

A Study on the multi-residue screening method using passive sampling in the environmental sample

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Congressi Stefano Franscini, Monte Verità,
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29. May ~ 3. June, 2016



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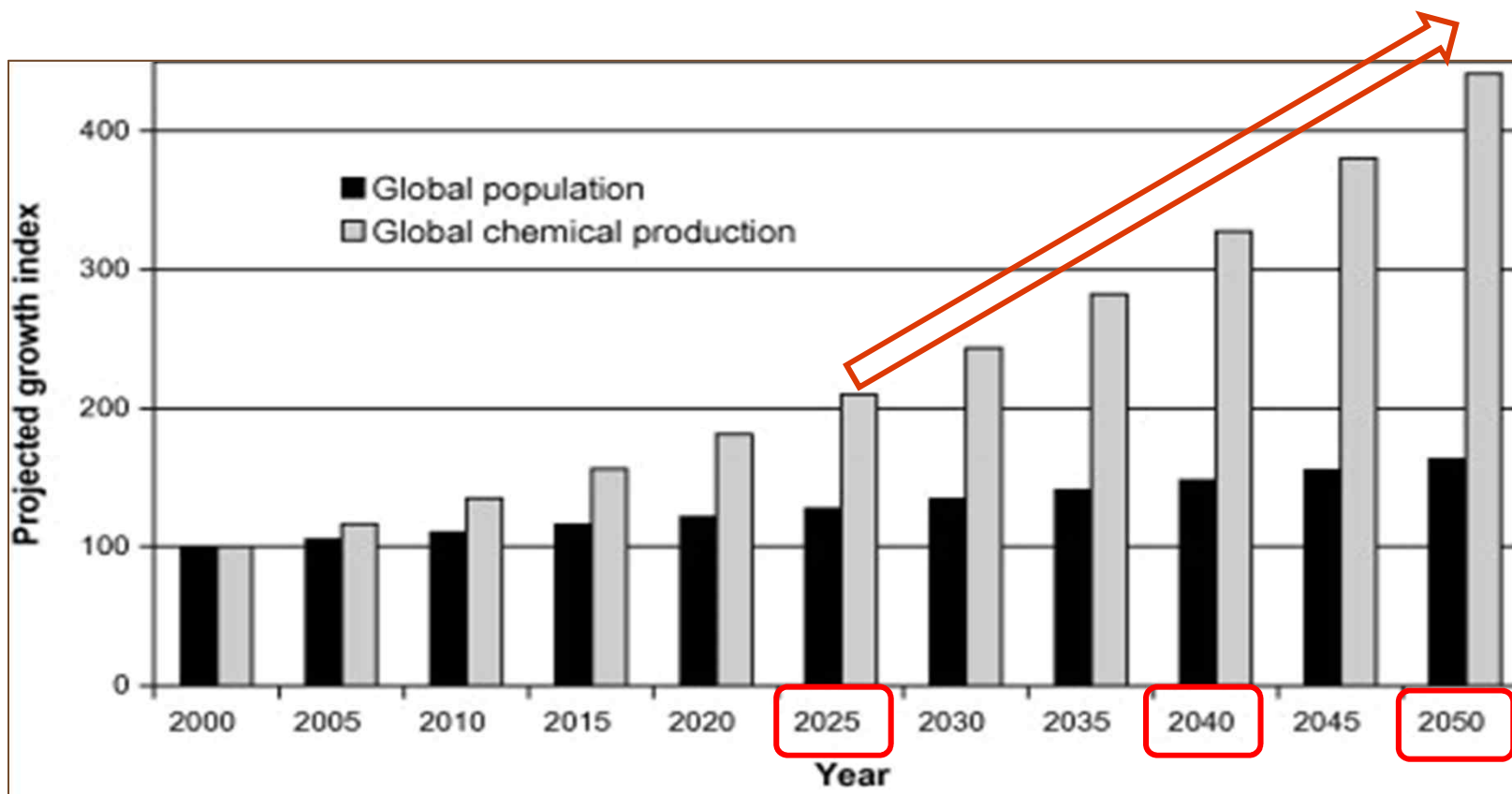


Conclusion and future plan



I Introduction

1. Increase of global chemical production



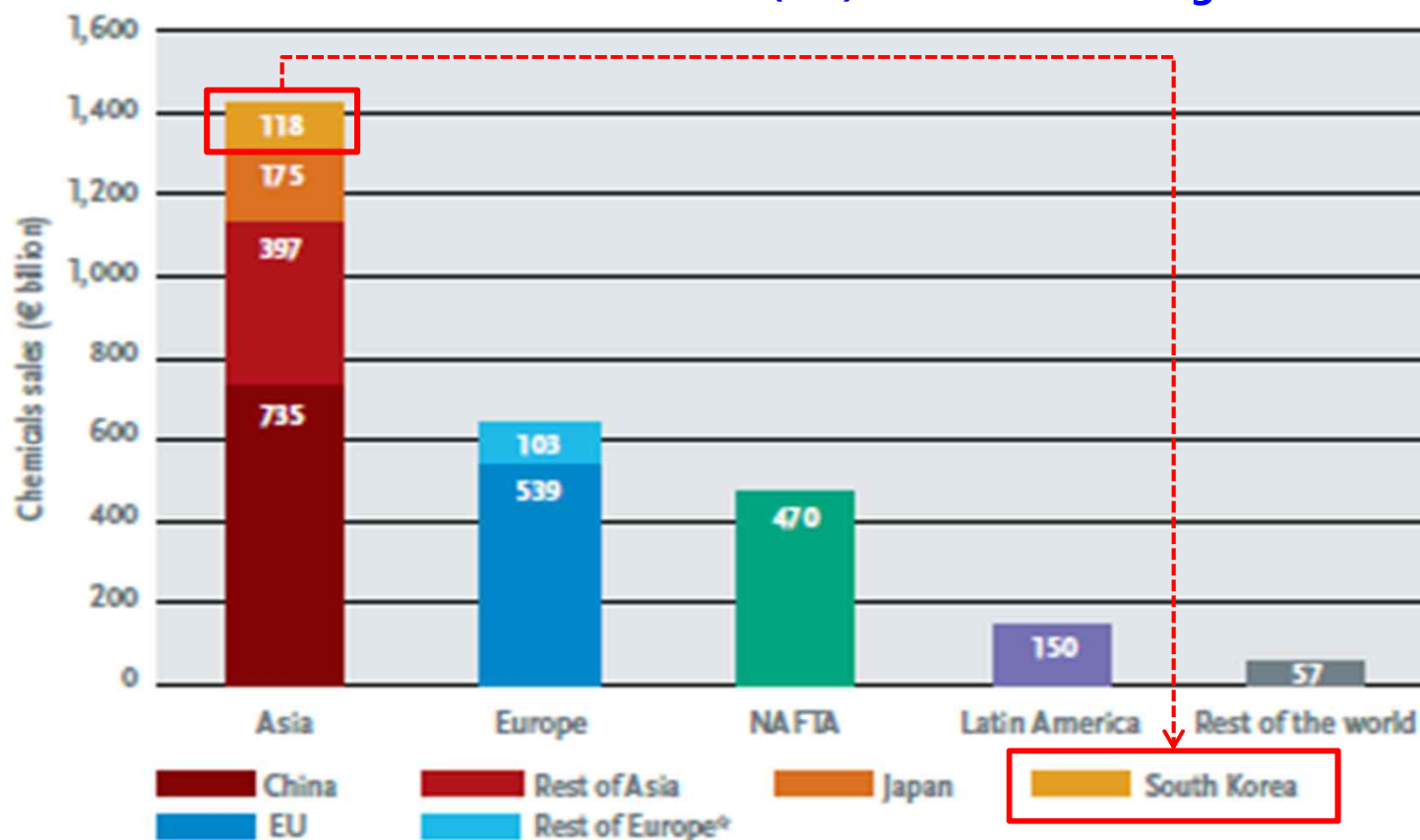
*Source : TrAC Trends in Analytical Chemistry Volume 28, Issue 8 2009 943 - 951

I

Introduction

2. Sales status on the global market

< Global chemicals sales('12) based on the region >



World chemicals sales in 2011 are valued at €27.44 billion. The European Union accounts for 19.6% of the total.

*Source : The European chemical industry in worldwide perspective Facts and Figures 2012, CEFIC

I

Introduction

3. Purpose of this study



Application of the passive sampling in the surface water and ambient air

- Surface water : ① SPMD (semi-permeable membrane device), ② POCIS (polar organic chemical integrative sampler; Pharmaceutical & Pesticide), ③ PDMS (polydimethyl siloxane)
- Ambient air : ④ PUF (polyurethane foam)



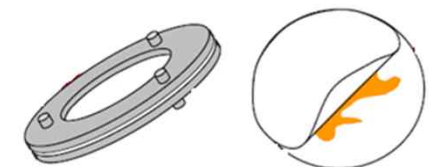
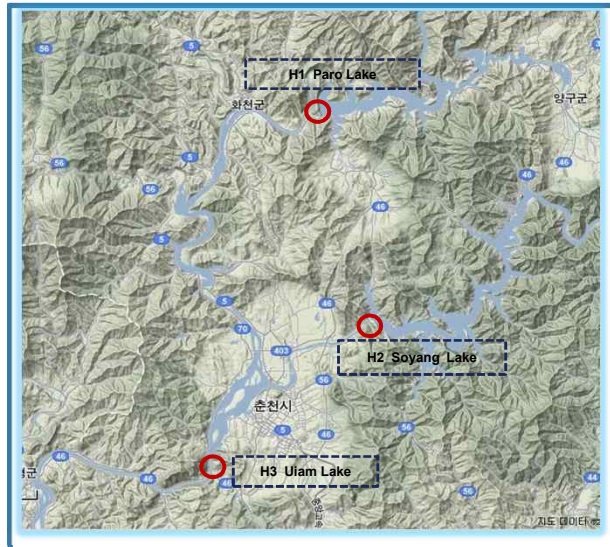
Screening in the real environment and comparison between the forest area and industrial zone

- Background sites (Han River) : 3 points
- Industrial sites (Shihwa) : 3 points

II Method

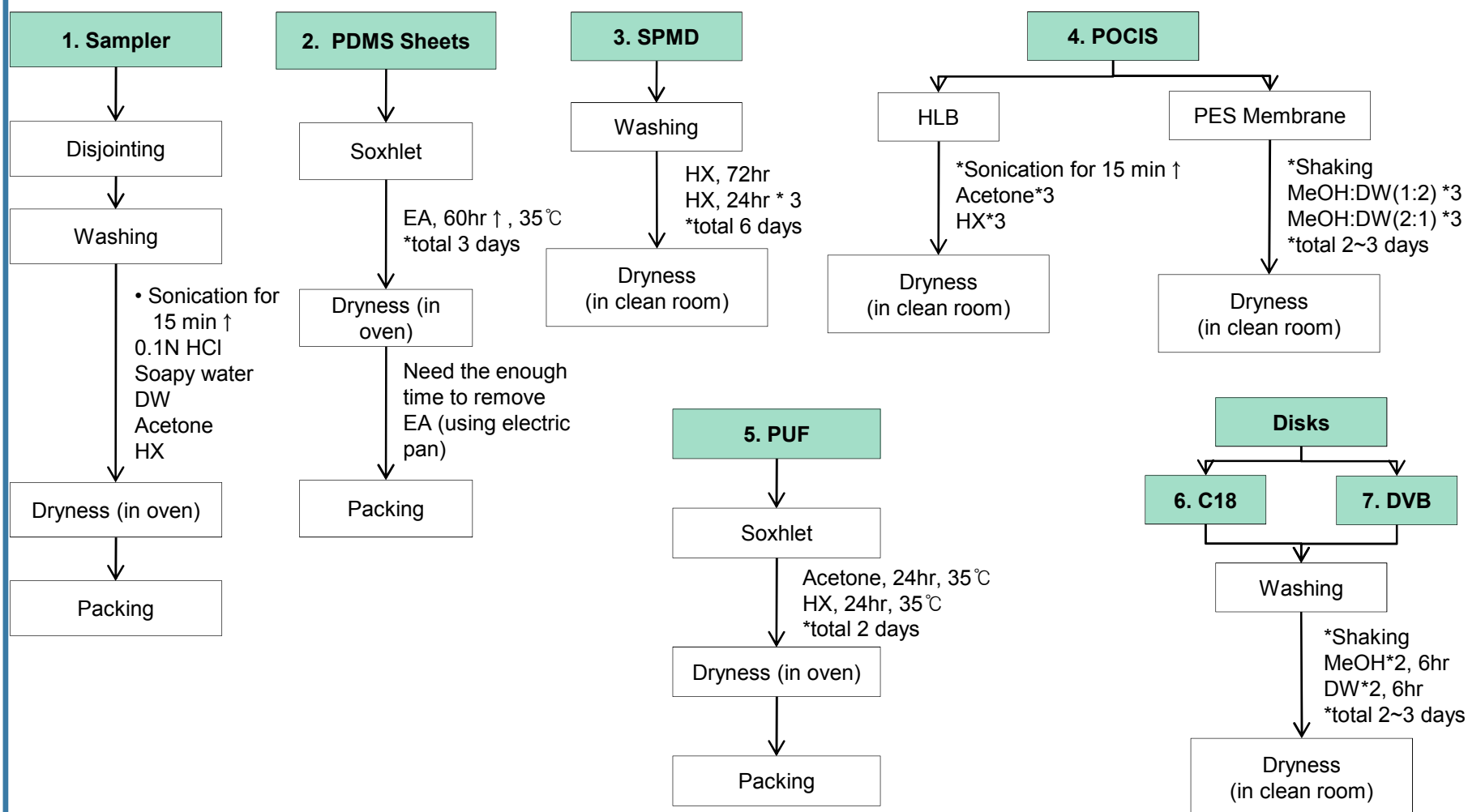
1. Sampling sites and devices

Sites (2 regions, 6 points)



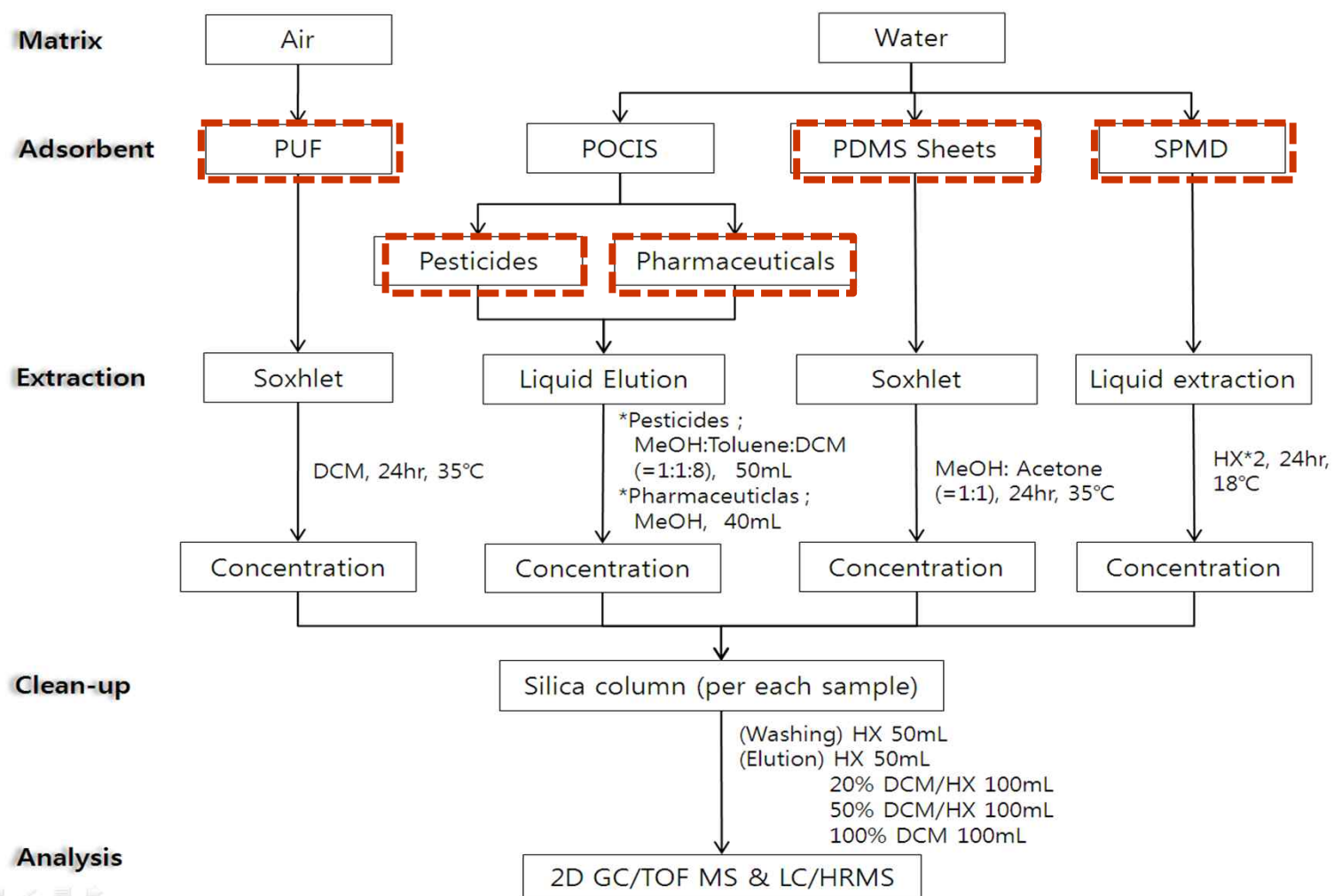
II Method

2. Sampling preparation for each sorbent



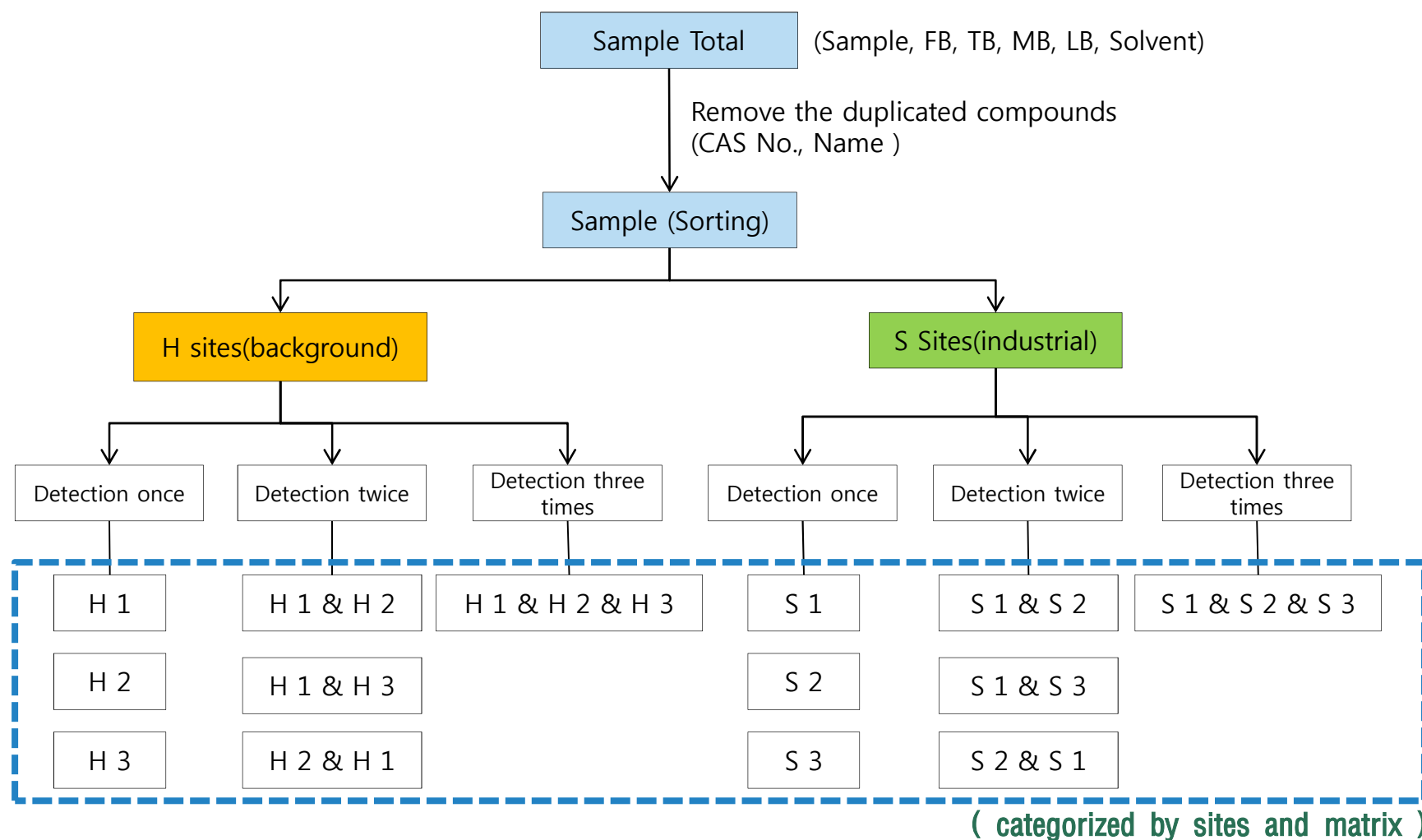
II Method

3. Sample preparation for each sorbent



III Result

1. Data process of analytical results



III

Result

I. List of the Detected chemicals

Sampling method

H1: 과로호, H2: 소양강댐, H3: 의암댐
S1: 옥구7교, S2: 시흥4교, S3: 시화호
Blank

Water, Air

SPMD, PDMSs, POCIS_Pest,
POCIS_Pharm, HLB, Disk-C18,
Disk-DVB, PUF, Grab

LB: lab blank, TB: trip blank, FB: field blank
MB: Method blank, ?_HX: hexane, Sample

Serial #	Sampling date	Site	Matrix	Sampling method	Category	Compounds	Formular	Similarity	S/N	Usage	pKow
1	2013-02-18	Blank	Water	Disk-C18	LB	1-PROPANOL 2-METHYL-	78-83-1	C4H10O	842	248.55	
3	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
4	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
5	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
6	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
7	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
8	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
9	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
10	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
11	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
12	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
13	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
14	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
15	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
16	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
17	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
18	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
19	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		
20	2013-02-18	Blank	Water	Disk-C18	LB	C10H18O2	110	777	1220.6		

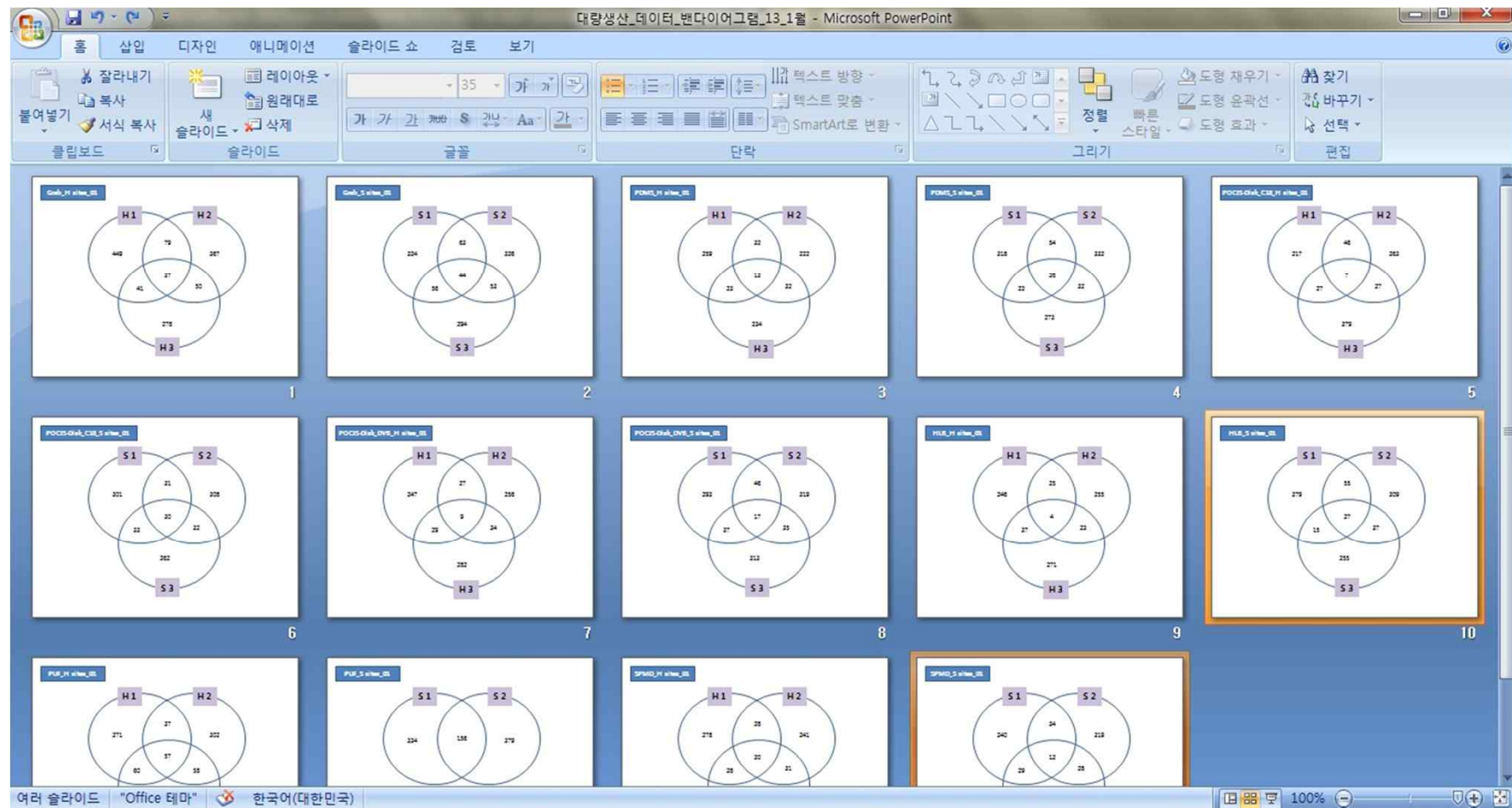
II. Sorting data using microsoft access program

Sampling #	Site	Matrix	Sampling	Category	Compound	CAS	Formular	Similarity	SN
2013-01-16	S2	Water	PDMSs	Sample	(T-BUTYLSIL' 135524-32-2	135524-32-2	C4H14GeSi	778	197.55
2013-01-16	S3	Water	PDMSs	Sample	(T-BUTYLSIL' 135524-32-2	135524-32-2	C4H14GeSi	777	274.9
2013-01-16	S2	Water	PDMSs	Sample	(1R,2R,3S,5R)- 22422-34-0	22422-34-0	C10H18O2	752	1220.6
2013-01-16	S3	Water	PDMSs	Sample	(1R,2R,3S,5R)- 22422-34-0	22422-34-0	C10H18O2	784	2740.5
2013-01-16	S2	Water	SPMD	Sample	(3S,4S,5S)-3-E 0-00-0	0-00-0	C9H14O3	793	66.961
2013-01-16	S3	Water	SPMD	Sample	(3S,4S,5S)-3-E 0-00-0	0-00-0	C9H14O3	711	57.755
2013-01-16	S2	Water	Grab	Sample	(E)-1-PHENYL 1005-64-7	1005-64-7	C10H12	738	178.1
2013-01-16	S3	Water	Grab	Sample	(E)-1-PHENYL 1005-64-7	1005-64-7	C10H12	803	228.98
2013-01-16	S2	Water	Grab	Sample	(R)-4-HYDRO 76282-48-9	76282-48-9	C4H8O2	783	7349.8
2013-01-16	S3	Water	Grab	Sample	(R)-4-HYDRO 76282-48-9	76282-48-9	C4H8O2	839	2073.8
2013-01-16	S2	Water	Disk_DVB	Sample	(RS)-3-METH 0-00-0	0-00-0	C8H14O2	708	16158
2013-01-16	S3	Water	Disk_DVB	Sample	(RS)-3-METH 0-00-0	0-00-0	C8H14O2	820	213.41
2013-01-16	S2	Water	HLB	Sample	(S,S)-N,N'-BIS 0-00-0	0-00-0	C9H20N4O2	906	56.361
2013-01-16	S3	Water	HLB	Sample	(S,S)-N,N'-BIS 0-00-0	0-00-0	C9H20N4O2	869	67.395
2013-01-16	S2	Water	Grab	Sample	(Z,Z)-1,4-DIA 139131-45-6	139131-45-6	C12H12N2O4	756	113.25
2013-01-16	S3	Water	Grab	Sample	(Z,Z)-1,4-DIA 139131-45-6	139131-45-6	C12H12N2O4	720	57.36
2013-01-16	S2	Water	Disk_DVB	Sample	1-(3-ETHYL-5 88-29-9	88-29-9	C18H26O	875	3419.8
2013-01-16	S3	Water	Disk_DVB	Sample	1-(3-ETHYL-5 88-29-9	88-29-9	C18H26O	810	851.83
2013-01-16	S2	Water	SPMD	Sample	1-(3-ETHYL-5 88-29-9	88-29-9	C18H26O	734	14455
2013-01-16	S3	Water	SPMD	Sample	1-(3-ETHYL-5 88-29-9	88-29-9	C18H26O	853	12788
2013-01-16	S2	Water	PDMSs	Sample	1-(4-TERT-BL 81-14-1	81-14-1	C14H18N2O5	926	40520
2013-01-16	S3	Water	PDMSs	Sample	1-(4-TERT-BL 81-14-1	81-14-1	C14H18N2O5	930	4939.8

III

Result

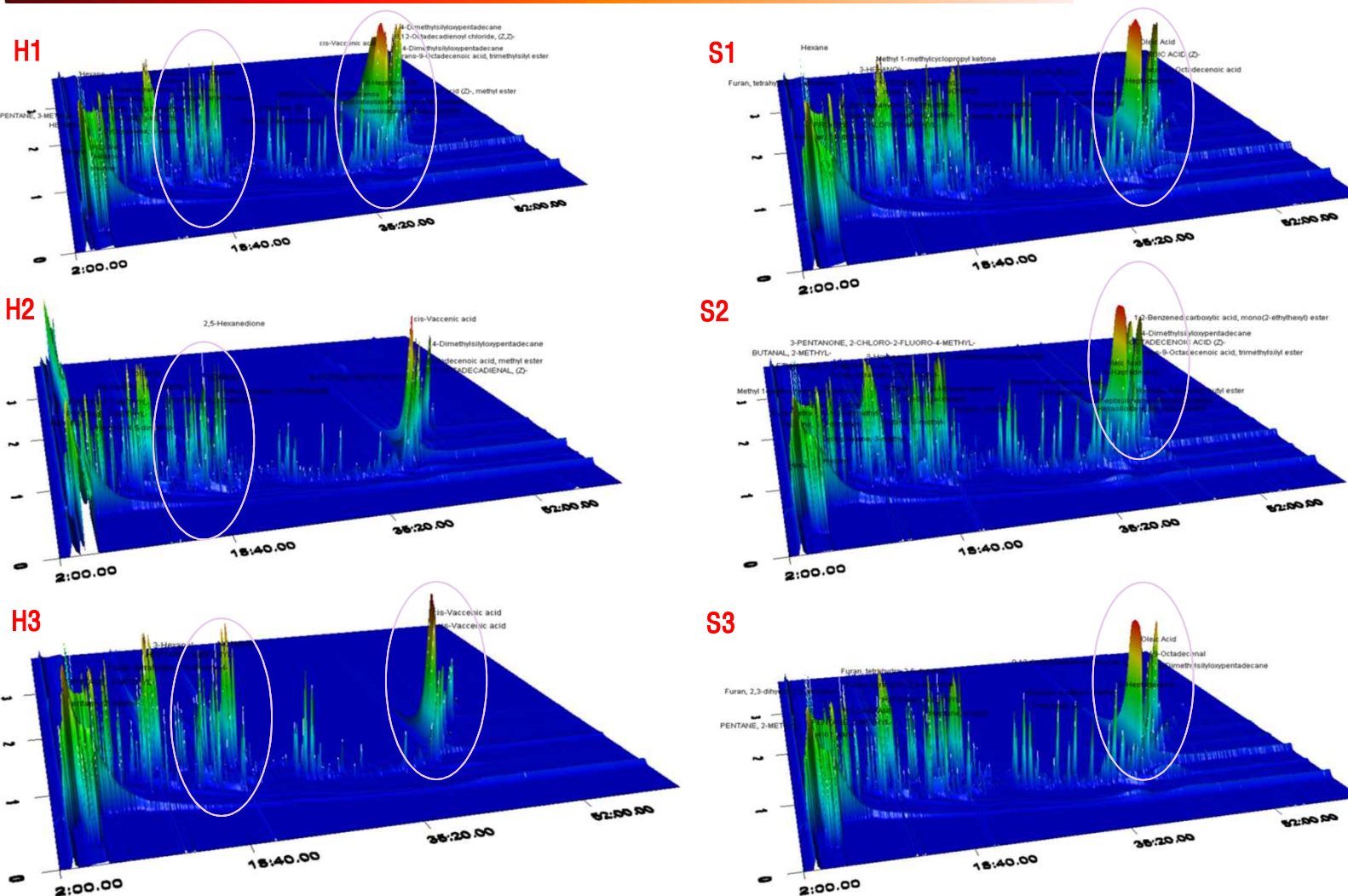
2. Venn diagrams for detected chemicals



III

Result

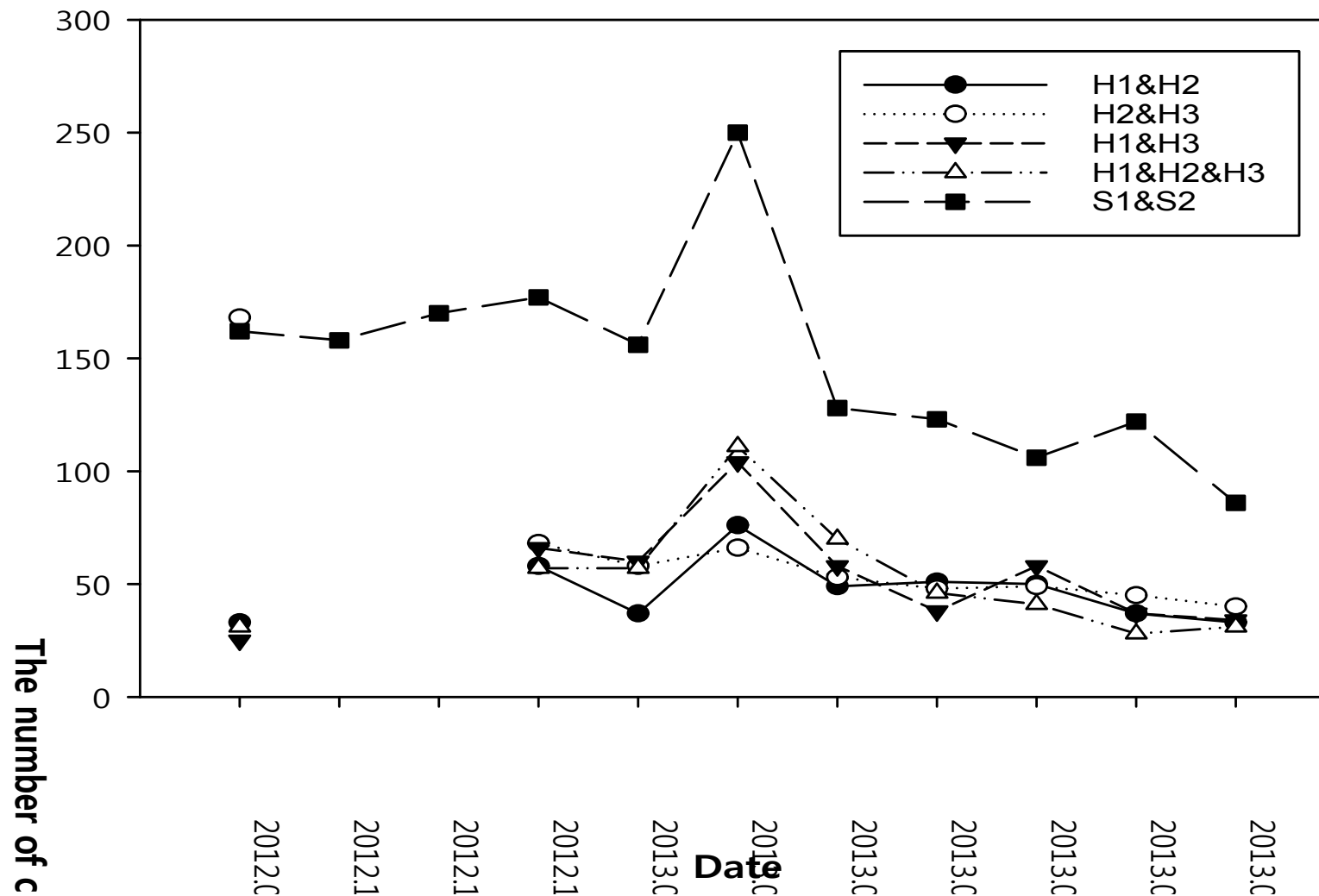
3. Comparison of trend detection with 3D image



III

Result

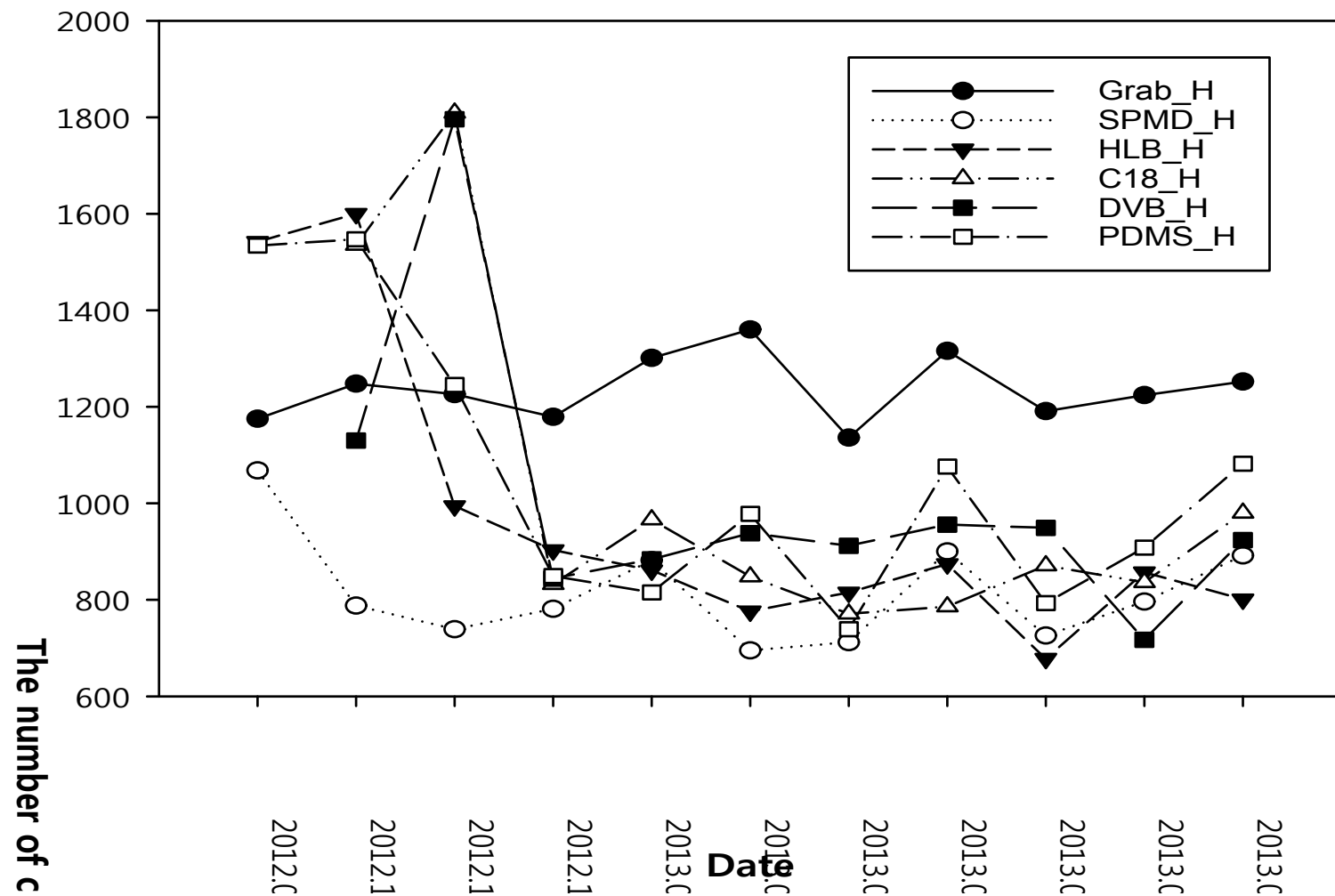
4. Seasonal variations of the detected chemicals from the air



III

Result

5. Seasonal variations of the detected chemicals from the water



IV

Conclusion and future plan

1. Conclusion

- standardization of the multi-residue screening method which be made up of passive sampling and 2D-GC/TOF-MS
- continuous monitoring with passive sampler and development of data processing system
- investigation into the correlation between adsorbents and sites
- confirmation of the detected chemicals such as phosphorous flame retardants(PFRs) like TCPP, VOCs, PAHs and chlorinated hydrocarbons

2. Future plan

- Application possibility of the human biosamples (blood, urine)
 - finding out the new exposure index chemicals
 - A study on the introduction of multi-screening method for new exposure index chemicals in human biosamples ('16)
 - Development of the multi-screening method for the new exposure index chemicals in human biosamples ('17~'21)

Thank you



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