



GENASIS

Global Environmental Assessment and Information System

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Identifying the research and infrastructure needs for the global assessment of hazardous chemicals 10 years after establishing the Stockholm Convention

- I. Control of the key emission sources of hazardous chemicals
- II. Understanding of the global scale transport
- III. Knowledge on half-lives and degradation pathways
- IV. **Advanced and cost-effective sensors**
- V. Integrated measurement and modeling strategies for reducing the human risk
- VI. **Global monitoring plan**
- VII. **Global Earth observation system of systems (GEOSS)**
- VIII. **Capacity building**
- IX. Limiting adverse effects
- X. Science to serve policy needs

Klánová, J., Diamond, M., Jones, K., Lammel, G., Lohmann, R., Pirrone, N., Scheringer, M., Balducci, C., Bidleman, T., Bláha, K., Bláha, L., Booij, K., Bouwman, H., Breivik, K., Eckhardt, S., Fiedler, H., Garriques, P., Harner, T., Holoubek, I., Hung, H., MacLeod, M., Magulova, K., Mosca, S., Pistocchi, A., Simonich, S., Smedes, F., Stephanou, E. G., Sweetman, A., Šebková, K., Venier, M., Vighi, M., Vrana, B., Wania, F., Weber, R., Weiss, P.: Identifying the research and infrastructure needs for the global assessment of hazardous chemicals 10 years after establishing the Stockholm Convention. *Environ. Sci. Technol.* 2011, 45, 7617–7619



Global Earth observation system of systems (GEOSS)

To improve the flow of relevant data to the environmental and health communities, the GMP has to be linked to available synergic instruments, especially to the GEOSS.

www.earthobservations.org



It has been incorporated in the **area of health (HE-02)**, as one of **9 ‘Societal Benefit Areas’** (disasters, health, energy, climate, water, weather, ecosystems, agriculture and biodiversity) identified in the revised (2012-2015) work plan in support to the 10-Year Implementation Plan of GEOSS.



Global Earth observation system of systems (GEOSS)

Among the priority actions to be undertaken in the next 3 years in frames of HE-2, is to

- (a) develop and implement a **global monitoring plan** for tracking changing levels of POPs in the natural environment and human beings,
- (b) **evaluate the effectiveness** of international efforts to reduce POP releases, and
- (c) **interlink relevant existing information systems** for monitoring air, water, ice caps and human health.



Global Earth observation system of systems (GEOSS)

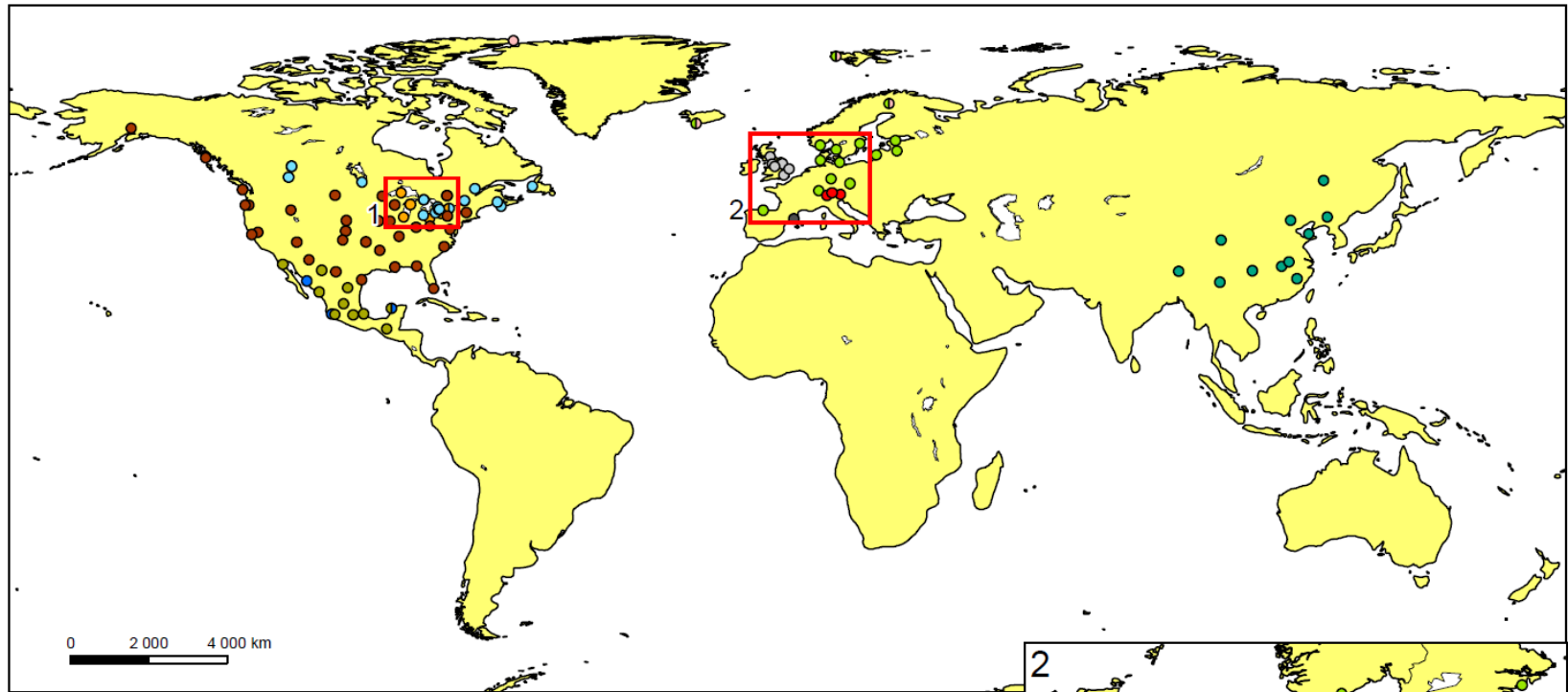
While former priority actions are under development, the latter one is awaiting implementation as the information system hosting GMP data is non-existent.

Development of such databases is needed to enhance visibility of the GMP and to facilitate improved interpretation, spatial visualization, and modeling of available monitoring data.












This will enhance our understanding of environmental factors affecting human health and well-being and promote a focus on prevention of environmental and human impacts.

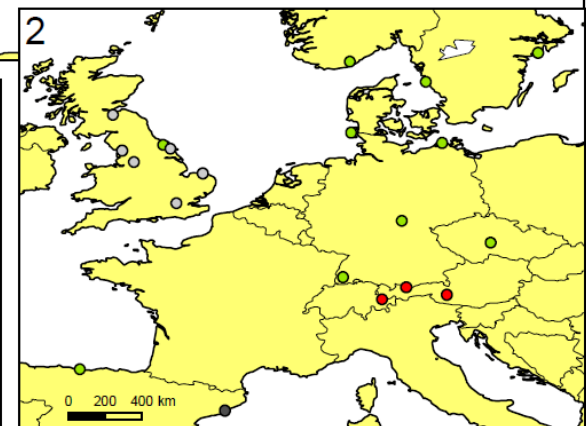
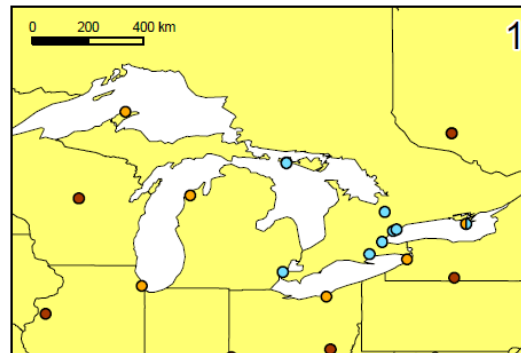


Long-term active air sampling networks

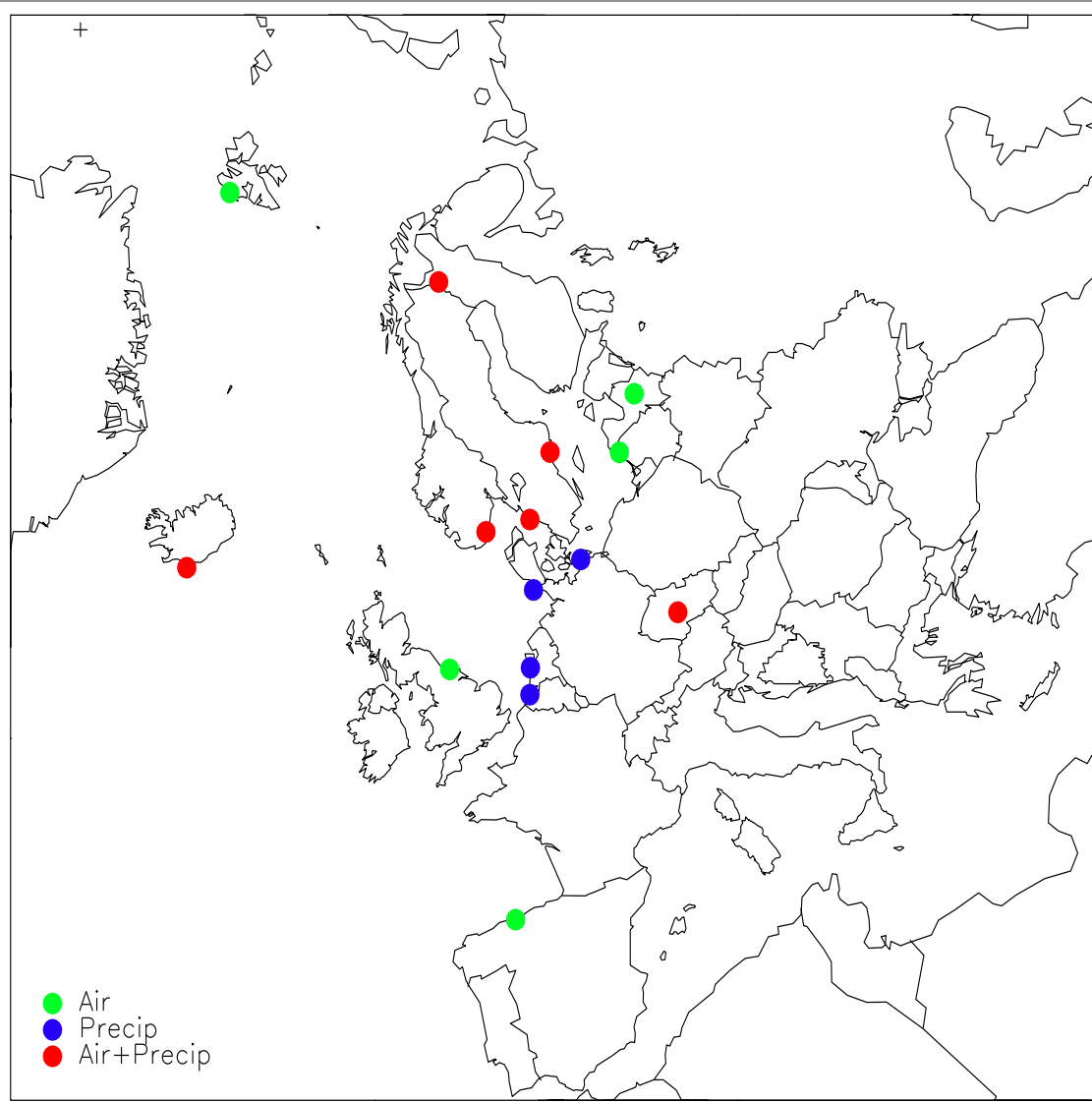


Sampling program

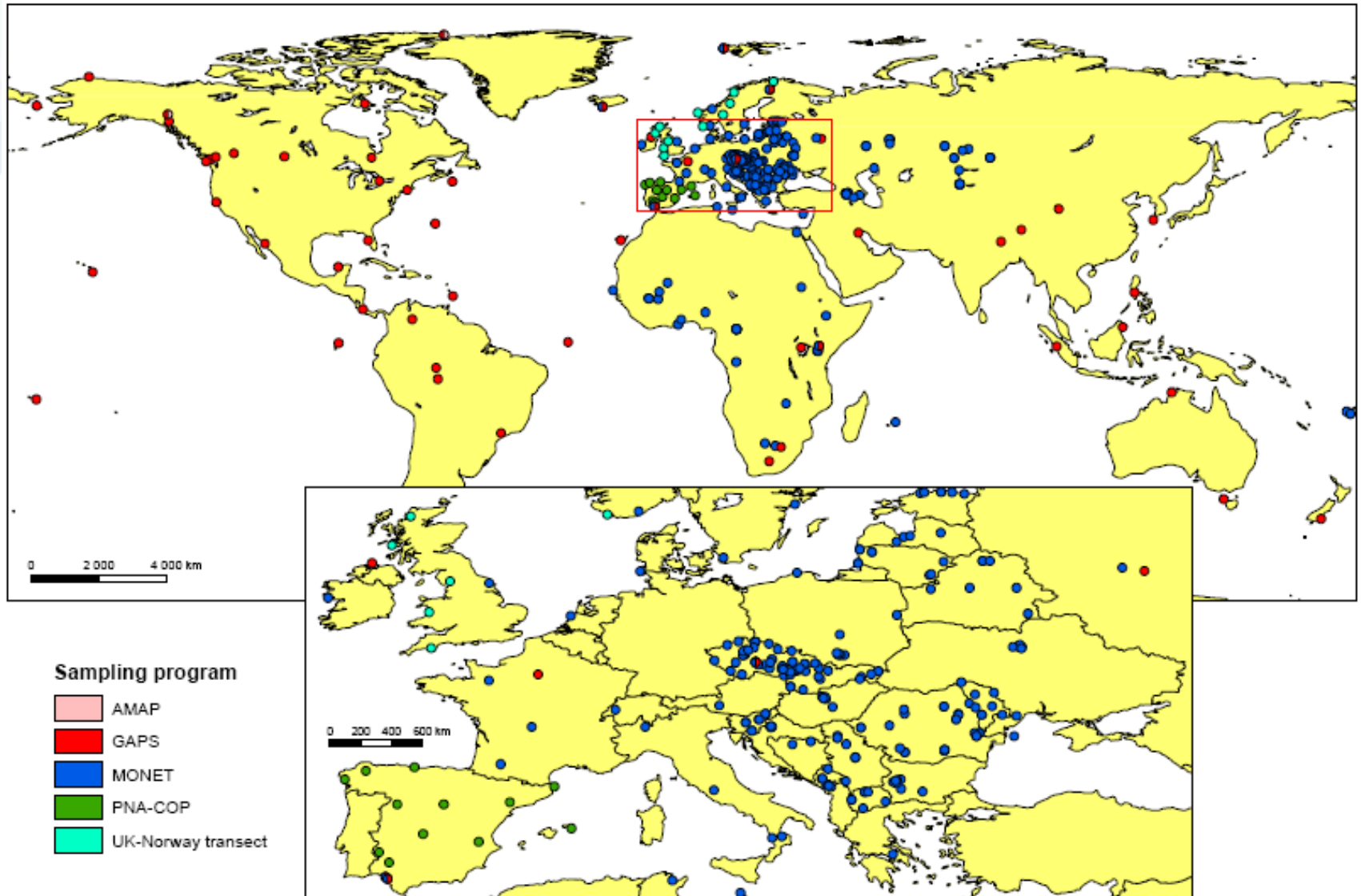
 NAPS	 BAMPPOPS
 TOMPS	 PRONAME
 AMAP	 XVPCA
 EMEP	 MDAMN
 IADN	 NDAMN
 MONARPOP	



EMEP active air monitoring network



Passive air sampling networks



GENESIS portal

GENESIS
Global Environmental Assessment and Information System

RECETOX IBA MASARYK UNIVERSITY

HOME CONTACTS RSS CZECH ENGLISH

Tools POPspedia Scientific section Tutorial E-learning Partners

Data sources

GENESIS and POPs

Survey of data

Site description Sum Time series Seasonality Trend comparison Compound comparison Regional comparison Bpx models

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Menu options

Description of project aims and importance

Survey of data sources

- User-friendly access to main system functions
- Main functions are directly accessible from the title page:
 - Analytical tools
 - ✦ With selection of the tool, the user runs software window and selects data for the appropriate analysis.
 - ✦ There are exceptions: 1) tool of Box models, where the Czech Republic box model window is opened directly and 2) module comparing substances.
 - Survey of data sources – opens table and map survey of all data sources.
 - Menu – access to all system functions.
 - Project aims – access to the detailed description of the project
- Other options
 - CZ/ENG language switch
 - RSS channel with news

Selection of the analytical tool

www.genasis.cz



User's view on GENASIS portal content



User's entry to GENASIS



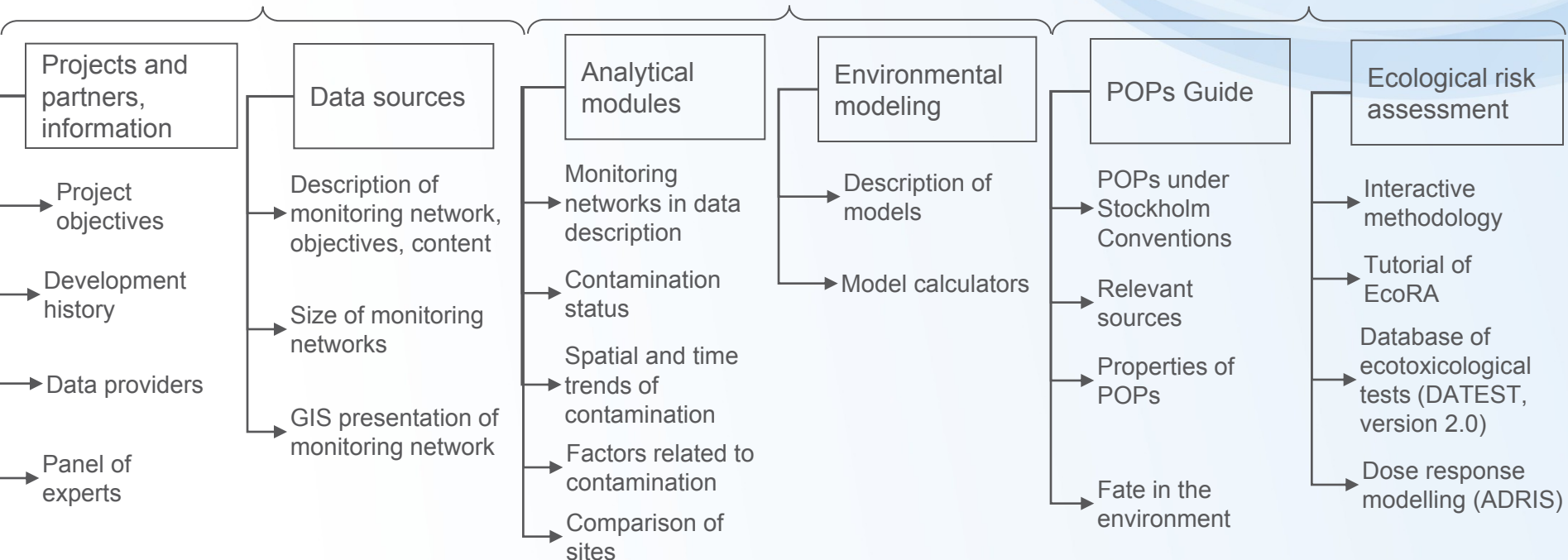
www.genasis.cz



I. Mapping of data sources

II. Analysis and modeling

III. E-learning



Selection of the data set for analysis

GENASIS - analyse

Select matrix¹

- Air
 - Air passive
 - Air active
- Water
- Soil
- Plant material
- Human tissues
- Human milk
- Foodwebs

Select project¹

- Košetice
- Mokrá
- Monet Africa
- Monet CEEC
- Monet CZ
- Monet Fiji
- UKZUZ
- Zlinsko

Select region¹

- Africa
- Asia
- Australasia
- Europe
 - Armenia
 - Belarus
 - Bosnia and Herzegovina
 - Bulgaria
 - Croatia
 - Czech Republic
 - Estonia
 - Hungary
 - Latvia
 - Lithuania
 - Macedonia
 - Moldova
 - Montenegro
 - Poland
 - Romania
 - Russia
 - Serbia
 - Slovakia
 - Slovenia
 - Ukraine

Select compound¹

- DDX
- HCB
- HCHs
- PAHs
- PCBs
- PeCB

N = 140 site(s)
(2096 sample(s))

Visualise selected data

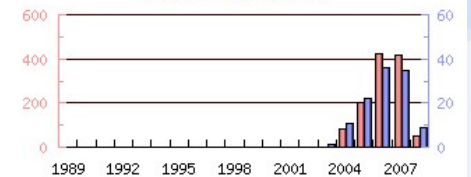
Analyse selected data

Back to previous analysis

RECETOX
MU
IBA
cetocoen



Sampling frequency



GENASIS - analyse - Mozilla Firefox

http://www.genasis.cz/analyse/3.1/index.php

GENASIS - analytický modul

N = 140 lokalita
(2096 vzorků)

Zpět na výběr dat

Analýzovat data

Zpět na předchozí analýzu

RECETOX
IBA



Analytical tools available



Sampling sites

Description of selected sampling sites: geographical position in map, altitude and other abiotic characteristics non-influenced by human activities; sampled matrices and compounds, number of samples



Summary report

Summary description of contamination of selected spatial area and time range. Comparison of levels of sampled compounds and their percentage structure. Comparison with legislative norms.



Time series

Time series of environmental contamination on one site or for selected set of sites. The analysis allows aggregations on several time levels (years, months) and comparison of results with legislative norms.



Analysis of seasonality

Seasonal changes of contamination, both in absolute concentrations values or percentage structure of compounds. Comparison of seasonality between years, sites, compounds.



Comparison of trends

Comparison of contamination trends between sites, differences of time series.



Comparison of sites

Comparison of contamination levels among i) individual sites or ii) among group of sites defined by environmental parameters (altitude, land use etc.)



Comparison of compounds


Comparison of chemical and ecotoxicological properties of POPs based on information from literature in POPspedia database.



Box models

Calculator of level IV box model of the Czech Republic; provides simulation of time development of selected compound concentrations.


Sampling site location

 Data overview

Site selection


Location of sites


Sampling frequency


 Basic analyses

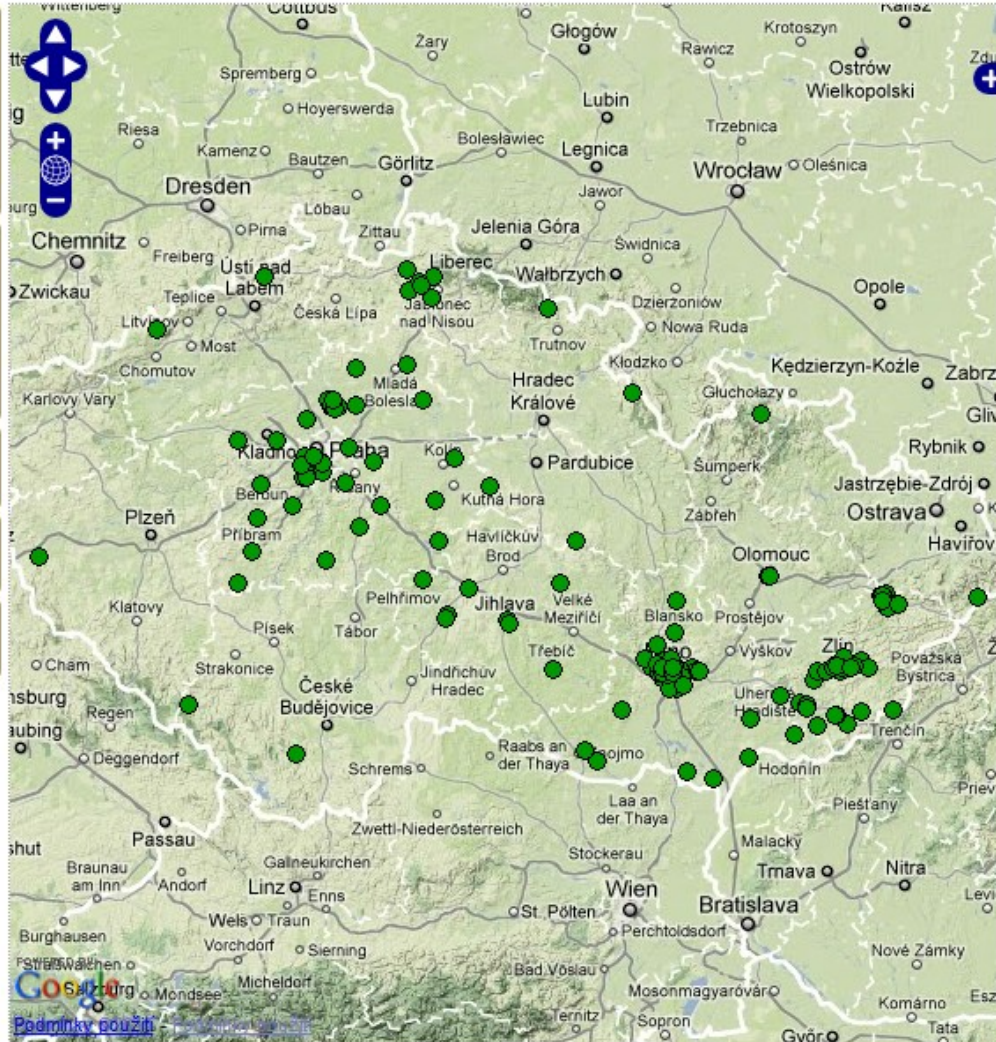
Distribution characteristics

Concentrations summary on sites

 Time series summary

 Seasonal pattern

 Temporal trends



Base for analysis
 N = 2096 (from 140 sites)
 Matrix: Air passive
 Time period: 2000 - 2009
 Project: Monet CZ
 Monitoring type: Long-term monitoring, Short-term studies, Finished long-term monitoring
 Region: Europe -> Czech Republic
 Compound: PCBs -> PCBs

Additional selections

-

Analysis settings

Show:

Analysis stratification

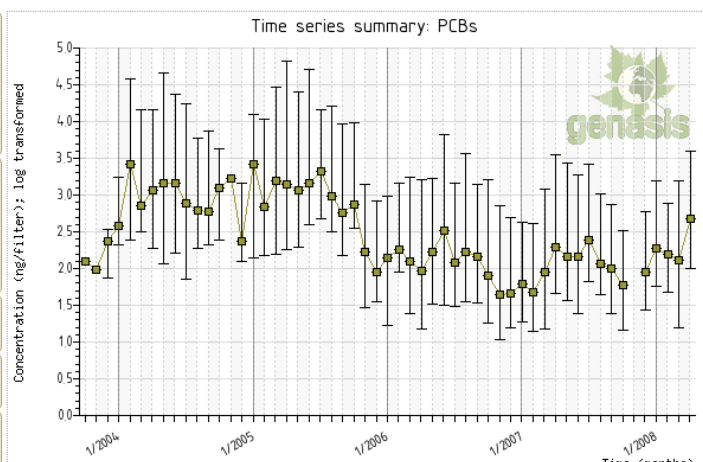
-

Data source: www.genasis.cz



Analyses of selected data set

- Data overview
- Site selection
- Location of sites
- Sampling frequency
- Basic analyses
- Distribution characteristics
- Concentrations summary on sites
- Time series summary
- Seasonal pattern
- Temporal trends



Base for analysis
 N = 1872 (from 135 sites)
 Matrix: Air passive
 Time period: 2000 - 2009
 Project: Monet CZ
 Monitoring type: Long-term
 Short-term studies, Finished monitoring
 Region: Europe -> Czech Republic
 Compound: PCBs -> PCBs

Additional selections
 -

Site deselection
 5 sites from 140 has been deselected

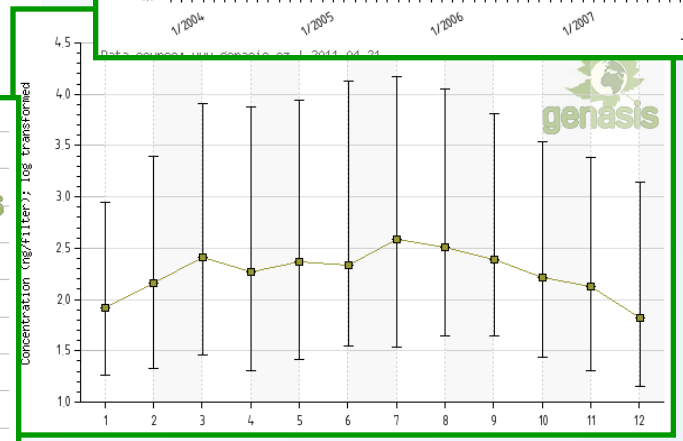
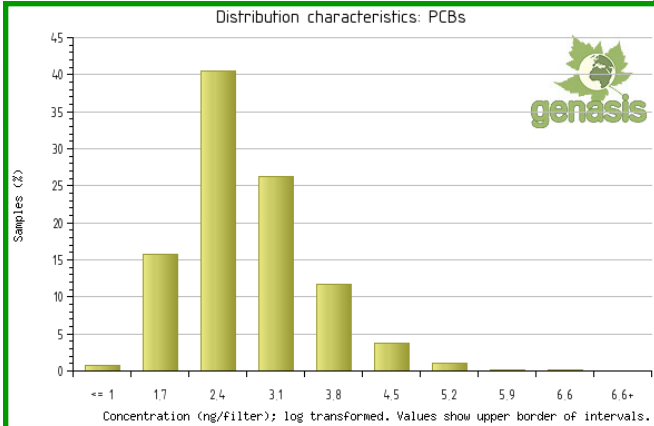
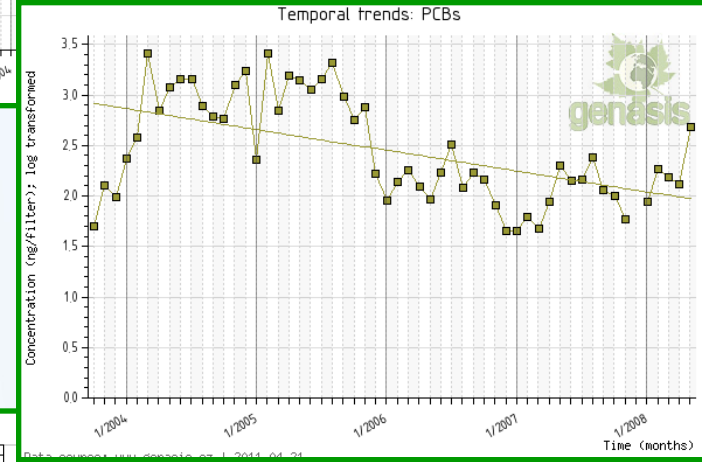
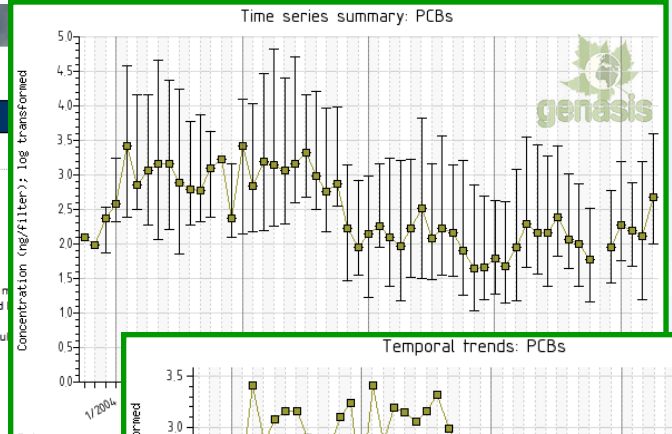
Analysis settings
 Transformation: Logarithm
 Show: Median (5-95th percentile)
 Base for analysis: Samples

Analysis stratification
 -

Data source: www.genasis.cz

Data source: www.genasis.cz | 2011-04-21

Number of samples (sites)	1872 (135)
Median (5th -95th percentile)	8.69 (2.99 - 43.68) ng/filter
Minimum - maximum	0.48 - 498.10 ng/filter
Geometric mean (95% CI)	10.96 (10.49 - 11.43) ng/filter
Arithmetic mean (95% CI)	14.84 (14.37 - 15.31) ng/filter

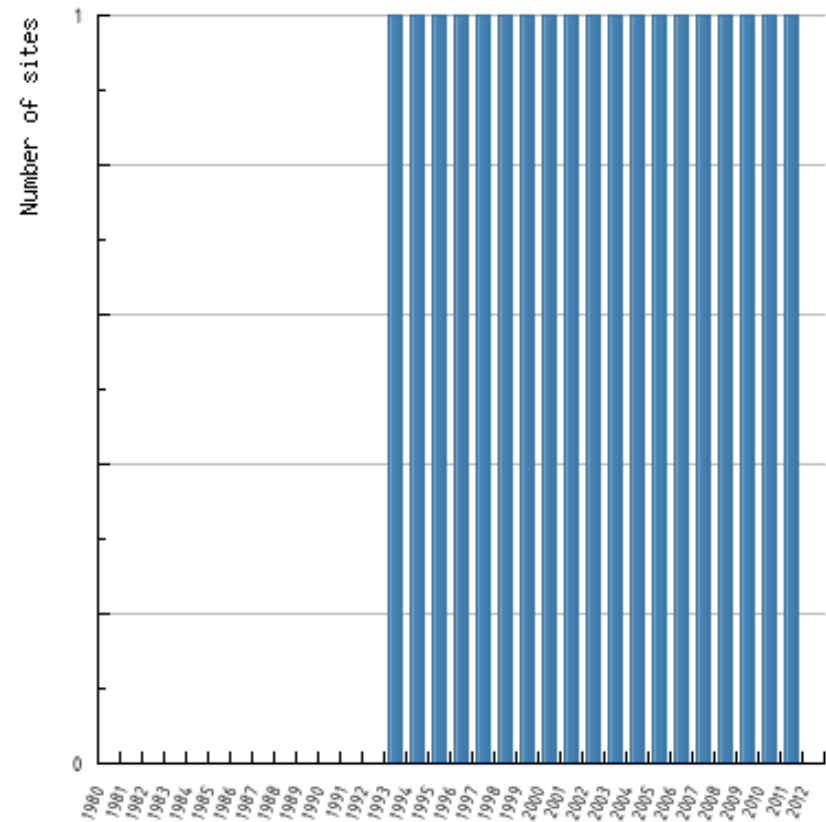
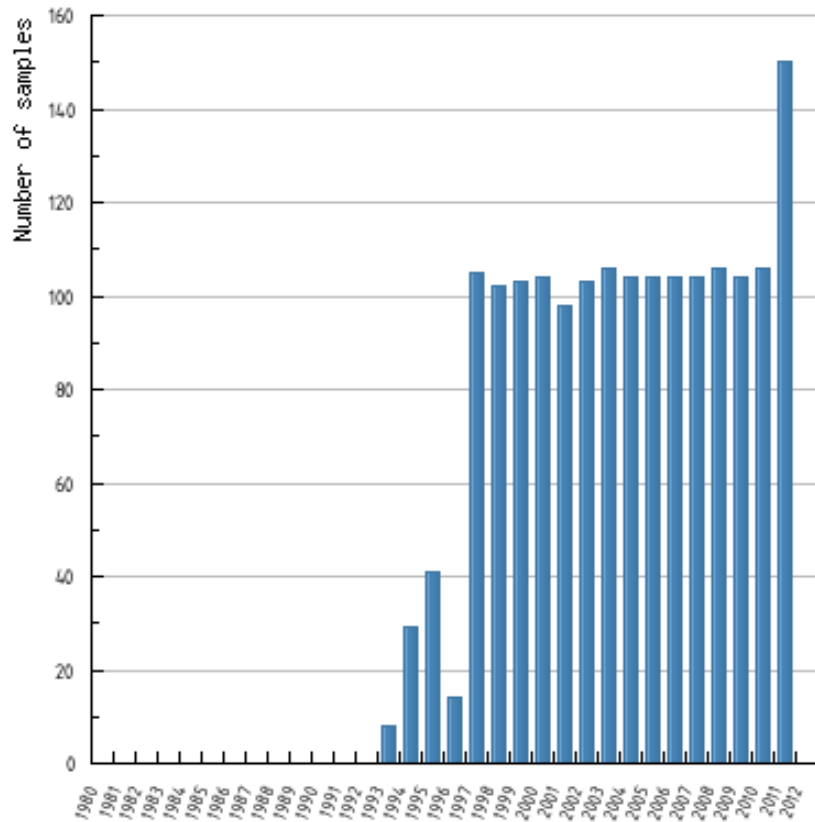


Integrated Monitoring, Košetice background station



Sampling frequencies

PCB 101 (atmosphere) – sampling frequency

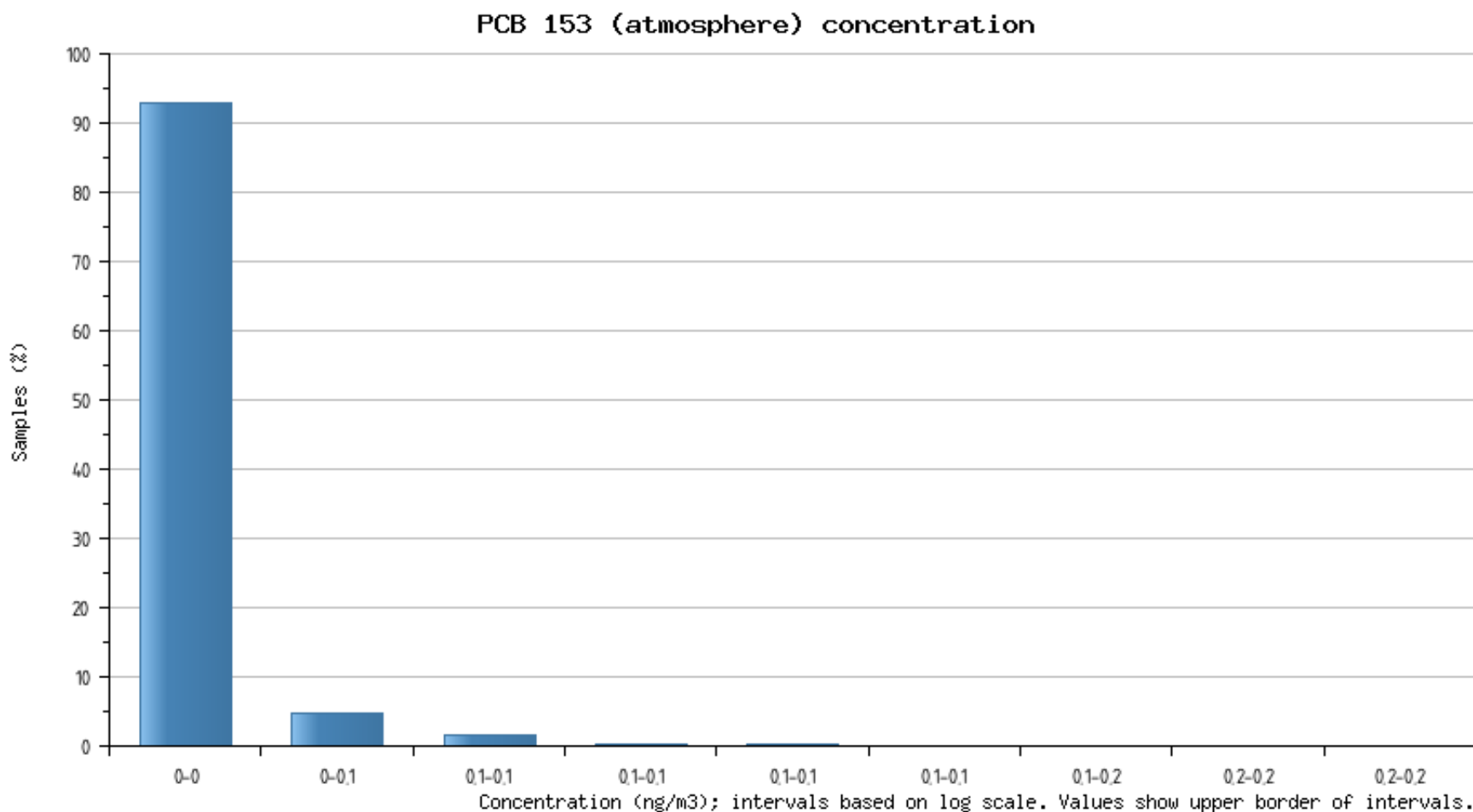


KOSETICE-INTEGR | (1993–2011) | no. of countries: 1 | sites in total: 1 | samples in total: 1695

www.genasis.cz



Concentration histograms



KOSETICE-INTEGR | (1993-2011) | no. of countries: 1 | sites in total: 1 | samples in total: 1666

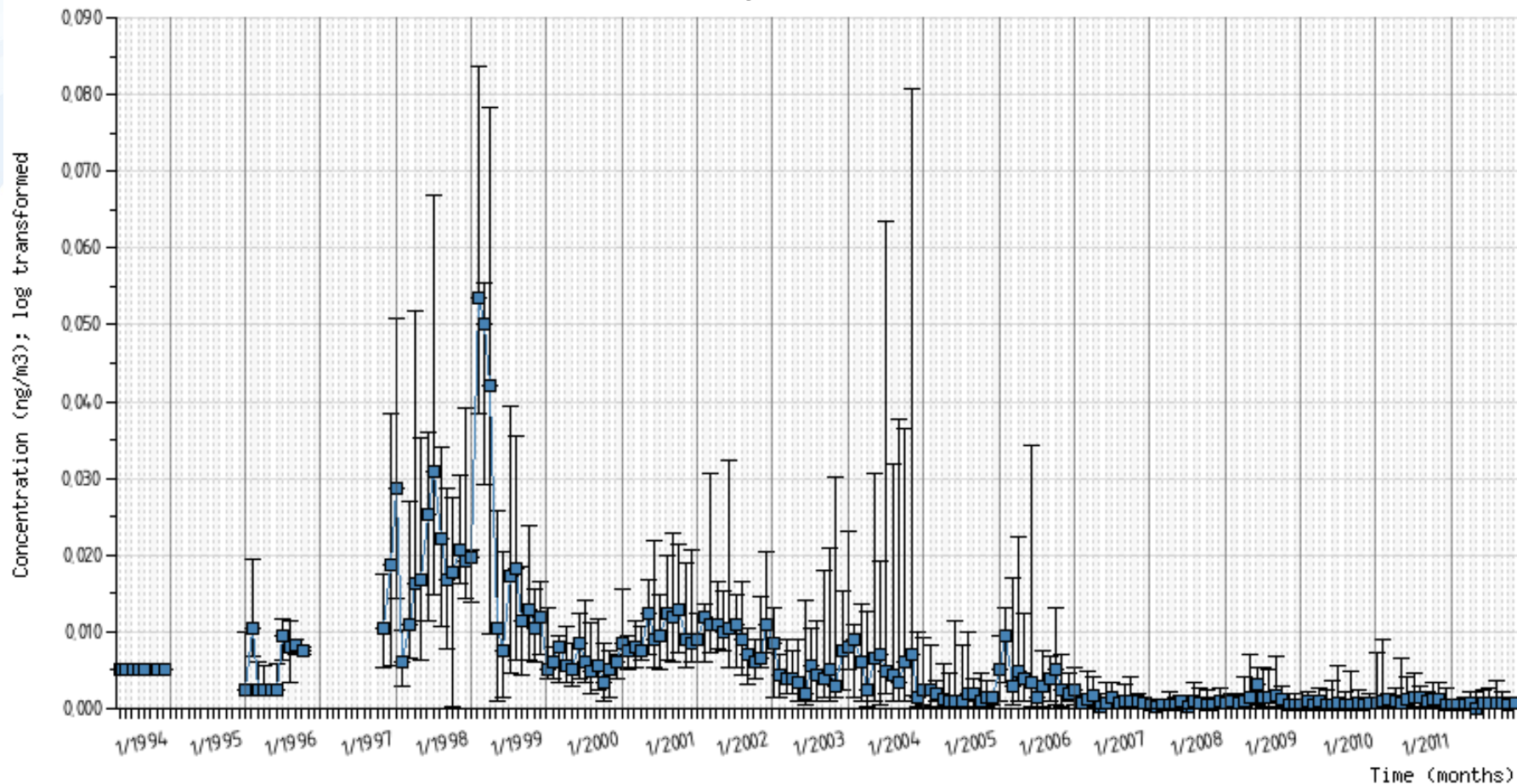
Base: samples

www.genasis.cz



Time series, summary

PCB 153 (atmosphere) time series



KOSETICE-INTEGR | (1993-2011) | no. of countries: 1 | sites in total: 1 | samples in total: 1666

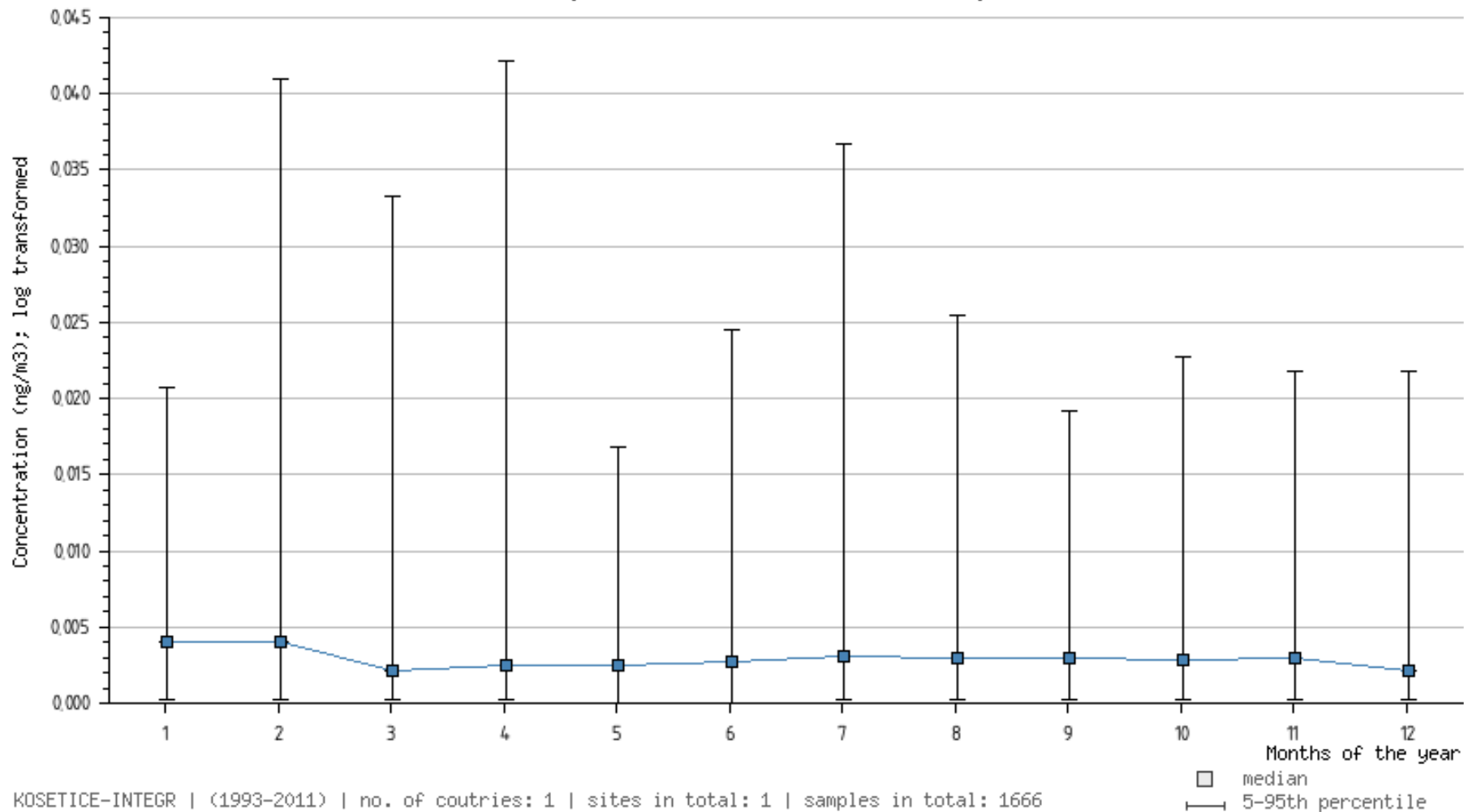
Base: samples

www.genasis.cz



Seasonality

Seasonal pattern of PCB 153 (atmosphere)



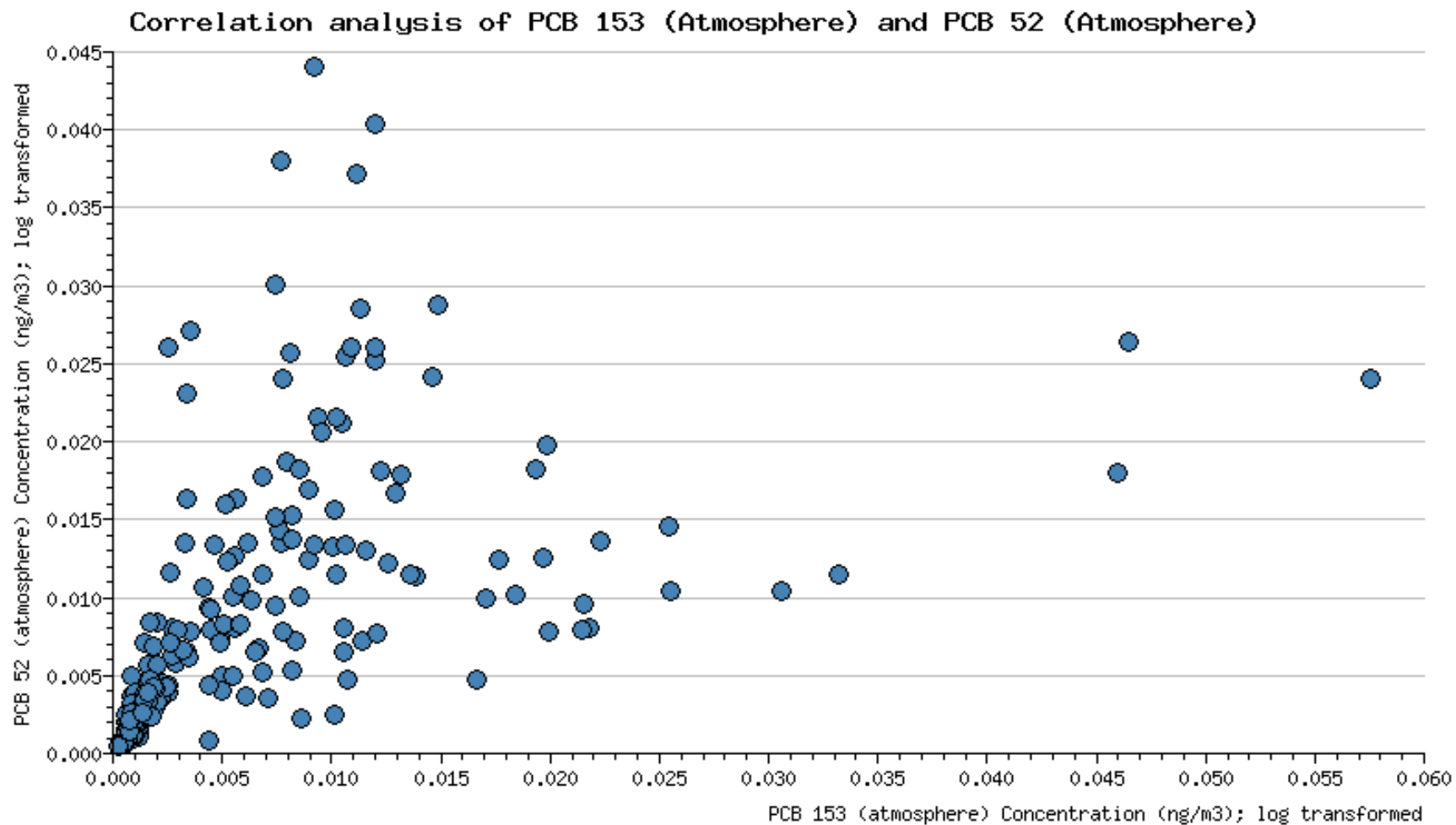
KOSETICE-INTEGR | (1993-2011) | no. of countries: 1 | sites in total: 1 | samples in total: 1666

Base: samples

www.genasis.cz



Correlation



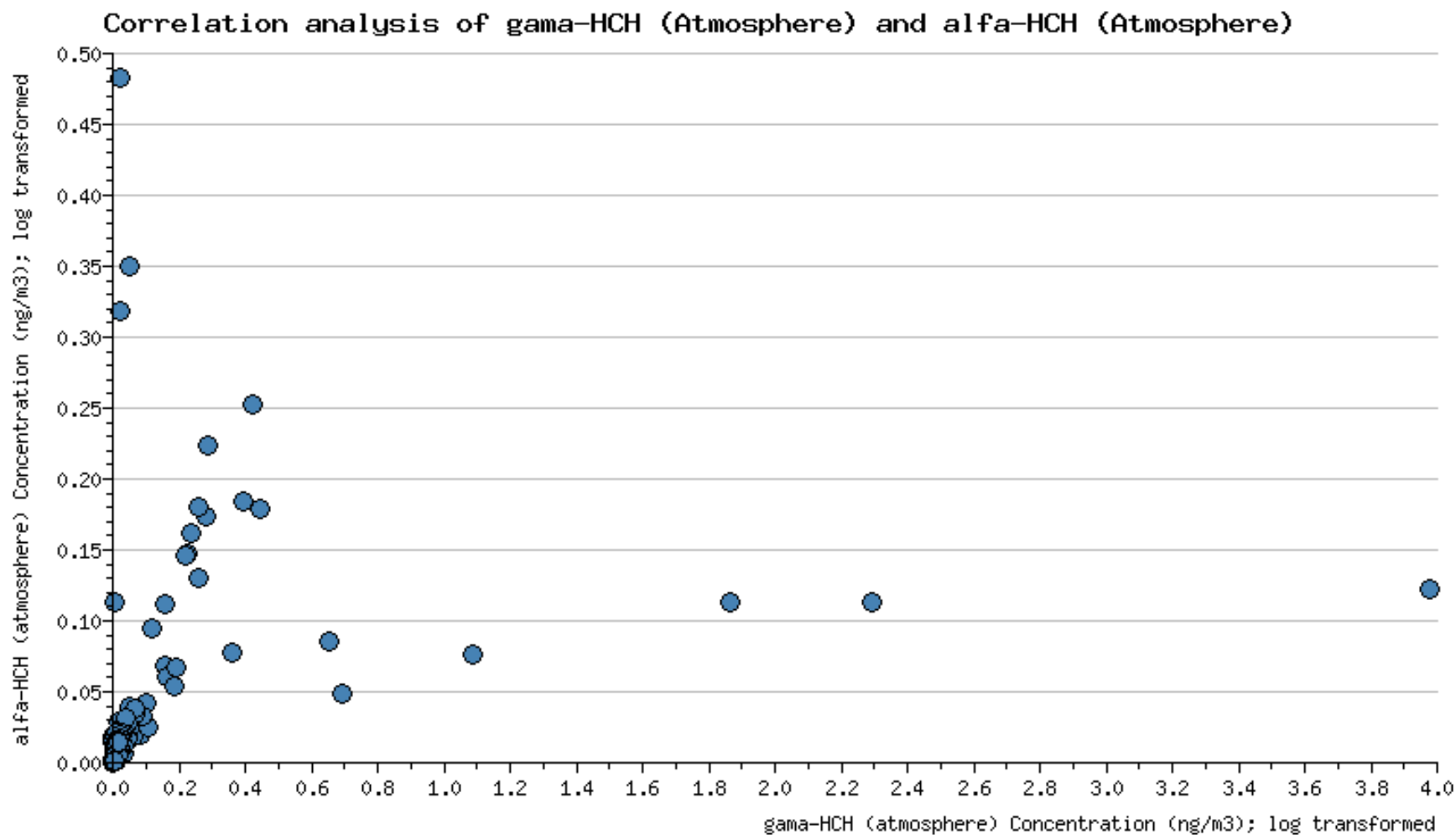
KOSETICE-INTEGR | (1993-2011) | no. of countries: 1 | sites in total: 1 | samples in total: 1666

Base: samples

www.genasis.cz



Correlation



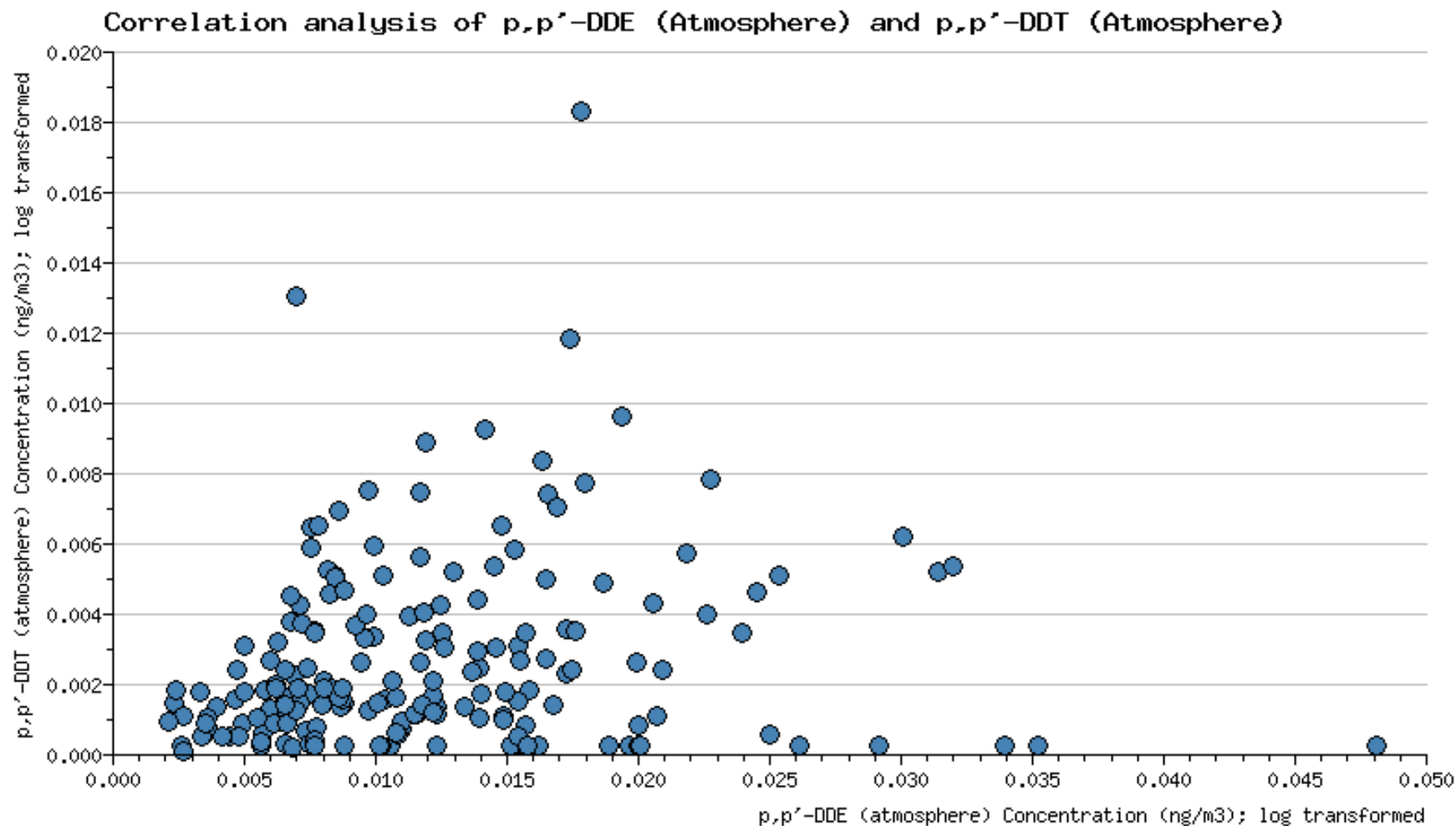
KOSETICE-INTEGR | (1993–2011) | no. of countries: 1 | sites in total: 1 | samples in total: 1695

Base: samples

www.genasis.cz



Correlation



KOSETICE-INTEGR | (1996-2011) | no. of countries: 1 | sites in total: 1 | samples in total: 1617

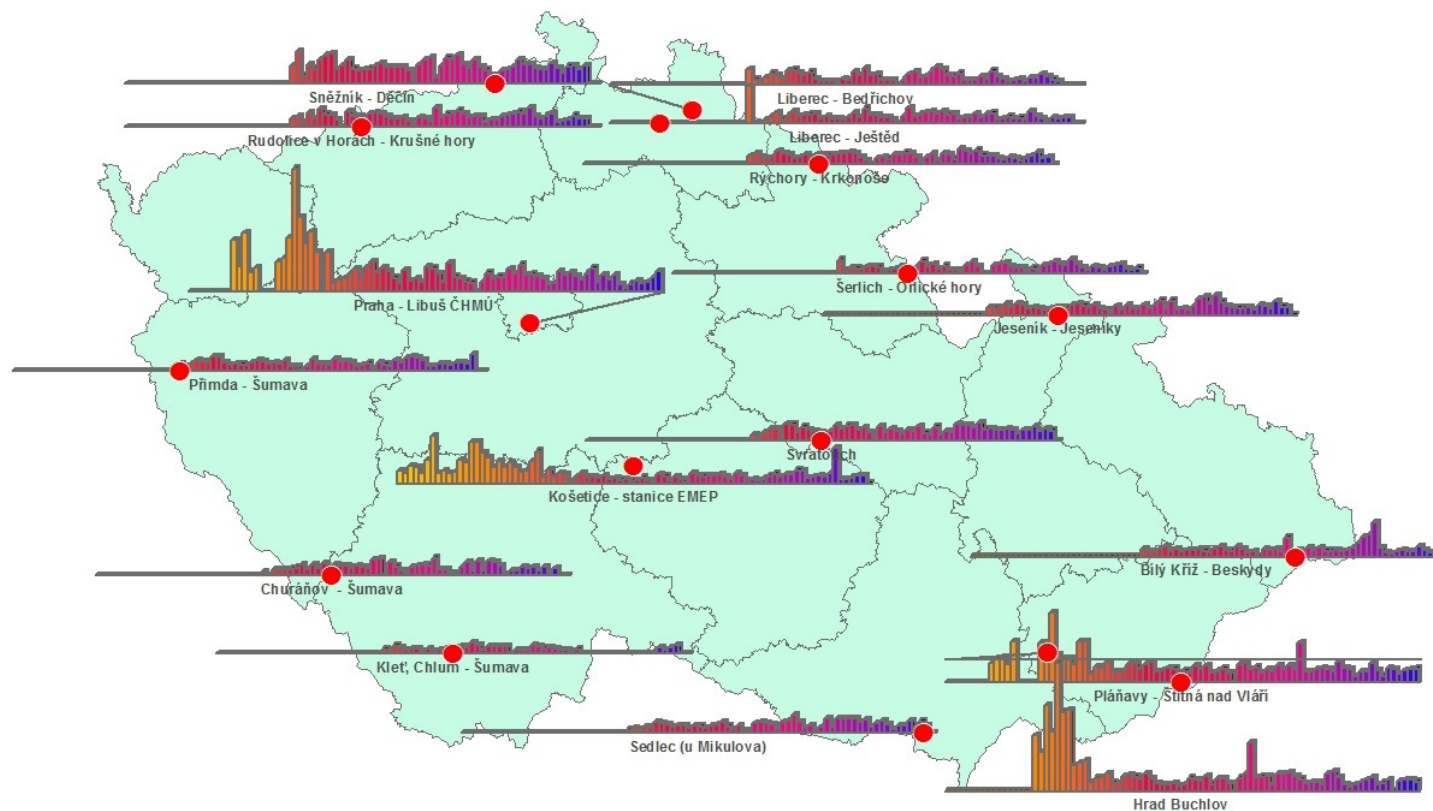
Base: samples

www.genasis.cz

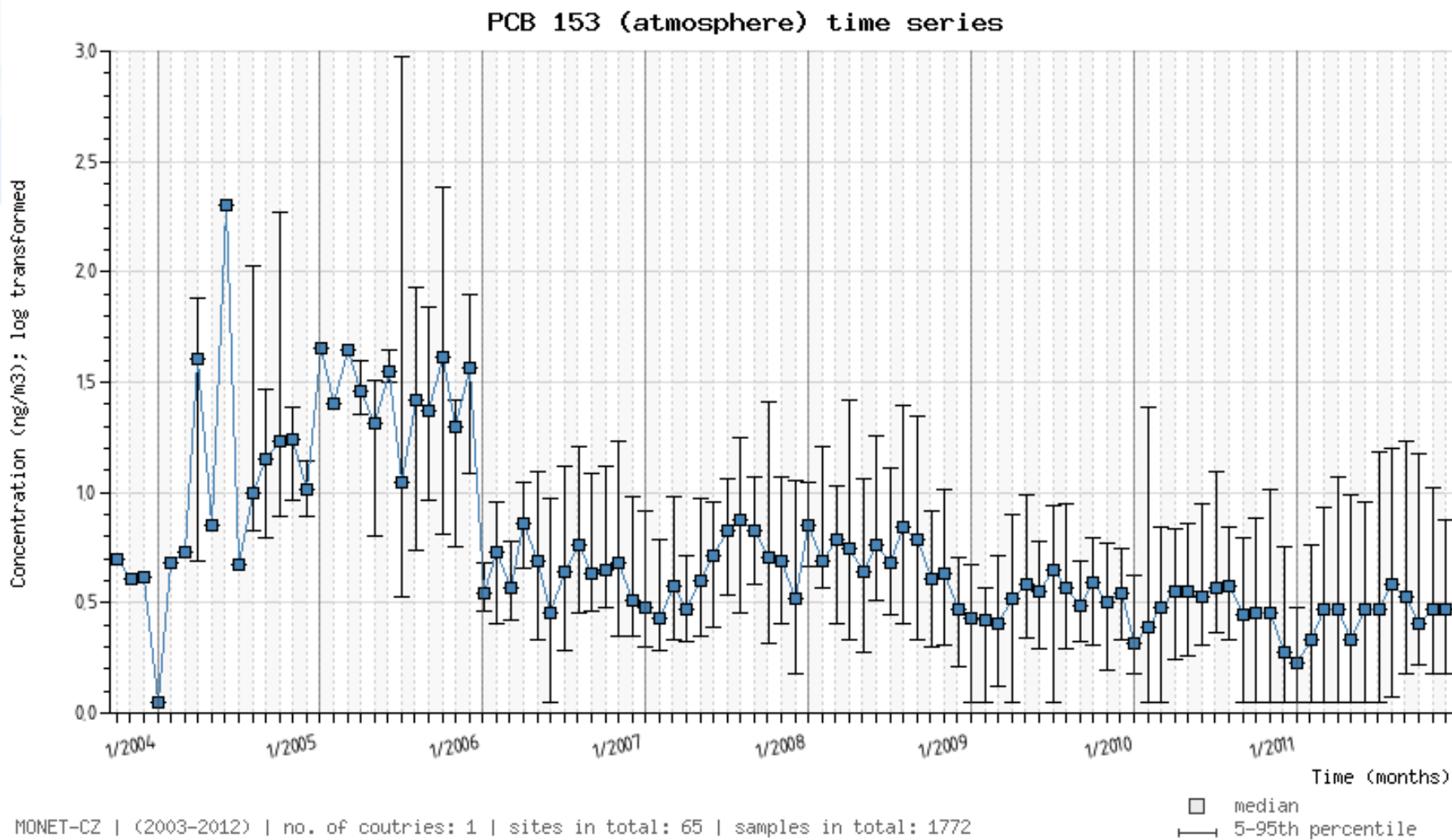


MONET CZ

PCB



MONET CZ time series, summary



MONET-CZ | (2003-2012) | no. of countries: 1 | sites in total: 65 | samples in total: 1772

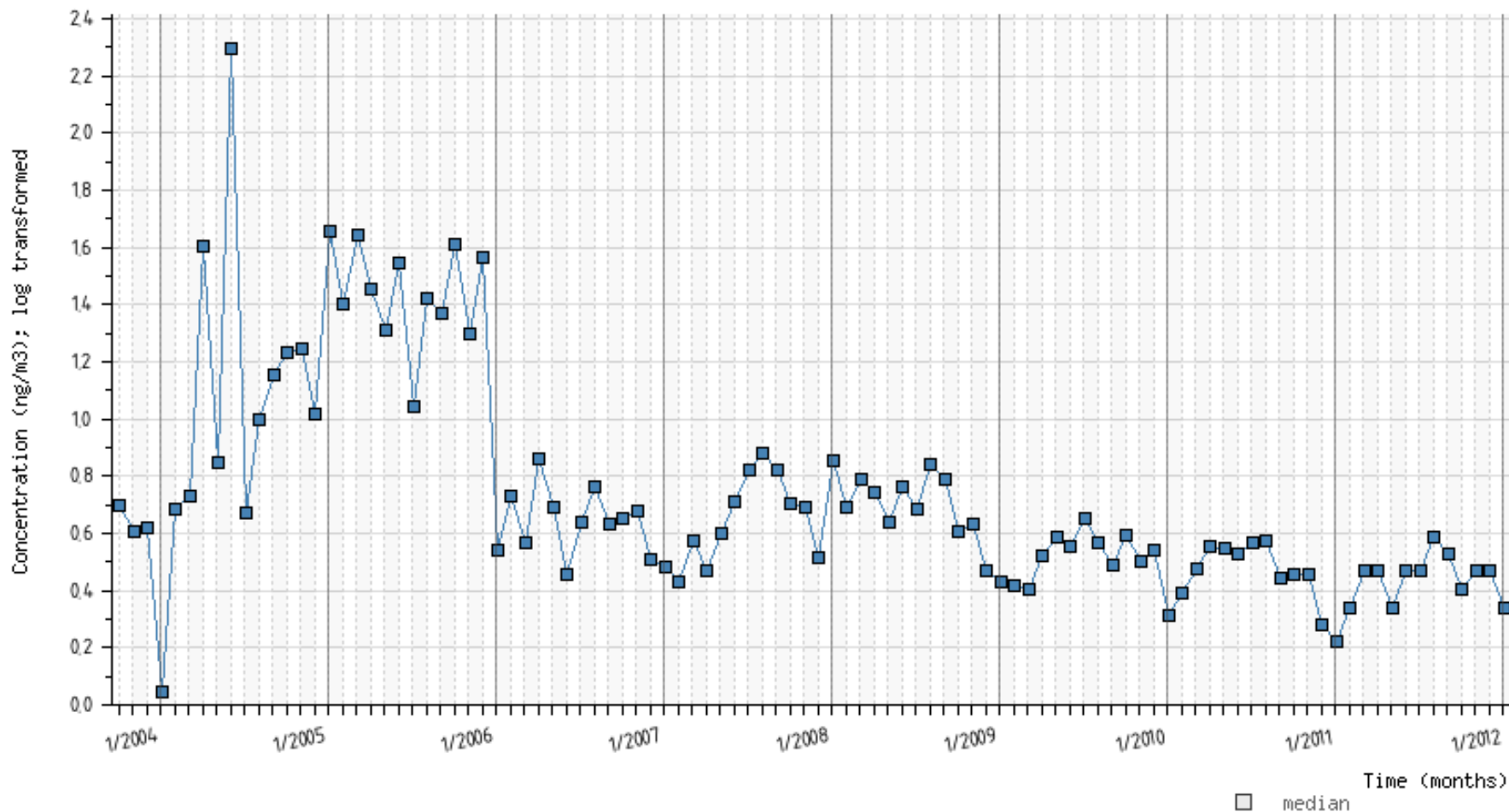
Base: samples | Stratified by: StationType

www.genasis.cz



MONET CZ time series, all sites, trends

PCB 153 (atmosphere) time series trend



MONET-CZ | (2003-2012) | no. of countries: 1 | sites in total: 65 | samples in total: 1772

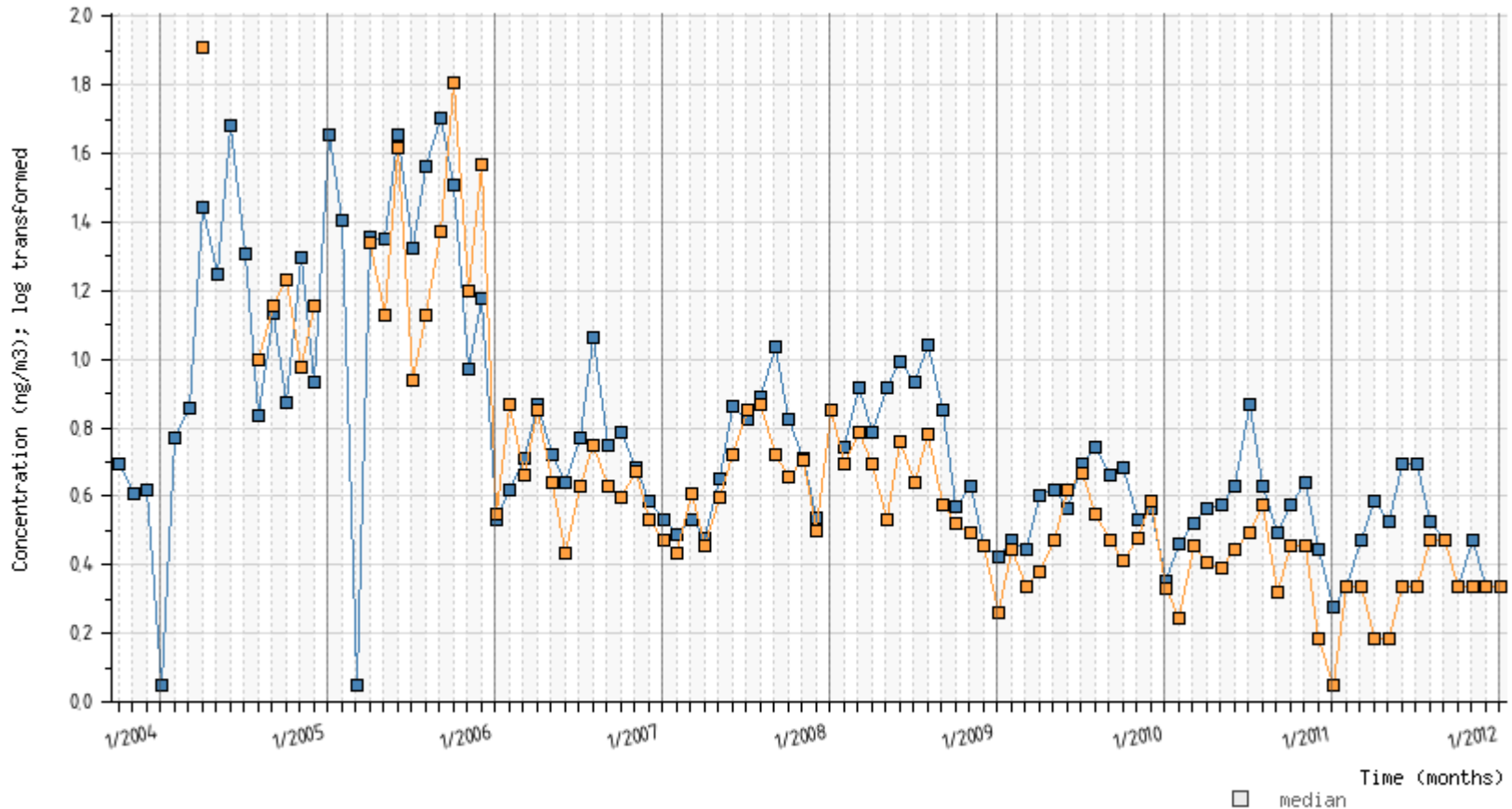
Base: samples | Stratified by: StationType

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MONET time series, rural and remote sites

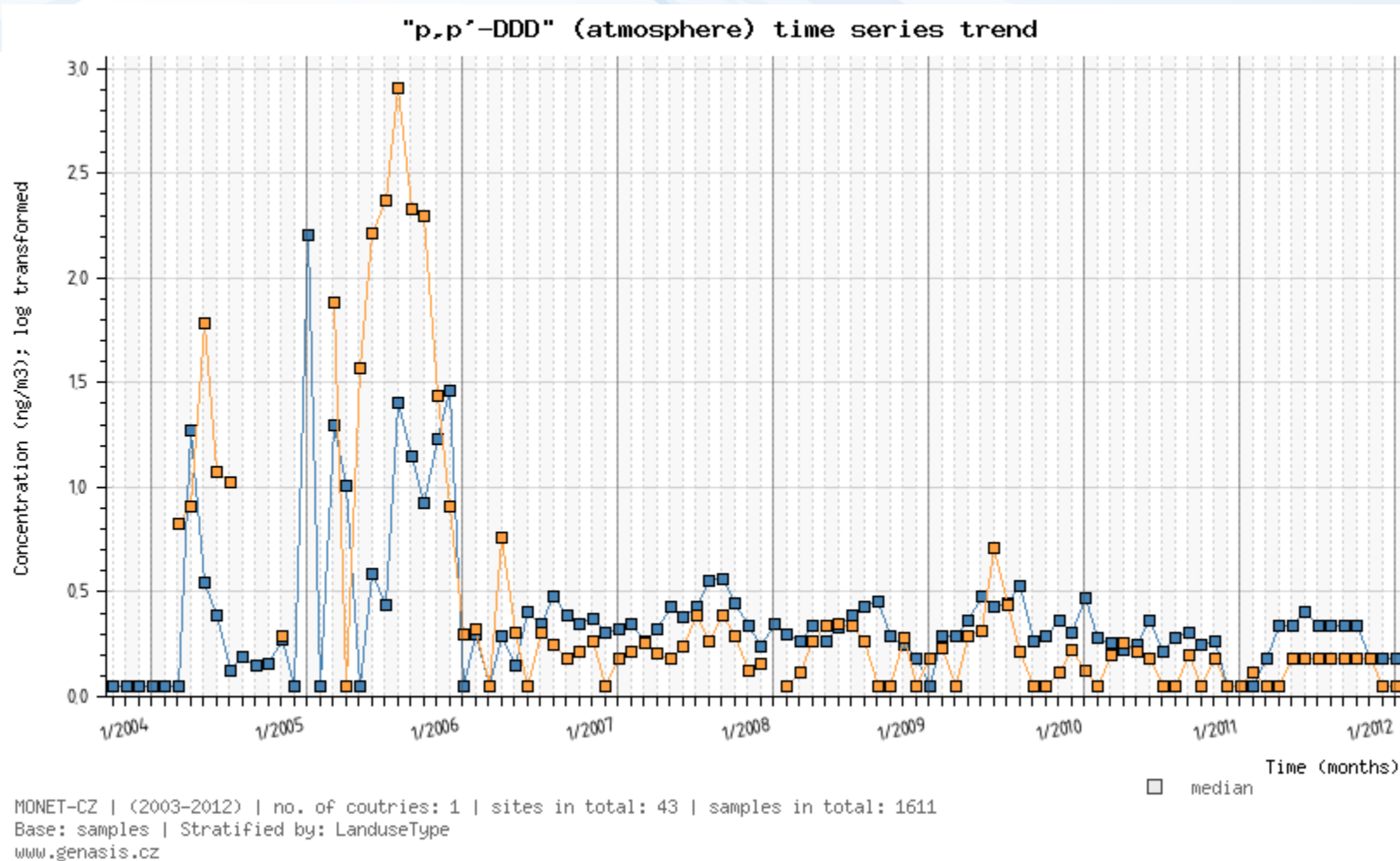
PCB 153 (atmosphere) time series trend



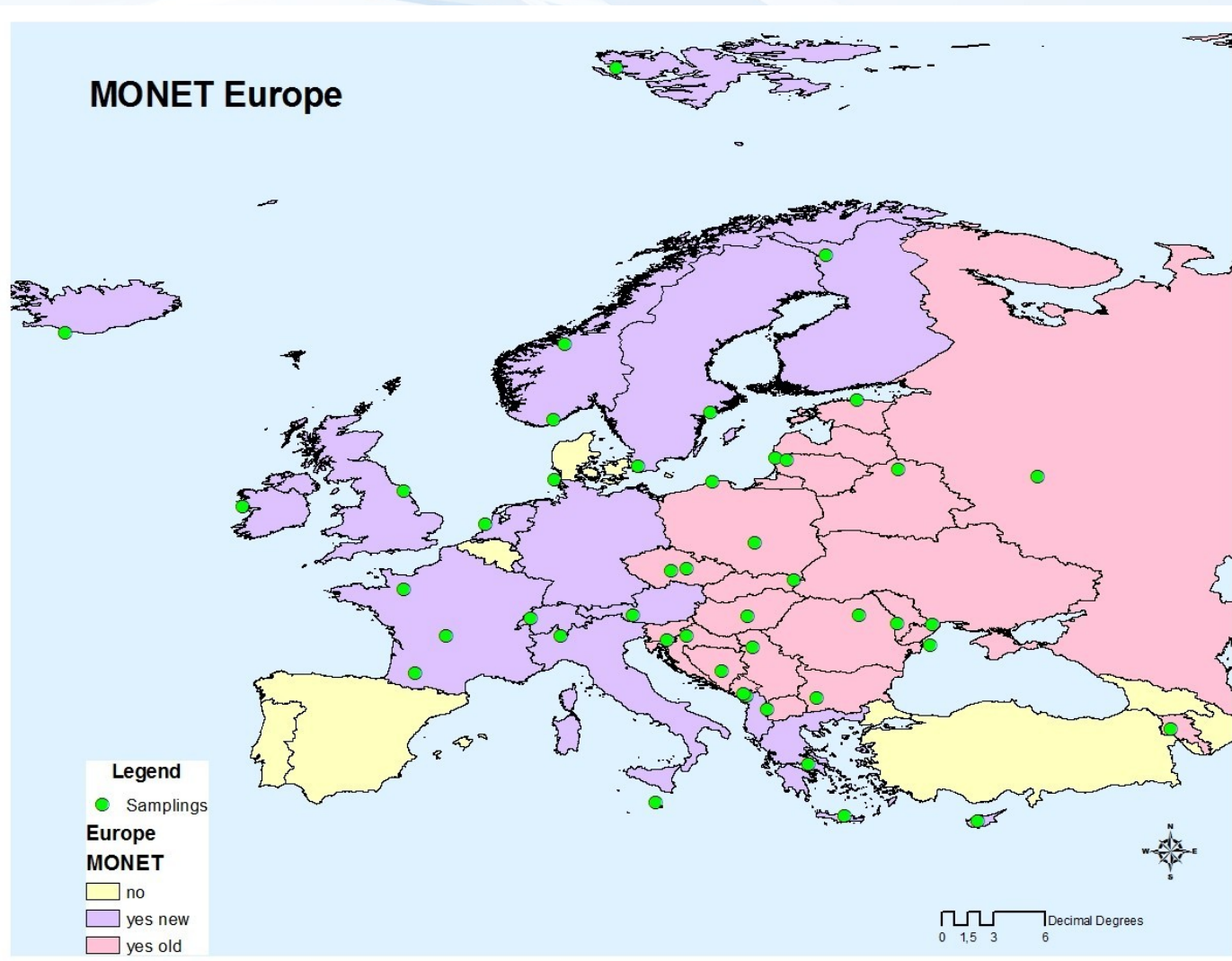
MONET-CZ | (2003-2012) | no. of countries: 1 | sites in total: 77 | samples in total: 2297
Base: samples | Stratified by: SettlementType
www.genasis.cz



MONET time series, agricultural and forest sites

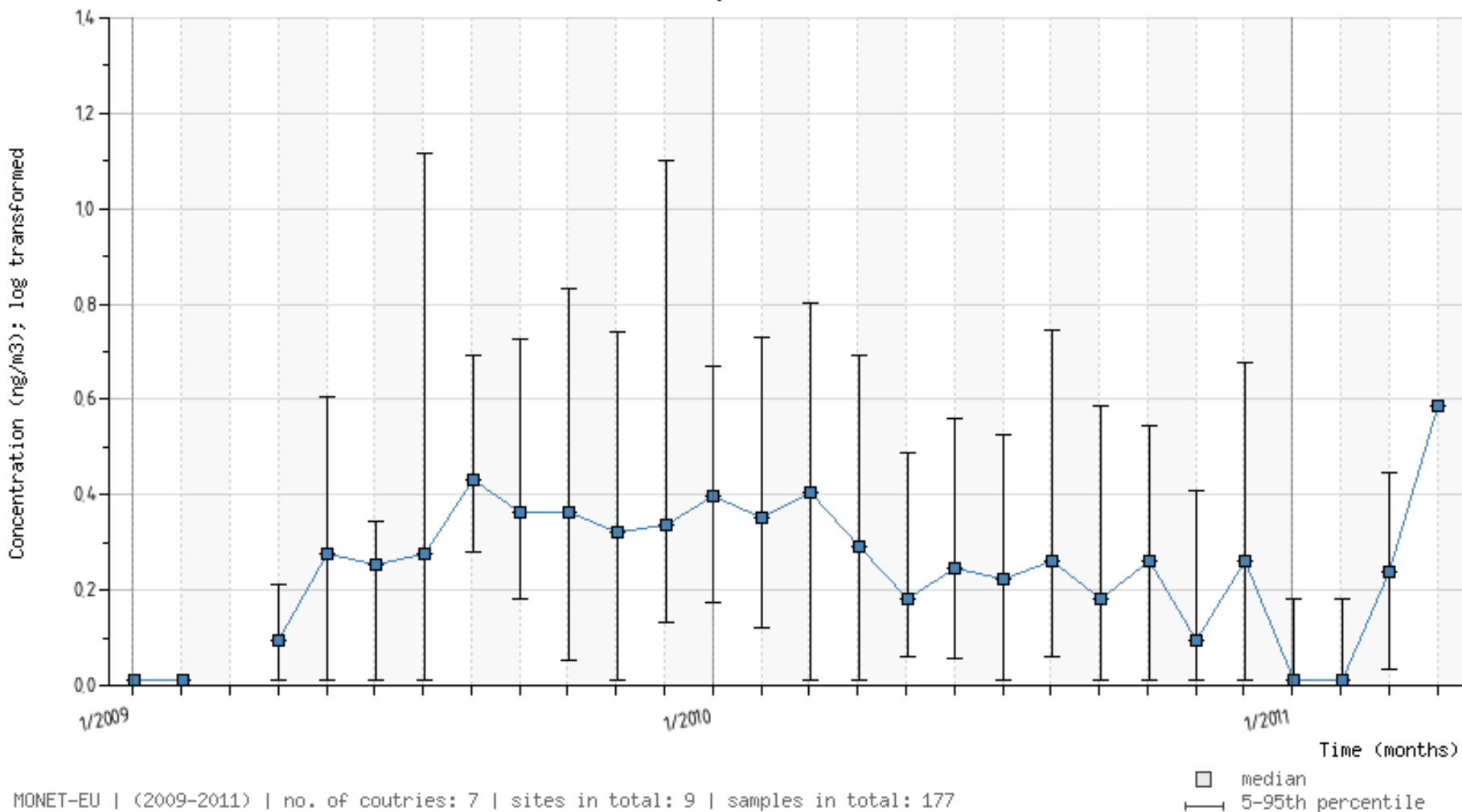


MONET EUROPE, starting 2009



MONET EUROPE

PCB 153 (atmosphere) time series



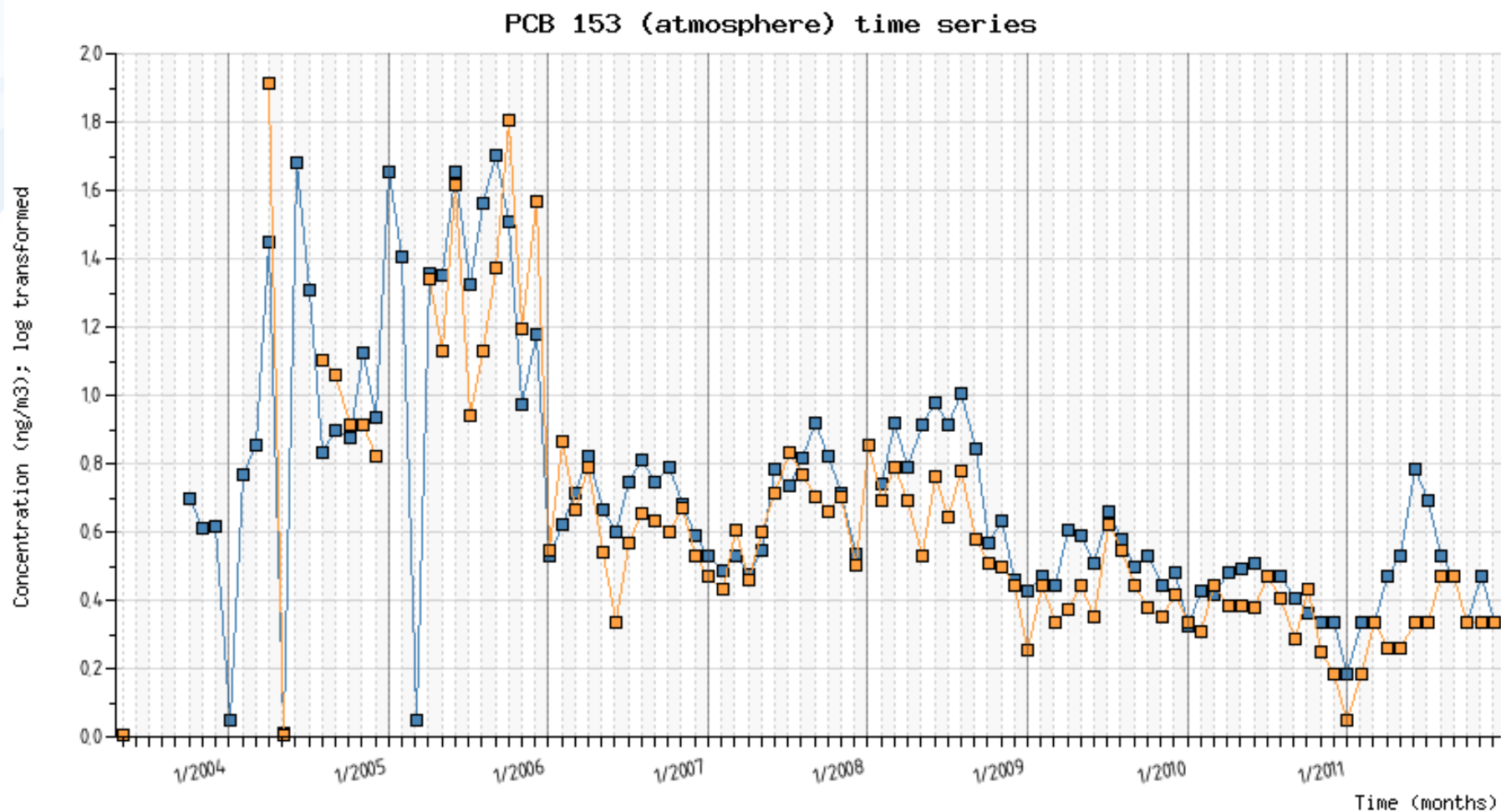
MONET-EU | (2009-2011) | no. of countries: 7 | sites in total: 9 | samples in total: 177

Base: samples | Stratified by: SettlementType

www.genasis.cz



MONET EUROPE (APOPSBAL, CZ, CEE, EU)



□ median

APOPSBAL, MONET-CEEC, MONET-CZ, MONET-EU | (2003-2012) | no. of countries: 30 | sites in total: 130 | samples in total: 3138

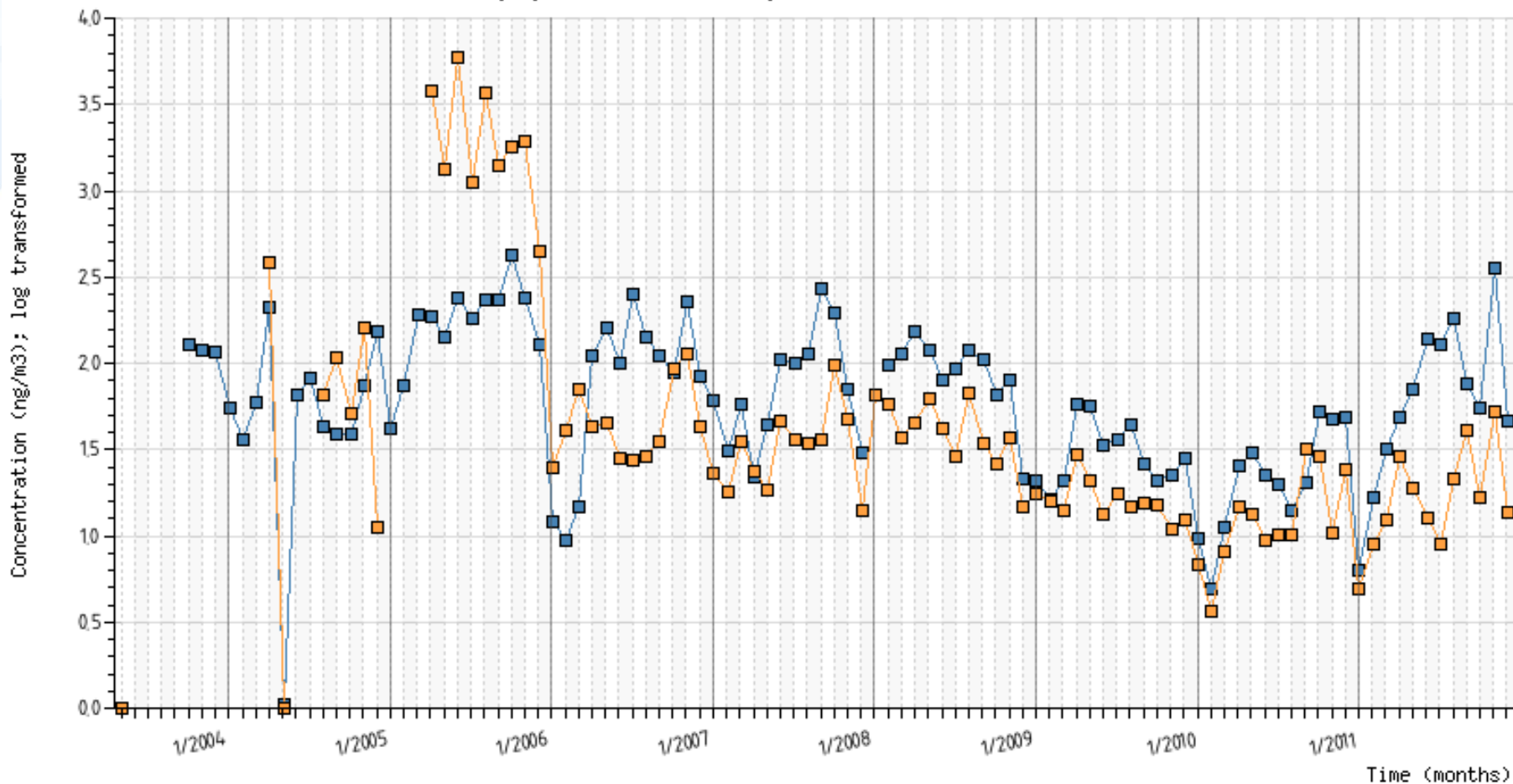
Base: samples | Stratified by: SettlementType

www.genasis.cz



MONET EUROPE (APOPSBAL, CZ, CEE, EU)

"p,p'-DDE" (atmosphere) time series



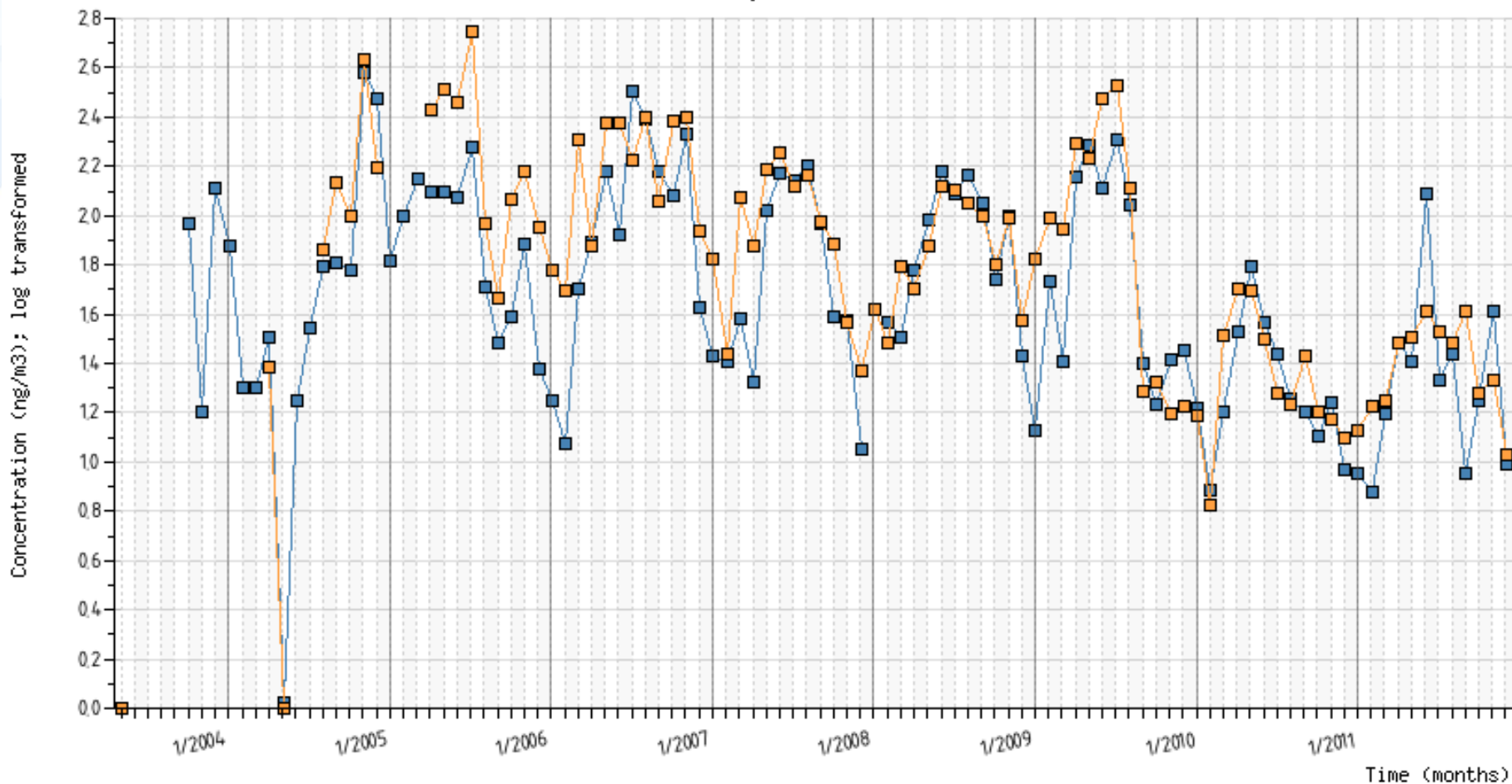
□ median
 — 95th percentile

APOPSBAL, MONET-CEEC, MONET-CZ, MONET-EU | (2003-2012) | no. of countries: 30 | sites in total: 130 | samples in total: 8122
 Base: samples | Stratified by: SettlementType
www.genasis.cz



MONET EUROPE (APOPSBAL, CZ, CEE, EU)

Gama-HCH (atmosphere) time series



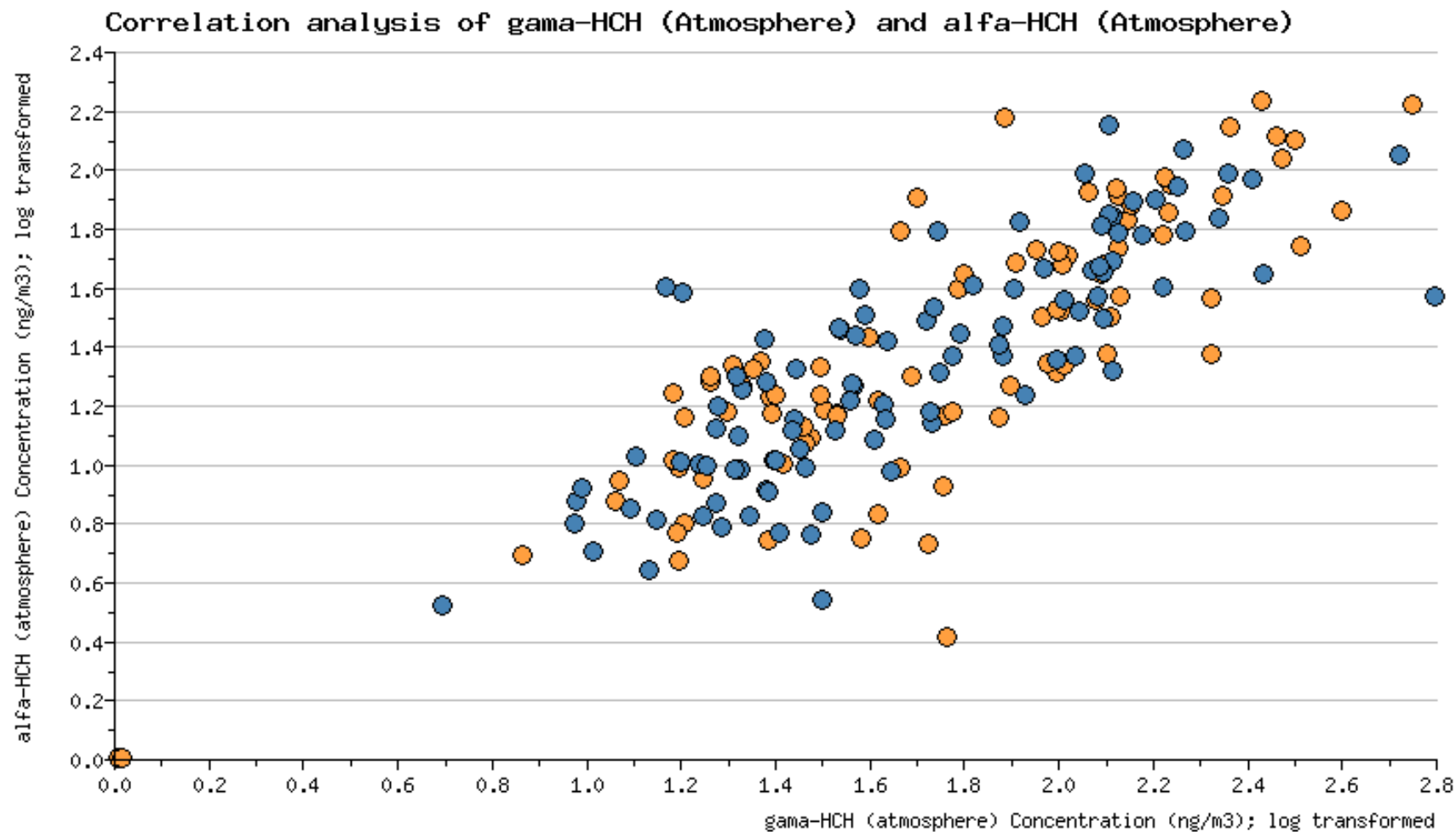
APOPSBAL, MONET-CEEC, MONET-CZ, MONET-EU | (2003-2012) | no. of countries: 30 | sites in total: 130 | samples in total: 3139

Base: samples | Stratified by: SettlementType

www.genasis.cz



MONET EUROPE (APOPSBAL, CZ, CEE, EU)



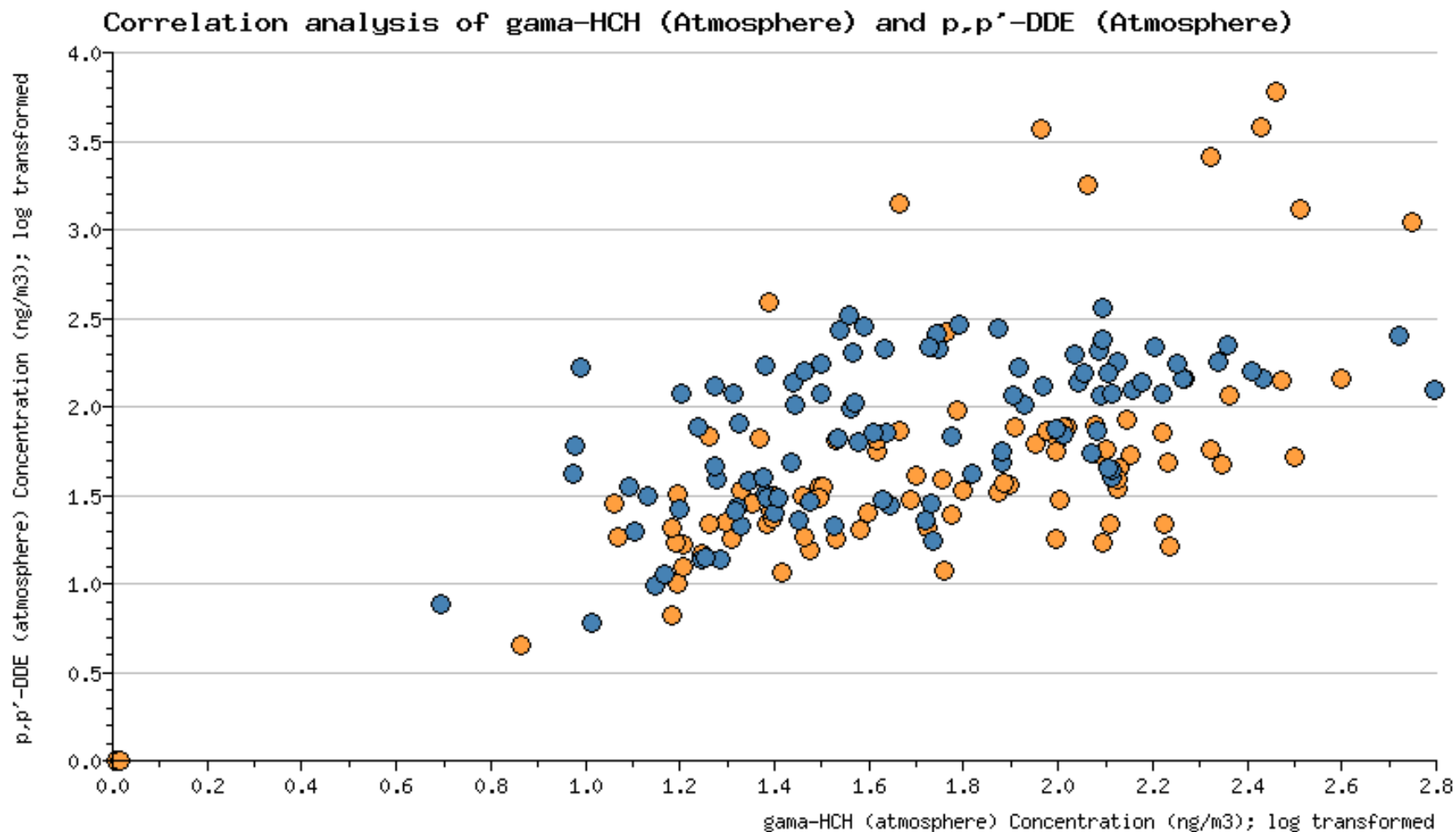
APOPSBAL, MONET-CEEC, MONET-CZ, MONET-EU | (2003-2012) | no. of countries: 30 | sites in total: 130 | samples in total: 3132

Base: samples | Stratified by: SettlementType

www.genasis.cz



MONET EUROPE (APOPSBAL, CZ, CEE, EU)



APOPSBAL, MONET-CEEC, MONET-CZ, MONET-EU | (2003-2012) | no. of countries: 30 | sites in total: 130 | samples in total: 3132

Base: samples | Stratified by: SettlementType

www.genasis.cz



Advantages of the GENASIS data management system

- multi-user system allowing to view and analyze data from various sources
- provides information on all included programs provided by data owners
- allows to view and analyze data together or separately by programs
- advanced visualization makes data assessible to the general public
- advanced statistical and analytical tools
- time series and time trends
- correlation analysis
- option of data stratification (geography, sources)
- comparison of data from various sources, regions, matrices
- accessibility of primary data
- options of various aggregations
- direct input into the Global monitoring reports



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Development for Innovation

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Thank you for your kind attention

