Overvåking av långtransporterade atmosfæriske miljøgifter: program og data for luft og nedbør 2014

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Organic pollutants

- Three background stations
  - Birkenes, Andøya, Zeppelin
- Two media:
  - Air – gas+particles
  - Precipitation
- Compounds:
  - Persistent organic pollutants (POPs)
    - PCBs, HCB, HCHs, DDTs, Chlordanes, PBDEs, PFAS, HBCDs
  - PAHs
  - Emerging pollutants
    - S/MCCPs, Siloxanes
- 53 samples per compound/station/year
  - one per week
  - about 600 samples per year

Organic pollutants – Air

Birkenes	Andøya	Zeppelin
PCBs (2004/2010)	PCBs (2009)	PCBs (2001)
HCB (1993)	HCB (2009)	HCB (1993)
HCHs (1991)	HCHs (2010)	HCHs (1993)
DDTs (2010)	DDTs (2010)	DDTs (1994)
CHLs (2010)		CHLs (1993)
		S/MCCPs (2013)
PAHs* (2009)	(2009-2012)	PAHs* (1994)
PBDEs (2008)	PBDEs (2009)	PBDEs (2006)
HBCDs (2006)		HBCDs (2006)
PFAS (2006)	PFAS (2009)	PFAS (2006)
		Siloxanes (summer+winter campaigns)

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The national monitoring programme of environmental contaminants, Norwegian Environment Agency
*Long-term dataseries programme, Ministry of Climate and Environment + NILU's internal monitoring progr.

Organic pollutants – Air

- Air sampling
  - Active High Volume Digitel sampler
  - Active NILU-PUR HV sampler
  - Gasphase – PUF/PUR
  - Particle phase – Glass fibre filter
  - Weekly (24-72 h per week)

Organic pollutants - Precipitation

Birkenes	Andøya	Zeppelin
PCBs* (2006)		
HCB* (1992)		
HCHs* (1992)		

*Long-term dataseries programme, Ministry of Climate and Environment

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Organic pollutants - Precipitation

- Precipitation sampling
  - Only at Birkenes
  - Bulk sampler (funnel and collector)
  - Weekly samples

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Heavy metals

- Six background stations
  - Birkenes, Andøya, Zeppelin
  - Hurdal, Kårvatn, Svanvik*
- Two media:
  - Air – particles (heavy metals) and gas (Hg)
  - Precipitation
- Compounds:
  - Al, As, Cd, Cr, Co, Cu, Pb, Mn, Ni, V, Zn + Hg
- 53 samples per compound/station/year
  - one per week

Heavy metals – Air

Birkenes	Hurdal	Kårvatn	Svanvik	Andøya	Zeppelin
As				As	As
Cd				Cd	Cd
Cr				Cr	Cr
Co				Co	Co
Cu				Cu	Cu
Pb				Pb	Pb
				Mn	Mn
Ni				Ni	Ni
V				V	V
Zn				Zn	Zn
Hg				Hg	Hg

Heavy metals – Air

- Air sampling heavy metals
  - Particle phase
    - Kleinfiltergerat (Birkenes)
      - Whatman quartz 47 mm filter
      - weekly (7 days per week)
    - Digitel High Volume sampler (Zeppelin and Andøya)
      - Whatman 41 filter – paper/cellulose
      - Weekly (48 h per week)
- Air sampling Hg
  - Gaseous phase
    - Tekran Hg monitor
      - Hourly data

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Heavy metals – Precipitation

Birkenes	Hurdal	Kårvatn	Svanvik	Andøya	Zeppelin
			Al**		
As			As**		
Cd	Cd*	Cd*	Cd**		
Cr			Cr**		
Co			Co**		
Cu			Cu**		
Pb	Pb*	Pb*	Pb**		
Mn			Mn**		
Ni			Ni**		
V			V**		
Zn	Zn*	Zn*	Zn**		
Hg					

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The national monitoring programme of environmental contaminants, Norwegian Environment Agency
*Long-term data series programme, Ministry of Climate and Environment
** The Norway-Russia measurement programme, Norwegian Environment Agency

Heavy metals – Precipitation

- Precipitation sampling Hg
  - Only at Birkenes
  - IVL (Swedish Environmental Research Institute) sampler
  - Monthly samples

- Precipitation sampling Heavy metals
  - Bulk sampler (funnel and collector) – NILU Innovation
  - Weekly samples

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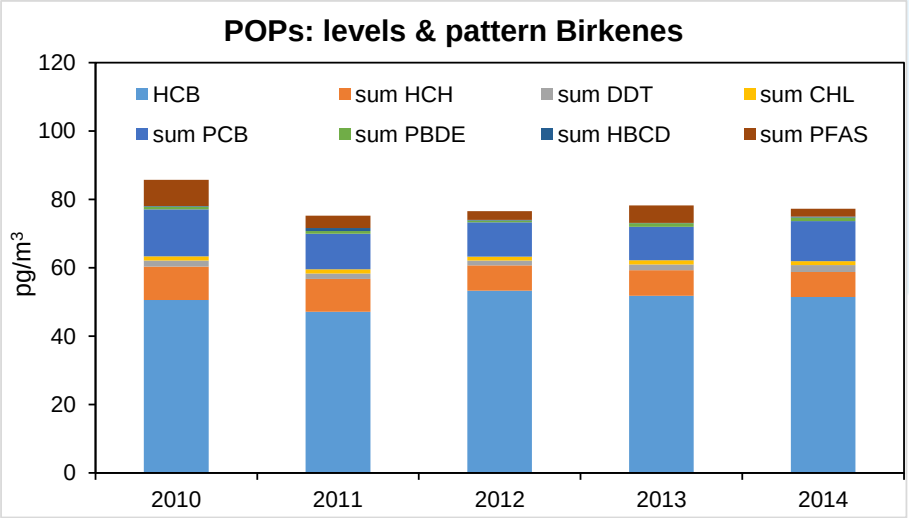
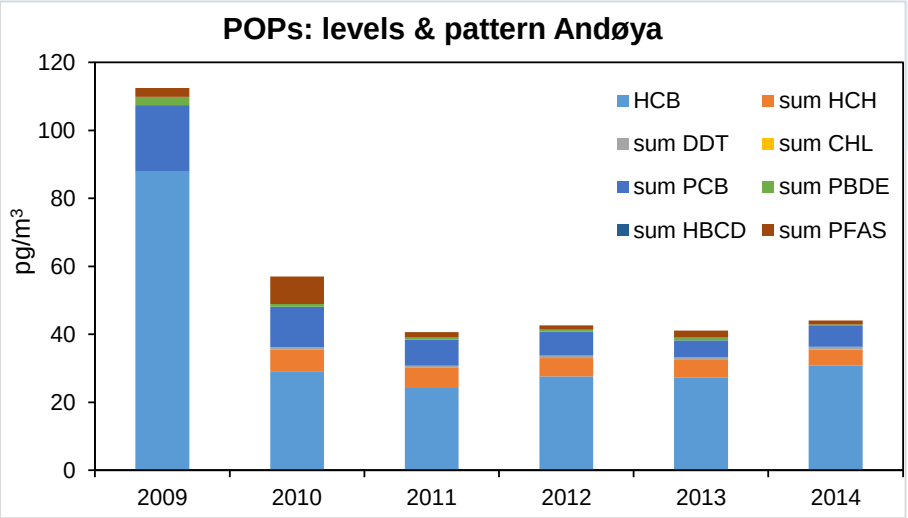
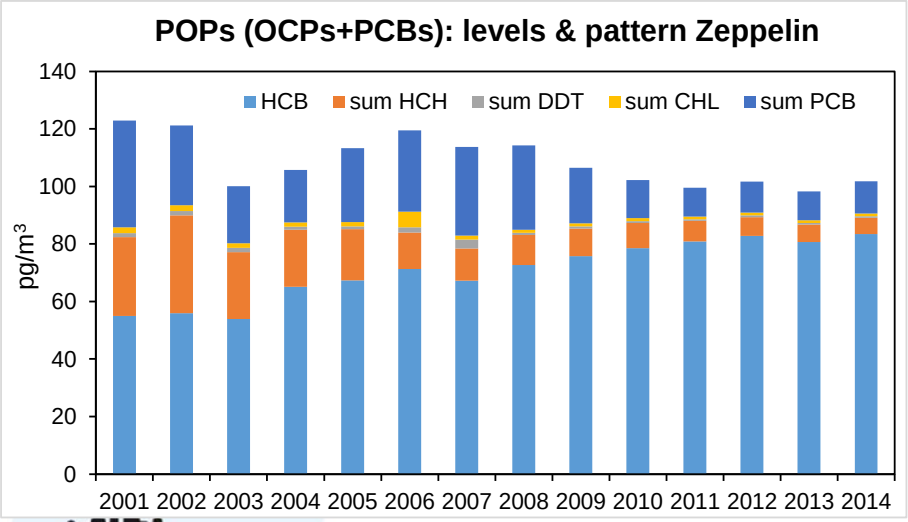
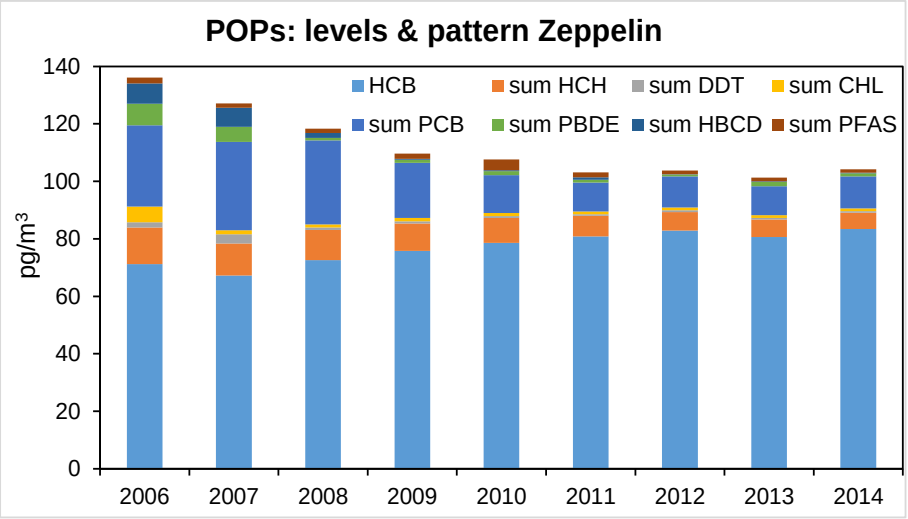
Results POPs









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Results organic pollutants

- Three groups – based on results in 2014
  1. Levels increasing
     i. PCBs
     ii. HCB
     iii. PAHs
     iv. DDTs
  2. Levels decreasing
     i. HCHs
     ii. CHLs
  3. Levels stable
     i. PBDEs
     ii. PFASs
     iii. HBCDs

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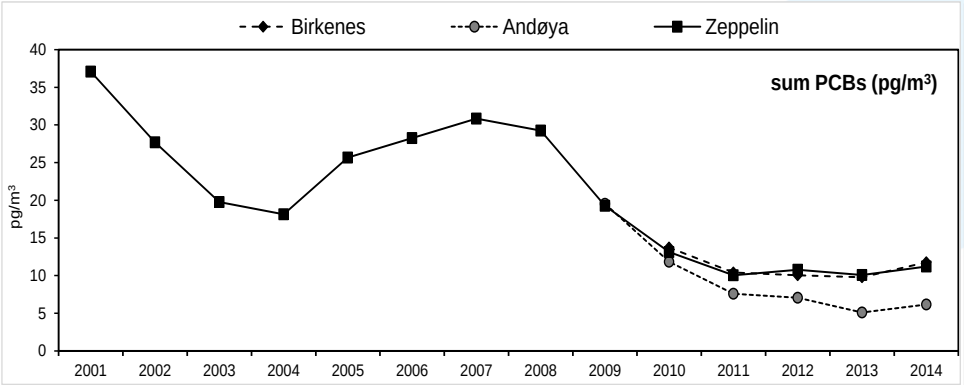
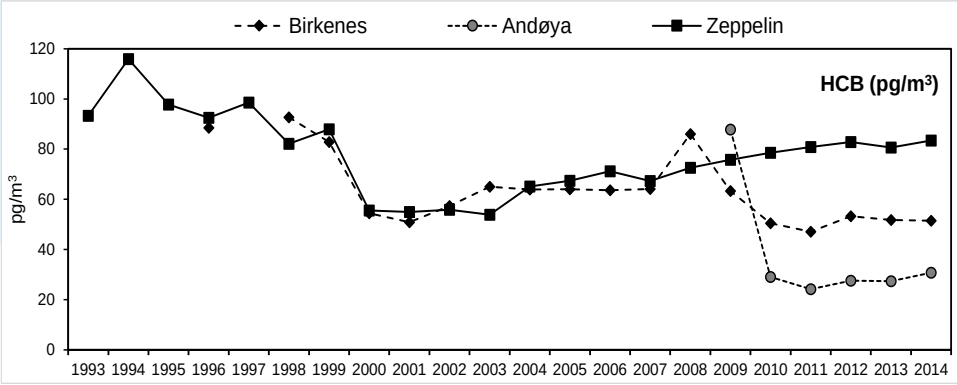
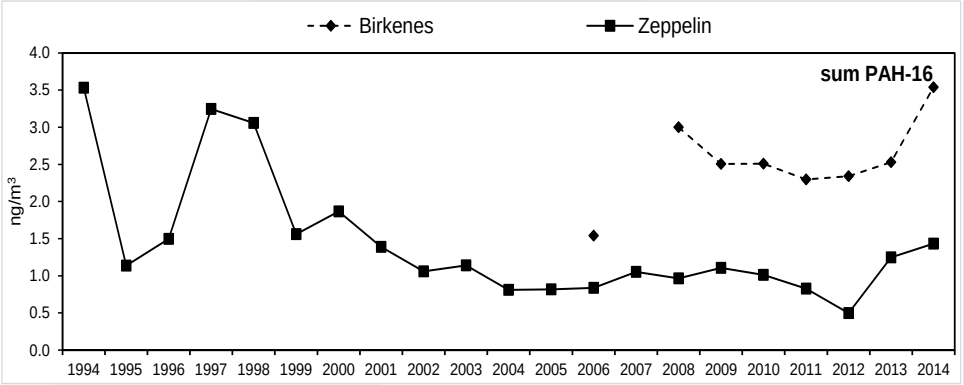
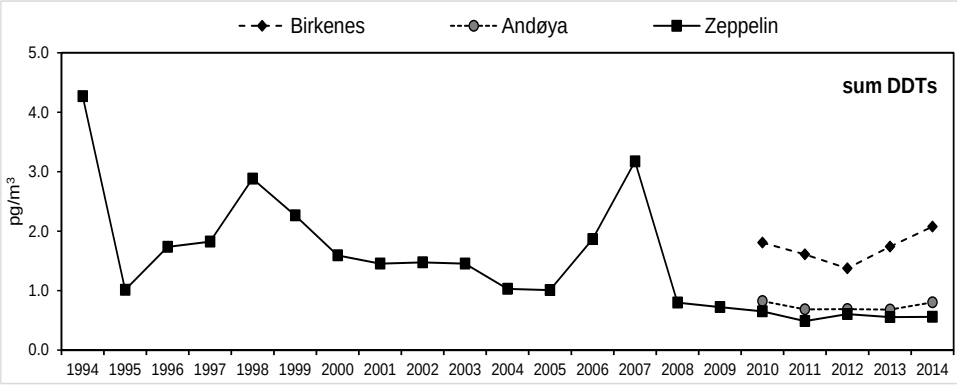
Results – increasing levels?









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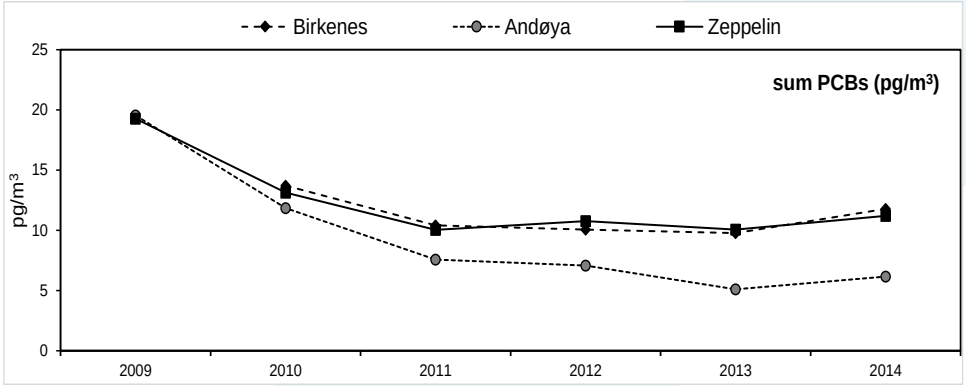
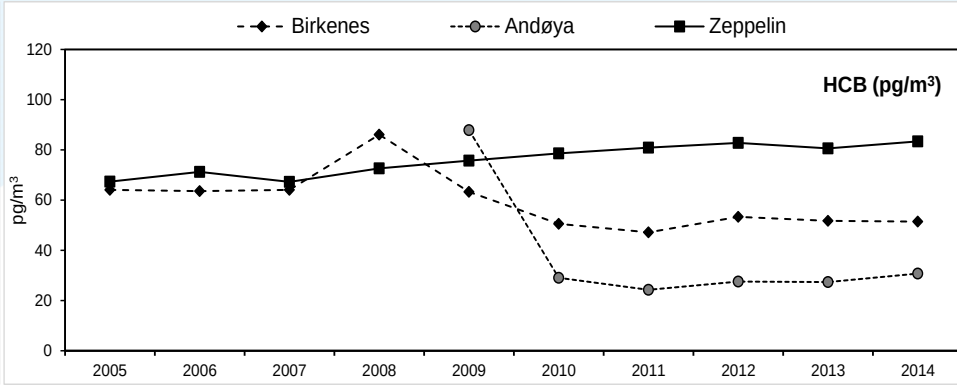
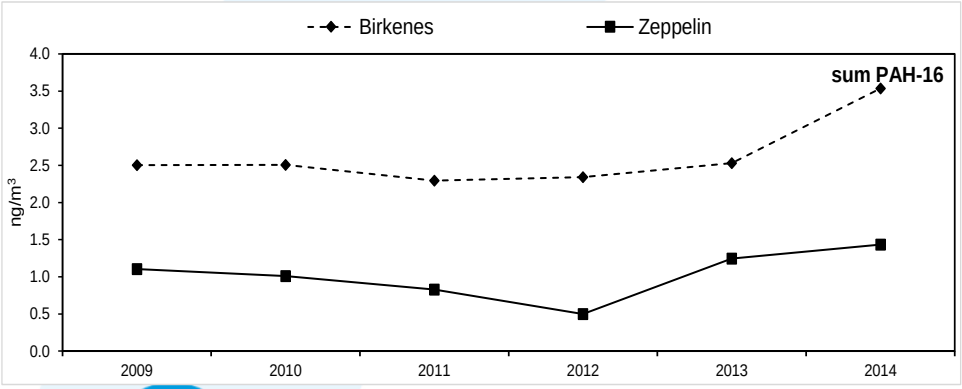
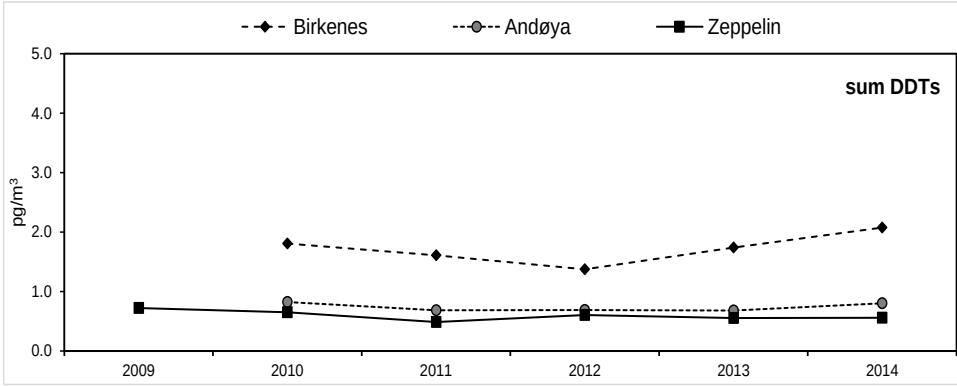
Results – increasing levels?









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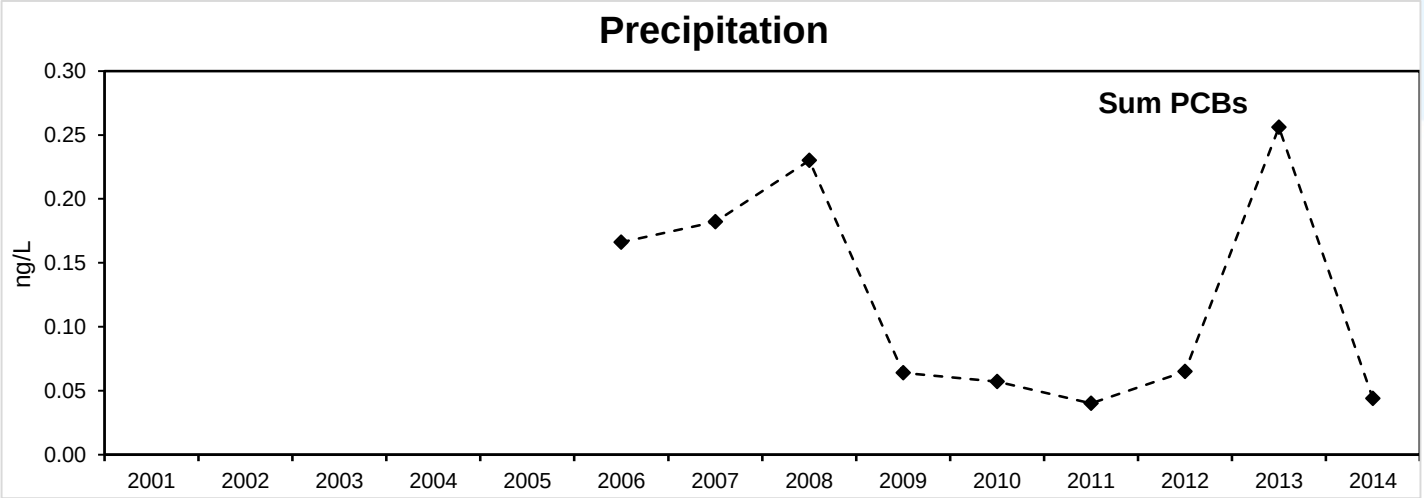
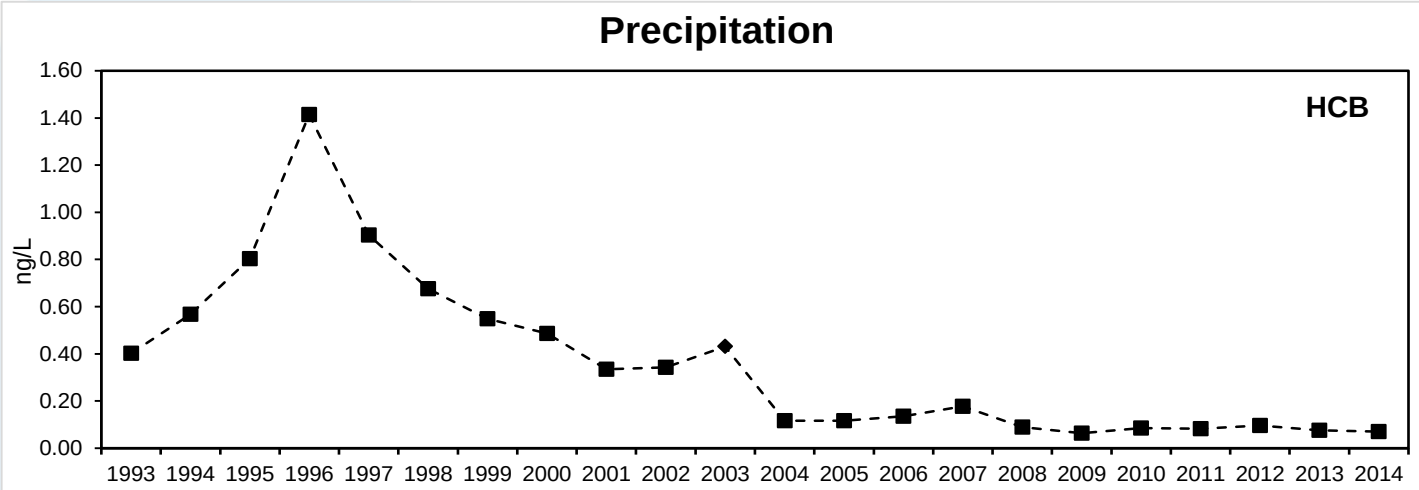
Results – increasing levels?





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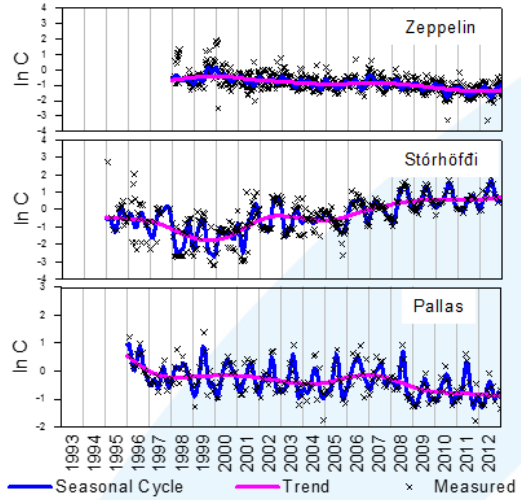
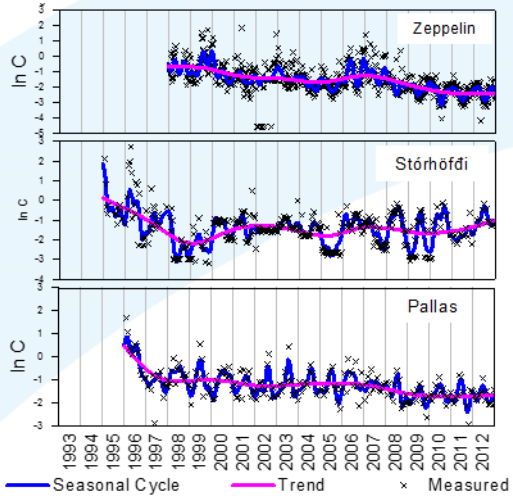
Results – increasing levels?

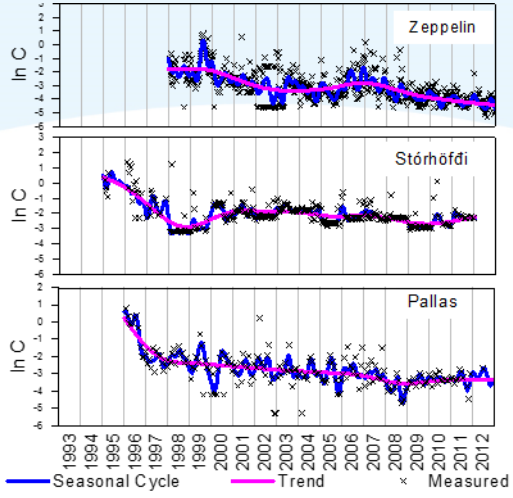
PCB 101



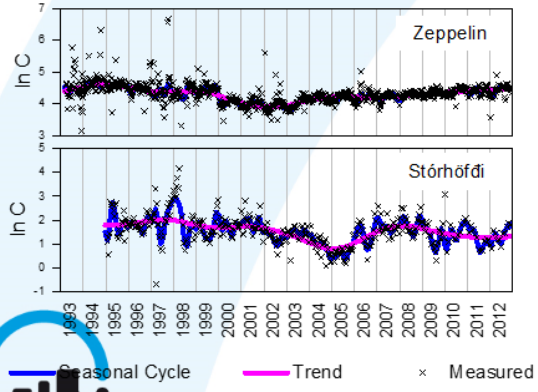
PCB 153



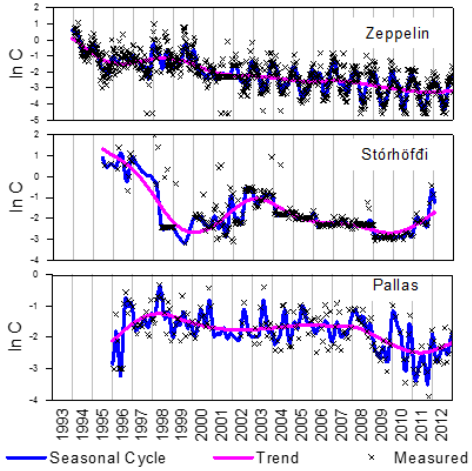
PCB 180



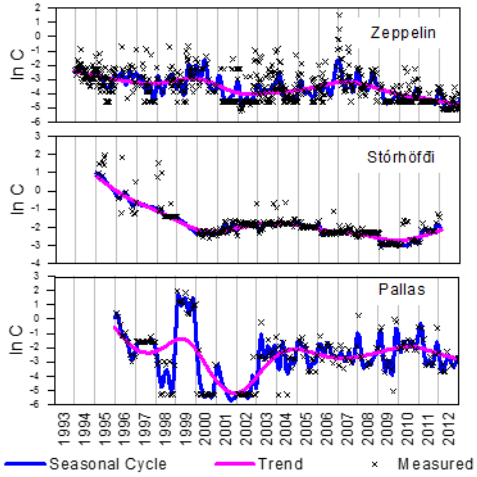
HCB



p,p'-DDT



p,p'-DDD



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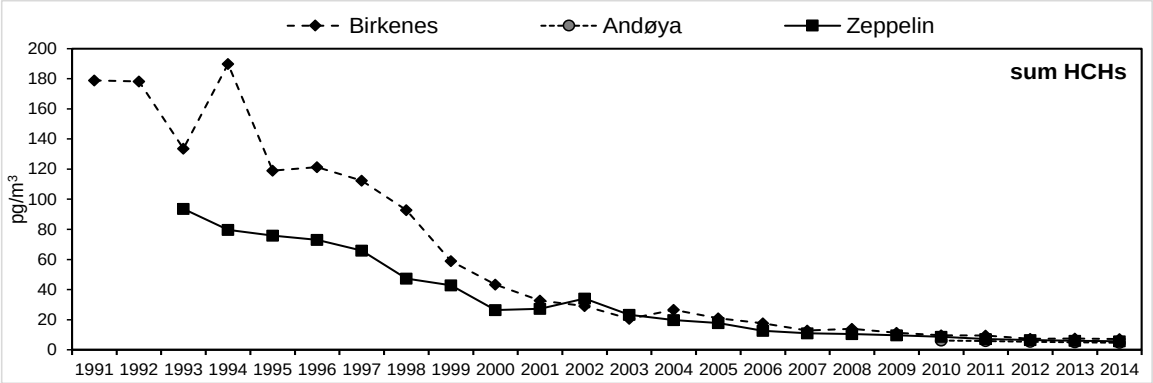
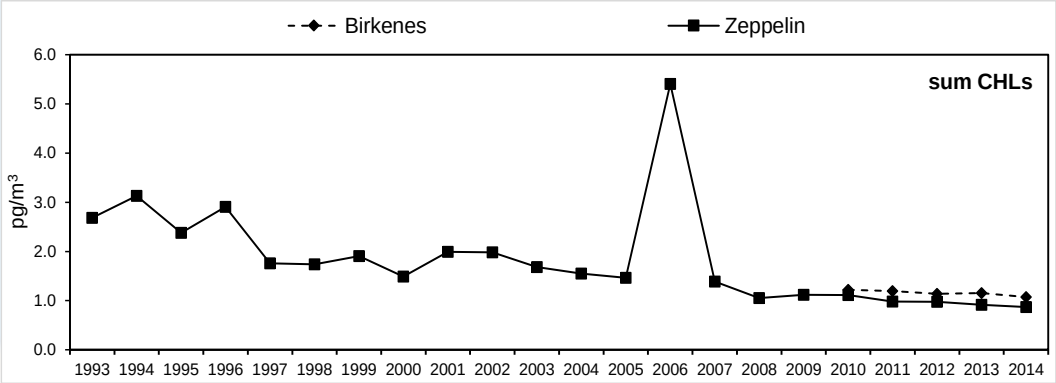
Results – decreasing levels?





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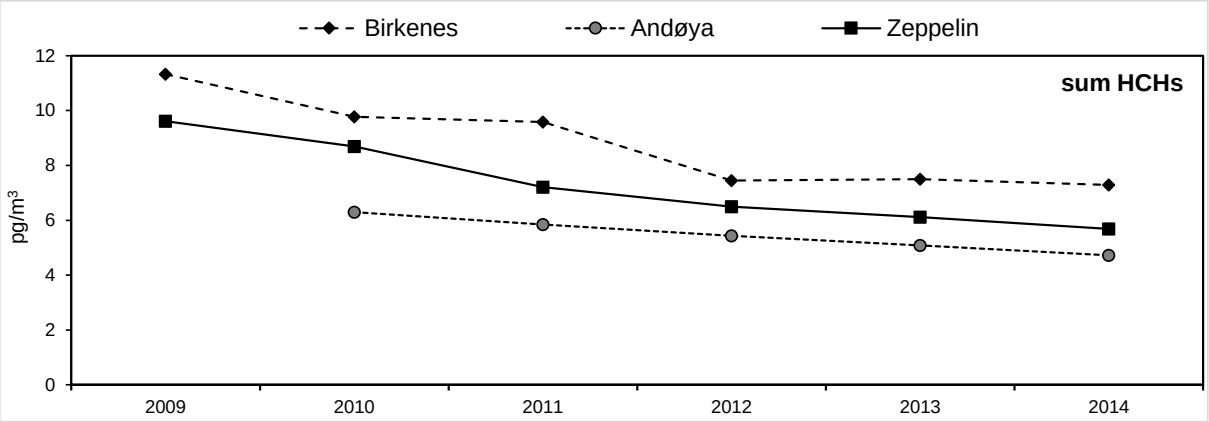
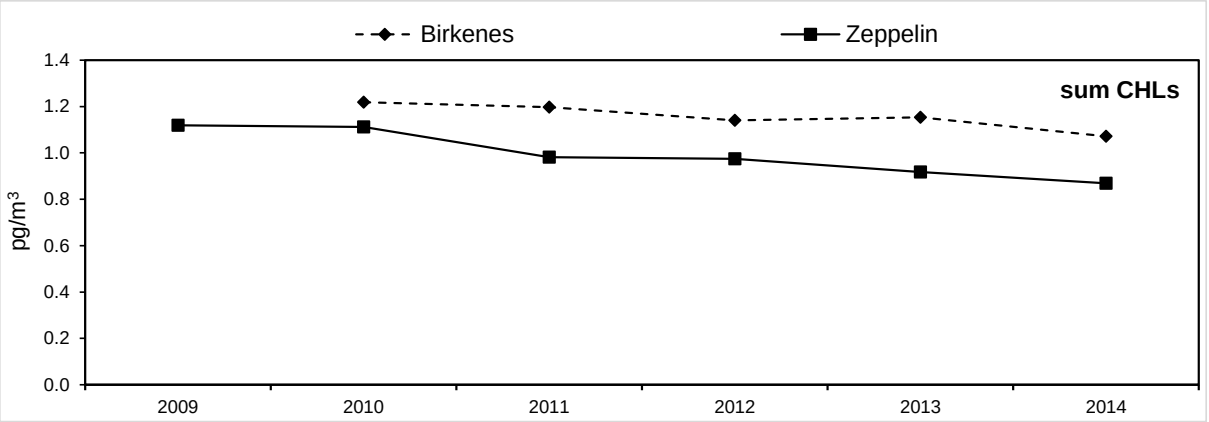
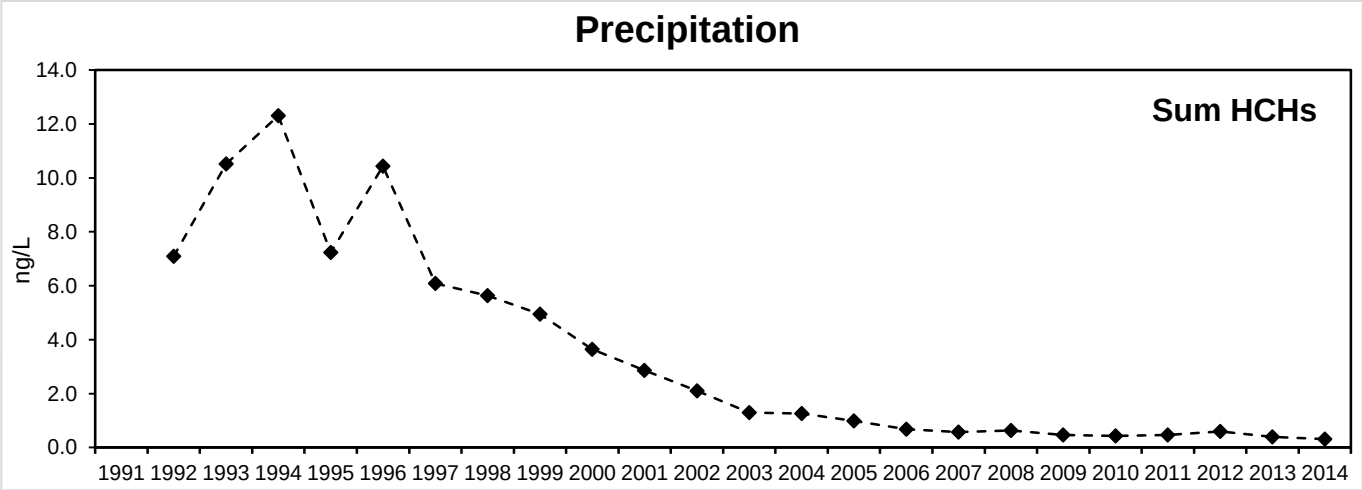




Results – decreasing levels?



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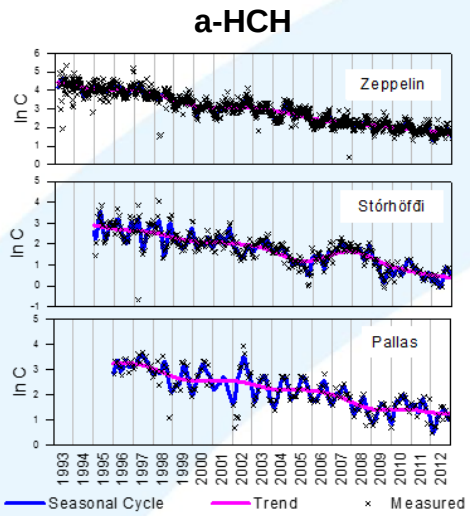
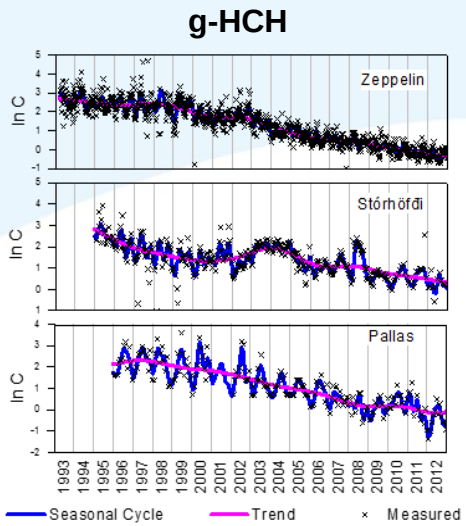
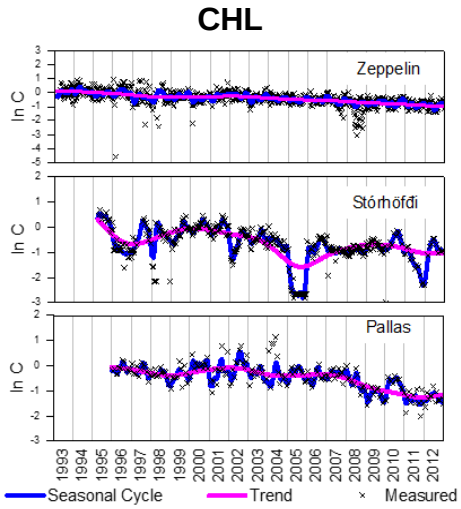
Results – decreasing levels?







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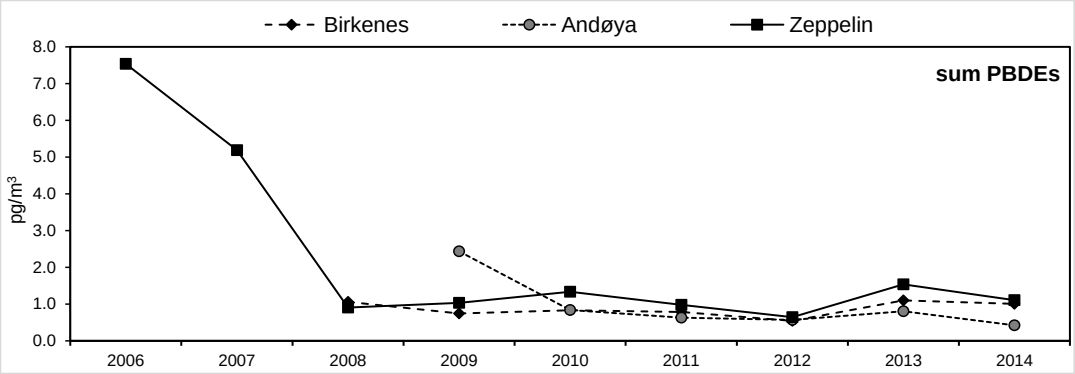
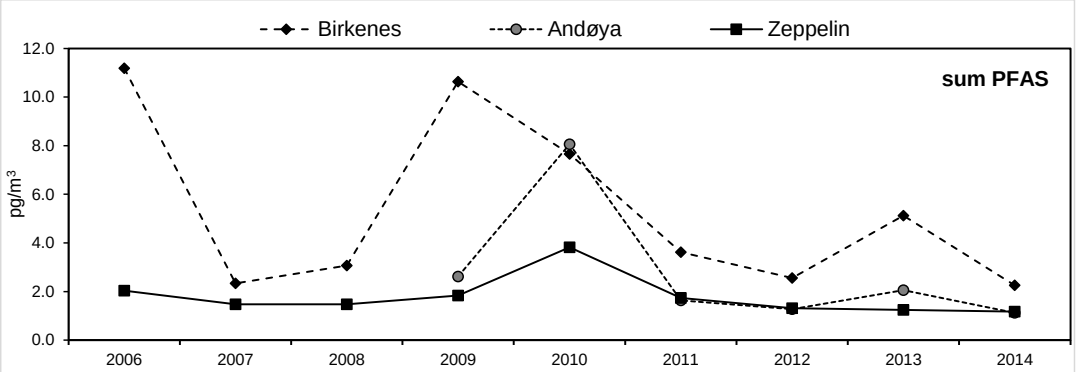
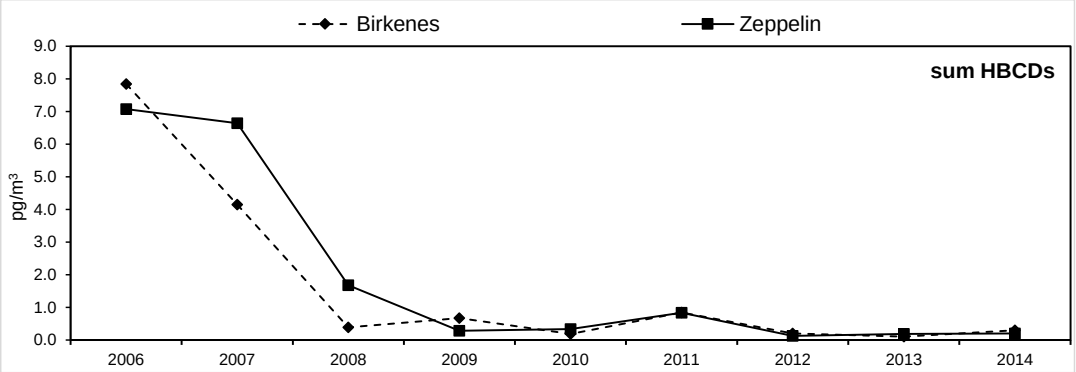
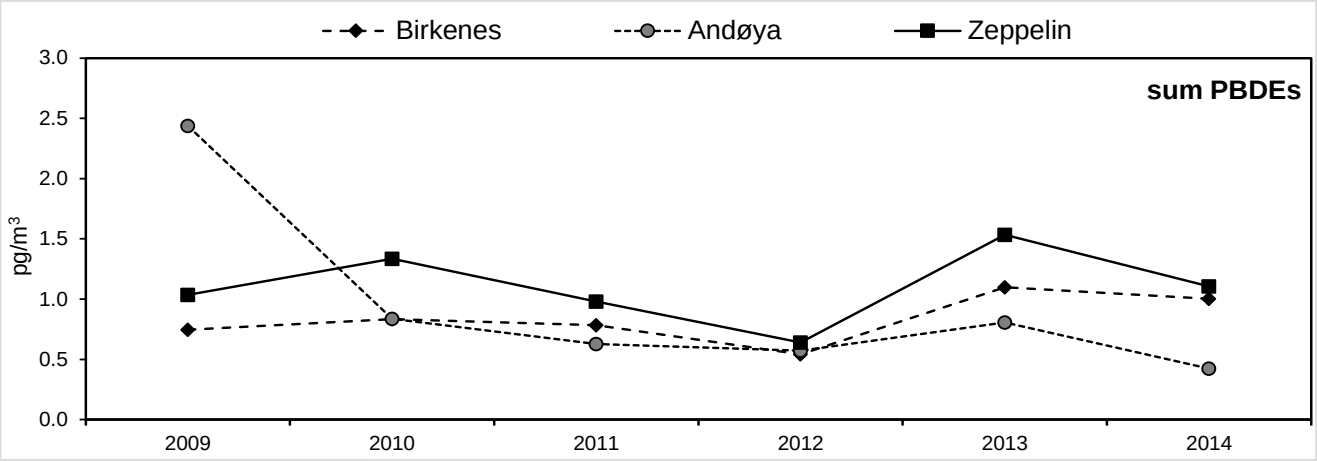
Results – stable levels?

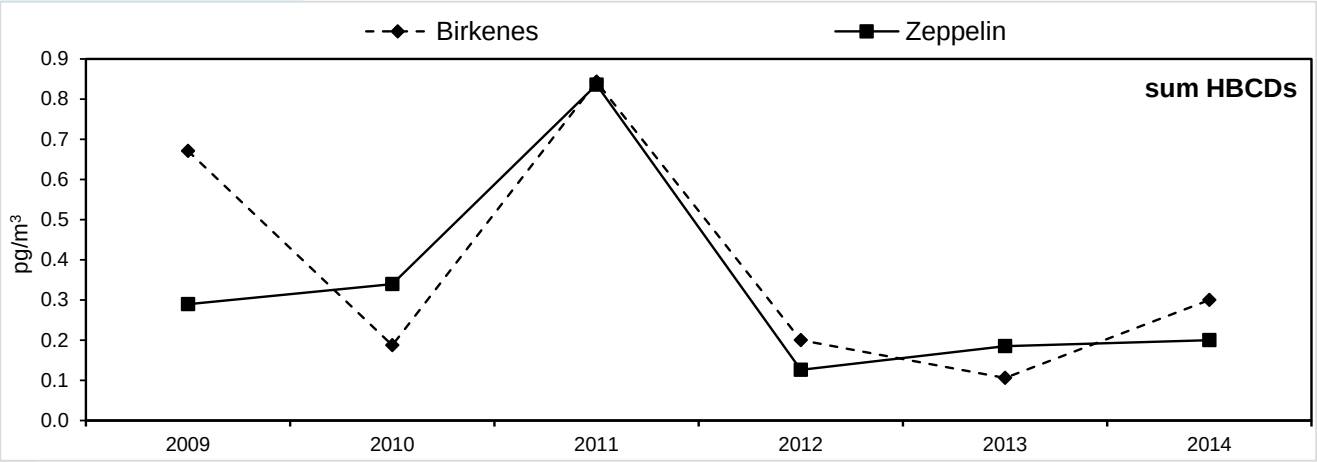






Results – stable levels





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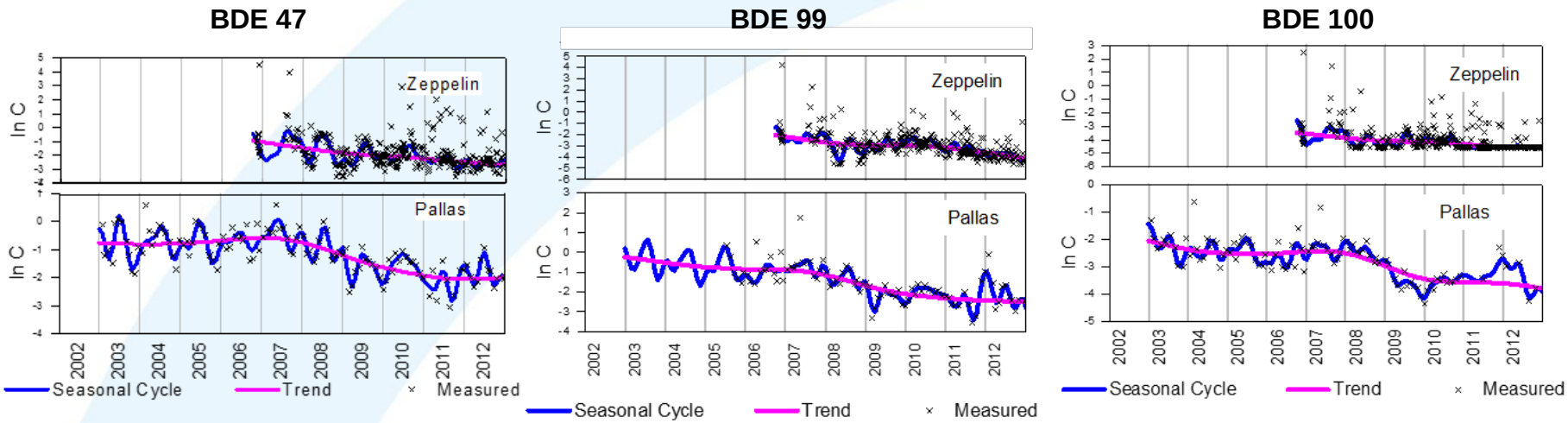
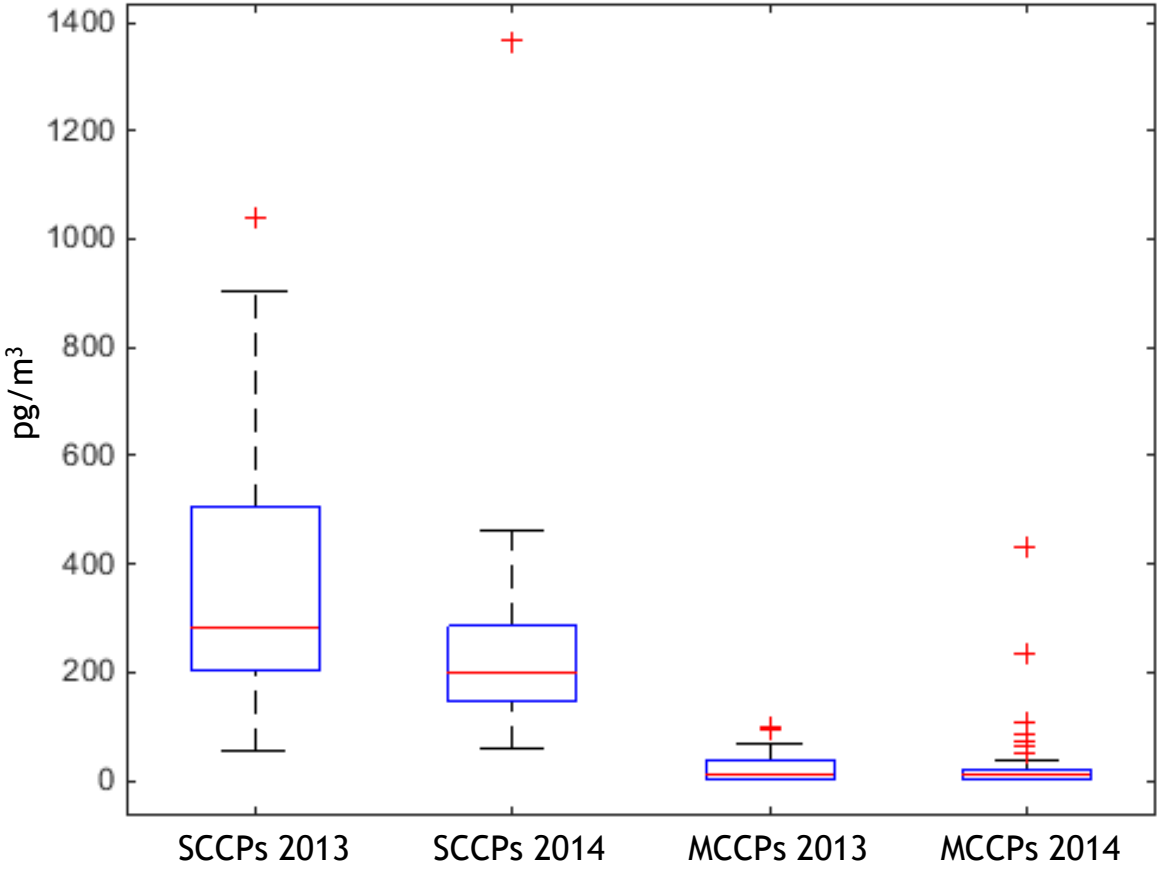
Results – stable levels



Results S/MCCPs



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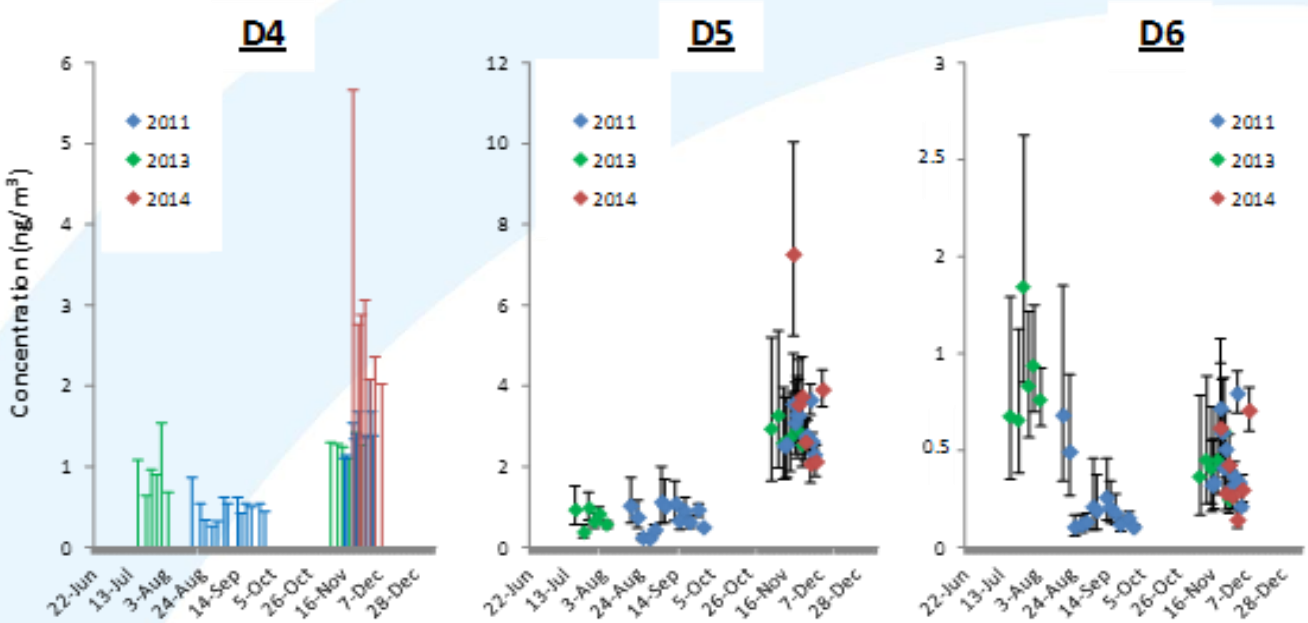
Results Siloxanes



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Conclusion Organic pollutants

- Highest concentrations found for PAHs, siloxanes, and S/MCCPs
- DDTs, PAHs and PFASs highest at Birkenes
- HCB highest at Zeppelin
- PCBs and PBDEs lowest at Andøya
- Increasing levels for HCB, PCBs, PAHs and DDTs?
- Decreasing levels for HCHs and chlordanes
- No trends for PBDEs, HBCDs and PFASs

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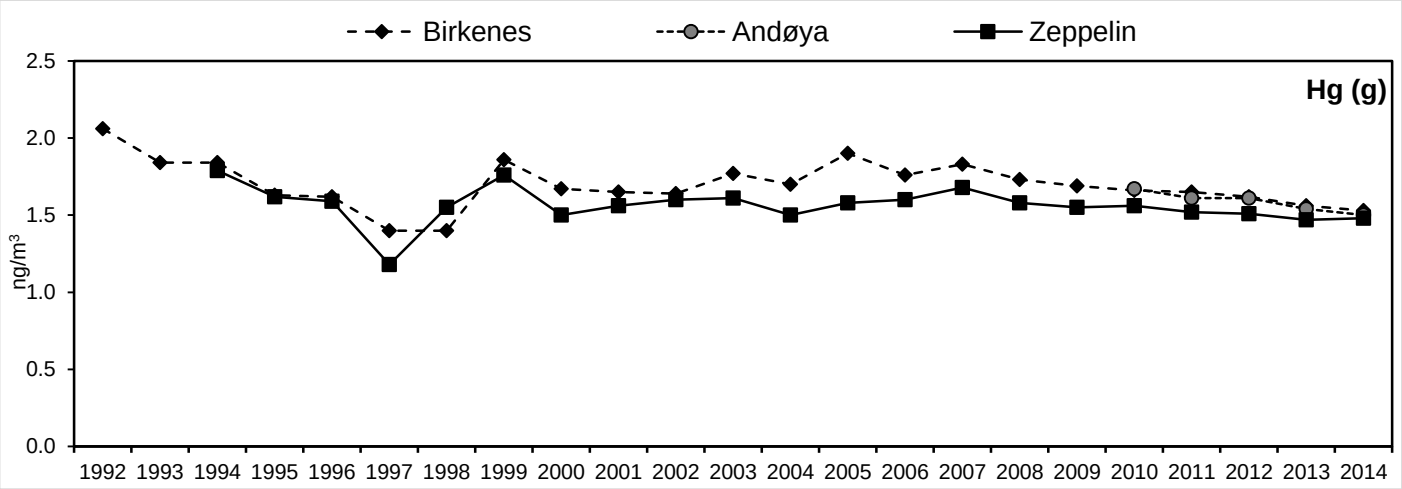
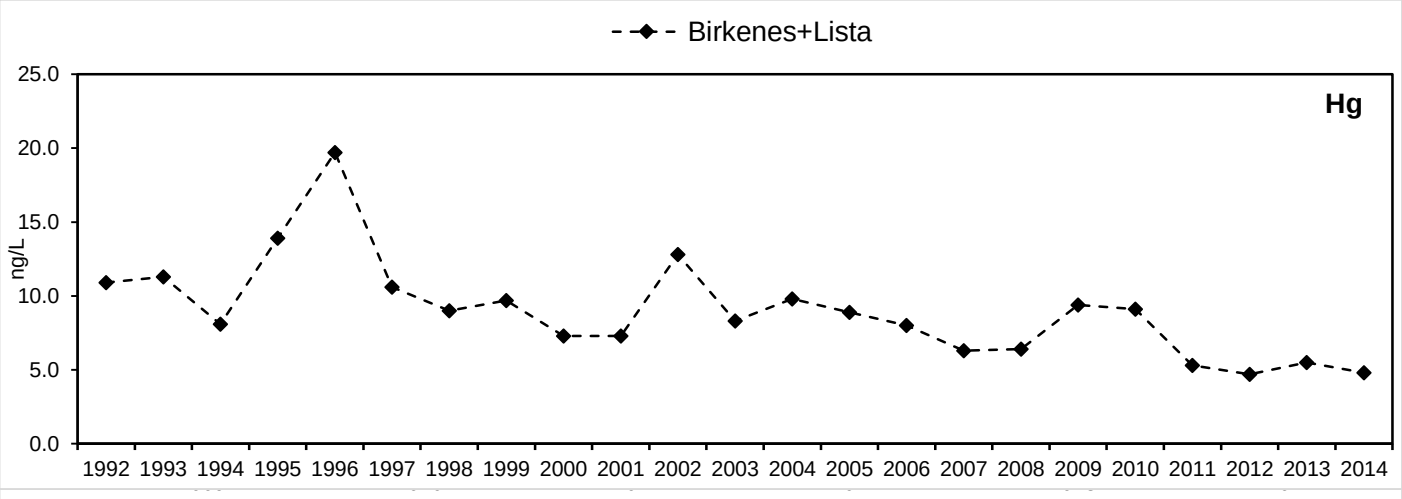
Results Hg – decreasing levels





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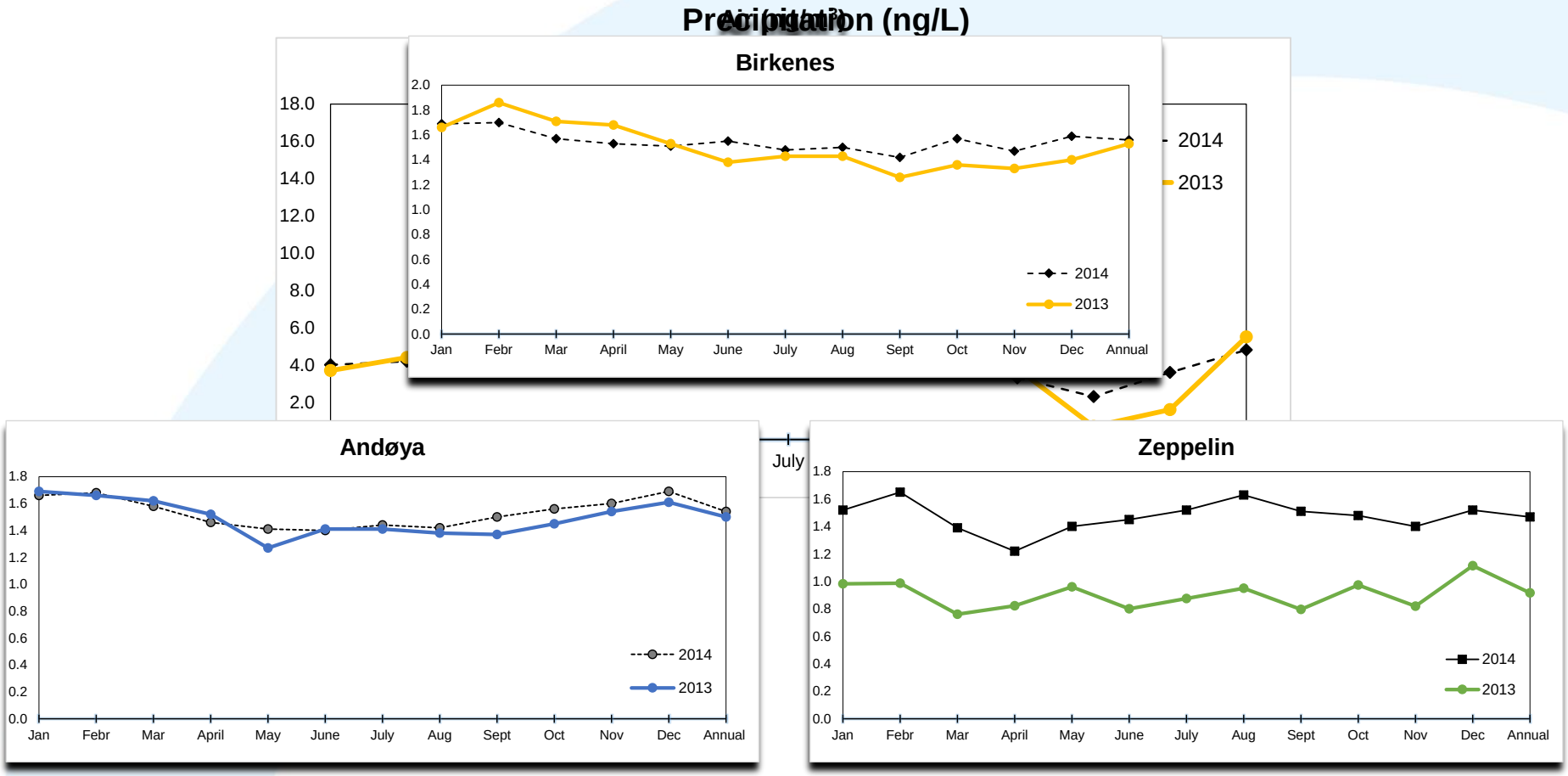
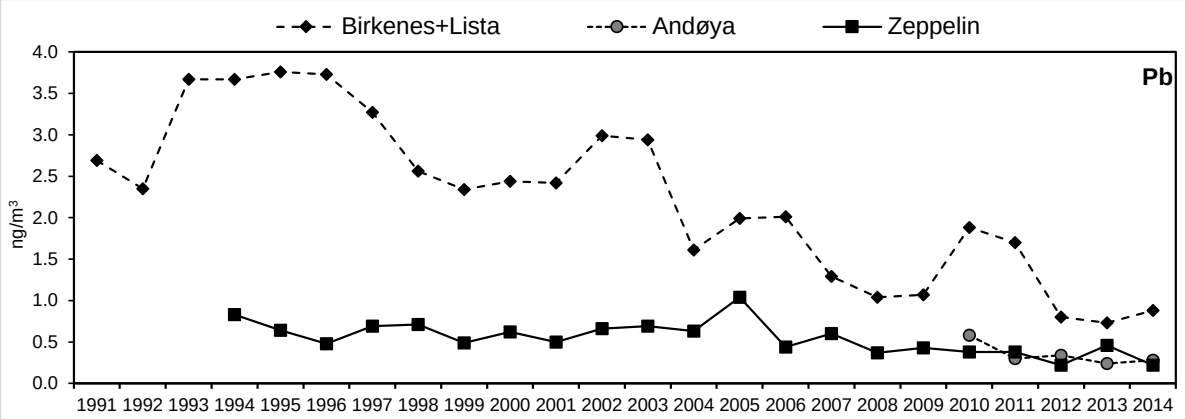
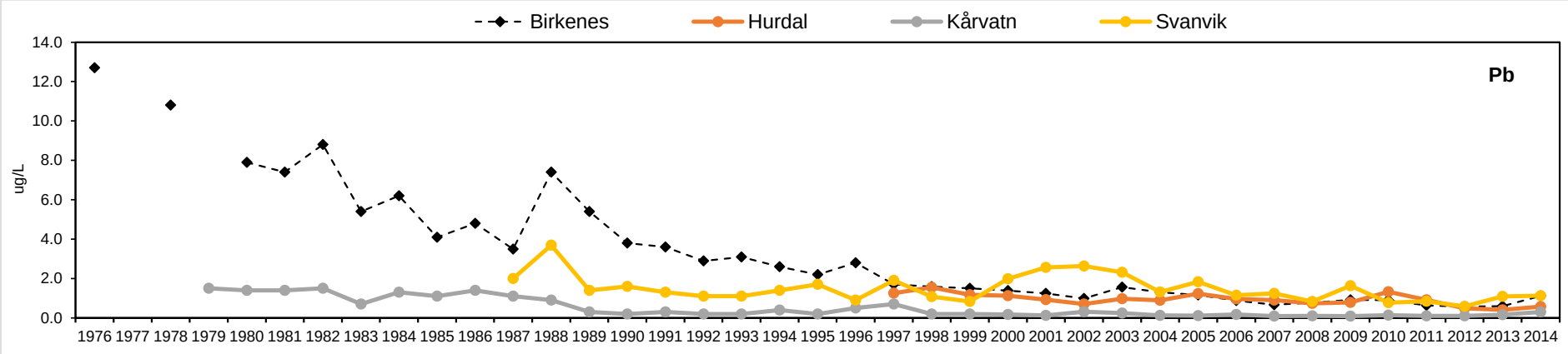
Results Hg


Precipitation (ng/L)
Birkenes
2014
2013
Andøya
2014
2013
Zeppelin
2014
2013
Jan
Febr
Mar
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Annual

Results Pb – increasing levels?





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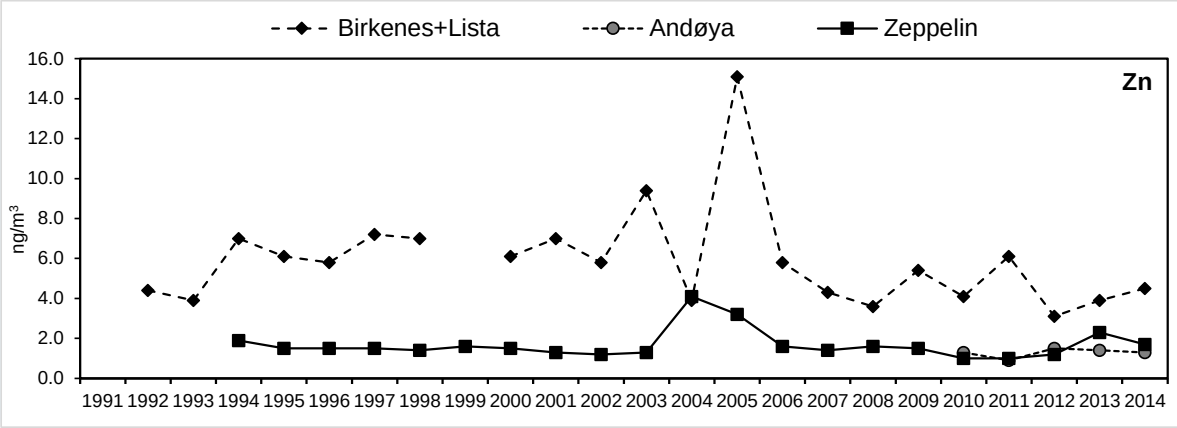
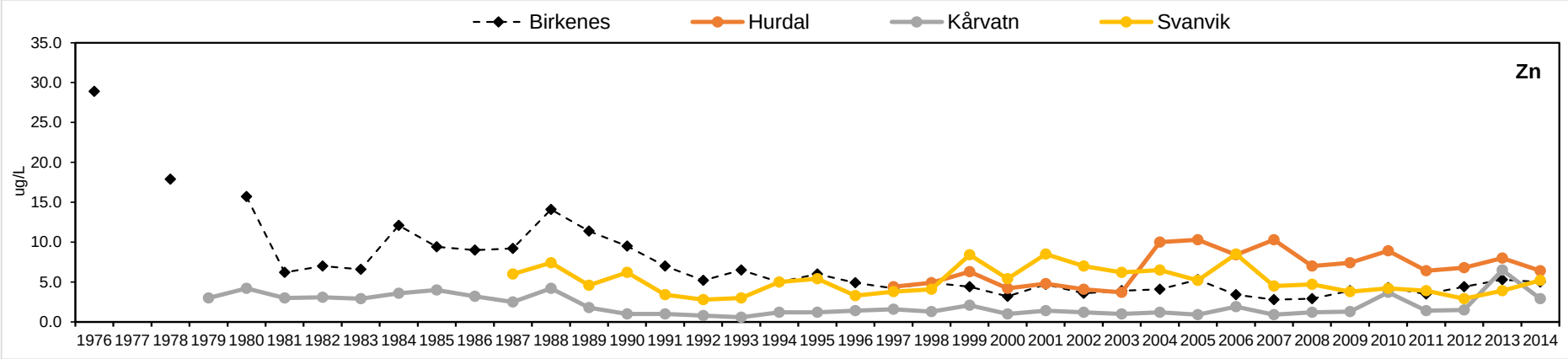
Results Zn – increasing levels?





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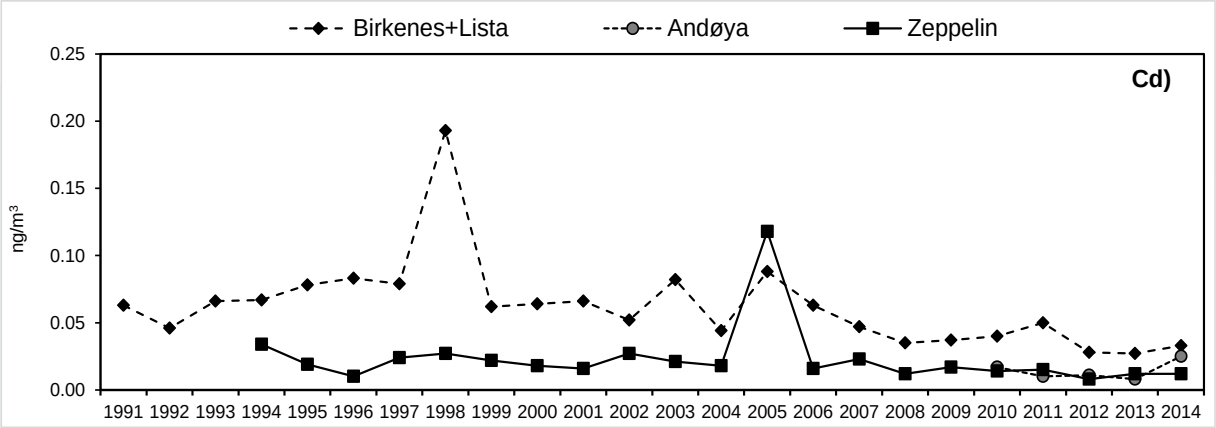
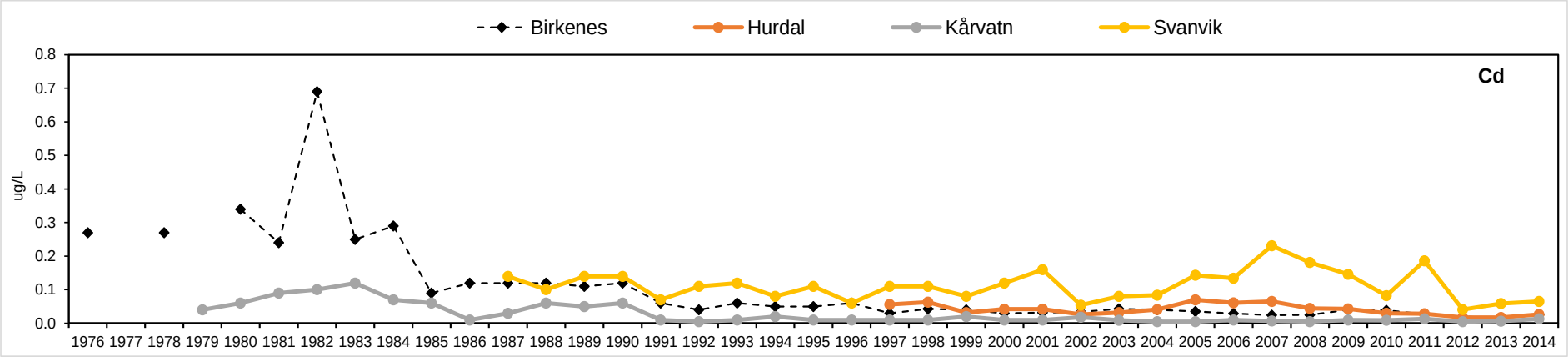
Results Cd – increasing levels?





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Conclusion heavy metals

- Cd and Pb higher in 2014 than 2013 both air and precipitation
- Hg lower in 2014
- Zn increases at Hurdal and Kårvatn

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Future thoughts

- Continue (almost) as today
- Lower time resolution for compounds that have reached “steady-state”?
- Passive samplers?
- Add new contaminants with potential for long-range transport or large scale production in early stage in order to catch changes:

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Future thoughts

- Novel flame retardants – OPFRs, NFRs
- Volatile PFAS
- Current-use pesticides
- Bisphenols (?)
- …
- Blank issues

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For more information, www.nilu.no

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