Applying Passive samplers to coastal observing networks and BOBs

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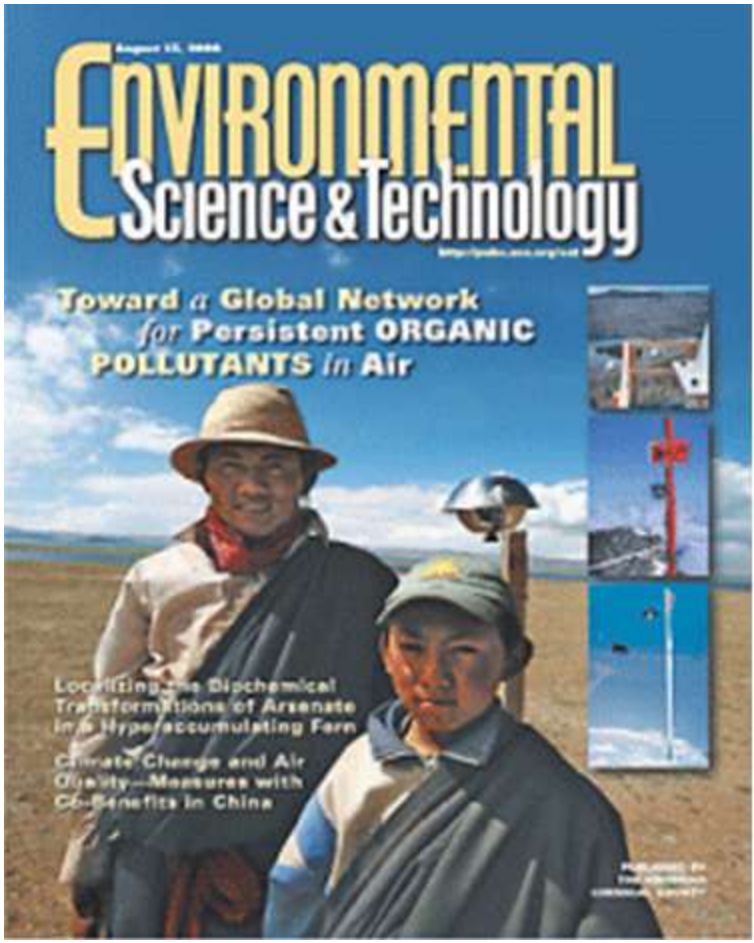
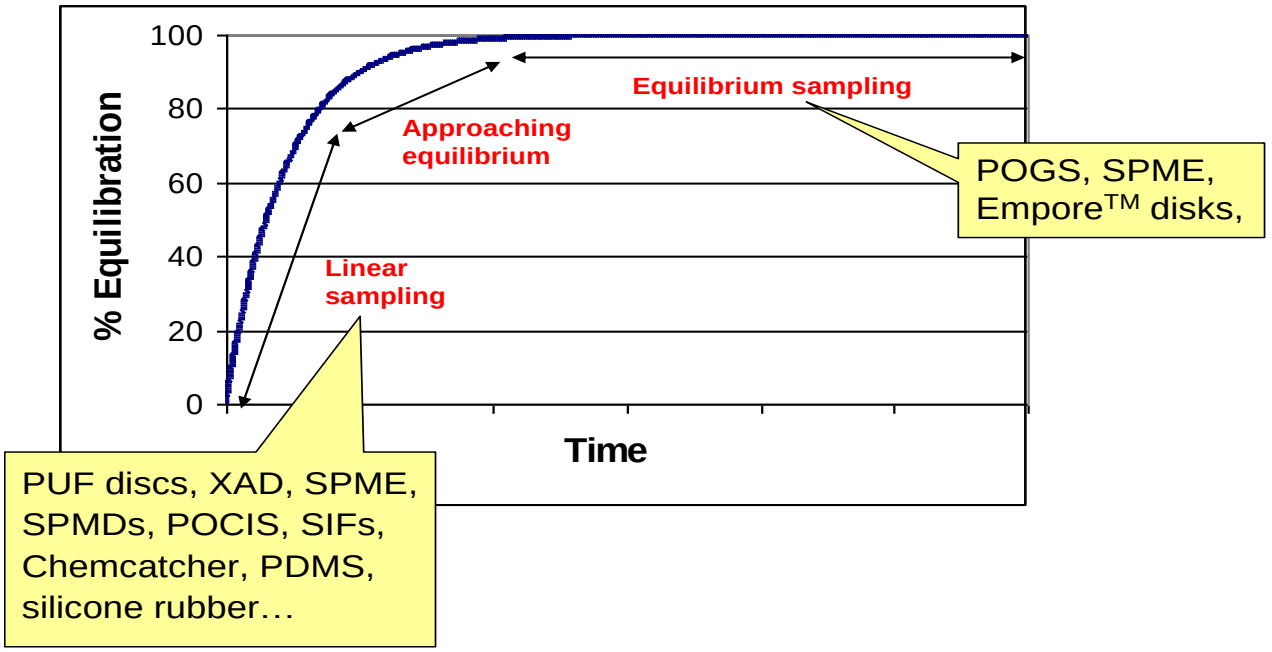
Local/Global Integration



Kinetic vs. Equilibrium



Equilibrium Sampling $C_s(t) = C_w * K \rightarrow C_w = C_s / K_{EVA\text{-}w}$

Kinetic Sampling $M_s(t) = C_w * R_s * t$

Sampling rate is to the volume of water that would need to be extracted per unit time to account for the increase of mass in the sampler

Graduate Student Joanne Elmoznino holding the LISICOS passive sampling device.


HONDA
225

Observing Systems

Study Site: Thames River Estuary

- Located in Southeastern Connecticut
- Head is in Norwich, CT – approximately 20 km long
- Highly industrialized
  - Wastewater Treatment
  - U. S. Naval Base
  - Chemical Industry
  - Pharmaceutical Industry
  - Power Plants
- 3 Sites
  - Possible Point Sources

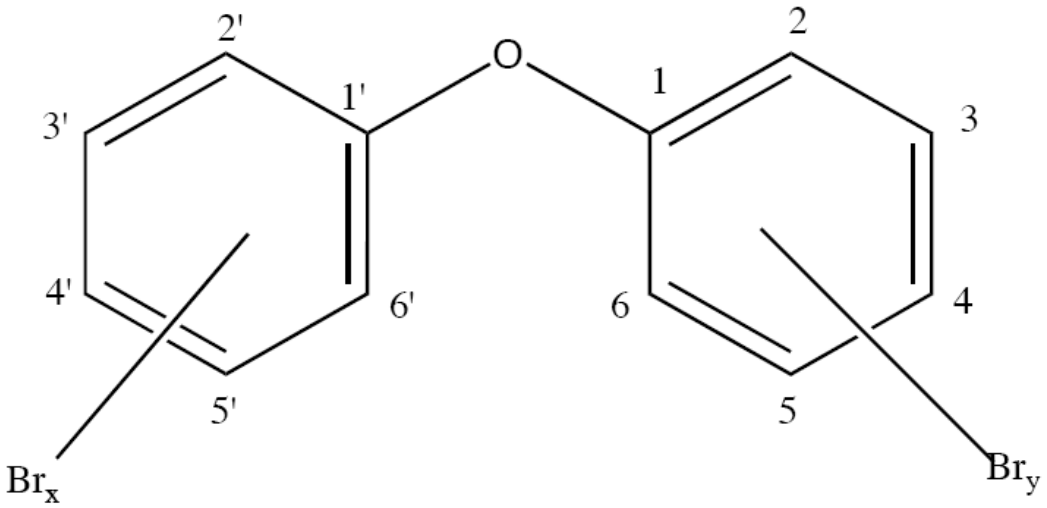
Target Analytes

Currently Used Pesticides (CUPs)

- Residential and Commercial
- Herbicides
- Fungicides
- Broad Spectrum Insecticides

Phorate	Metribuzin
Dazomet	Malathion
Simazine	Parathion-d10
Carbofuran	Chlorpyrifos
Atrazine	Dacthal
Terbufos	Pendimethalin
Diazinon-d10	Endosulfan-α
Trifluralin	Chlorothalonil
Disulfoton	g-HCH-d6
Alachlor	α-HCH
Metolachlor	

Analysis conducted for listed pesticides.



Polybrominated Diphenyl Ethers (PBDEs)

14 Predominant Congeners

(3 Commercial Mixtures)

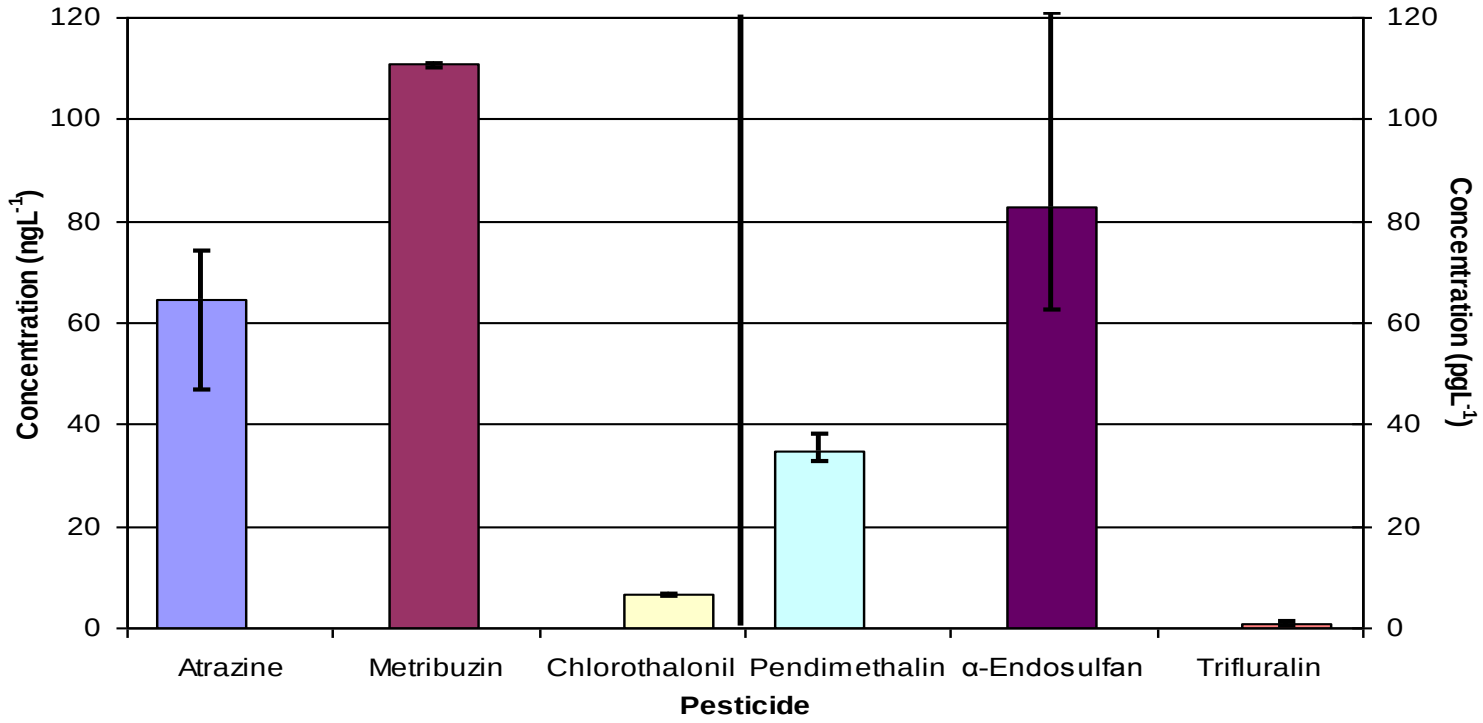
Detection limits

$$M_{EVA} = N_{target}\ \rho_{EVA}(K_{EVA\text{-}W}C_W)^{-1}$$

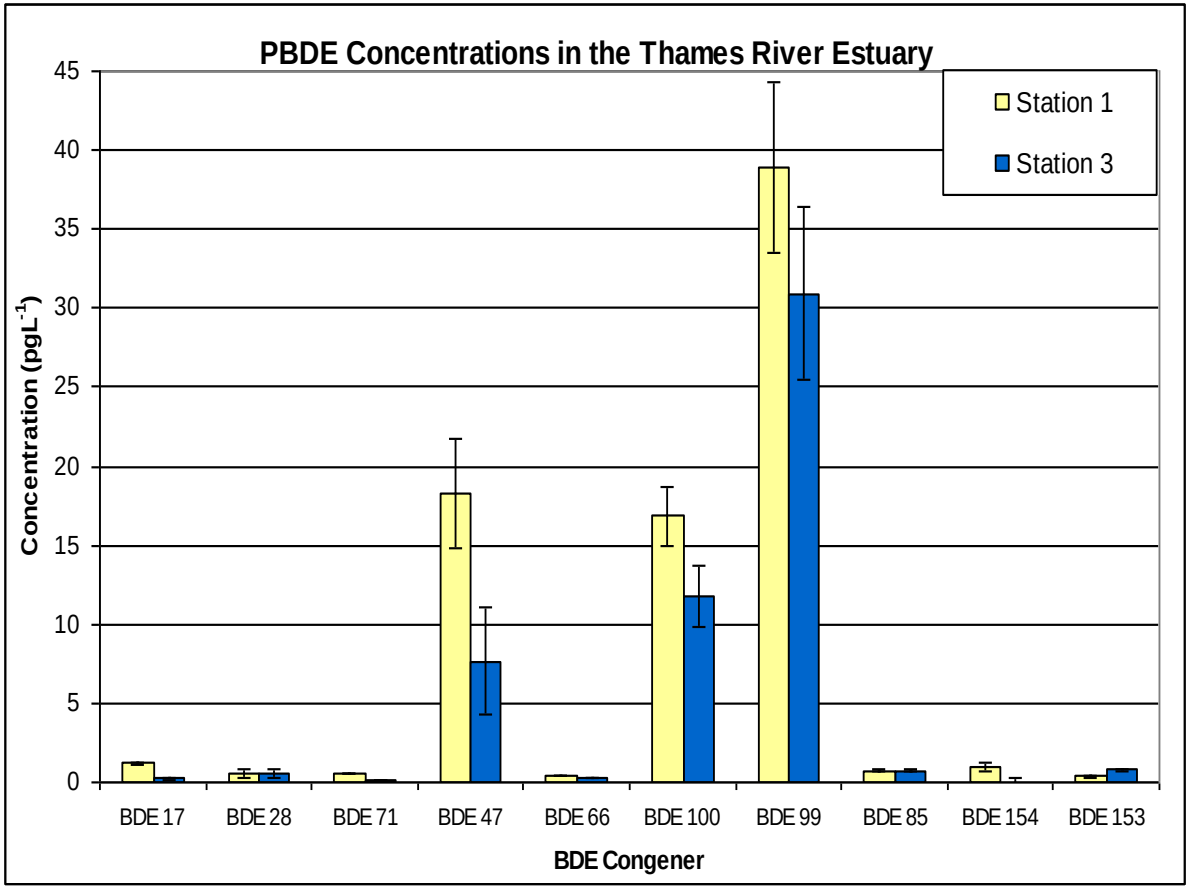
The amount of EVA on the passive sampler M_{EVA} (g_{EVA}) can be optimized for the target compound using:

- N_{target} , the detection limits of the analytical technique (mass spectrometry) for the compound (usually mol_{cpd})
- ρ_{EVA} , the density of EVA (coating) (g_{EVA}/ml_{EVA})
- $K_{EVA\text{-}W}$ the equilibrium partitioning coefficient of the compound in EVA and water ((mol_{cpd}/ml_{EVA})/(mol_{cpd}/L_{water}))and
- C_W is the anticipated concentration range of the compound in the monitored waters (mol_{cpd}/L_{water})

Tracking Chemical Contaminants

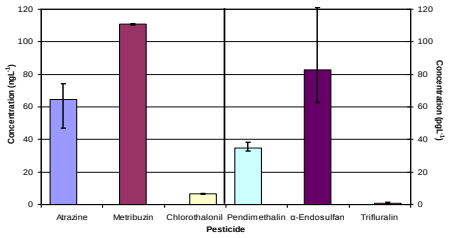


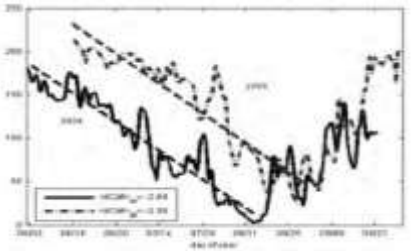
Results - PBDEs



- Concentrations detected in pg/L concentrations
- Spatial variation – All PBDE conc. Detected highest at Sta 1
- Station 2 –located midway between other stations – concentrations Below Detection Limit = (< D.L)
- Suggests that 2 point sources exist – locations near Sta 1 and Sta 3

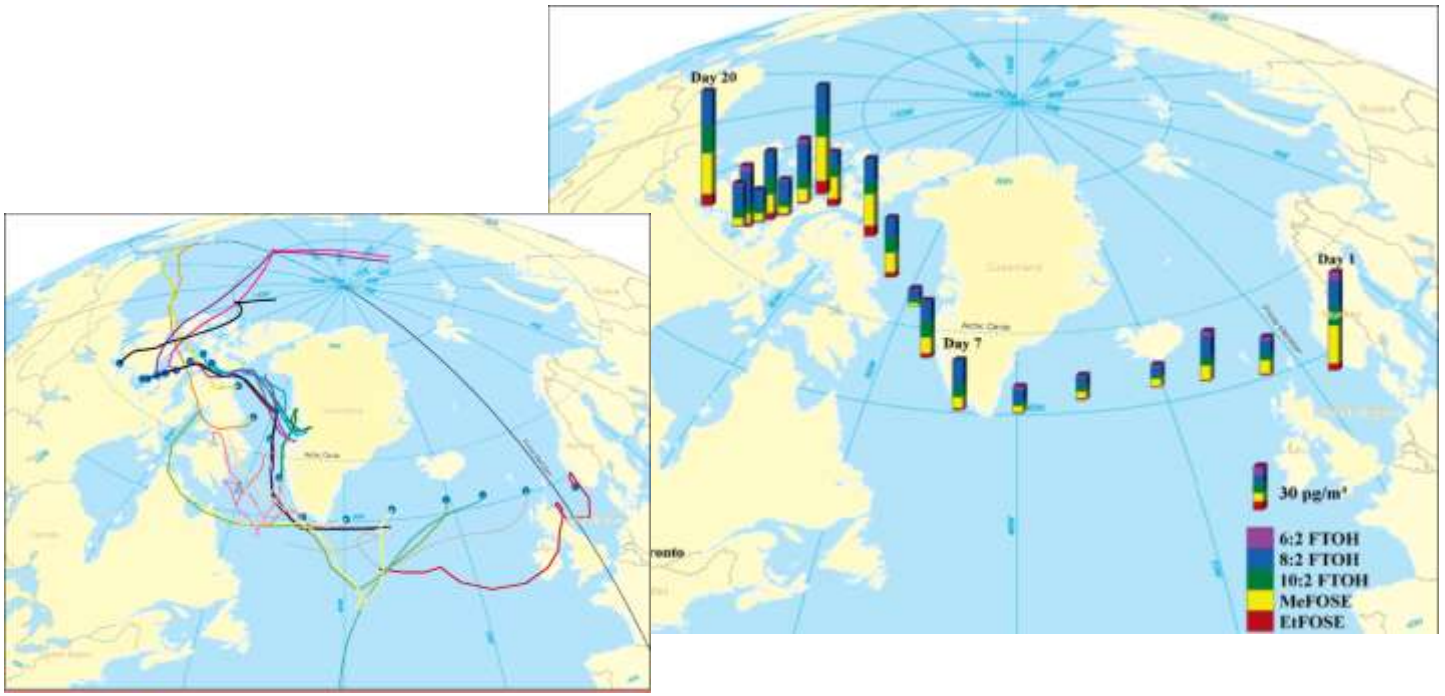
Everyone part of the network….





Work for the future….

1. Networks for chemical tracking
2. Early warning systems
3. Linking coastal simulations with global climate models
4. Coupling cycles over spatial and temporal scales



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A rapidly equilibrating, thin film, passive water sampler for organic contaminants; characterization and field testing

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An ethylene vinyl acetate (EVA), thin-film passive sampler for the detection of organic compounds in marine environments is calibrated and field tested.