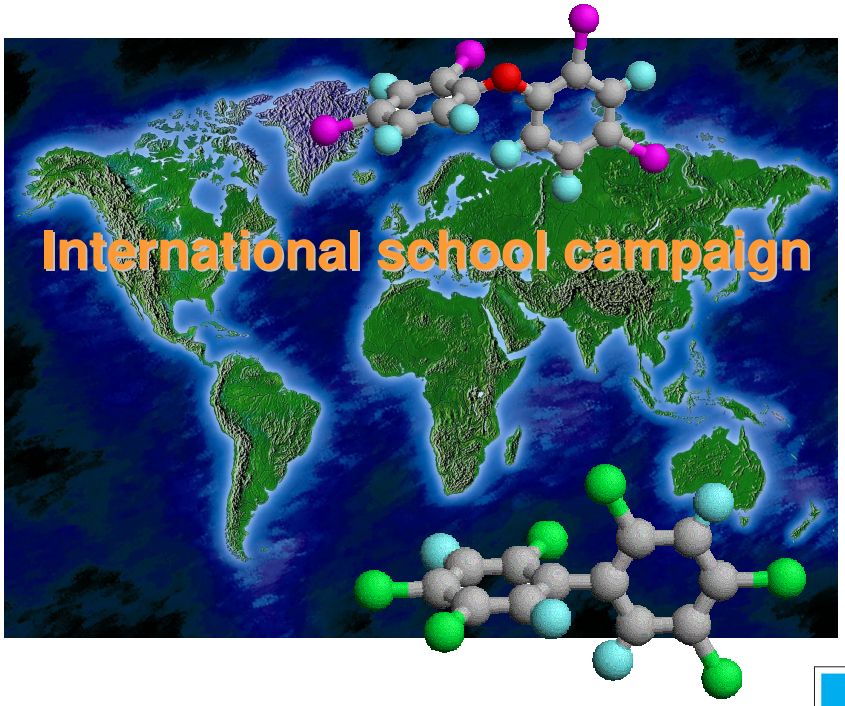
Global POP

- An investigation of environmental pollutants in fish worldwide



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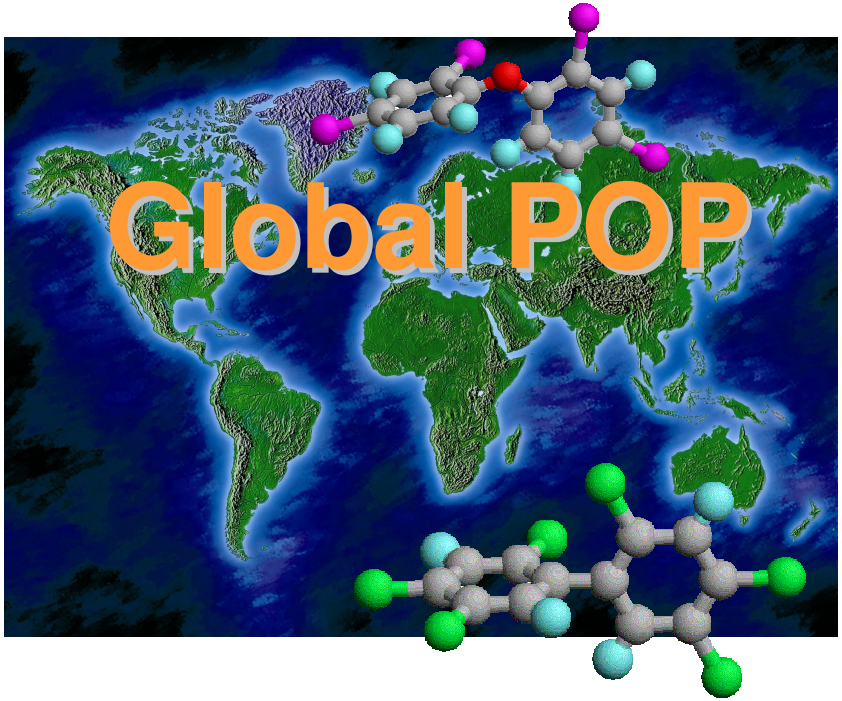
NILU

Version April 2007

Background



Builds on years of experience

- Yearly campaigns with hundred of schools in Norway where pupils performs a national scientific study.

- GLOBE Arctic project 2000-2004
  – POPs in The Arctic.

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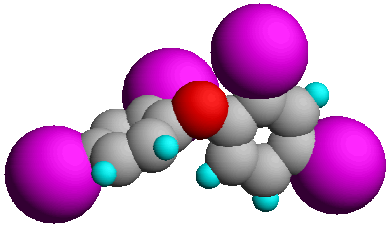
The Arctic POPs project



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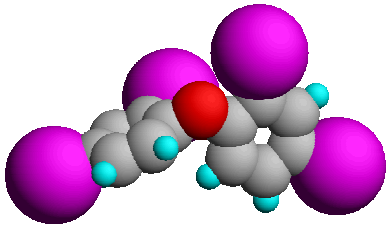
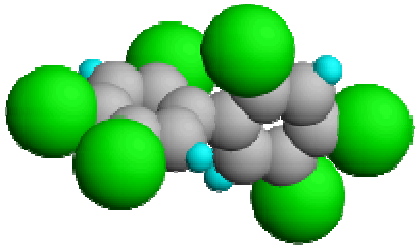
POPs investigated

- **Brominated flame retardants**

  (PBDE 47= 2,2',4,4'-tetrabromdiphenylether)



- **PCBs as reference group**



Brominated flame retardants

Used in electronic equipment, textiles, and furniture to prevent fires

Electronic parts of colour televisions and personal computers
Textile coatings; sofas, in seats of cars, buses, and aircraft.

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The Arctic POPs project

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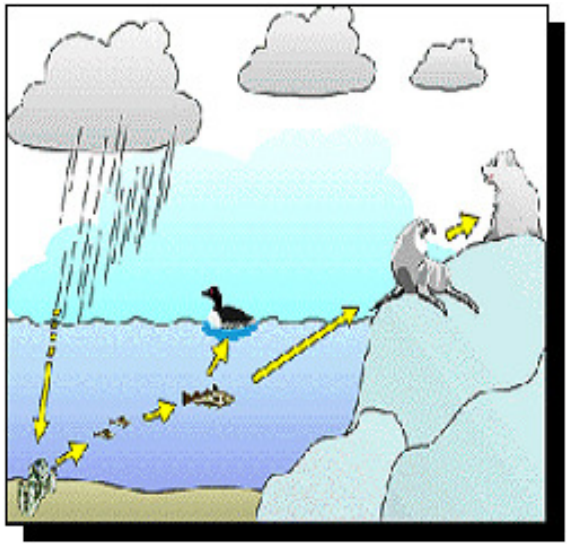
- *Investigate* the distribution and level of selected POPs in the Arctic region
- *Increase the knowledge* of POPs and general environmental science in the involved schools
- *Contribute to the documentation* of new POPs in the Arctic, needed for international political processes



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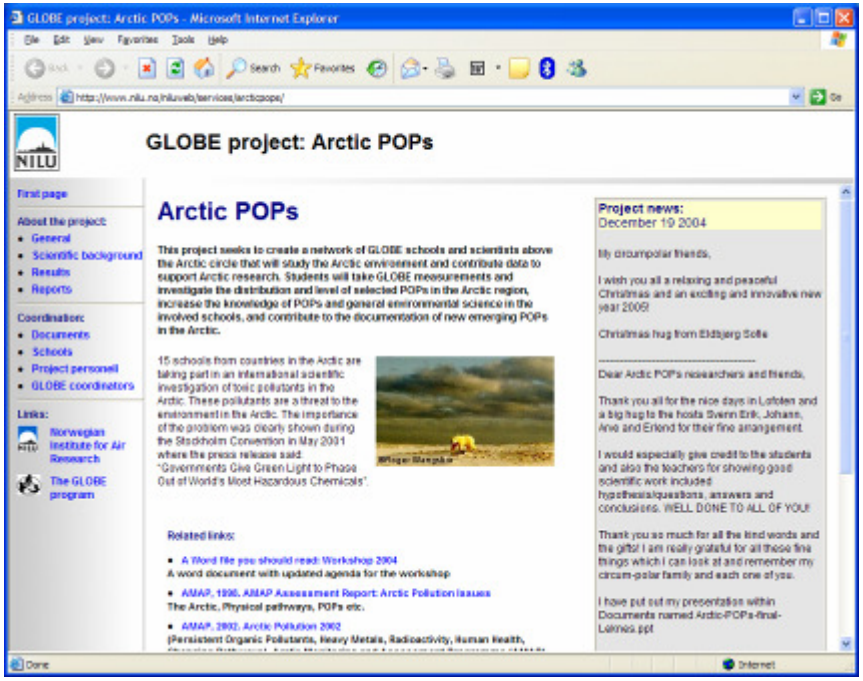
Details on planned project

Project outline

- Schools take flesh sample of local fish
- Schools sends sample to NILU laboratory
- NILU analysis all samples for dioxin related pollutants – bioassay measurement technique
- Schools retrieves raw data result
- Schools retrieves relevant findings from Arctic and Antarctic observations of similar compounds

Sign up and communication

- All registration on project web pages
- Communication through e-mail and bulletins
- PR in cooperation with GLOBE
- Up to 10 schools per country can participate (due to cost of lab analysis)



New web solution to be built, building on solution developed for previous project

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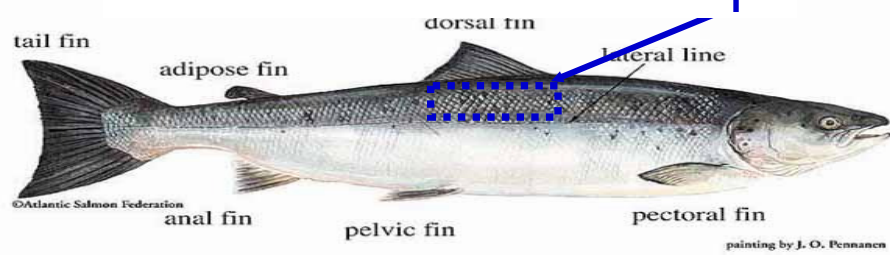
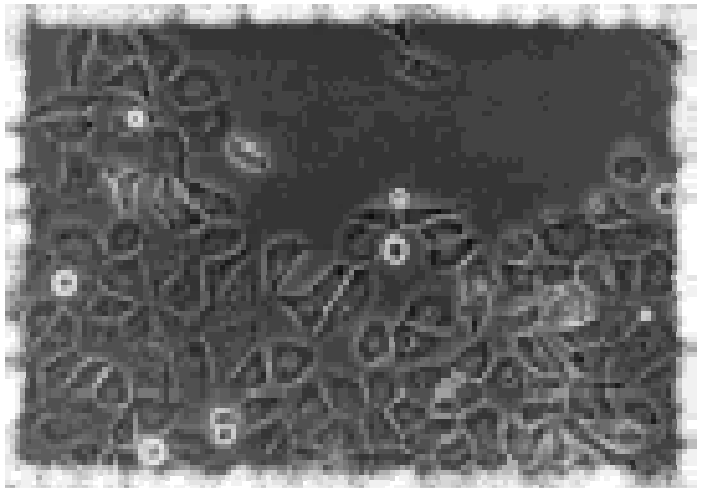
The sampling and sending

- Schools receives a package with sampling kit and detailed instructions
- Schools catches fish in local lake/sea
- Selected metadata about the fish is registrated on sampling sheet to be sent together with the fish sample
- 100 g of flesh from below dorsal finn to be packed in accordance with instructions and sent in provided packing material in stamped envelope provided.

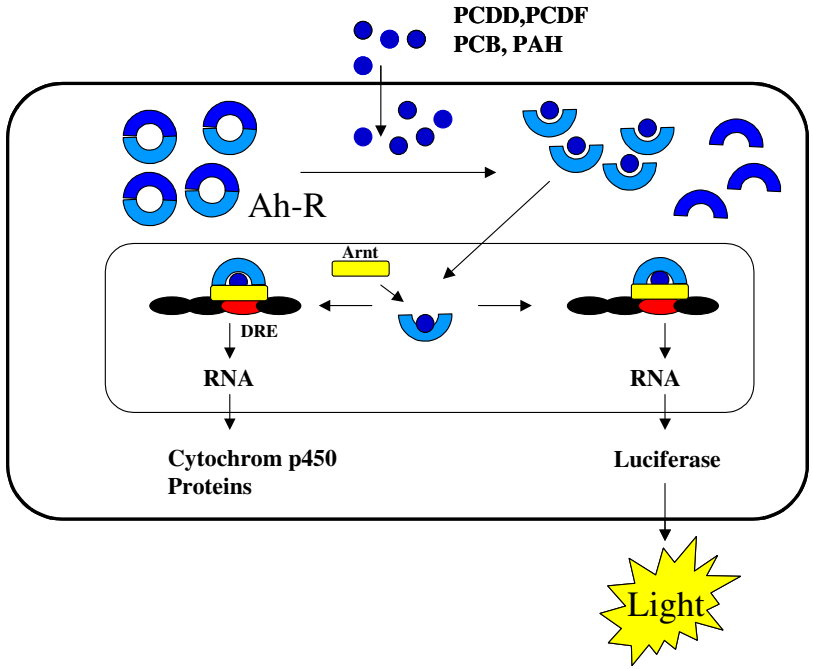
with sterile scalpel



Bioassays analysis at NILU



http://www.biodetectionsystems.com



Bioassay methods are based on the cellular mechanism of dioxin toxicity. Dioxin-like compounds bind to a cytosolic protein, the aryl-hydrocarbon (Ah) receptor, then the receptor–chemical complex migrates to the cell's nucleus and binds with the Ah-receptor nuclear translocator protein (Arnt). This Ah receptor–Arnt complex interacts with specific DNA sequences and alters gene expression of regulated genes. One of the most studied of the family of regulated proteins is the cytochrome P450 gene product CYP1A1.

ENVIRONMENTAL BIOANALYSIS OF DIOXIN, Marcus Cooke, George C. Clark, Leo Goeyens, and Willy Baeyens, Today's Chemist at work, Volume 9, No. 7, 15, 16, 19.

With those analysis:

- Samples tested for effect on AH receptor – in other words a health related effect
- Dioxin and dioxin-like compounds – being the most toxic environmental pollutants – are tested for.
- This technique is very suitable for screening of many samples
- The technique is relative new and very suitable for educational purposes since it measures an actual health effect.

School evaluations

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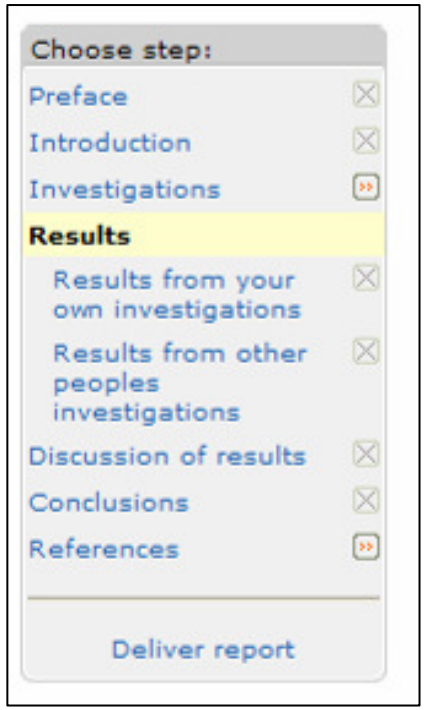
- What are levels in the local fish from our school?
- What are the levels from the Arctic and Antarctic results provided?
- Our schools compared to the Polar findings?
- What are the differences in our results compared to average results, max, min etc?
- Why is it likely we have the results we have?

Through an interactive report generator on the web pages the schools can make their own scientific report with graphs, pictures and evaluations



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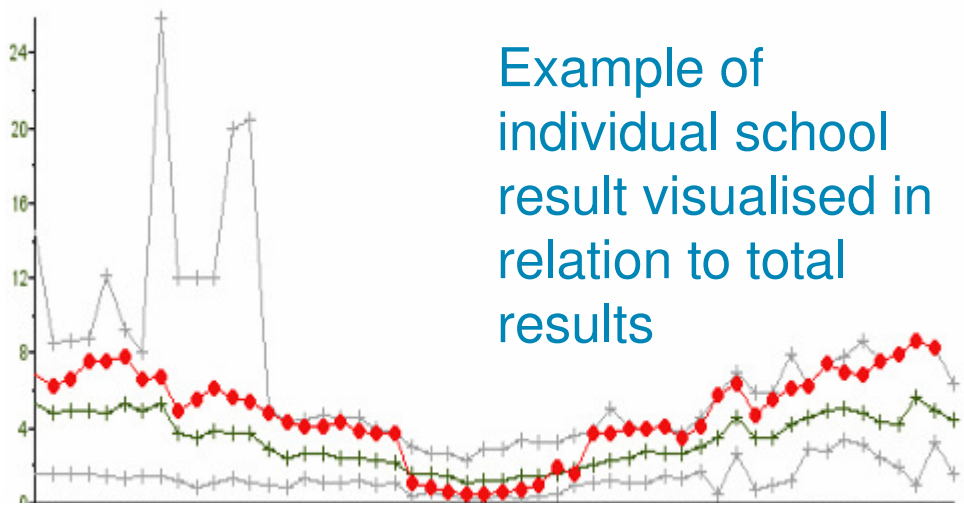
Results visualisations

- All results will be made available on the Internet pages and visualised with graphs, figures, tables and maps

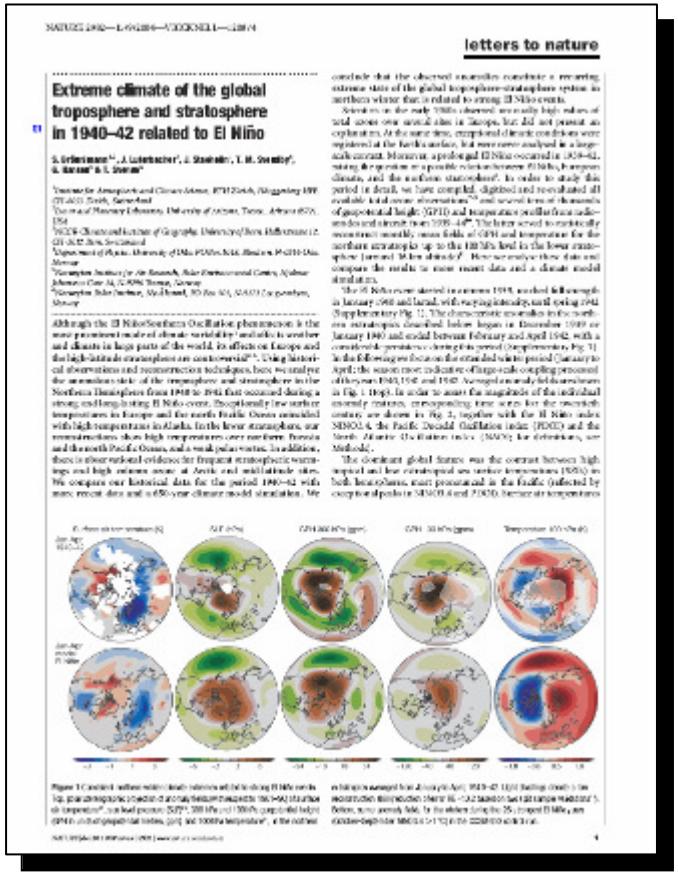


Example of individual school result visualised in relation to total results

- Schools can also download the results in excel format and use this for making own calculations and visualisations

Project reporting

- The scientists will make one common report on all findings
- Relevant scientific results will be published in international journals.


letters to nature

Extreme climate of the global troposphere and stratosphere in 1940–42 related to El Niño

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