



Passive sampling in water related to biota

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Can passive sampling predict concentrations in biota?



Can passive sampling predict concentrations in biota?

No



Can we predict concentrations in biota?

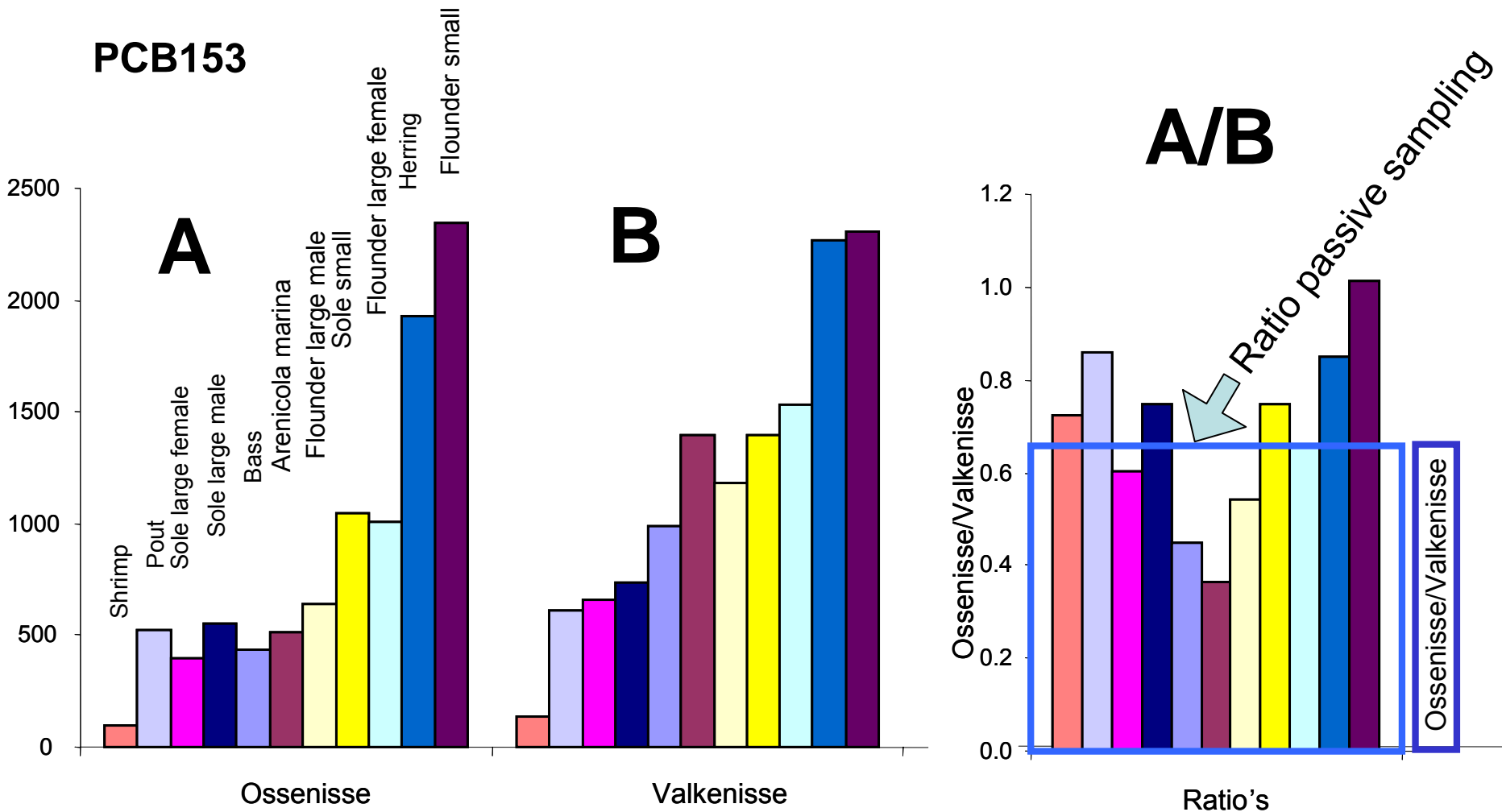
Biota is too variable



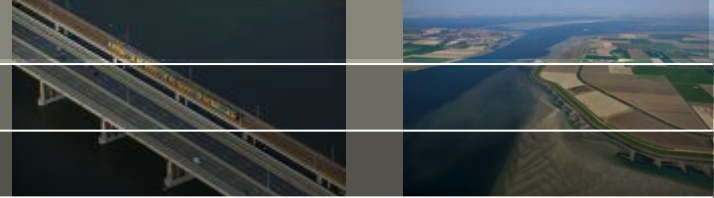
Lipid based concentrations in biota

Two stations in the Western Scheldt

PCB153



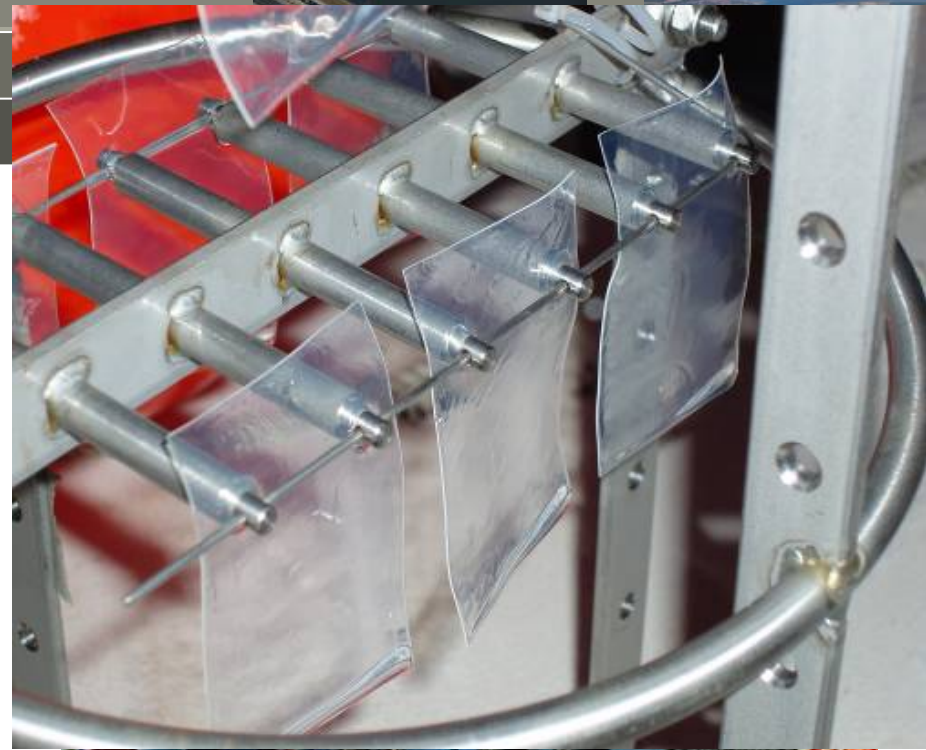
Test with single organism



Passive samplers
versus
“cogenetic” deployed mussels

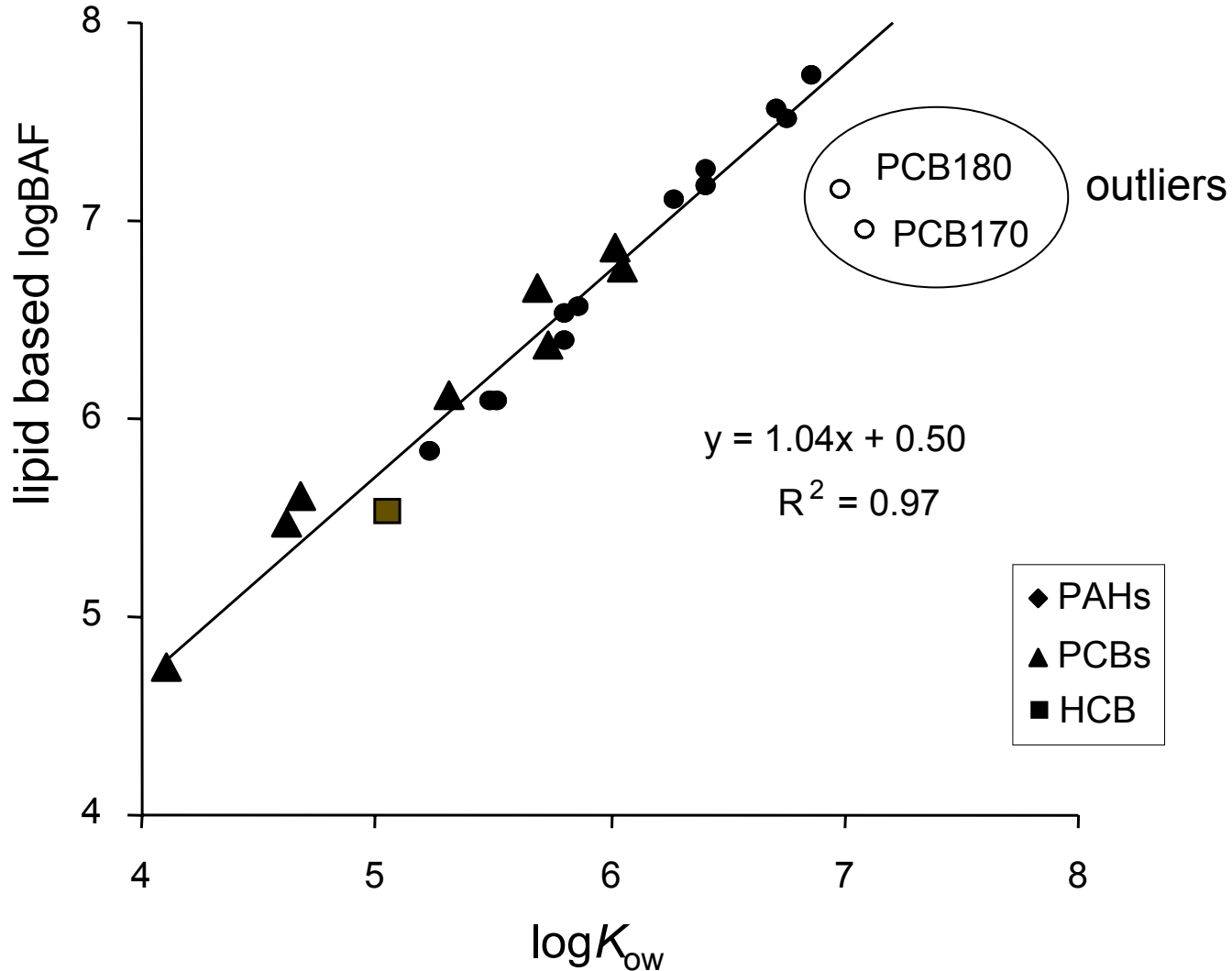


Field - Mussel Frame

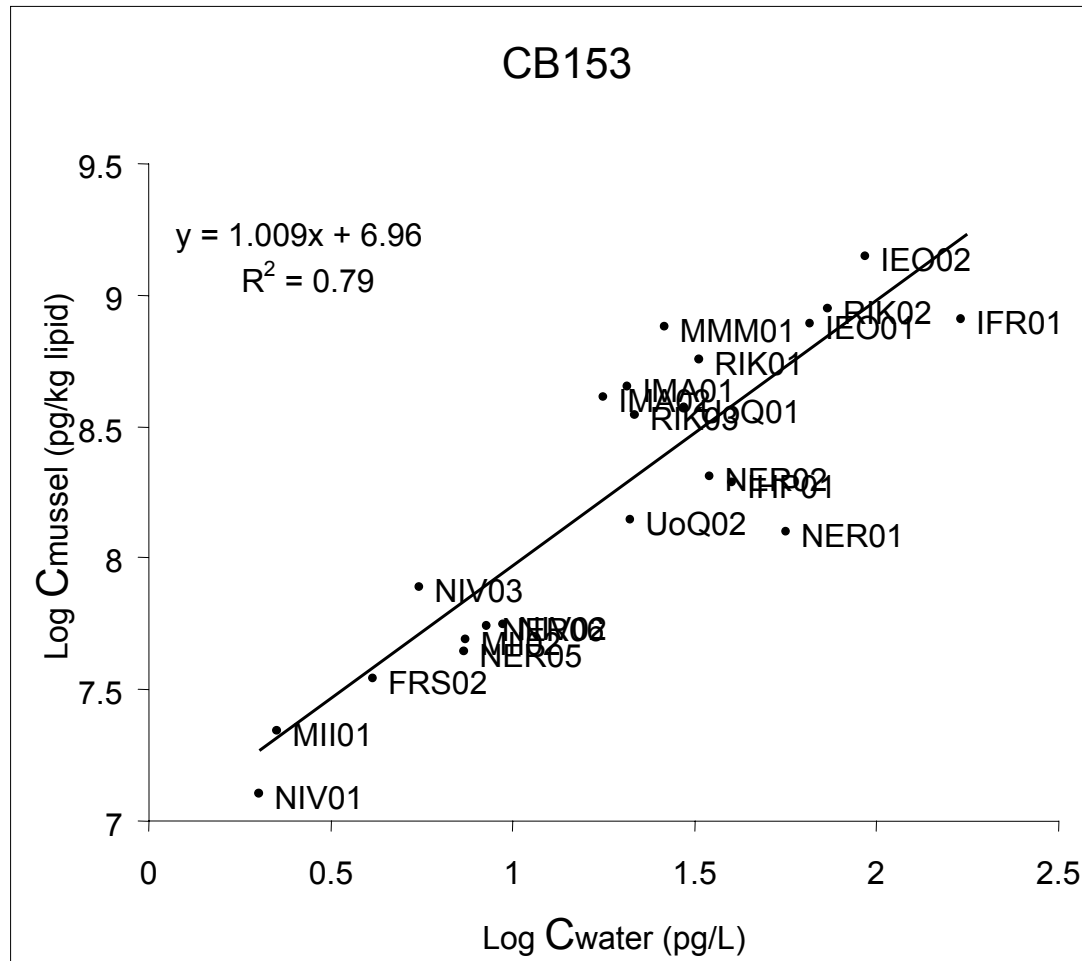


Lipid based log BAFs versus log K_{ow}

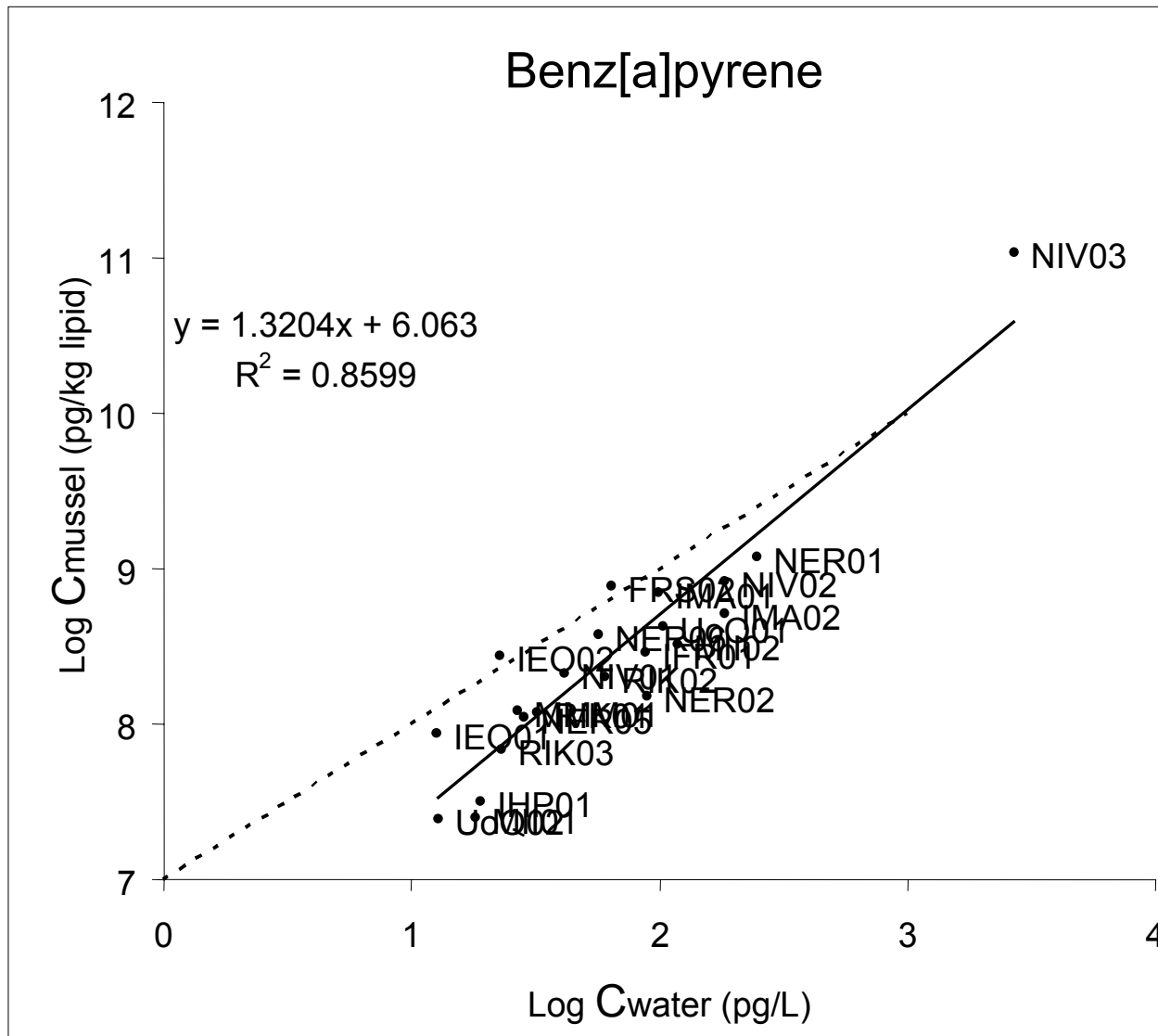
Monitoring by PS and deployed mussels in Dutch coastal waters (2001-2010)



PSTS 30 stations over Europe logC_l in mussels versus logC_{water}

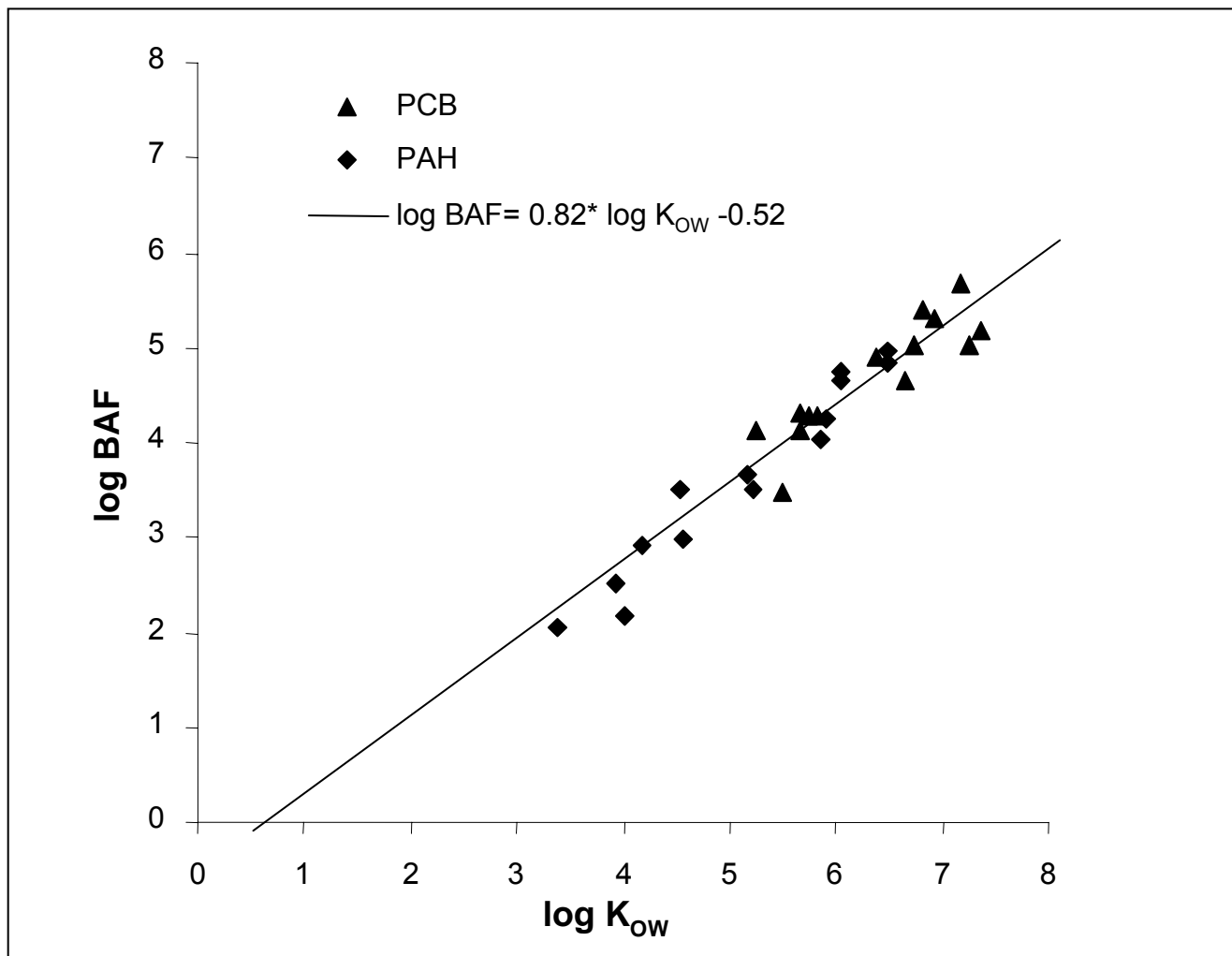


PSTS individual: C_L mussels versus C_{water}

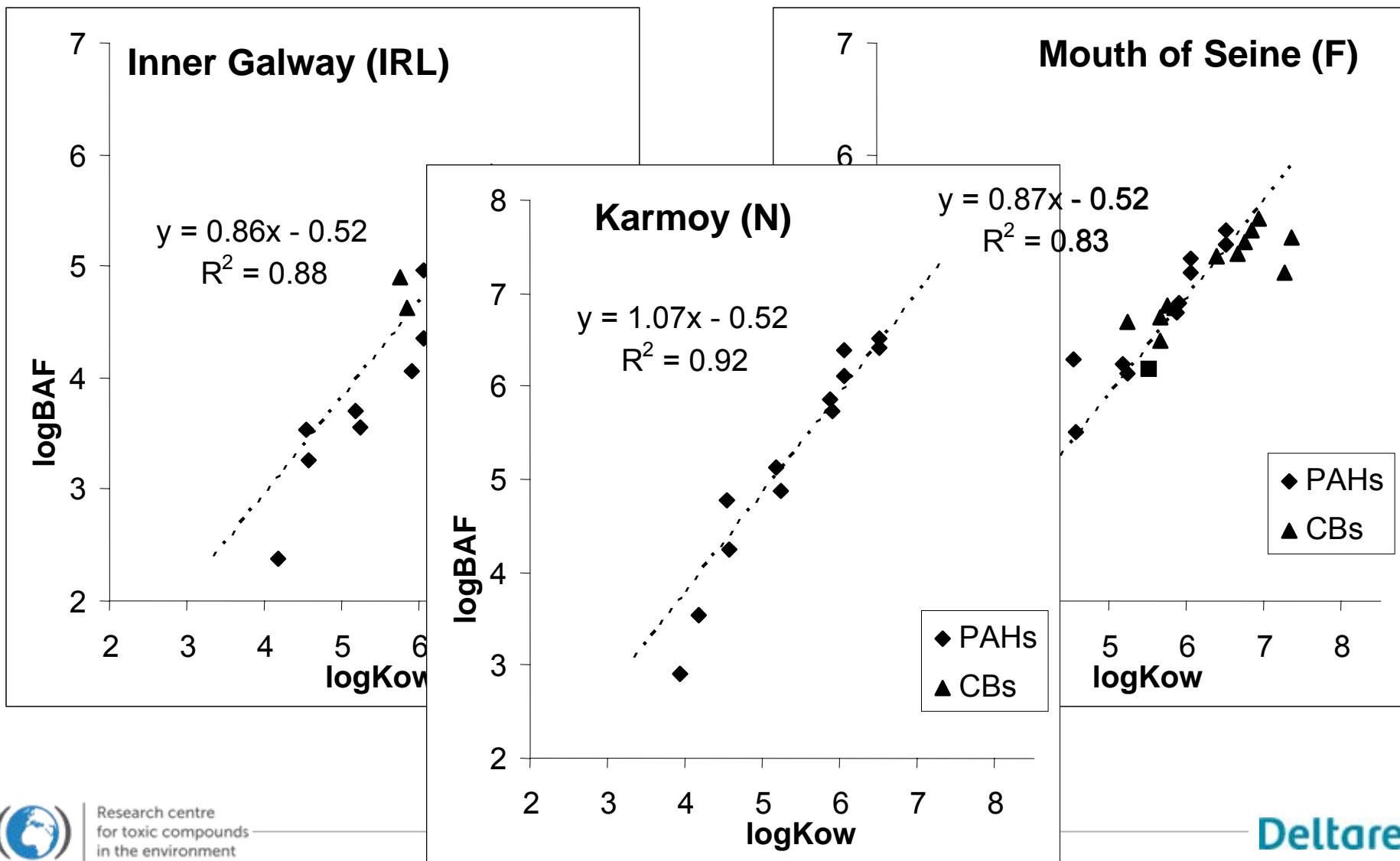


ICES Passive Sampling Trial Survey (ICES PSTS)

Avg logBAF (dw) versus logK_{ow}



BAF at some individual Stations





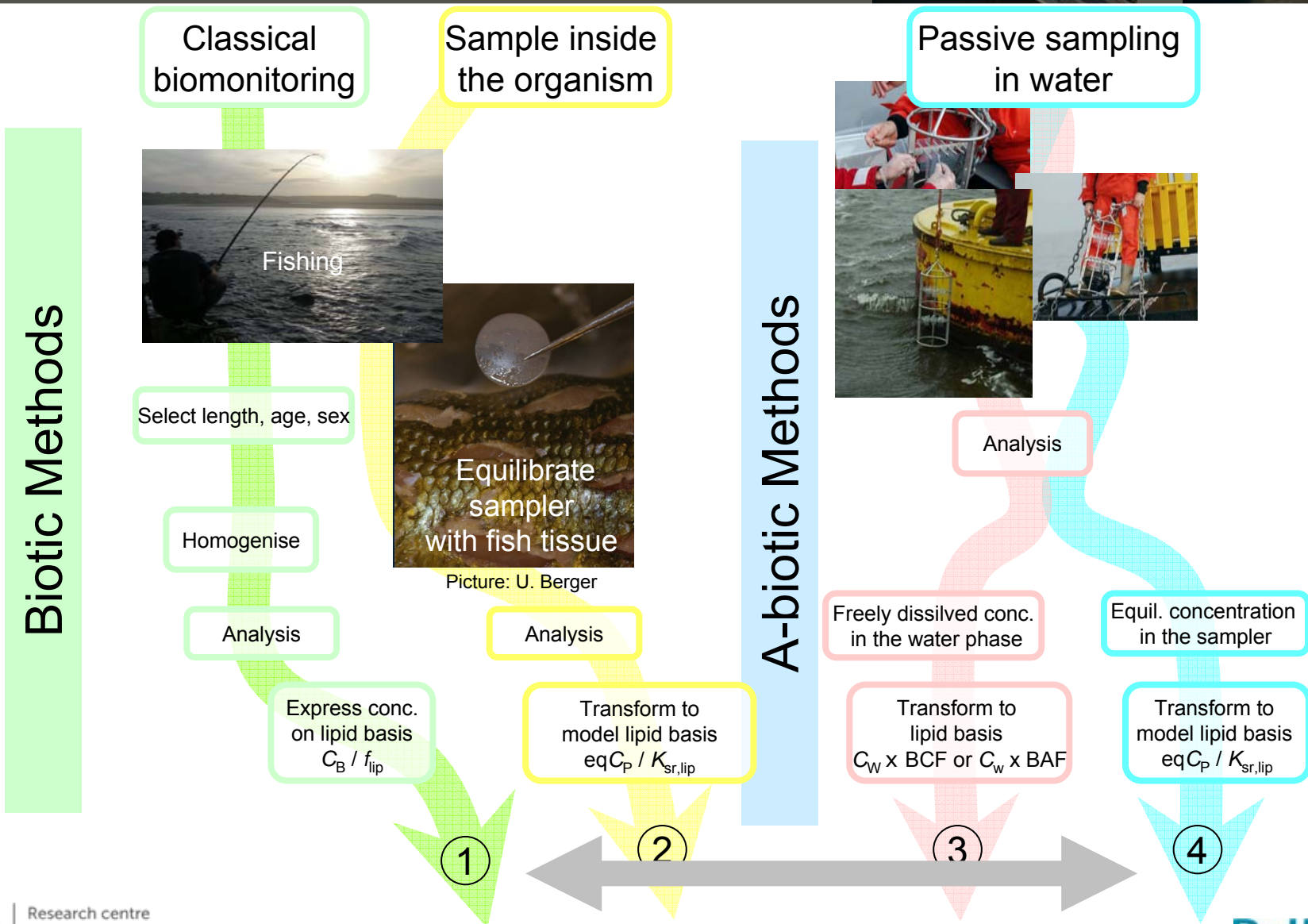
It looks great but we still
look at a log scale

Predictions from PS would still need to
use (variable) literature BCF or BAFs

!!

How to get around that?

Several ways to lipid based concentrations



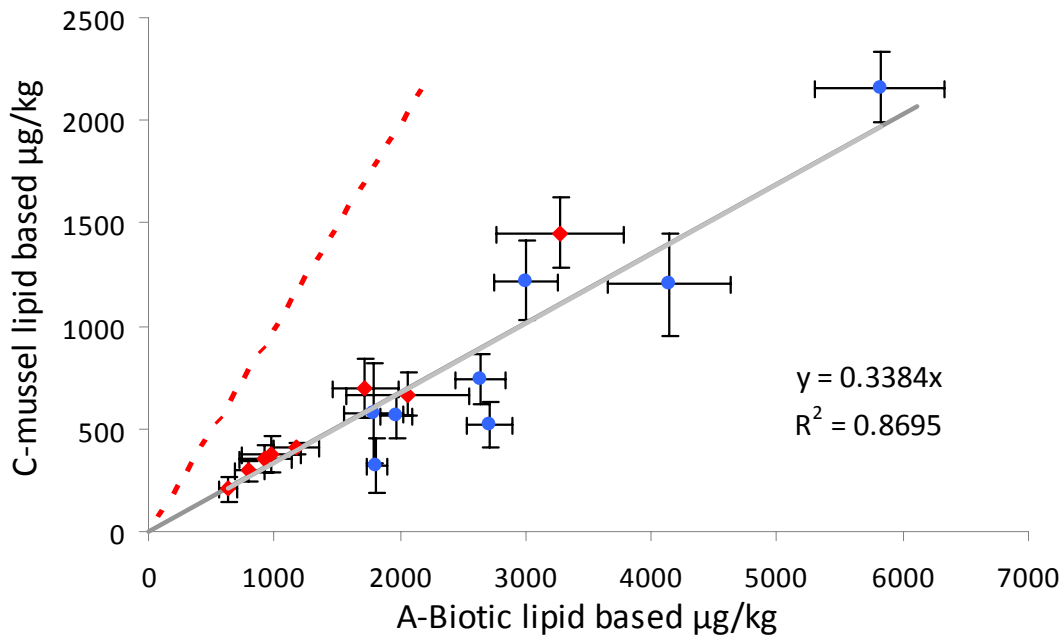
Sampler-lipid partition coefficients ($K_{P,L}$ or $K_{L,P}$)

- Not different for lipids
- Not affected by lipid uptake in the sampler
- No measurable temperature effect
- Are relatively small

and can therefore be accurately measured

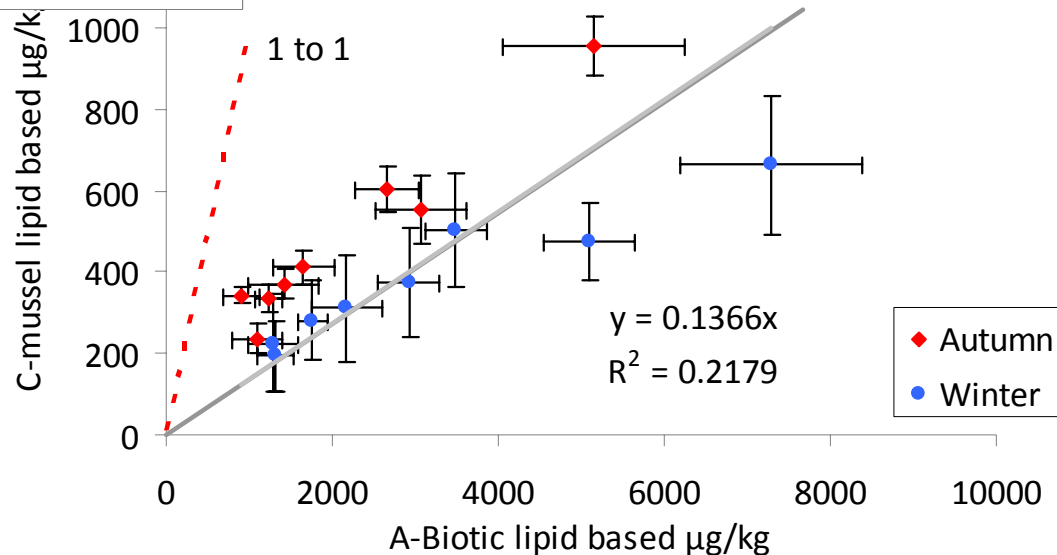
Measured C_{Lip} mussel versus A-Biotic-lipid based concentrations averaged for all stations and years

Pyrene, All years and all stations

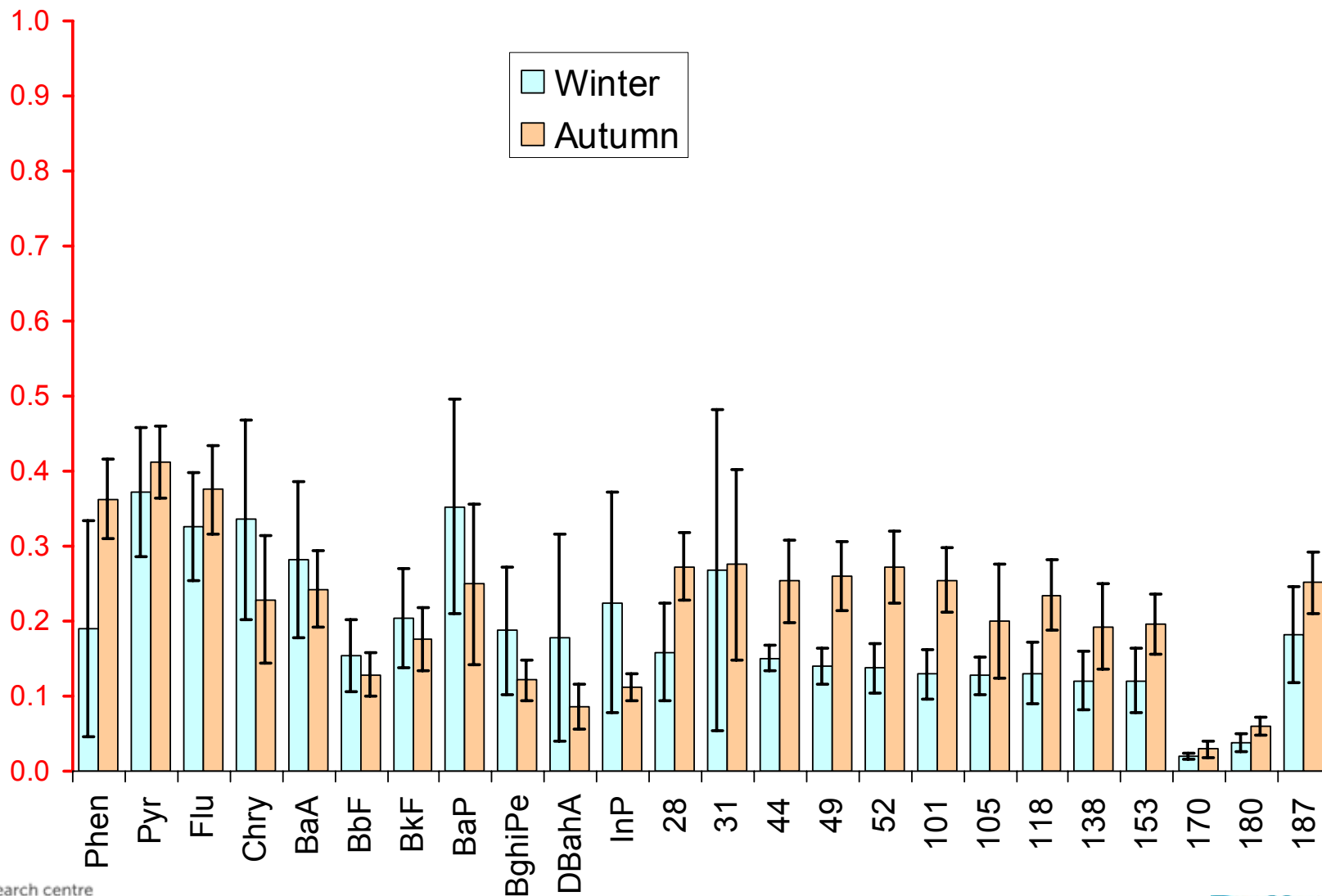


Error bars represent the standard deviation over 10 years data

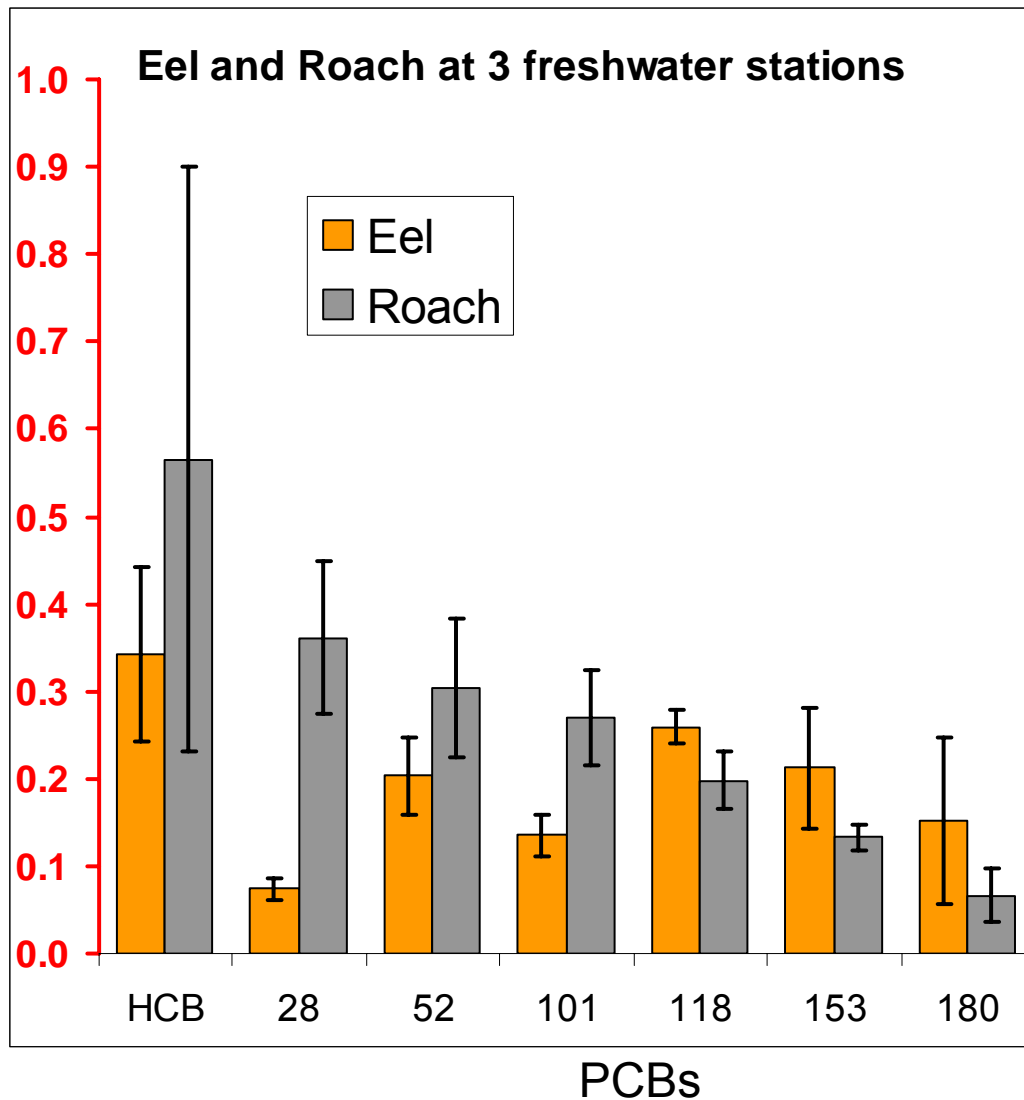
PCB153, All years and all stations



Ratio of measured C_{Lip} in mussels and C_{AL} from PS



Ratio of measured C_{Lip} and C_{AL} uit PS for Eel and Roach

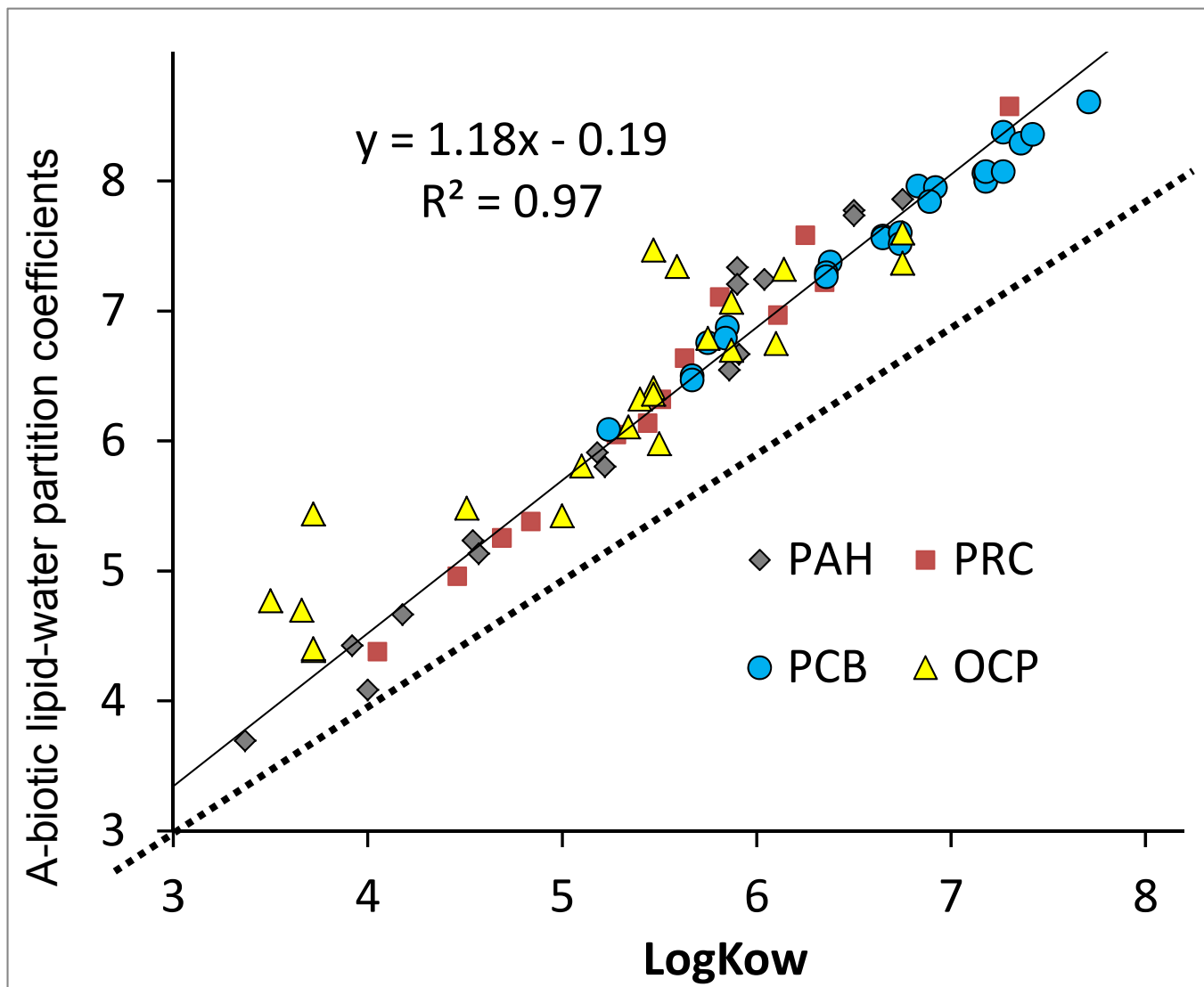


skip

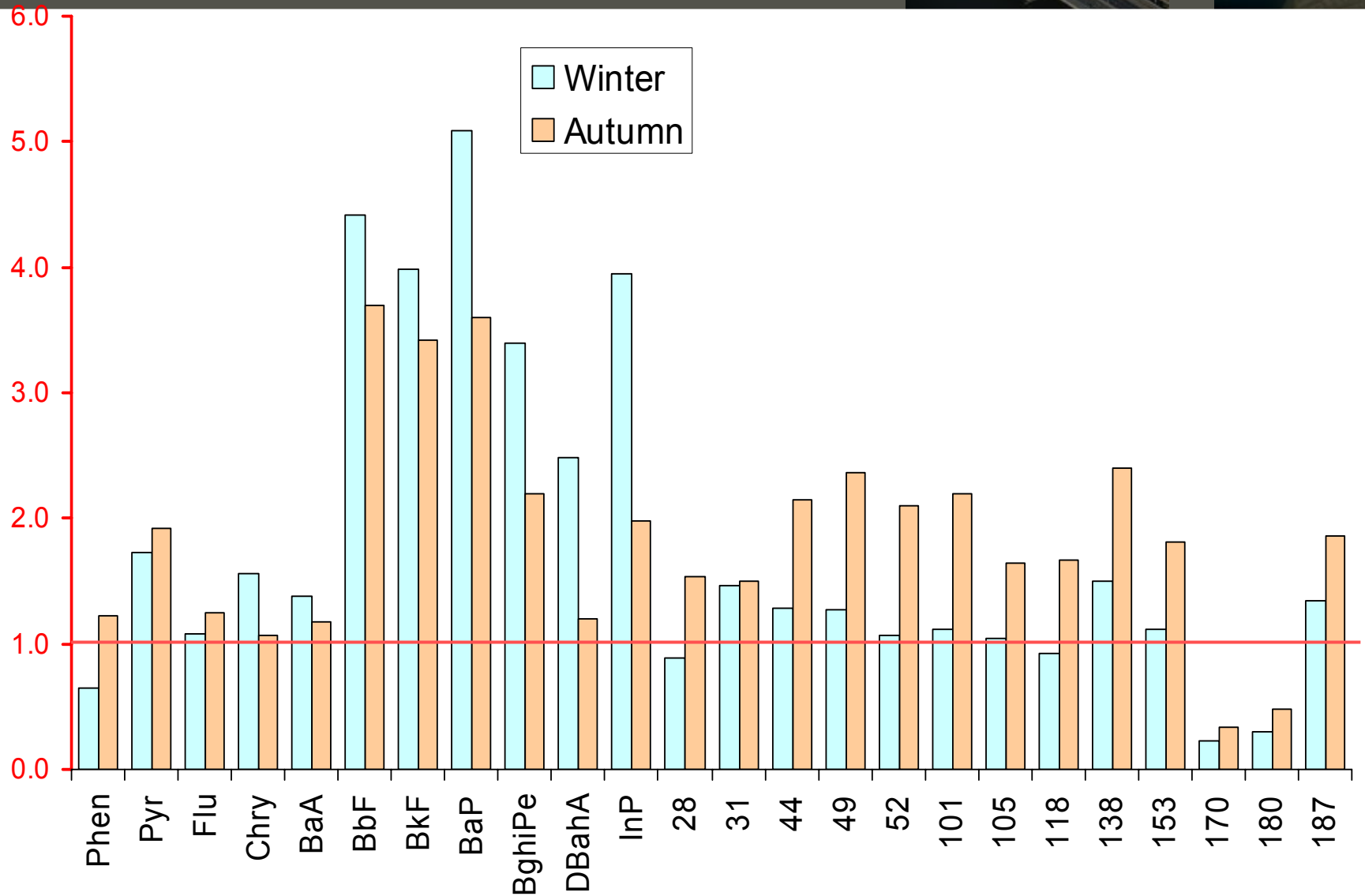


A-biotic obtained $\log K_{AL,W}$ versus $\log K_{OW}$

Calculated from K_{OW} and K_{LP}



Ratio of C_{Lip} in mussel with C-octanol



Can we predict concentrations in biota?

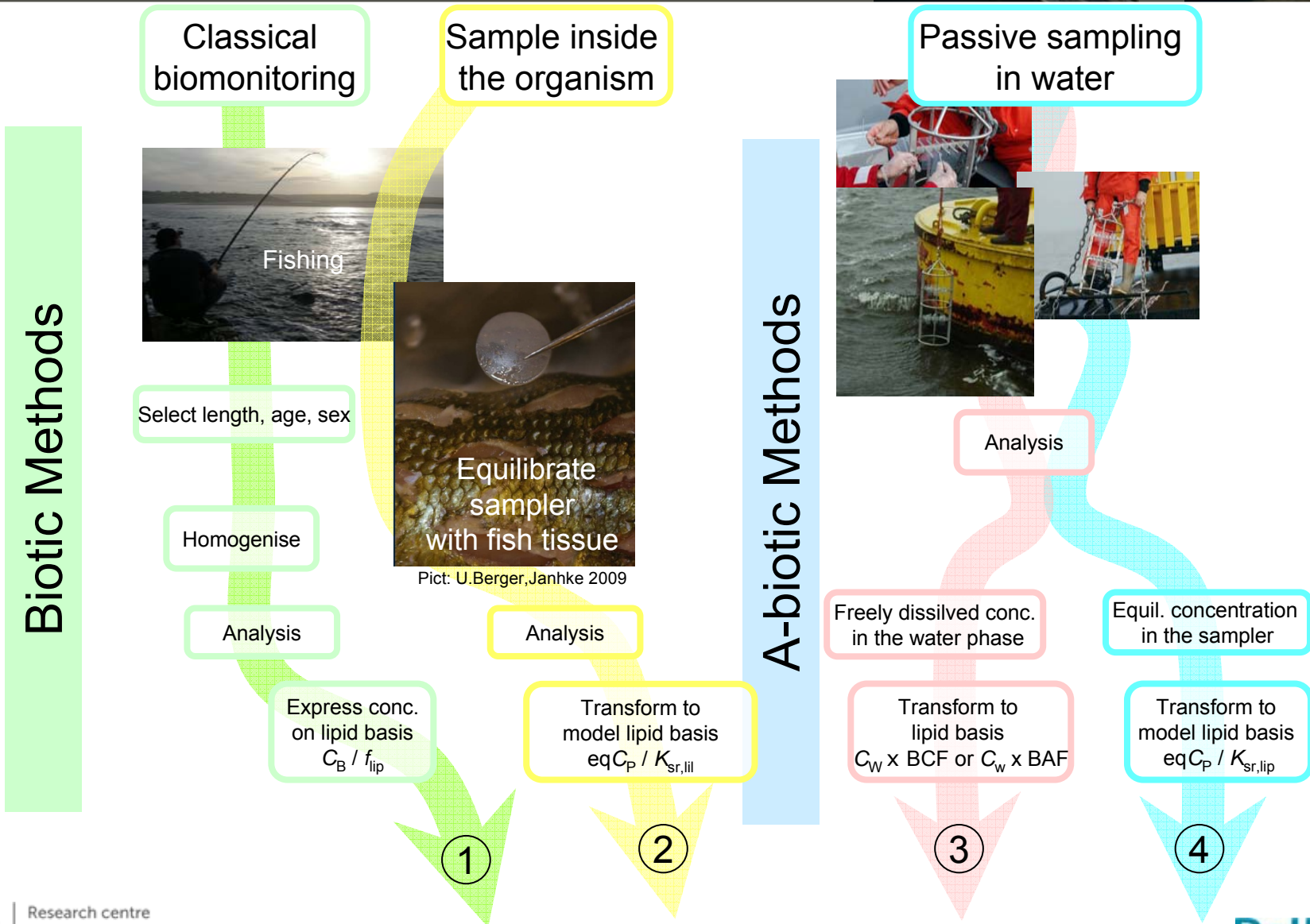
So, although biota is still to variable

passive sampling can give
a prediction for

a lipid based concentration that biota would have
if they were in equilibrium with their
environment



Several ways to lipid based concentrations



Express conc.
on lipid basis
 C_B / f_{lip}

①

Transfer to
model lipid basis
 $eq C_P / K_{sr,lil}$

②

Transfer to
lipid basis
 $C_W \times BCF$ or $C_W \delta BAF$

③

Transfer to
model lipid basis
 $eq C_P / K_{sr,lip}$

④

Availability	Not always		Good	
Animal welfare	Not really		Yes	
Stationary	No guarantees		Yes	
Immortal	No		Yes	
Equal for species, age, sex, size	No		(No) ^b	Yes
Independent of stress?	No		Yes	
Proxy for exposure (chemical activity)	More or less, not for lean	Yes	(Yes)	Yes
Includes compounds that metabolize?	No		No	Yes
Quality standards available?	Yes	Yes (biota?)	Yes (biota?)	



Is there a future for an A-Biotic exposure level

Advantages

- ✓ Worldwide comparable
- ✓ Different waters
Fresh and saline water, toxic, anoxic, porewater
- ✓ Relevant for ~~uptake by~~ exposure of organisms
- ✓ Metabolisation not included#
- ✓ Not mortal

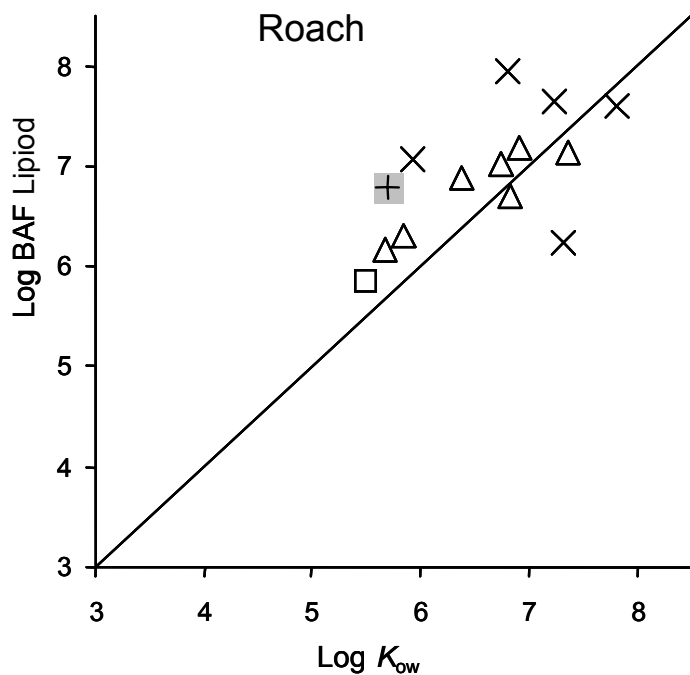
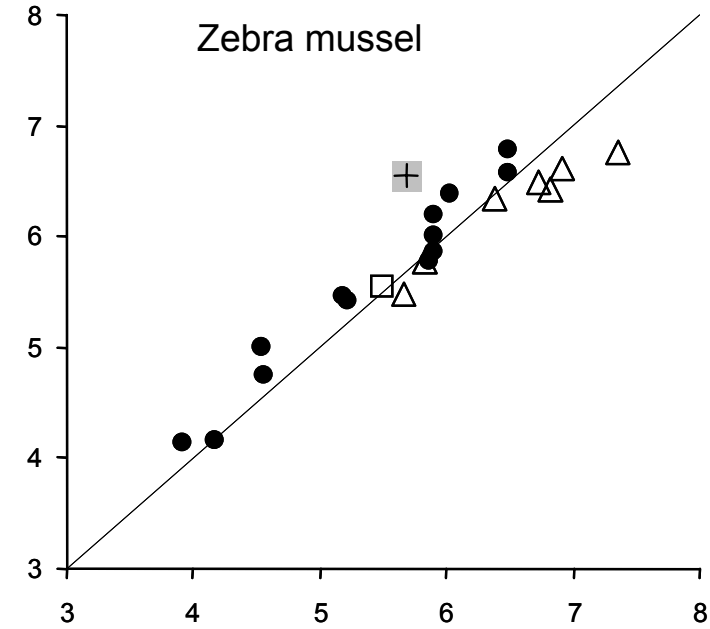
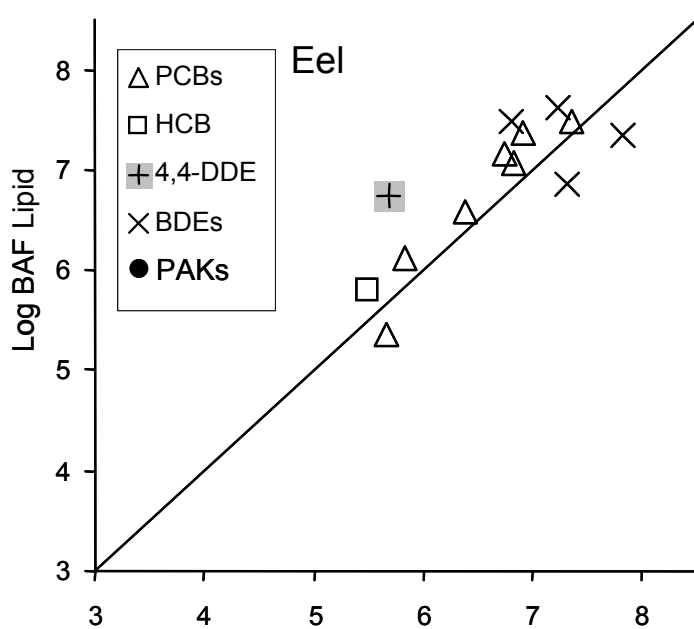
Also exposure data for compounds not found in the biota





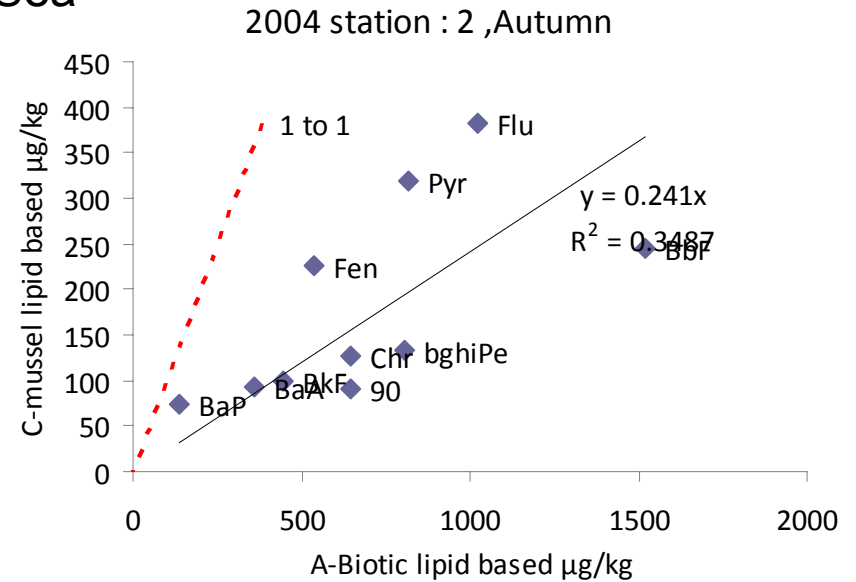
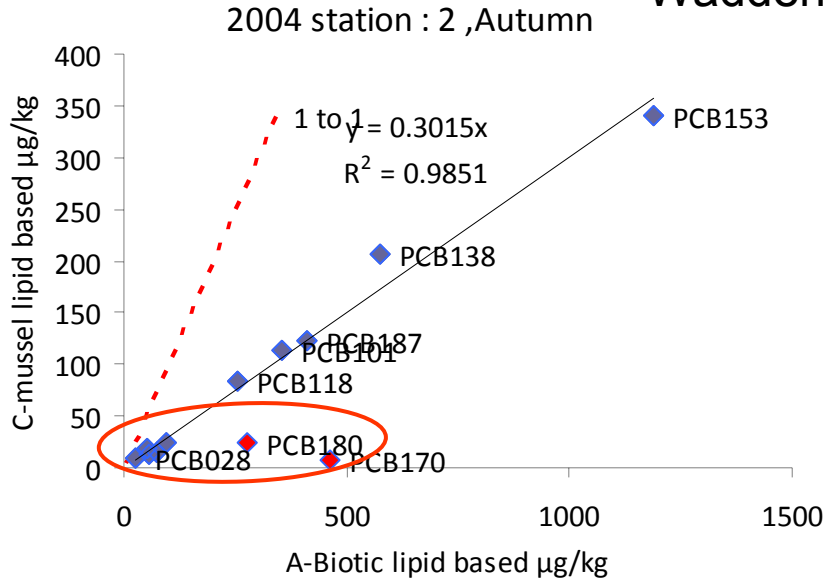
Thank you for your attention





Measured C_{Lip} mussel versus A-Biotic lipid based conc

Wadden Sea



Western Scheldt

