

- Progress of POPs monitoring on the regional level -

3rd round compilation of regional report in Asia Pacific under the Stockholm Convention

Yasuyuki SHIBATA

A member of Global Coordination Group (GCG)
& Regional Organization Group (ROG) in Asia-Pacific
National Institute for Environmental Studies, Japan

Stockholm Convention

Adopted: 22 May 2001

Entered into force: 17 May 2004

Number of Parties: 182 (3 Aug 2018)

Article 1

Objective

Mindful of the precautionary approach as set forth in Principle 15 of the Rio Declaration on Environment and Development, the objective of this Convention is to protect human health and the environment from persistent organic pollutants.

Article 16

Effectiveness evaluation.

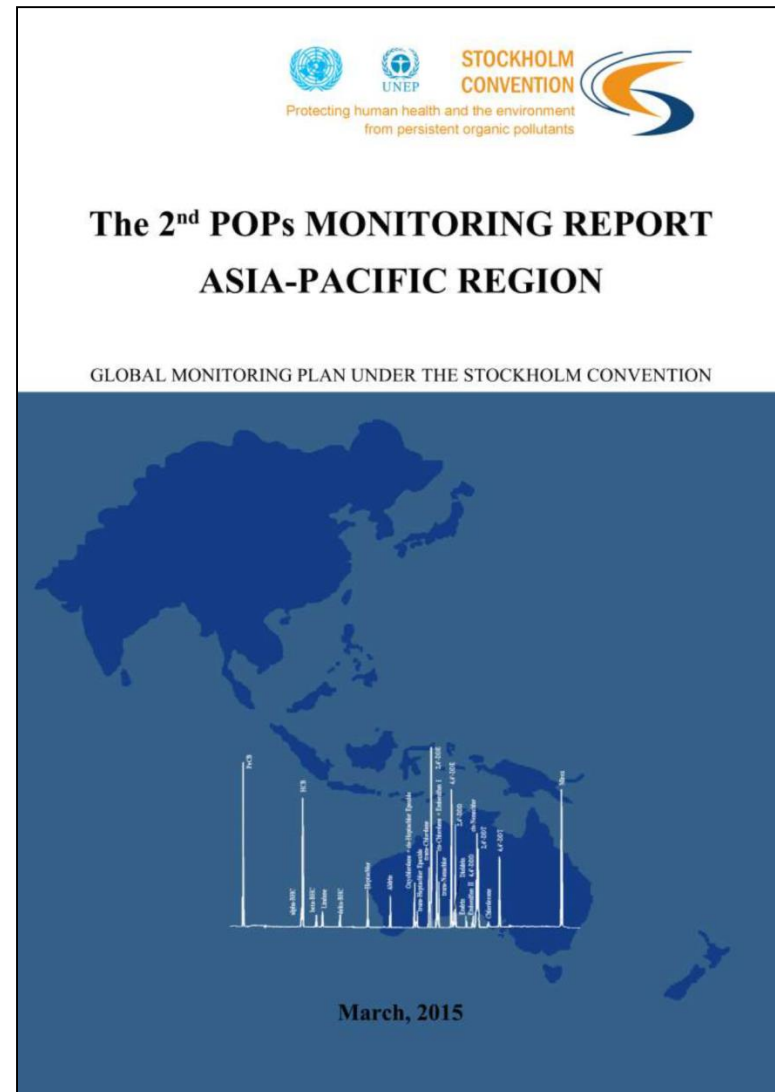
2004 + 4 = 2008

6 years interval

1. Commencing four years after the date of entry into force of this Convention, and periodically thereafter at intervals to be decided by the Conference of the Parties, the Conference shall evaluate the effectiveness of this Convention.
2. In order to facilitate such evaluation, the Conference of the Parties shall, at its first meeting, initiate the establishment of arrangements to provide itself with comparable monitoring data on the presence of the chemicals listed in Annexes A, B and C as well as their regional and global environmental transport. These arrangements:



1st Asia-Pacific Report (Dec 2008)



2nd Asia-Pacific Report (Mar 2015)

(<http://chm.pops.int/Implementation/GlobalMonitoringPlan/MonitoringReports/tabid/525/Default.aspx>)

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	1
PREFACE	2
ABBREVIATIONS AND ACRONYMS	3
GLOSSARY OF TERMS	6
EXECUTIVE SUMMARY	7
Overview of the region	7
Description of contributing programs	7
Main findings	7
Conclusions and recommendations	11
A) Capacity building needs	11
B) Future programmes	12
1 Introduction	13
2 Description of the region	15
2.1 Overall composition of the region	15
2.2 Historical and current sources	18
3 Organization of regional implementation	29
3.1 Preparatory workshops	29
3.2 Establishment and responsibilities of the regional organization group	30
3.3 Agreement on a basic framework to provide comparable information	31
3.4 Regionally developed and executed implementation plans	31
3.5 Information gathering strategy	32
3.6 Strategy for using information from existing programmes	32
3.7 Preparation of the monitoring reports	33
4 Methods for sampling, analysis and handling of data	34
5 Results and discussion	38
5.1 Results	38
5.1.1 Ambient air	38
5.1.2 Human tissues (milk and blood)	49
5.1.3 Water	58
5.1.4 Other media	60
5.2 Review and discussion	62
5.2.1 Ambient air	62
5.2.2 Human tissues (milk and/or blood)	64
5.2.3 Water	66
5.2.4 Other media (sediment core)	66
5.3 Long-range transport	67
6 Conclusions and recommendations	69
7 References	72

Priority Media:

<All POPs>

- Air
- Human tissues
(breast milk / bloods)

<PFOS>

- Water

Other Media:

- Sediments
- Biota (fishes, bivalves)

2nd Asia-Pacific Report (Mar 2015)

Major programs in the 2nd Regional Report in Asia-Pacific

	Program	Countries / Areas	Media (Bold: core media)
China	National POPs monitoring	Mainland	Air, Human breastmilk, Water (PFOS)
		HongKong, Macao	Air, water (PFOS)
		HongKong	Human breastmilk
Japan	National POPs monitoring		Air, Water, Sediments, Biota (fishes, bivalves, birds)
	Survey on Dioxins		Air, Water, Soil, Sediments, Biota
	Survey on human exposure		Human bloods (dioxins, PCB, OCPs)
	Human breastmilk survey	Osaka	Human breastmilk
	Marine Monitoring Survey		Seawater, Sediments, Biota
	Marine Pollution Survey		Sediments (PCB)
	PFOS in seawater	Pacific Ocean	Seawater
Temporal trends of POPs in cetaceans	Japan / Pacific ocean	blubber of stranded whales, dolphins	
East Asia	POPs in Air in East Asia	Indonesia, Japan, Korea, Lao PDR, Malaysia, Mongolia, Philippines, Thailand, Vietnam	Air (HV sampling)
East Asia	UNU/Shimadzu Coastal hydrosphere	Korea, Philippines, Thailand	Water (PFOS), fish, sediments
Thailand	Literature data		Water (PFOS)
Pacific Islands	POPs in Air in Pacific countries	Fiji, Kiribati, Niue, Palau, Samoa, Solomon Islands, Tuvalu	Air (passive sampling)
	POPs in human milk in Pacific Islands	Fiji, Kiribati, Niue, Palau, Samoa, Solomon Islands, Tonga, Tuvalu, Marshall Islands	Human breastmilk



Members of the Regional Organization Group for the 3rd round GMP in Asia and the Pacific

Mr. Minghui Zheng (China) (leader)*

Mr. Johann Poinapen (Fiji)*

Mr. Abdulrahman Bahrami (Iran)

Mr. Yasuyuki Shibata (Japan)*

Mr. Anas Ali Saeed AL-Nadhari (Yemen)

Mr. Ram Bharosey Lal (India)

* Members of Global Coordination Group

Table 1 Sub-regional framework of responsibilities in ROG members

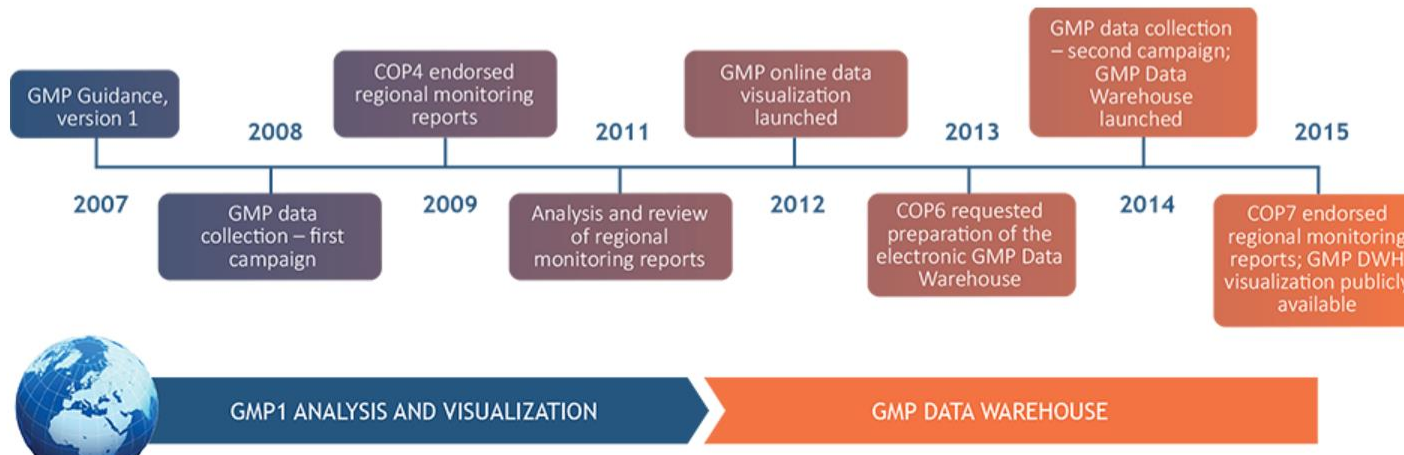
<i>ROG member</i>	<i>Selected member of countries within the sub-region</i>		
<i>Yemen</i>	Iraq Jordan Bahrain Kuwait	Lebanon Palestine Oman Saudi Arabia	Syria Qatar United Arab Emirates
<i>India & Iran</i>	Afghanistan Bangladesh Bhutan	Nepal Maldives	Pakistan Sri Lanka
<i>China</i>	Korea (DPRK) Lao People's Republic Mongolia	Vietnam Kazakhstan Kyrgyzstan	Tajikistan Turkmenistan Uzbekistan
<i>Japan</i>	Brunei Darussalam Cambodia Indonesia	Korea (Republic of) Myanmar	Philippines Singapore Thailand
<i>Fiji</i>	Samoa Cook Islands French Polynesia Guam Kiribati Micronesia Marshall Islands	Nauru New Caledonia Niue N. Mariana Islands Palau (Republic of) Papua New Guinea Pitcairn Islands	Solomon Islands Tokelau Tonga Tuvalu Vanuatu Wallis and Futuna

Milestones	1 st ½ 2017	2 nd ½ 2017	1 st ½ 2018	2 nd ½ 2018	1 st ½ 2019	2 nd ½ 2019	1 st ½ 2020	2 nd ½ 2020	May 2021	2 nd ½ 2021	2022	2023
Meetings of the COP	COP8				COP9				COP10			COP11
Air monitoring activities												
Water monitoring activities												
Human monitoring												
Updating of Guidance after listing new POPs (expert group)		X			updated							
Meetings of the global coordination group (GCG)			X			X		X		X		
Meetings of the ROGs			X		x		X					
ROGs to check availability of existing programmes for GMP Phase 3												
ROGs to identify additional programmes to fill the geographic gaps												
ROGs to identify programmes to contribute baseline for new POPs												
GCG to evaluate further needs for capacity enhancement												
* Establish arrangements to receive data sets												
ROGs to establishing drafting team												
* ROGs collecting all data and information to be used for drafting												
ROGs to evaluate quality of data sets and process data												
ROGs to finalize the first draft of the regional monitoring reports												
* Draft regional monitoring report submitted for regional comments												
ROGs to revise the regional reports according to comments												
Finalization of the regional monitoring reports and submission to SSC												
Reports considered and welcomed at COP 10												
GCG to develop the global monitoring report												
Full effectiveness evaluation by the EEG												
GMP global report and second EE report considered at COP-11												

Global Monitoring Plan on Persistent Organic Pollutants

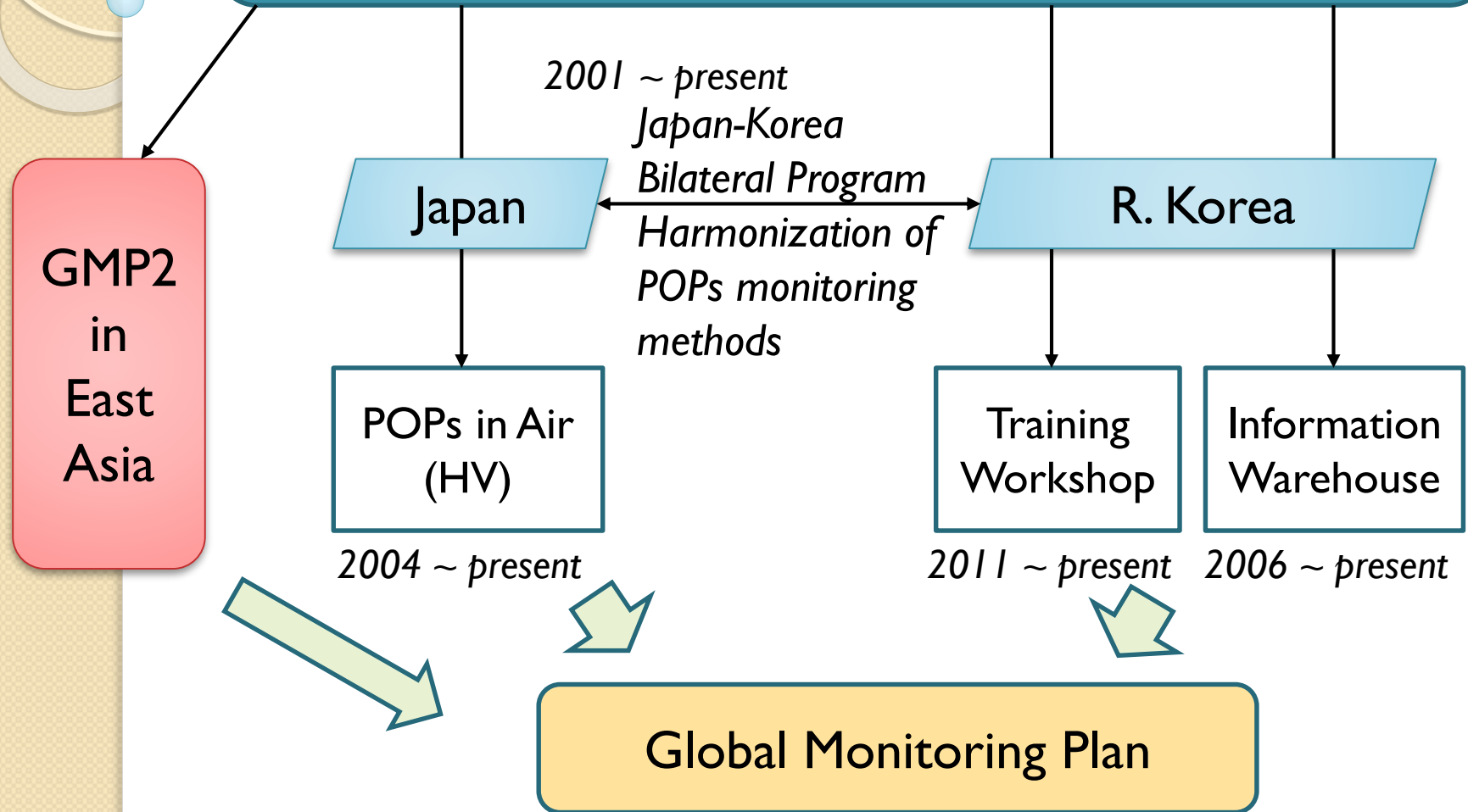
Welcome to the website supporting the implementation of the Stockholm Convention on Persistent Organic Pollutants. Its Article 16 requires that effectiveness of measures adopted by the Convention to eliminate or significantly reduce POPs releases into environment must be regularly evaluated. To that regard a Global Monitoring Plan (GMP) was established; it aims at collecting comparable, harmonized and reliable information on POP levels in core environmental matrices (air, human tissues (breast milk/blood), and water).

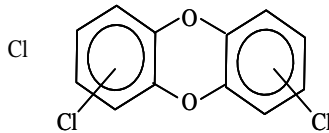
This website is divided into two key parts - [Background](#) providing a reference to the Stockholm convention and content analysis of information available in the first set of GMP regional reports on POPs levels in the environment until 2008 inclusive, focusing on initial 12 POPs. The second part is GMP DWH that holds a [Global Monitoring Plan Data Warehouse](#): online tool to store and visualize global data on levels of POPs in core matrices and thus shows data made available until 2014 inclusive where available.



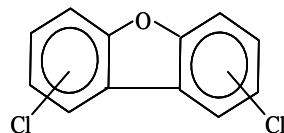
GMP Data Warehouse
<http://www.pops-gmp.org/index.php>

POPs monitoring in East Asia (POPSEA) (2002~)
Cambodia, Indonesia, Japan, R. Korea, Lao PDR, Malaysia,
Mongolia, Philippines, (Singapore), Thailand, Vietnam

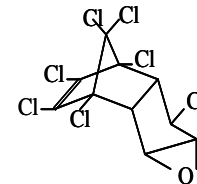
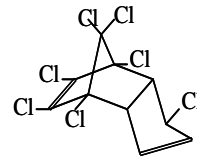




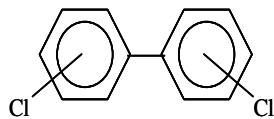
PCDDs



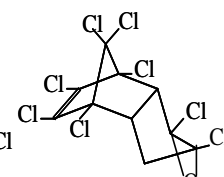
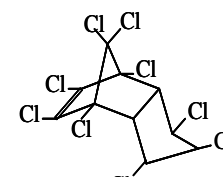
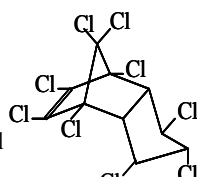
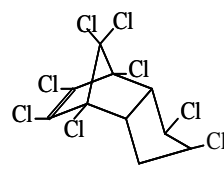
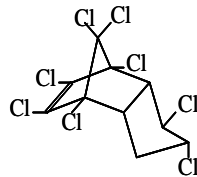
PCDFs



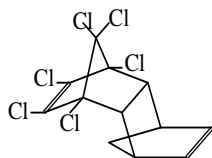
Heptachlor *c,t*-Heptachlor epoxide



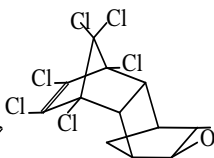
PCB



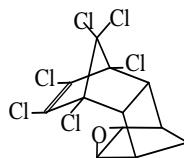
t-Chlordane *c*-Chlordane *t*-Nonachlor *c*-Nonachlor Oxychlordane



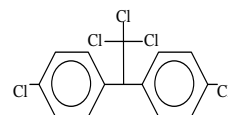
Aldrin



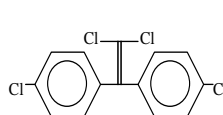
Dieldrin



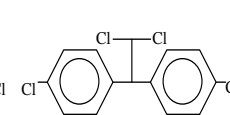
Endrin



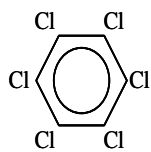
p,p'-DDT



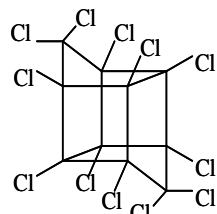
p,p'-DDE



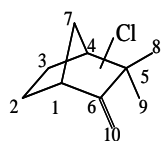
p,p'-DDD



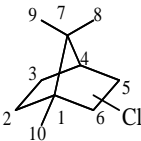
HCB



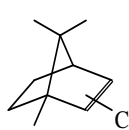
Mirex



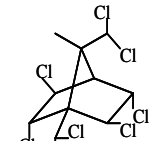
Toxaphene



Parlar 26



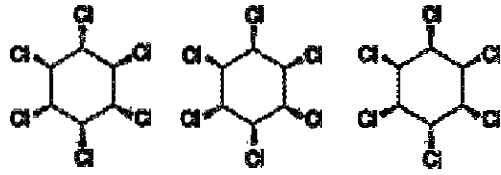
Parlar 50



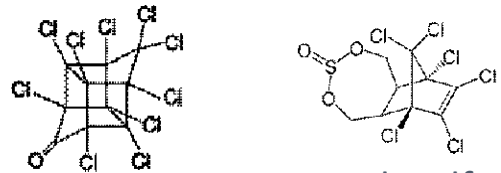
Parlar 62

Original 12 POPs Chemicals

α, β, γ -HCHs

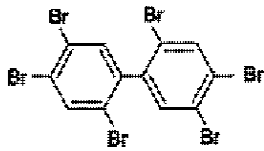
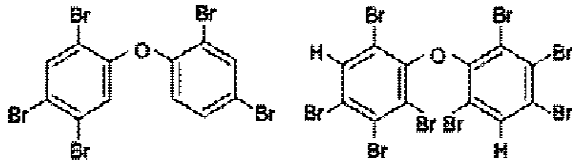


Chlordecone

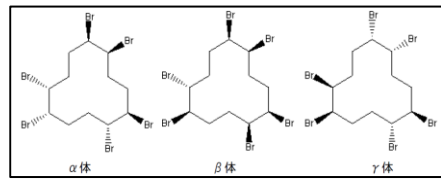


Endosulfan

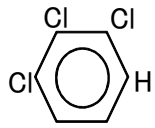
Te/PeBDEs
Hx/HpBDEs



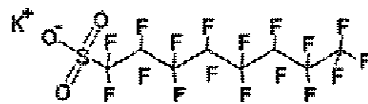
HxBB



α, β, γ -HCB

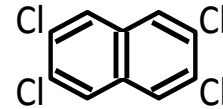


PeCB

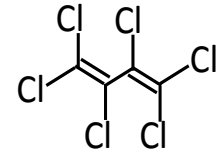


PFOS

11 new chemicals added until 2013

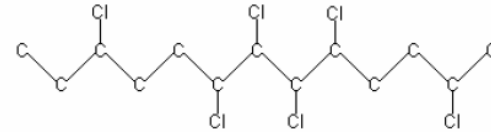
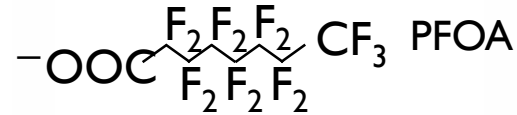


PCN



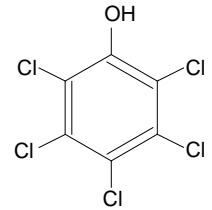
Hexachlorobutadiene
(HCBD)

3 New additions in 2015

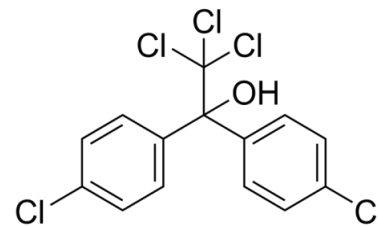


2 New additions in 2017

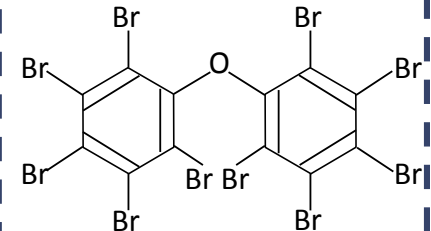
SCCP



PCP



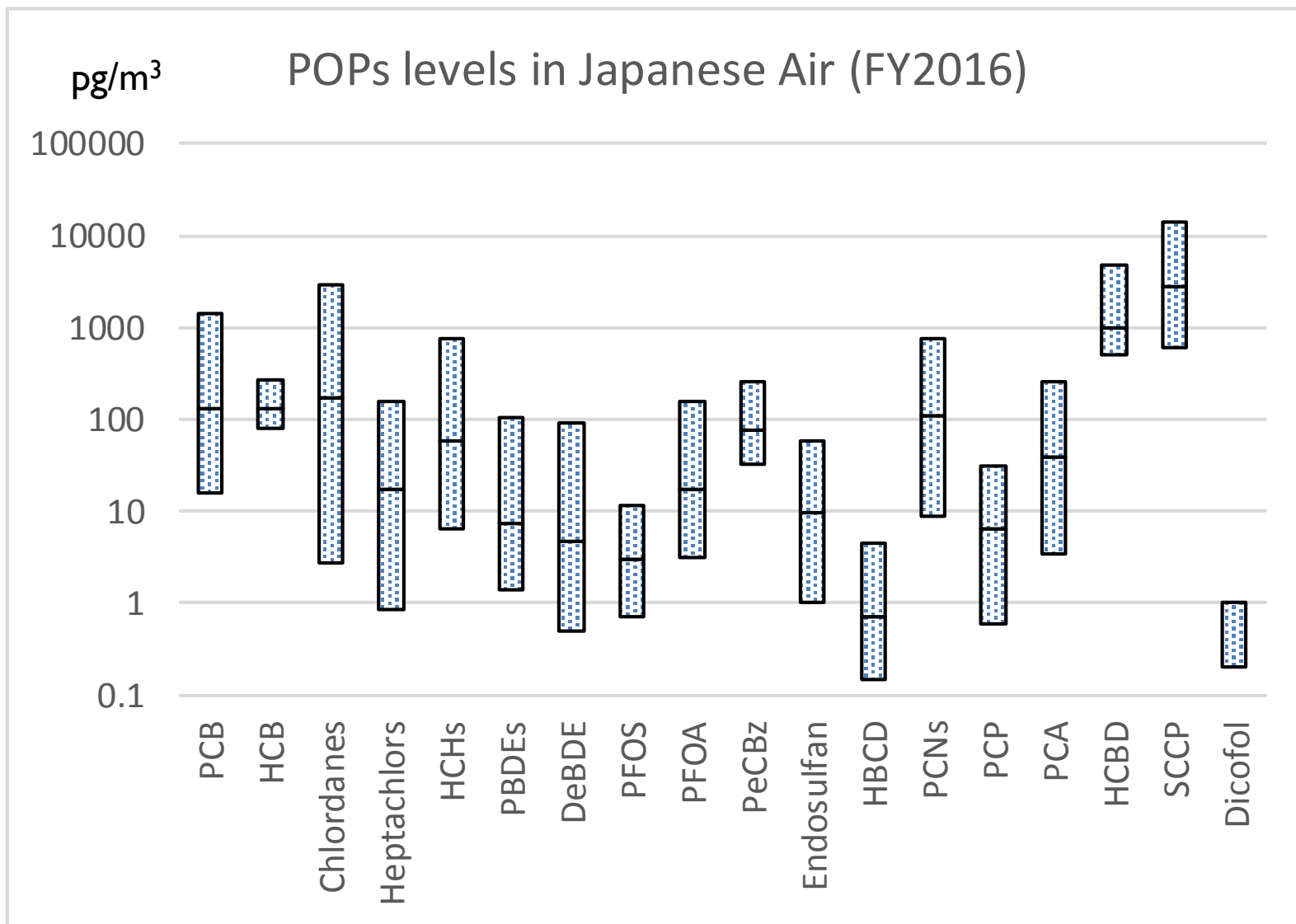
Dicofol



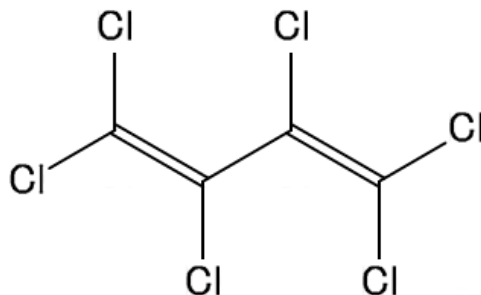
DeBDE

Target chemicals in POPs monitoring

Target chemicals	2017				2016				2015				2014				2013			
	water	sediment	biota	air	water	sediment	biota	air	water	sediment	biota	air	water	sediment	biota	air	water	sediment	biota	air
PCBs	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
HCB	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Aldrin	-	-	-	-	-	-	-	-	-	-	●	●	-	-	-	-	-	-	-	-
Dieldrin	-	-	-	-	-	-	-	-	●	-	●	●	-	-	-	-	-	-	-	-
Endrin	-	-	-	-	-	-	-	-	●	-	●	●	-	-	-	-	-	-	-	-
DDTs	-	-	-	-	-	-	-	●	●	●	-	-	-	-	●	●	-	-	-	-
Chlordanes	-	-	●	●	-	-	-	-	-	-	-	-	●	●	●	●	●	●	●	●
Heptachlors	-	-	●	●	-	-	●	●	●	●	-	-	-	-	●	●	-	-	●	●
Toxaphene	-	-	-	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HCHs	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Chlordecone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PBDEs	●	●	●	●	●	●	●	●	●	●	●	●	-	-	-	-	●	●	●	●
HxBB	-	-	-	-	-	●	●	●	-	-	-	-	-	-	-	-	-	-	-	-
PFOS	●	●	●	●	●	●	●	●	●	●	●	●	-	-	-	●	●	●	●	●
PFOA	●	●	●	●	●	●	●	●	●	●	●	●	-	-	-	●	●	●	●	●
PeCB	-	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Endosulfan	-	-	-	●	-	-	●	●	-	-	●	●	-	-	-	-	●	●	●	●
HBCD	-	●	●	●	-	-	●	●	●	-	●	●	-	-	-	-	-	●	●	●
PCN	-	●	●	●	-	-	●	-	-	-	-	●	-	-	-	-	-	-	-	-
PCP, PCA	-	-	●	●	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HCBD	-	-	-	●	-	-	-	●	-	-	-	-	●	●	●	-	-	-	-	-
SCCPs (C10-C13)	-	-	●	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dicofol	-	-	-	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Monitoring of HCBD in the Air



Hexachlorobuta-1,3-diene

UNEP/POPS/POPRC.8/3 "Draft risk profile: HCBD"

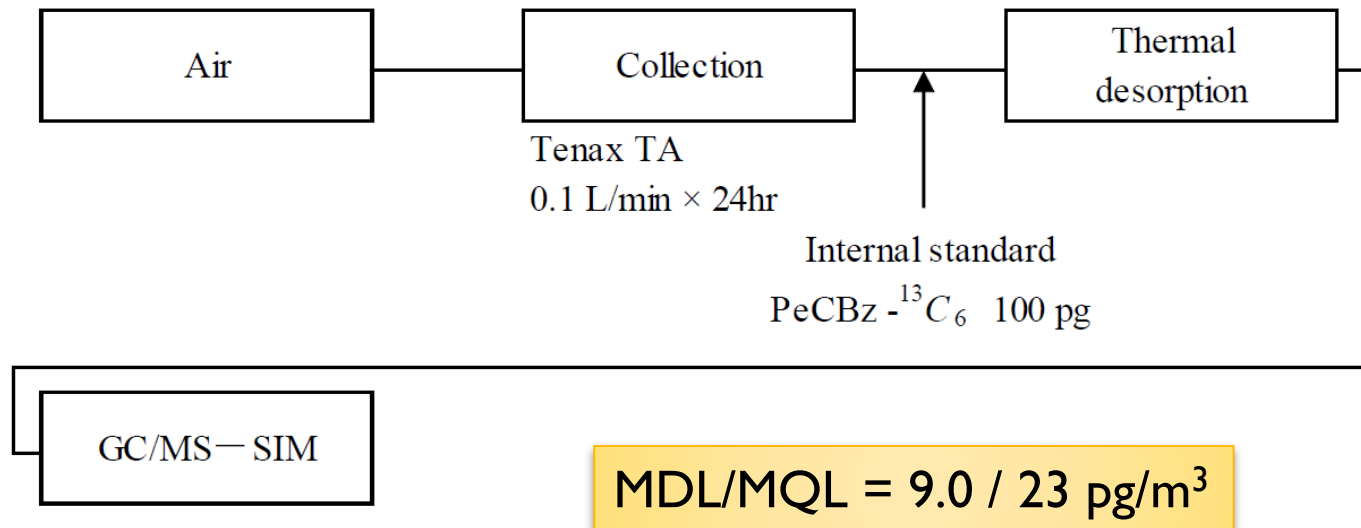
- 21 HCBD is still unintentionally generated during the production of chlorinated hydrocarbons, particularly of perchloroethylene, trichloroethylene and carbon tetrachloride.
- 37 Estimated half-lives ... ranging from 60 days to 3 years ...

Monitoring method:

- * Low Volume Sampler with Tenax TA adsorbent
- * Thermal Desorption – GC/ECNI-qMS

Sampling: Mini-Air Pump (100 mL/min for 24hrs) + Tenax TA

Analysis: Thermal desorption unit + GC/NCI-qMS (or GC/HRMS)



"Monitoring method of HCBd in air" (Method ID 11786, Ministry of the Environment Japan (2013);

<http://www.nies.go.jp/emdb/pdfs/kurohon/2013/adoc2013-2-604.pdf> (in Japanese)

Global baseline pollution studies

X.¹ Atmospheric halocarbons: global budget estimations for tetrachloroethene, 1,2-dichloroethane, 1,1,1,2-tetrachloroethane, hexachloroethane and hexachlorobutadiene. Estimation of the hydroxyl radical concentrations in the troposphere of the northern and southern hemisphere²

Th. Class and K. Ballschmiter

Abteilung Analytische Chemie, Universität Ulm, Oberer Eselsberg, D-7900 Ulm, Federal Republic of Germany

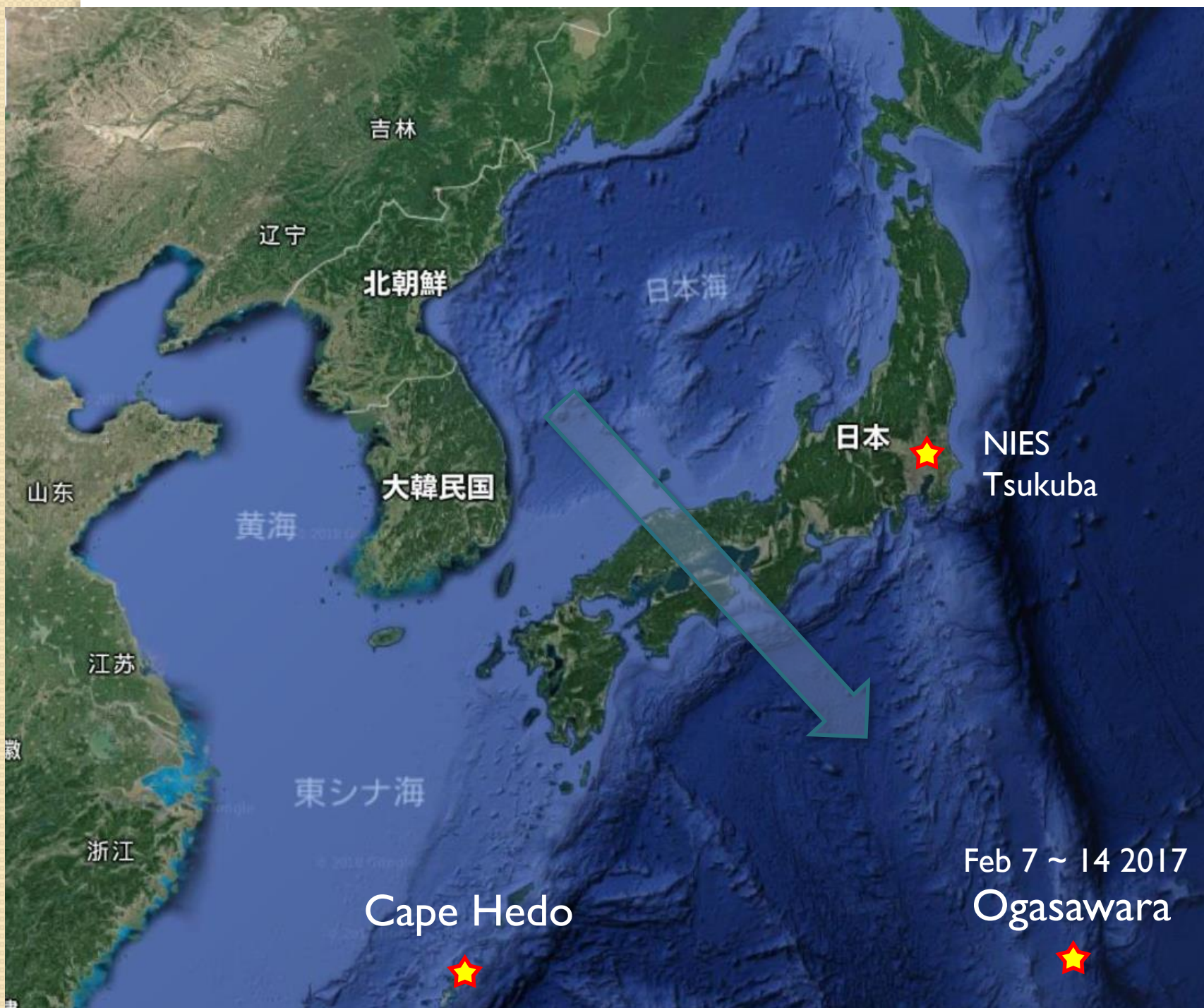
Tenax TA - TDU - GC/ECD



Tenax TA - TDU - GC/NCI-qMS (¹³C-PeCBz)

Tenax TA - TDU - GC/NCI-hrMS (¹³C-HCBD)

**HCBD in background (Northern Hemisphere) ~ 1,800 pg/m³
(in the middle of 1980's)**

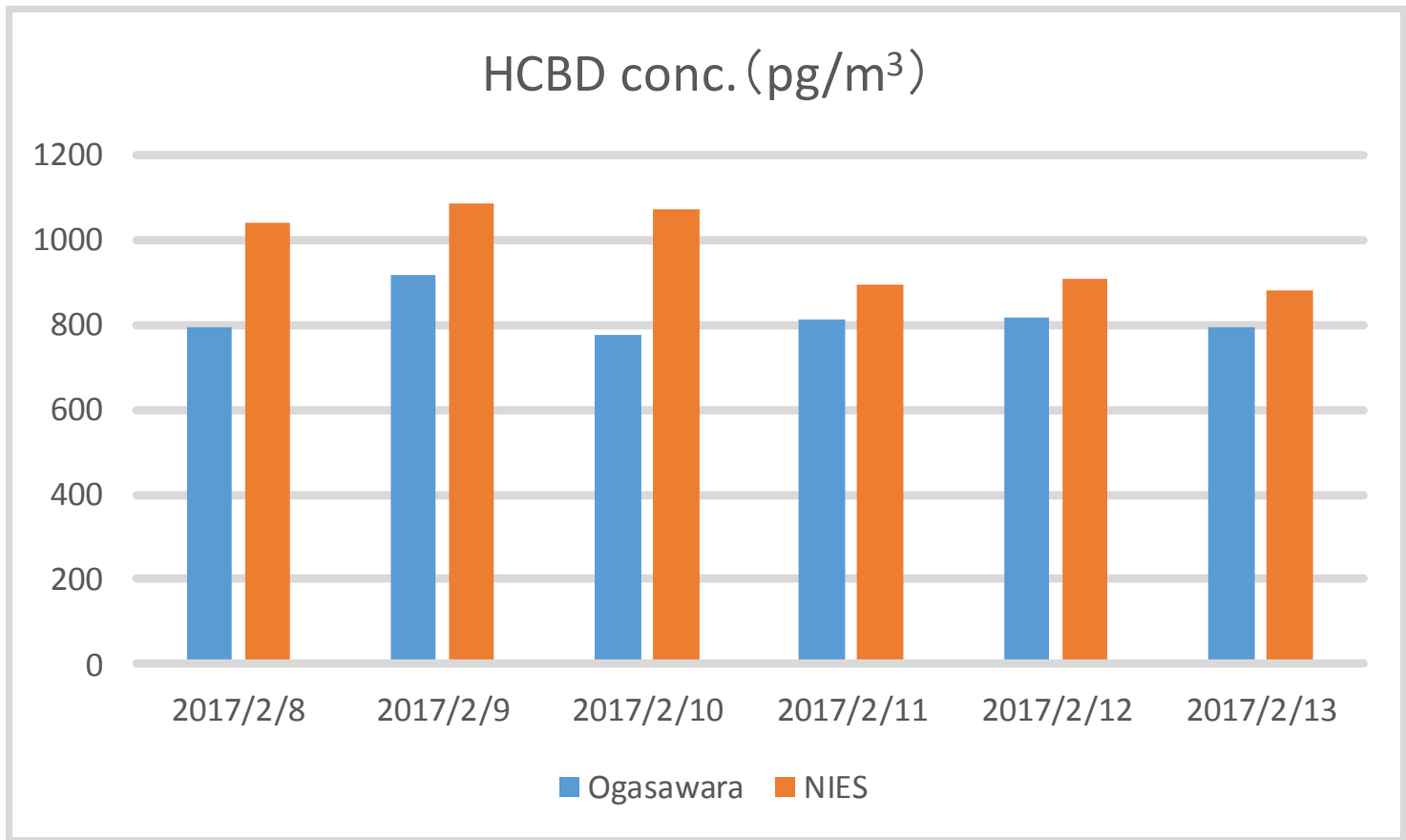




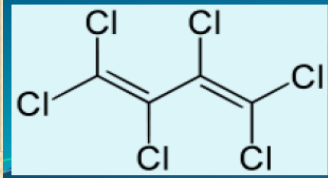






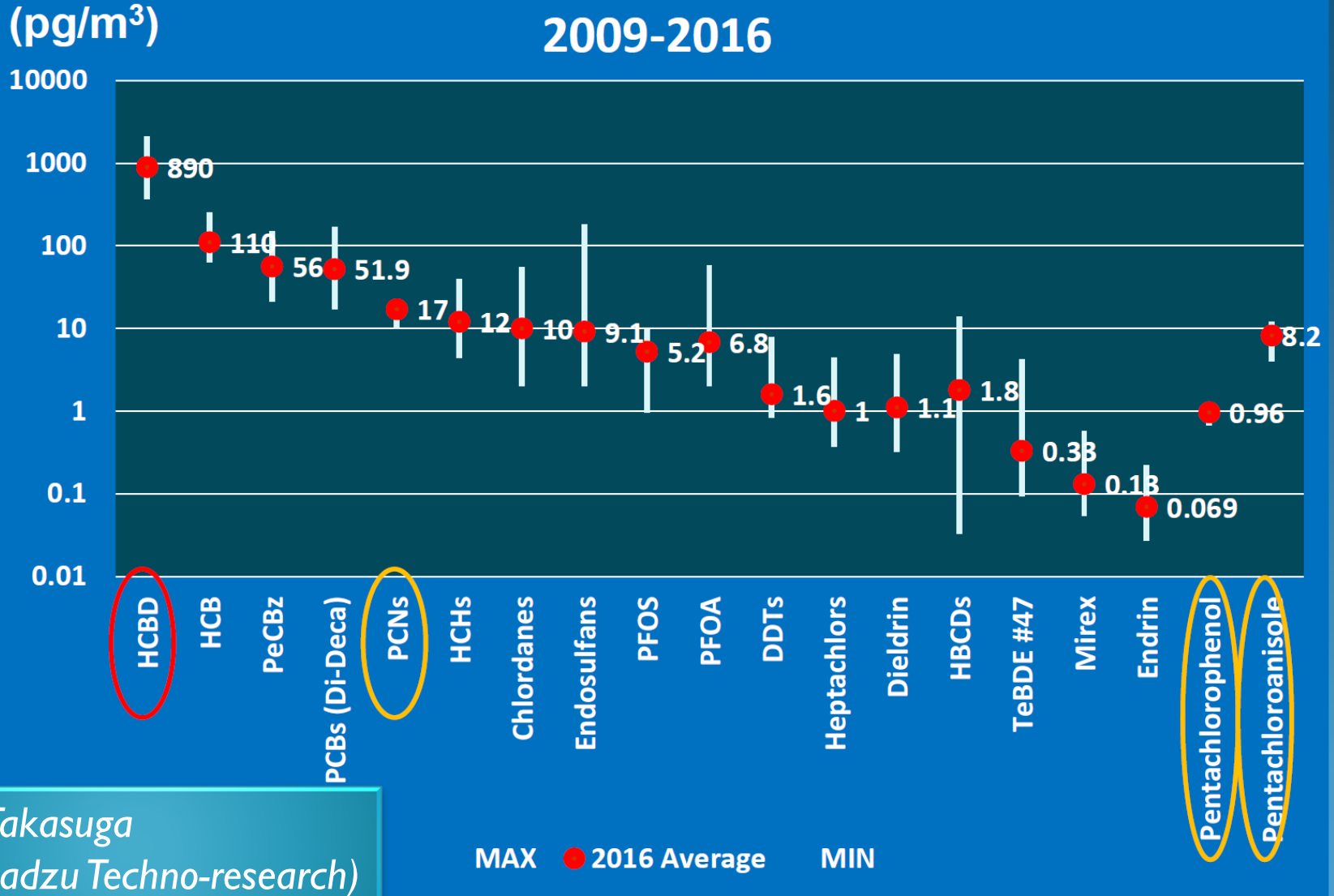


T. Takazawa (NIES)



POPs levels **FY 2009-2016** at Cape Hedo, Okinawa

HCBD

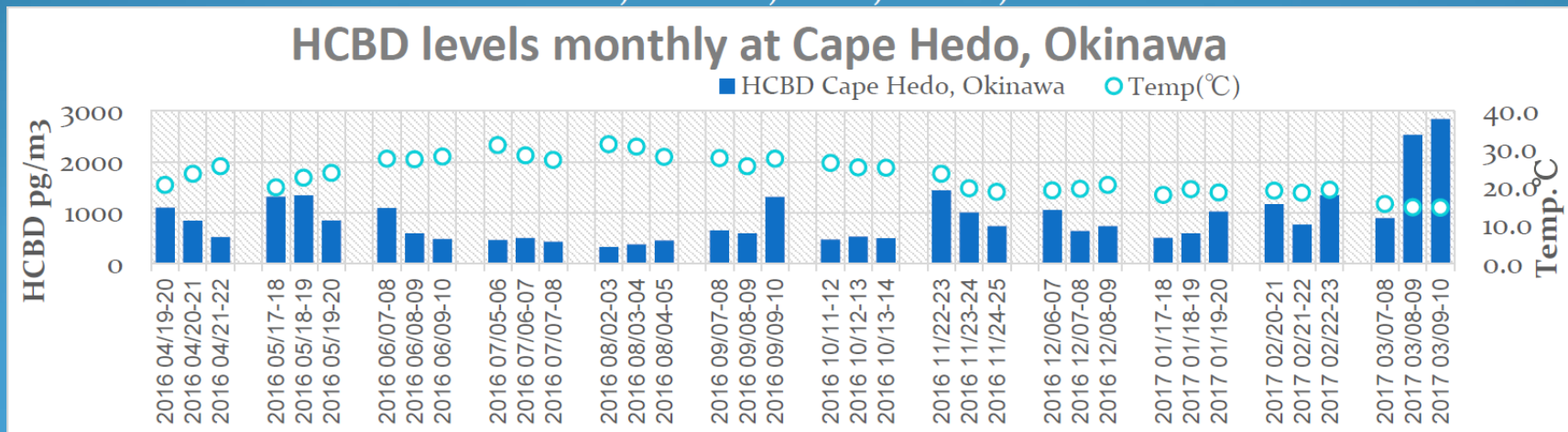


Dr T. Takasuga
(Shimadzu Techno-research)

Conclusion HCBD

Dr T. Takasuga
(Shimadzu Techno-research)

- HCBD were highest detectable levels in all POPs and all seasons.
- HCBD levels at super site (Cape Hedo) were averaged 900pg/m³ (330 – 2900 pg/m³)
- HCBD at super site seems same levels to Nation-wide POPs Monitoring sites FY 2015, 1,100pg/m³ (70 – 2100 pg/m³)
- The HCBD concentration variation of 3 days per month were 1.2 to 3.2 times differences.
- The Backward Trajectory analysis suggested that higher levels of PM_{2.5} correlated to Data comparison of HCBD and PM_{2.5} seems weak correlation northwest wind direction affected from the Asian continent.
- Data comparison of HCBD and temperature seems no correlation.
- HCBD, the highest POPs in ambient air due to the moderately high vapor pressure and is also released into air.
- HCBD has correlation to HCBz, PeCBz, PCB, HCH, DDT



Similarity of HCBD with Mercury

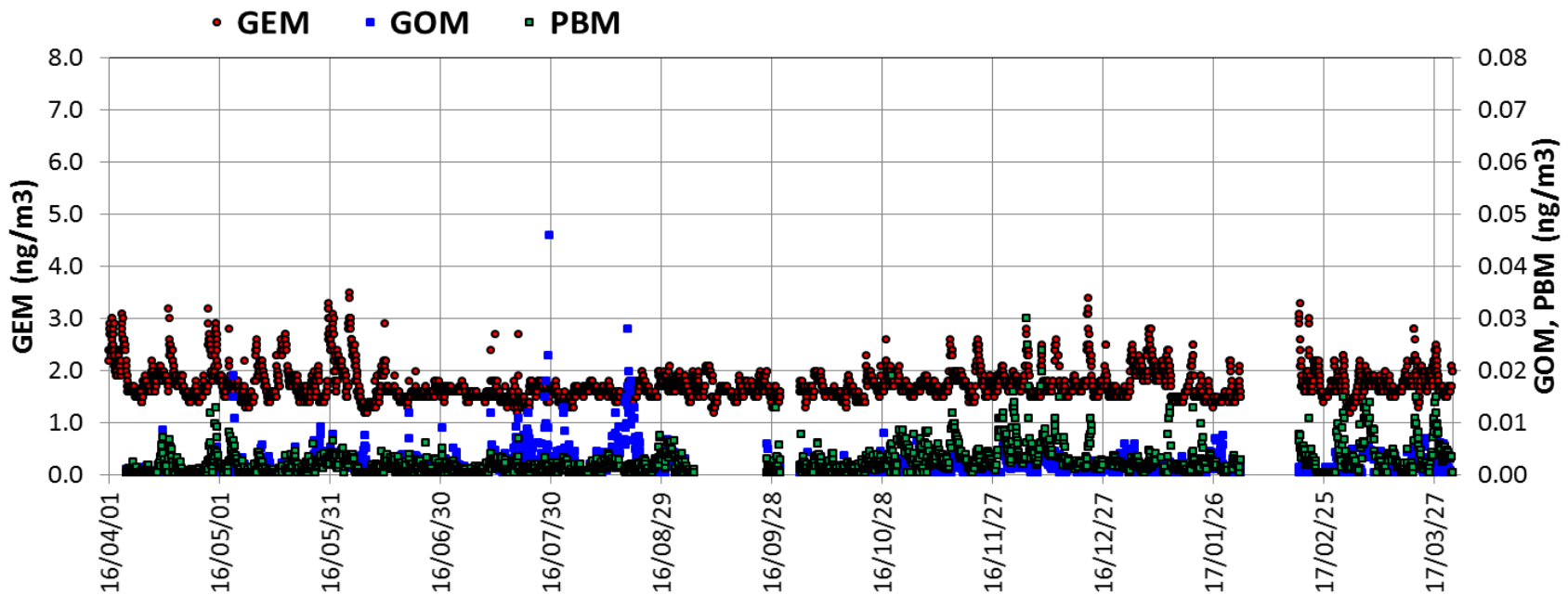
Mercury in the atmosphere:

- Gaseous elemental mercury (GEM) $\sim 1,500 \text{ pg/m}^3$
- Gaseous oxidized mercury (GOM) $\sim 10 \text{ pg/m}^3$
- Particle-bound mercury (PBM) $\sim 10 \text{ pg/m}^3$

Half-life of GEM ~ 1 year



Similar to HCBD



Ministry of the Environment, Japan

Dioxin 2019

39th International Symposium on Halogenated Persistent Organic Pollutants

Venue: Kyoto International Conference Hall
26 Aug ~ 30 Aug, 2019

Previous Dioxin meetings in Japan

1986 Fukuoka

1994 Kyoto

2007 Tokyo

Thank you very much !

