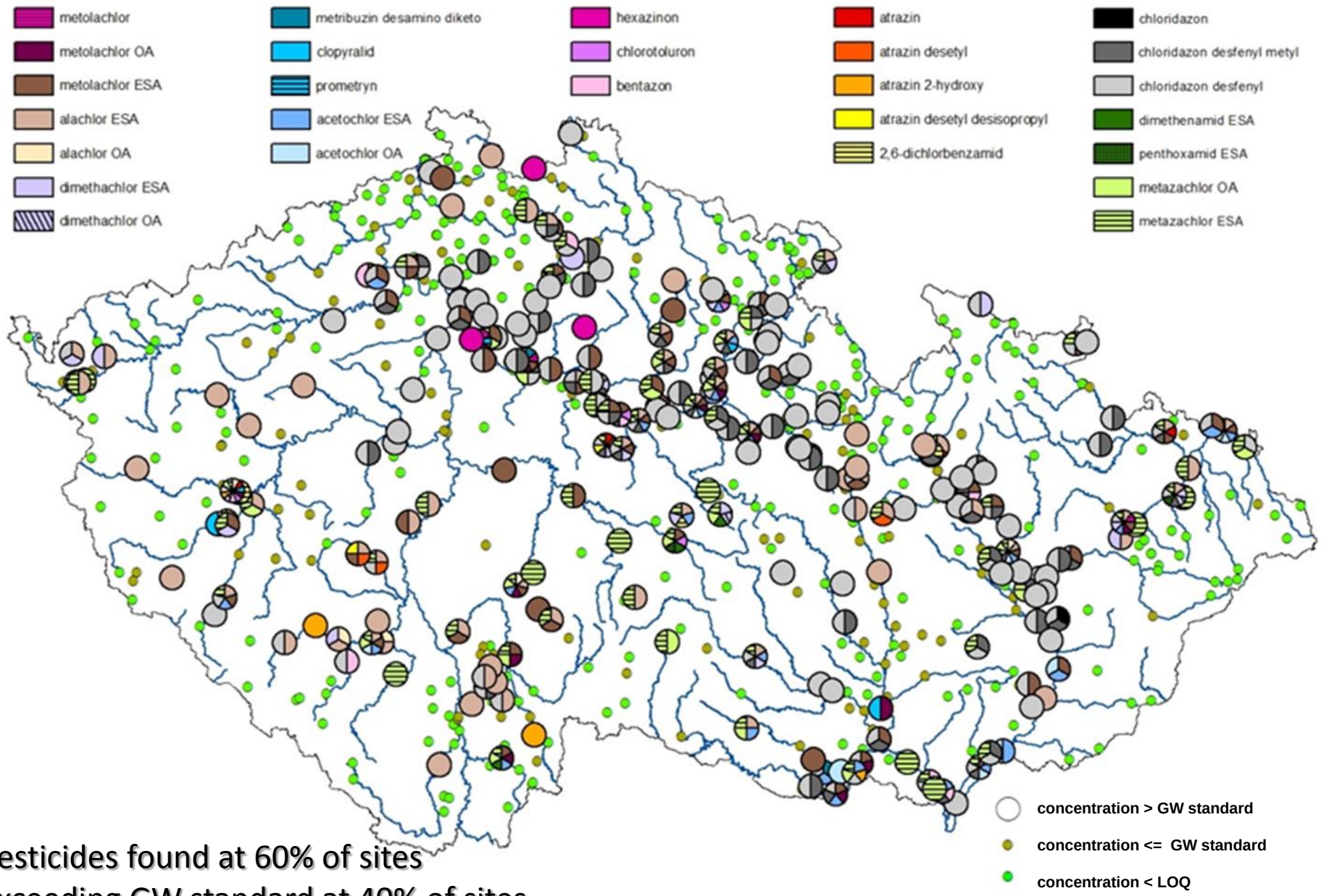








2018 - Pesticides exceeding GW standard at > 2 sites

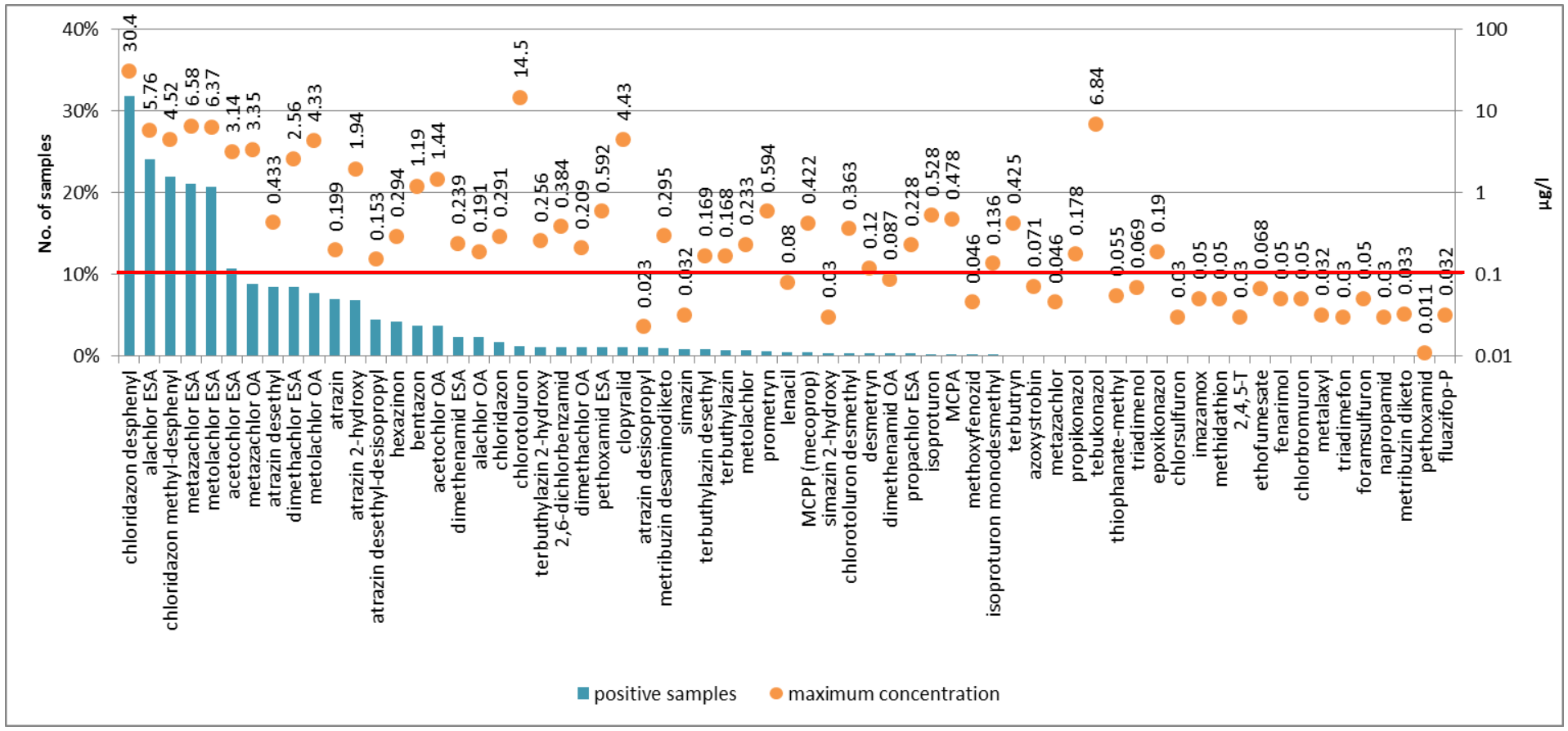


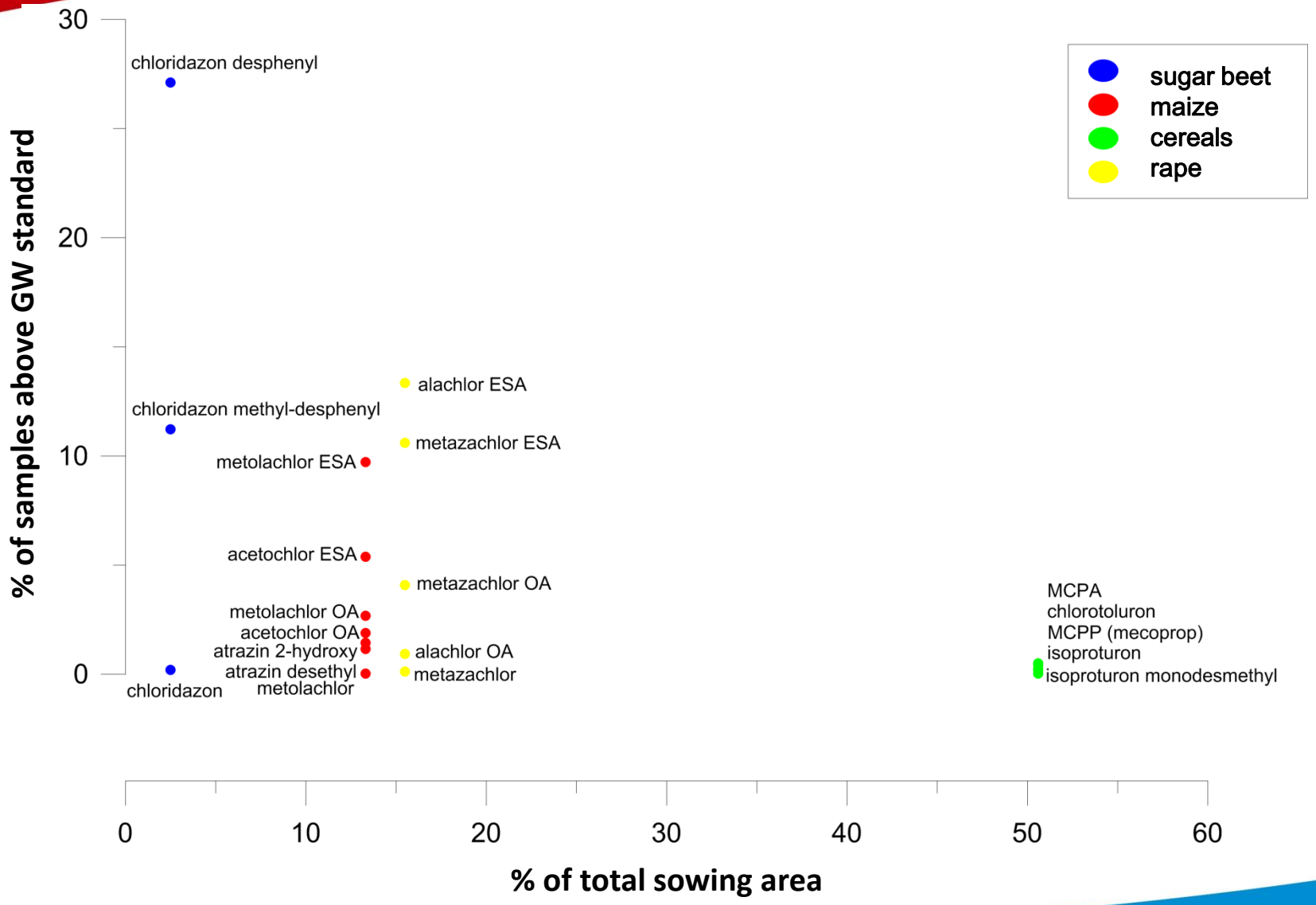
Pesticides found at 60% of sites

Exceeding GW standard at 40% of sites

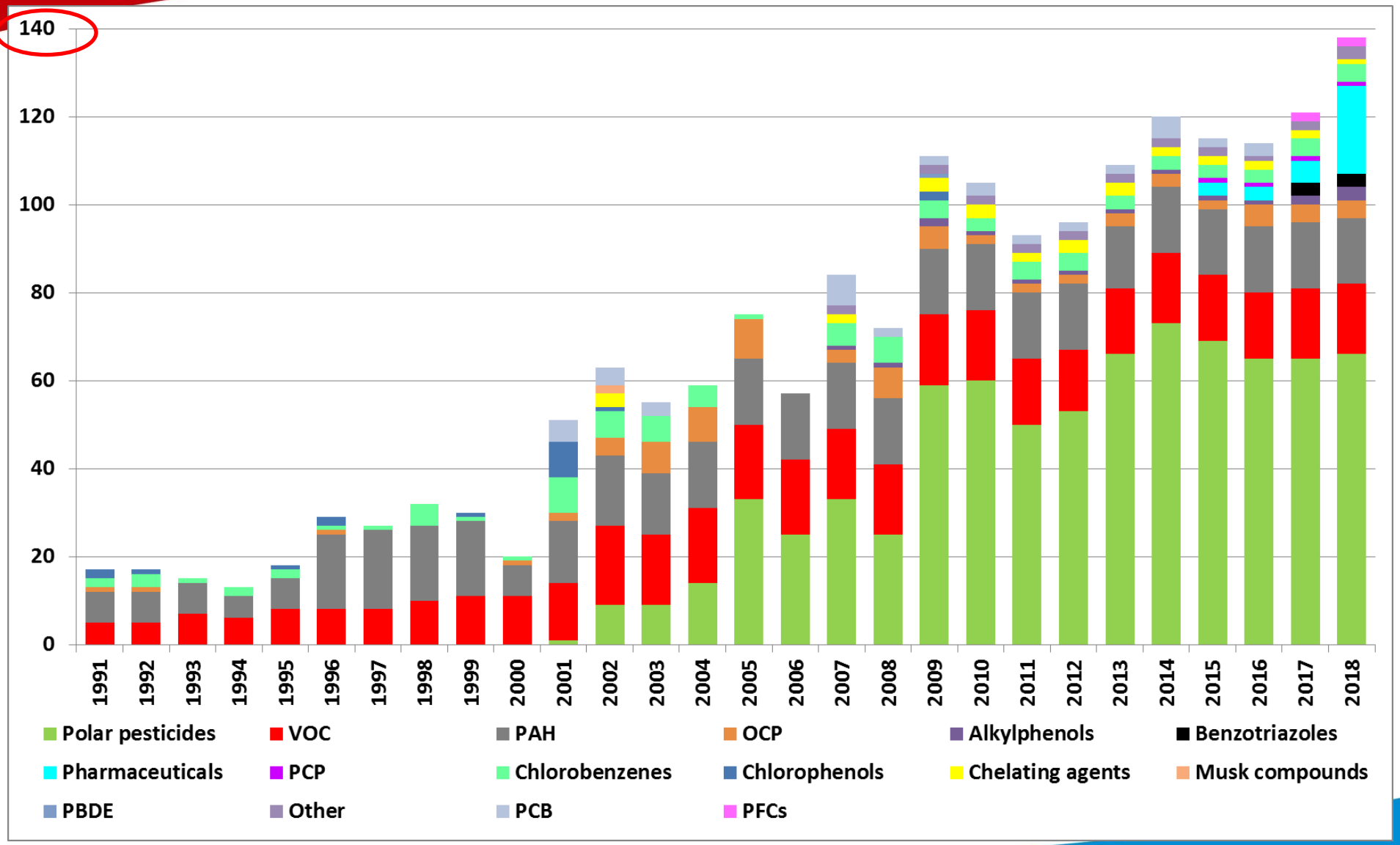
Exceeding GW standard for sum of pesticides at 30% of sites

2018

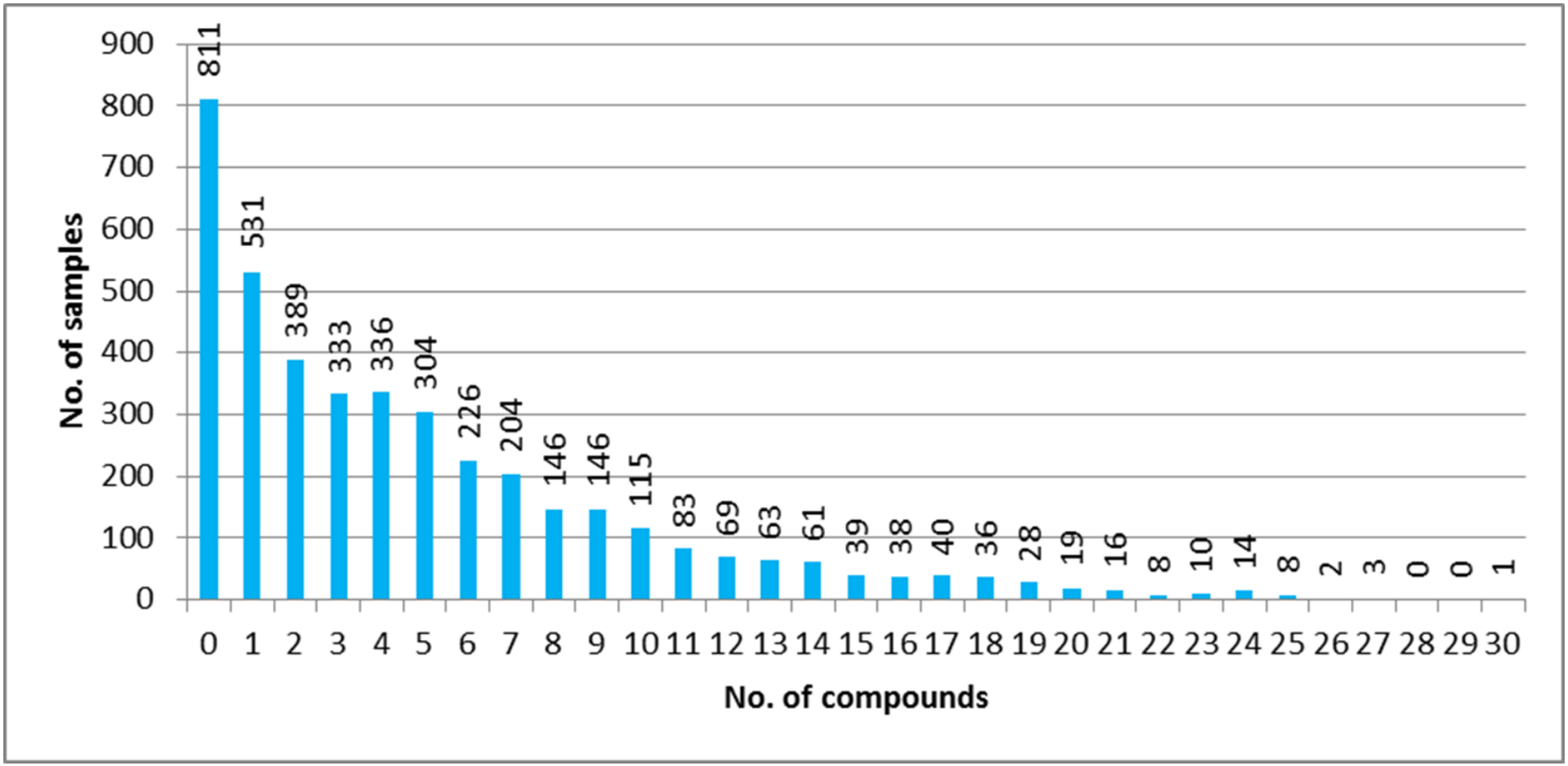

No. of samples
40%
30%
20%
10%
0%
100
10
1
0.1
0.01
µg/l
30.4
5.76
4.52
6.58
6.37
3.14
3.35
0.433
2.56
4.33
0.199
1.94
0.153
0.294
1.19
1.44
0.239
0.191
0.291
14.5
0.256
0.384
0.209
0.592
4.43
0.023
0.295
0.032
0.169
0.168
0.233
0.594
0.08
0.422
0.03
0.363
0.12
0.087
0.228
0.528
0.478
0.046
0.136
0.425
0.071
0.046
0.178
6.84
0.055
0.069
0.19
0.03
0.05
0.05
0.03
0.068
0.05
0.05
0.032
0.03
0.05
0.03
0.033
0.011
0.032
chloridazon desphenyl
alachlor ESA
chloridazon methyl-desphenyl
metazachlor ESA
metolachlor ESA
acetochlor ESA
metazachlor OA
atrazin desethyl
dimethachlor ESA
metolachlor OA
atrazin
atrazin 2-hydroxy
atrazin desethyl-desisopropyl
hexazinon
bentazon
acetochlor OA
dimethenamid ESA
alachlor OA
chloridazon
chlorotoluron
terbuthylazin 2-hydroxy
2,6-dichlorbenzamid
dimethachlor OA
pethoxamid ESA
clopyralid
atrazin desisopropyl
metribuzin desaminodiketo
simazin
terbuthylazin desethyl
terbuthylazin
metolachlor
prometryn
lenacil
MCPP (mecoprop)
simazin 2-hydroxy
chlorotoluron desmethyl
desmetryn
dimethenamid OA
propachlor ESA
isoproturon
MCPA
methoxyfenozid
isoproturon monodesmethyl
terbutryn
azoxystrobin
metazachlor
propikonazol
tebukonazol
thiophanate-methyl
triadimenol
epoxikonazol
chlorsulfuron
imazamox
methidathion
2,4,5-T
ethofumesate
fenarimol
chlorbromuron
metalaxyl
triadimefon
foramsulfuron
napropamid
metribuzin diketo
pethoxamid
fluazifop-P
positive samples
maximum concentration


% of samples above GW standard
30
20
10
0
chloridazon desphenyl
chloridazon methyl-desphenyl
metolachlor ESA
acetochlor ESA
metolachlor OA
acetochlor OA
atrazin 2-hydroxy
atrazin desethyl
chloridazon
metolachlor
alachlor ESA
metazachlor ESA
metazachlor OA
alachlor OA
metazachlor
MCPA
chlorotoluron
MCPP (mecoprop)
isoproturon
isoproturon monodesmethyl
sugar beet
maize
cereals
rape
0
10
20
30
40
50
60
% of total sowing area

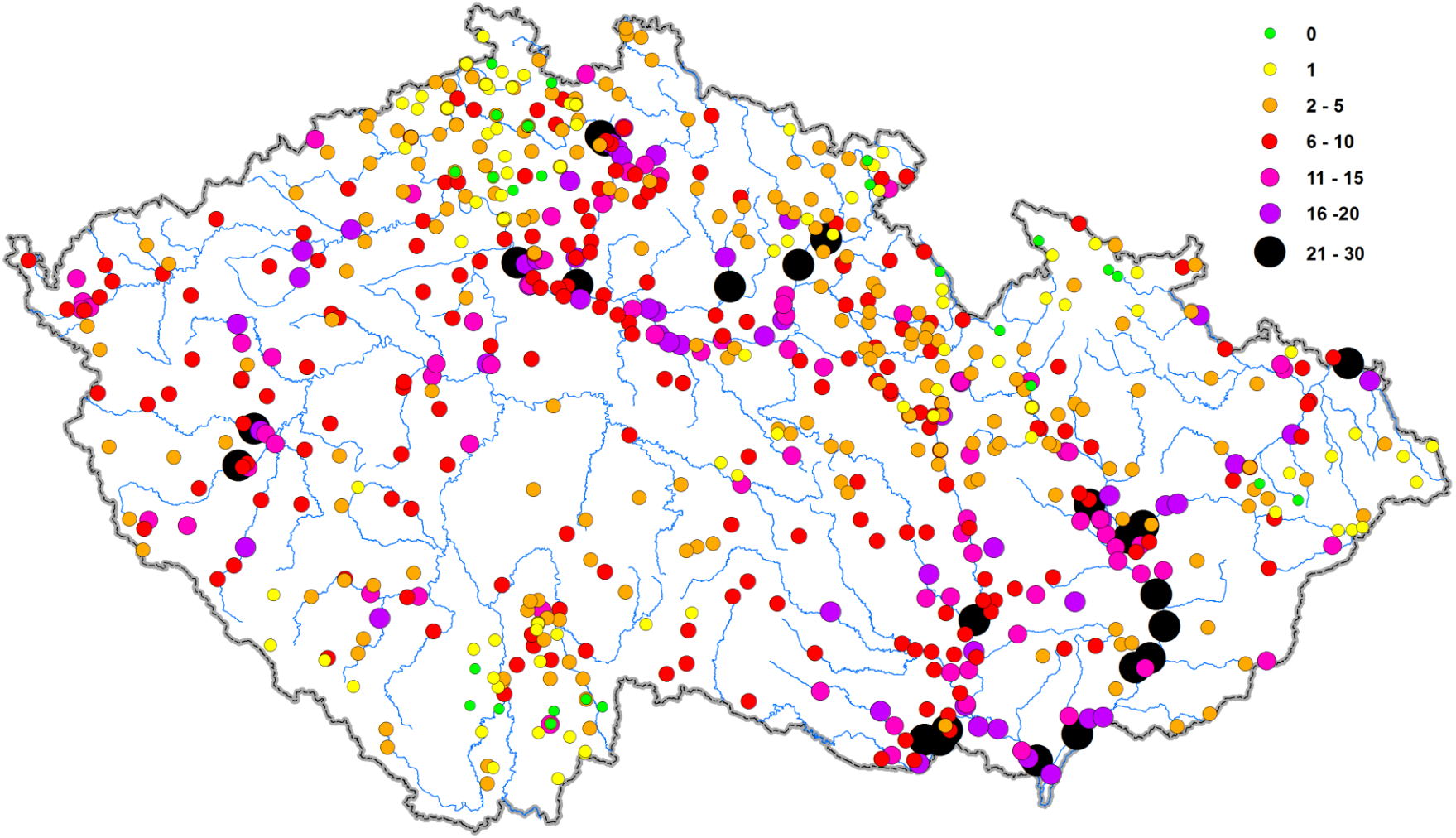
Findings of organic micropollutants



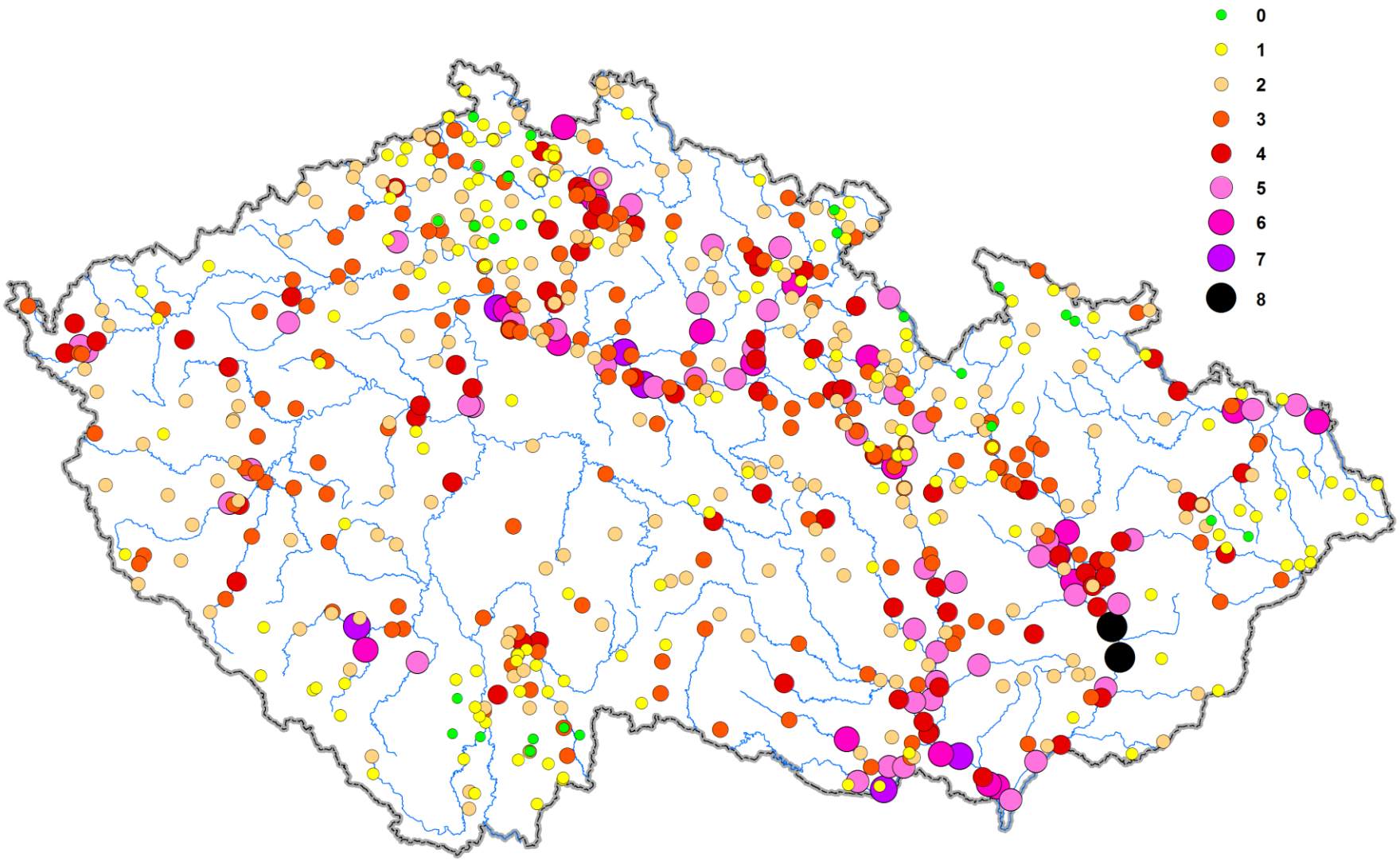
Findings of organic micropollutants 2016-2018 (4079 samples)



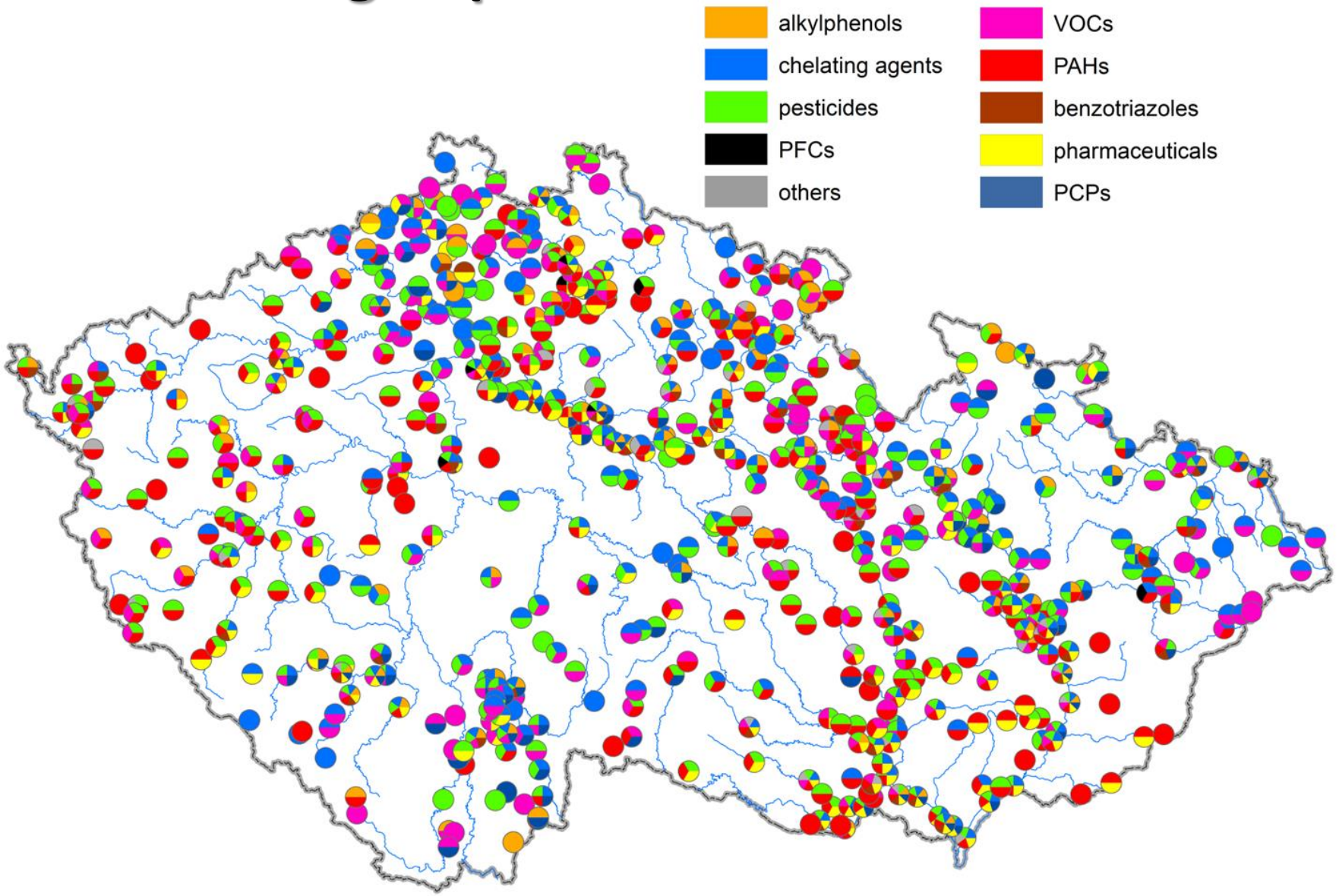
No. of detected compounds at individual sites



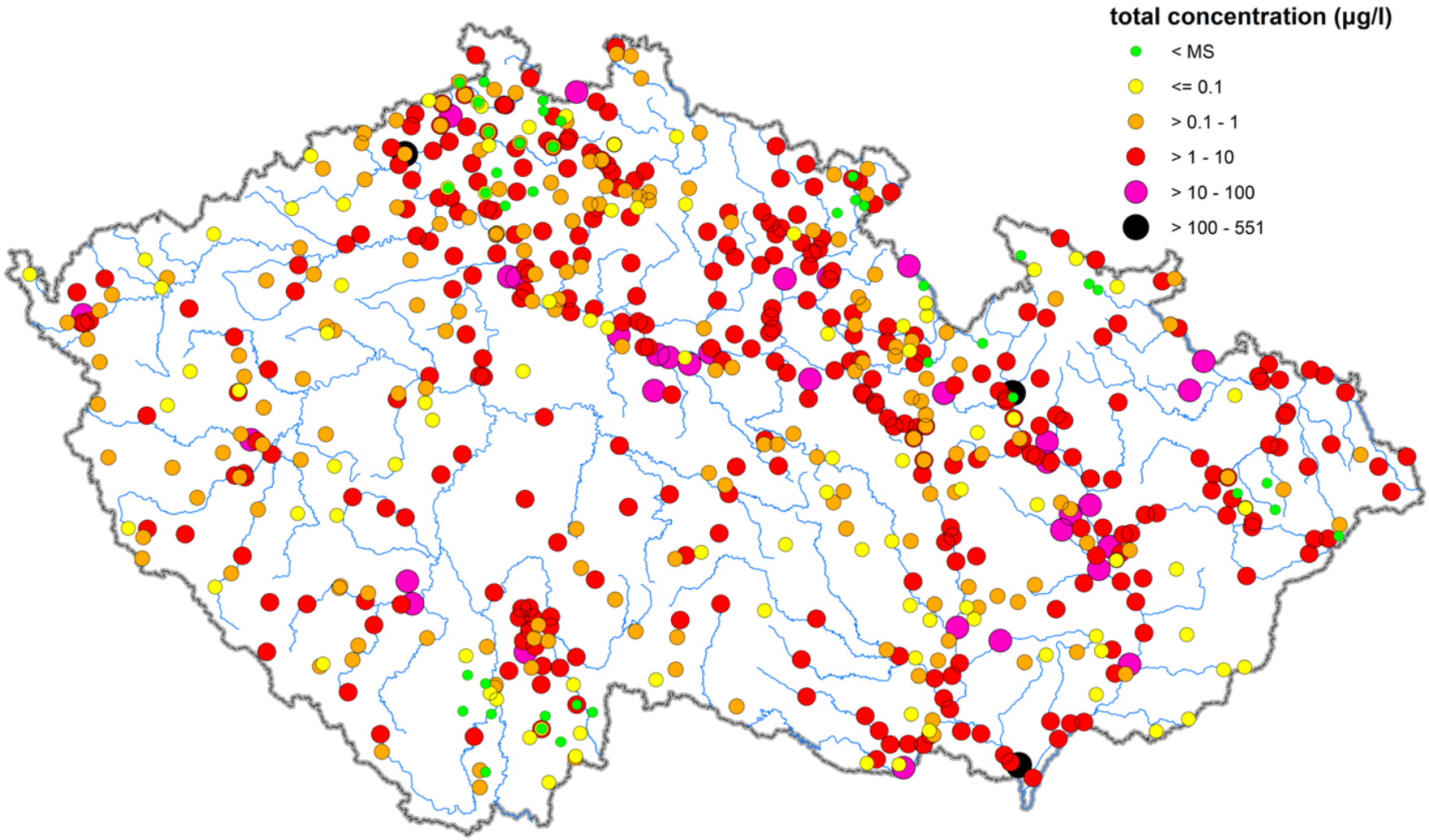
No. of groups of chemicals found at individual sites



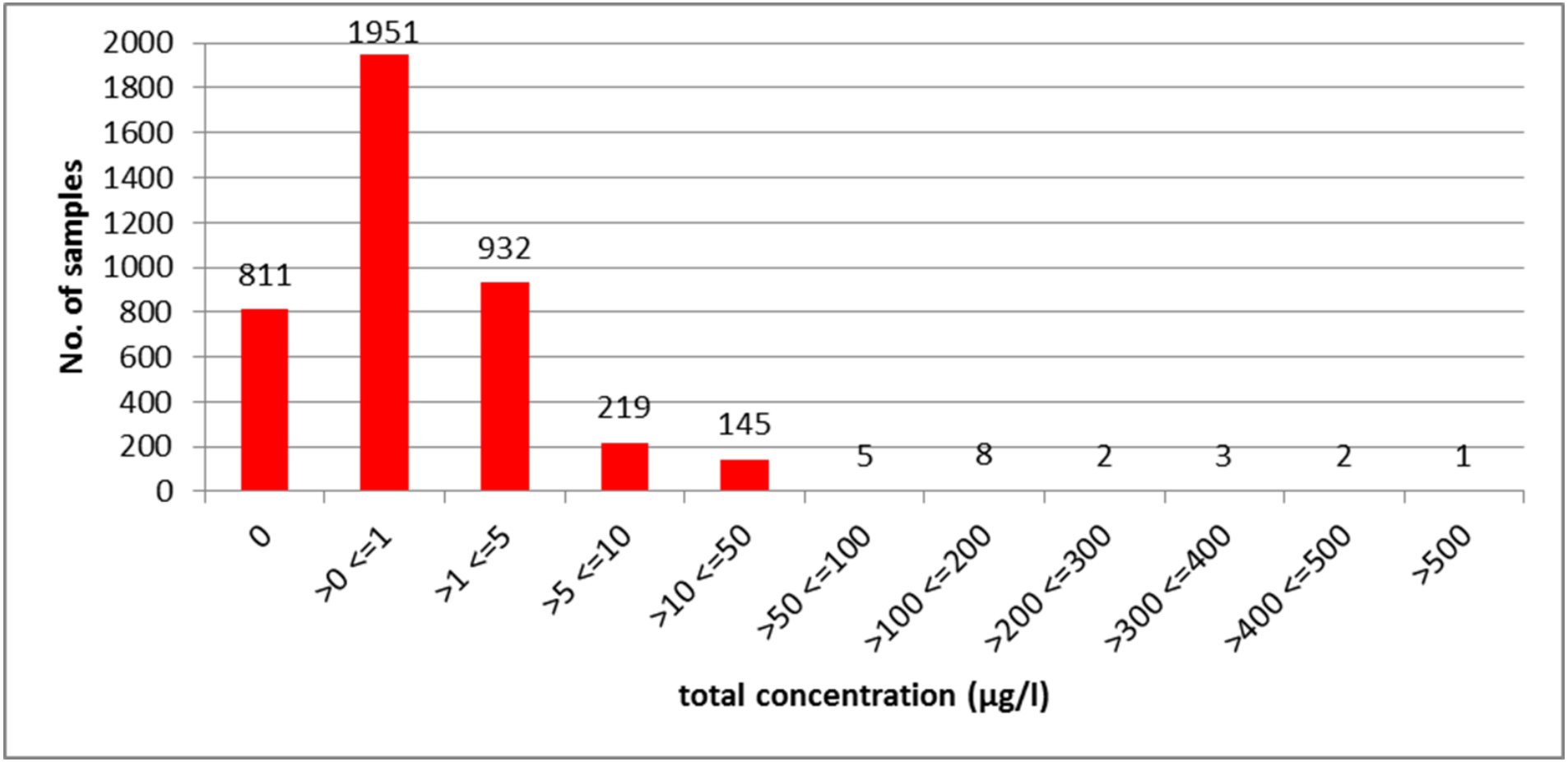
Occurrence of groups of chemicals at individual sites



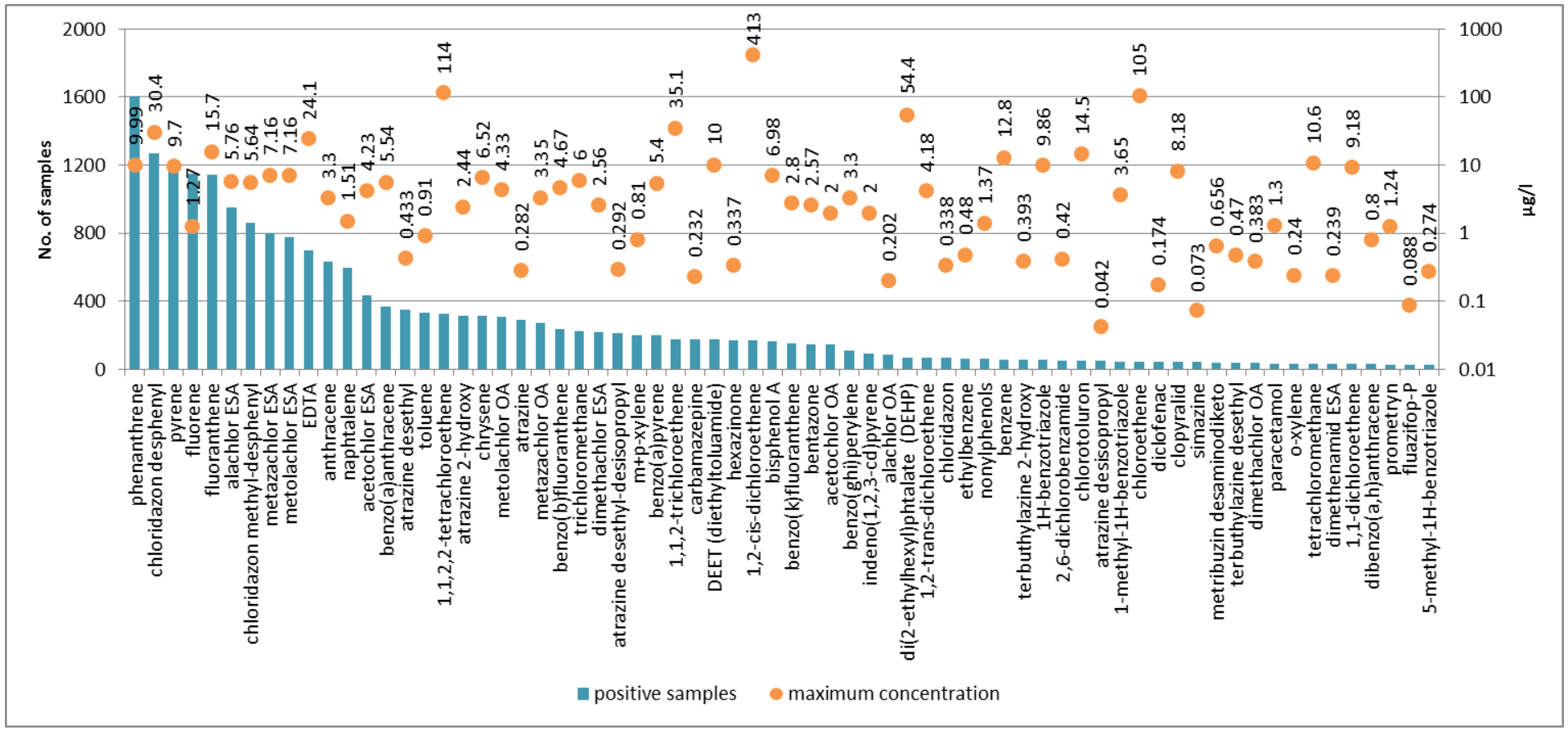
Total concentrations at individual sites



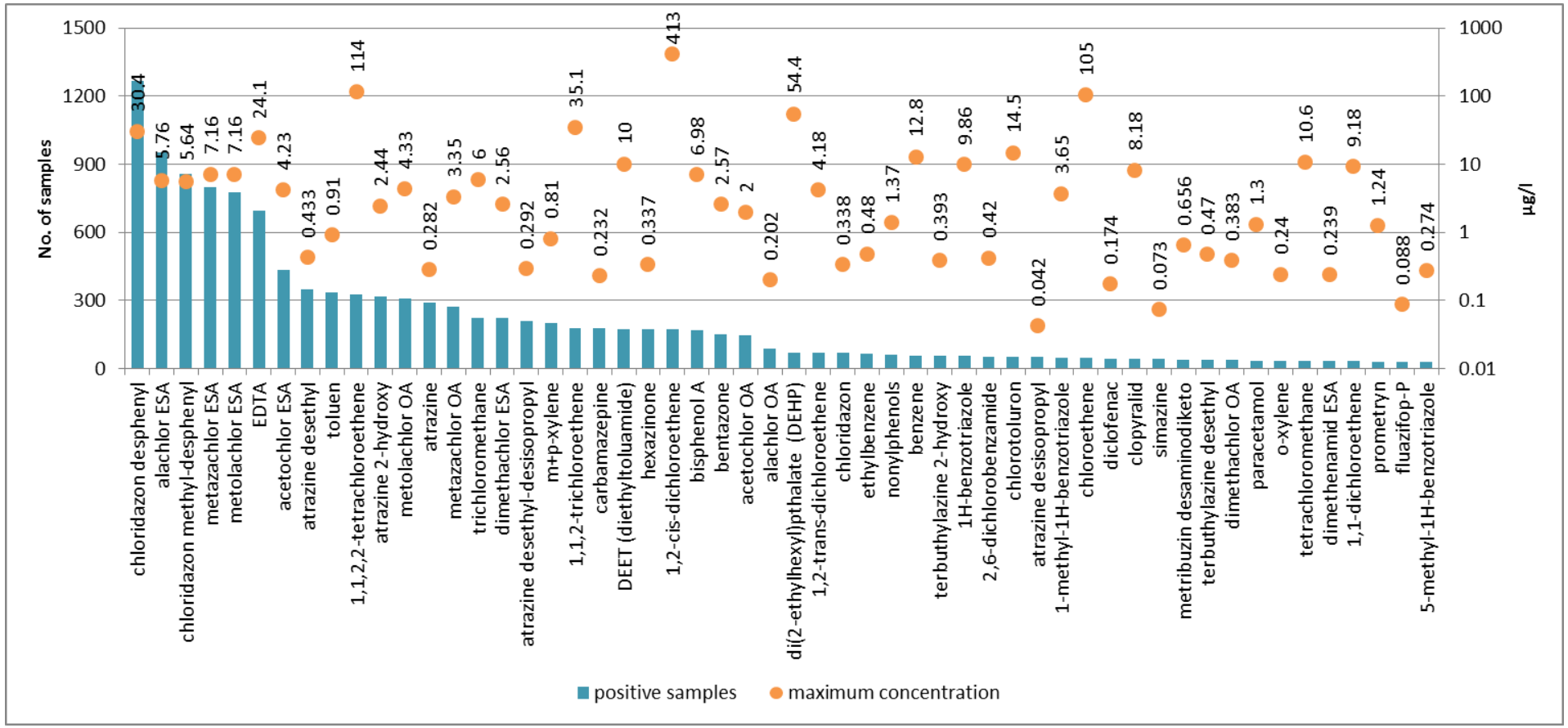
Frequency of total concentrations



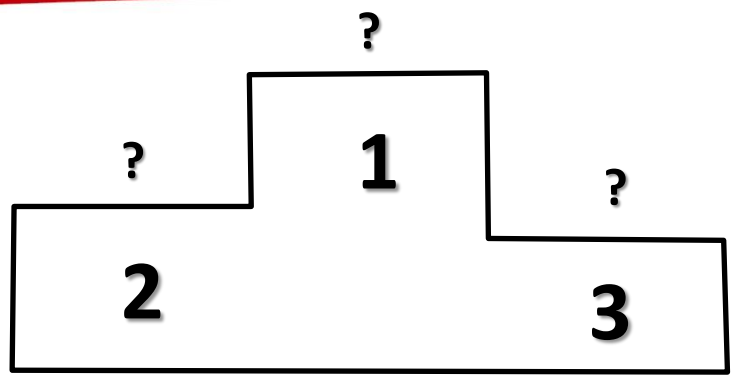
Occurence of substances incl. PAHs



Occurence of substances excl. PAHs



National record holder sites



VP1873: Total concentration 551 µg/l, 7 substances from 2 groups
VOCs (6), pesticides (1)

VP1567: Total concentration 10.14 µg/l, 30 substances from 3 groups
pesticides (22), PAHs (7), chel. agents(1)

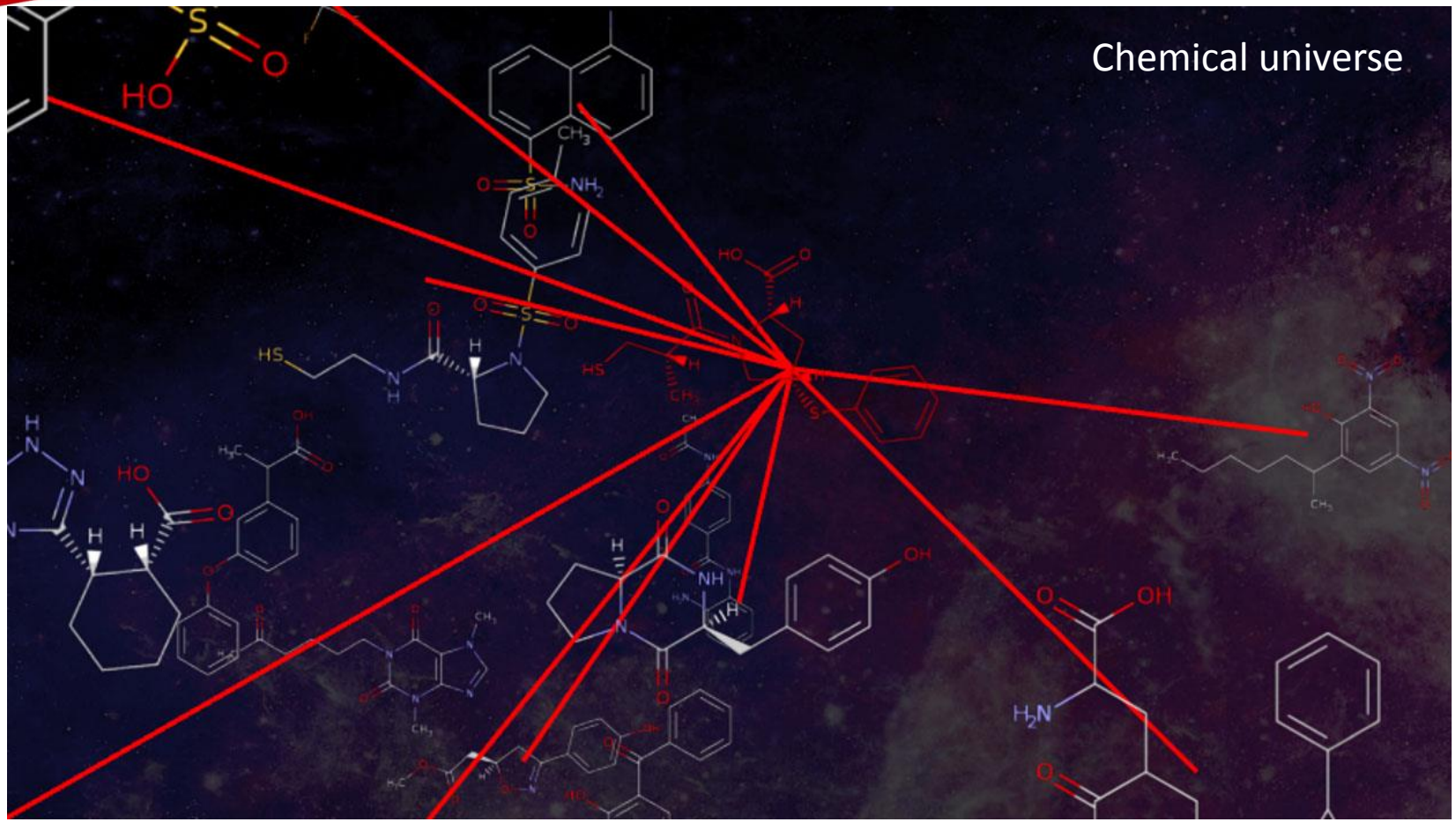
VB0173: Total concentration 5.945 µg/l, 28 substances from 6 groups
PAHs(12), pesticides (10), pharms (3), PCP (1), chel. agents (1), alkylphenols (1)

Drinking water supply: Total concentration 3.383 µg/l, 23 substances from 8 groups
pesticides (9), pharms(5), PAHs (3), benzotriazoles (2), PCPs (1), alkylphenols (1), chel.agents (1), other (1))

Conclusion

Monitoring results show that mixtures of various xenobiotics can be found in groundwater more often than one could expect.

There is a very little knowledge on harmful effects of such mixtures and their impact on human health, thus the precautionary principle should be applied.



Thank you for attention...