



Factors affecting bioaccumulation of cyclic volatile methyl siloxanes in a subarctic benthopelagic food web

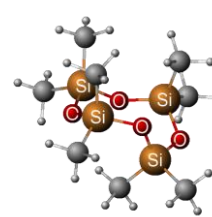
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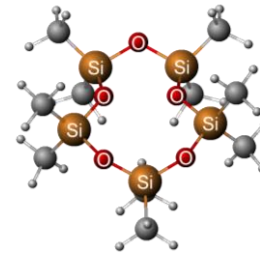
UiO : University of Oslo

Cyclic volatile methyl siloxanes (cVMS)

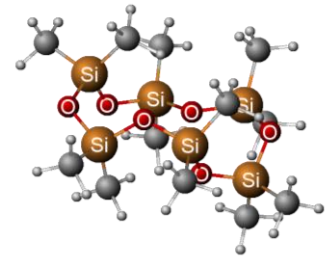
- Personal care products
- Volatile & hydrophobic
- Present in sediments and aquatic biota
- D4 & D5 bioaccumulative (ECHA 2015)
- Conflicting evidence from field studies



D4



D5



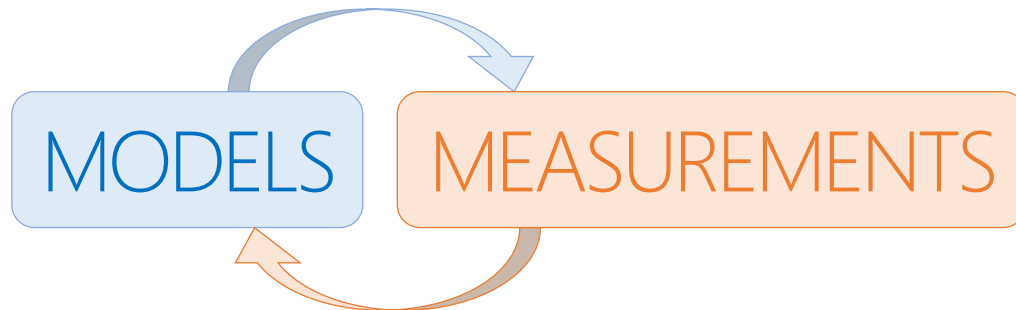
D6



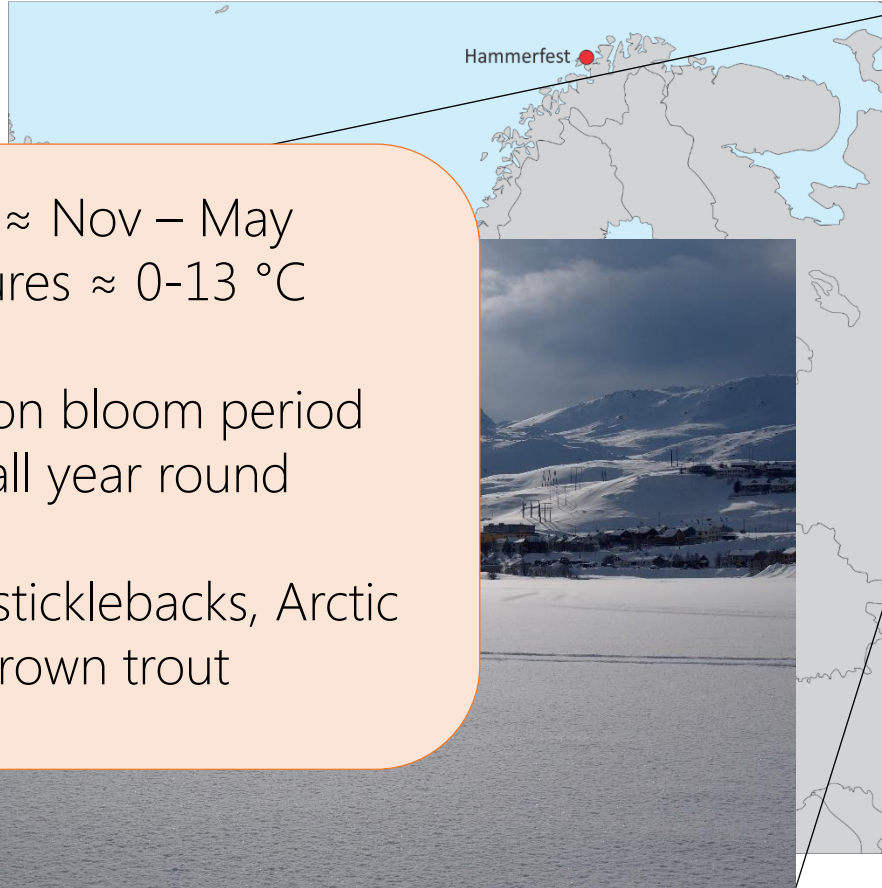
Key questions

What role does the benthic environment have for bioaccumulation behavior of cVMS?

How is bioaccumulation of cVMS influenced by subarctic environmental conditions?



Study site - Lake Storvannet



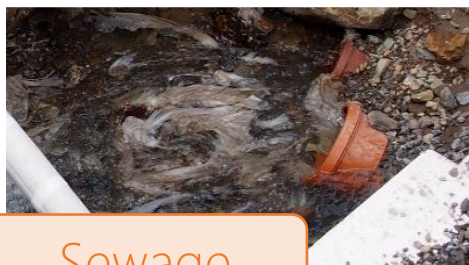
Ice cover $\approx$ Nov – May
Temperatures $\approx$ 0-13 °C

Short plankton bloom period
Benthos all year round

Three-spined sticklebacks, Arctic
char, brown trout

cVMS in Storvannet

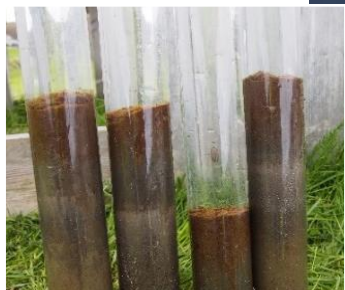
March & June 2014



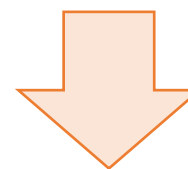
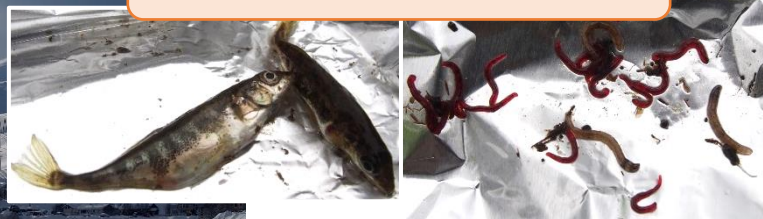
Sewage



Fish & benthos

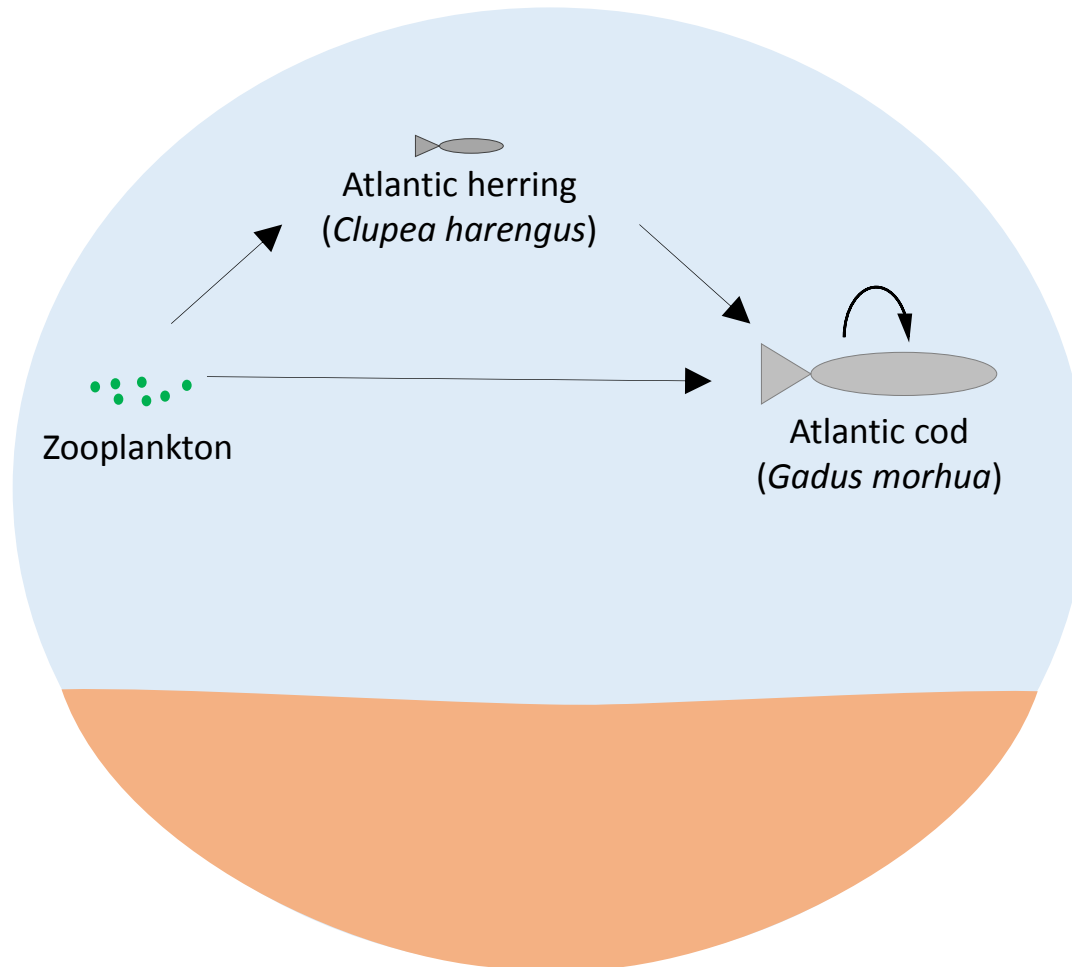


Sediment and water

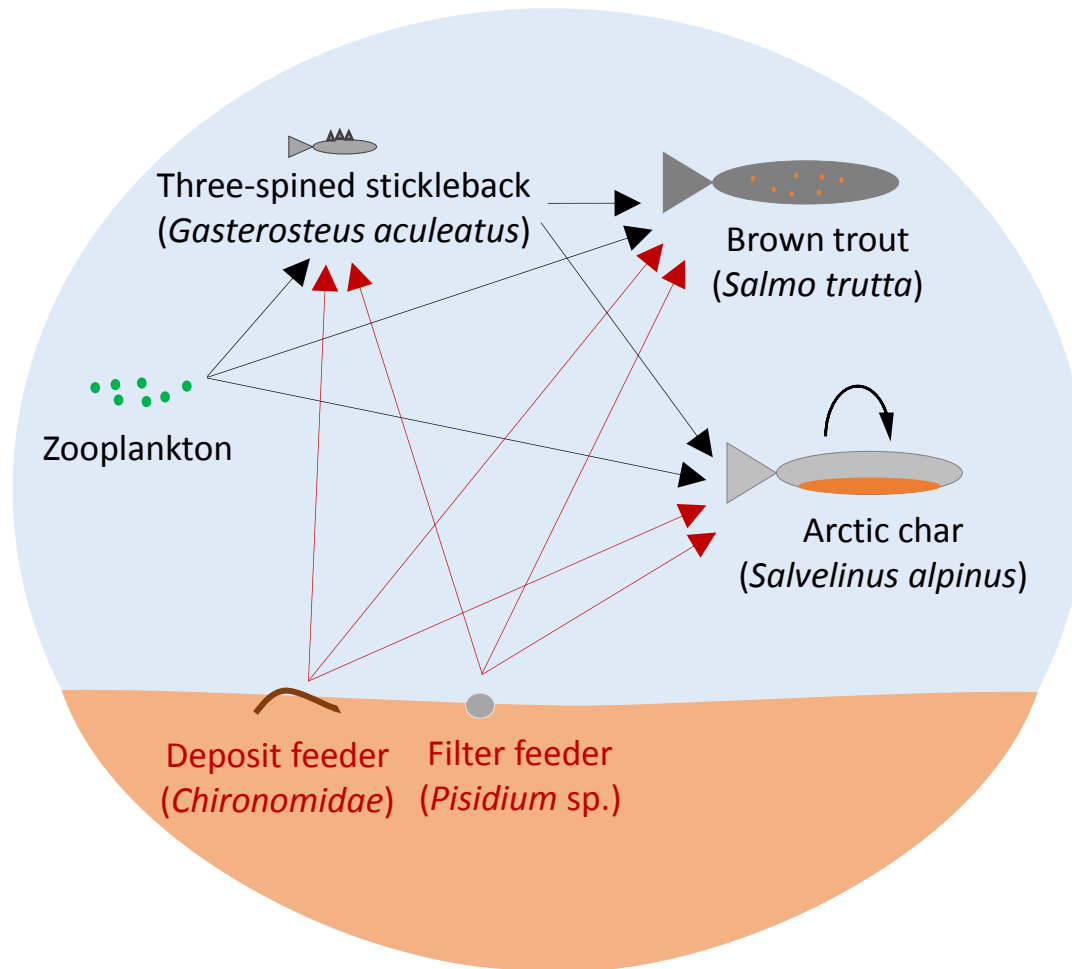


Extraction with hexane
No clean-up
Analysis on GC-MS

Pelagic ACC-HUMAN model



Benthopelagic ACC-HUMAN: Lake Storvannet



Model evaluation & application

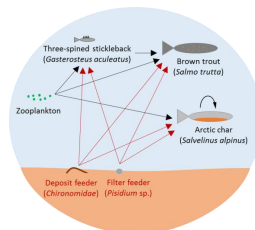
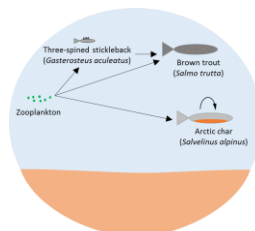
EVALUATION: PCBS

Phys-chem properties
(K_{OW} , K_{OC} , ΔU_{OW} , ΔU_{OC})

Biotransformation = 0

Measured conc. sediment

Measured conc. water



Predicted concentrations in biota compared to measured concentrations in biota

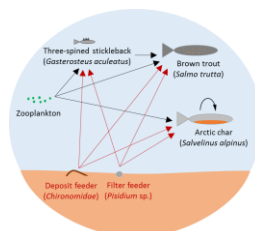
APPLICATION: cVMS

Phys-chem properties
(K_{OW} , K_{OC} , ΔU_{OW} , ΔU_{OC})

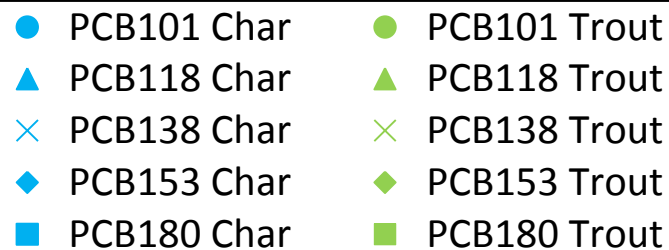
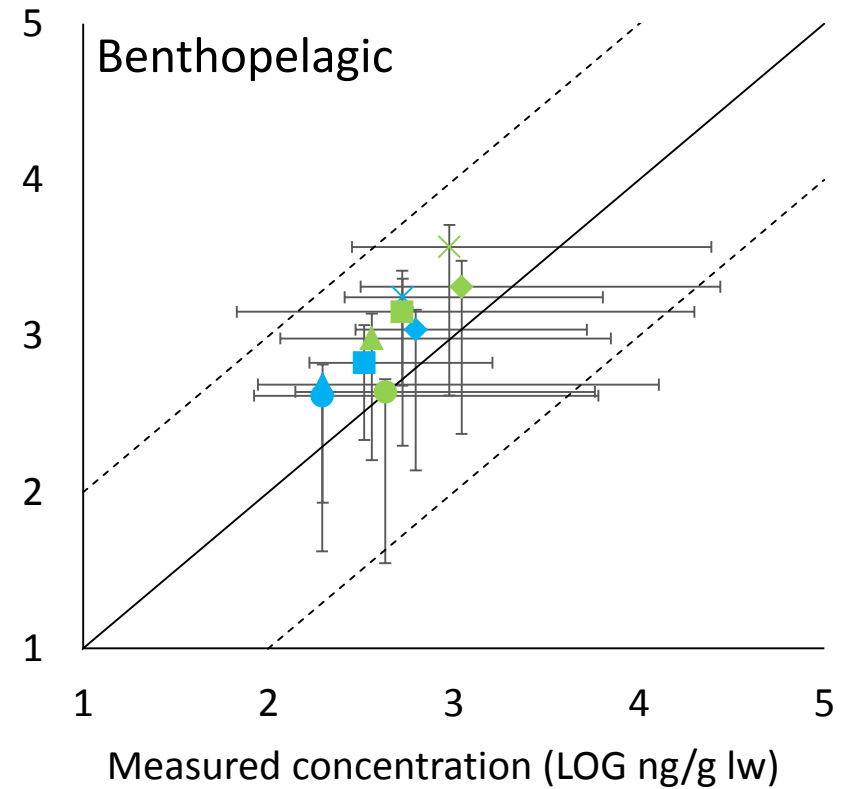
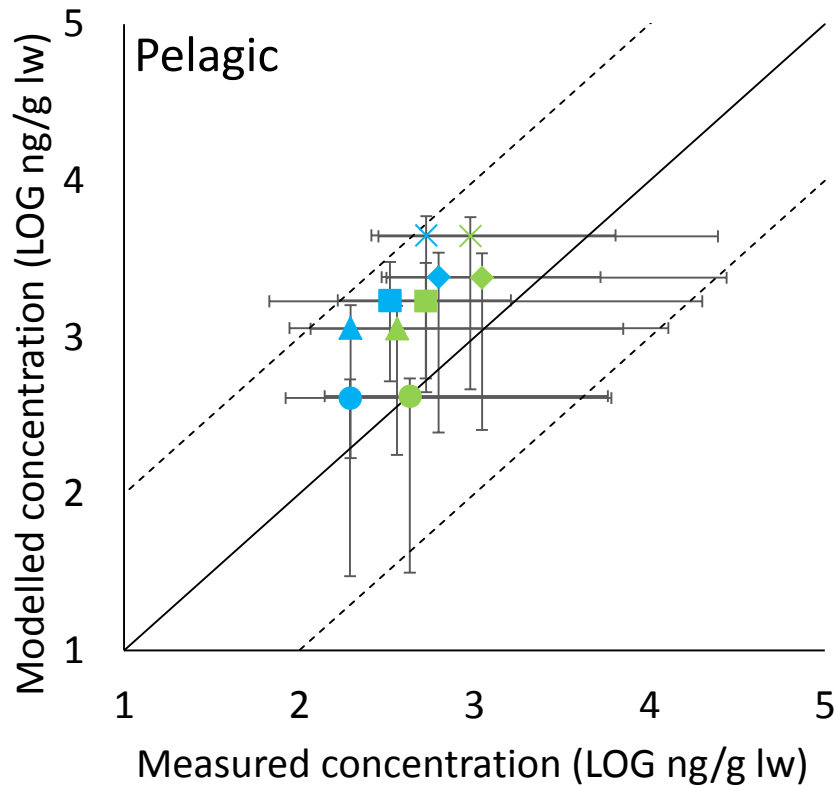
Biotransformation in fish

Measured conc. sediment

Calibration of fugacity in water

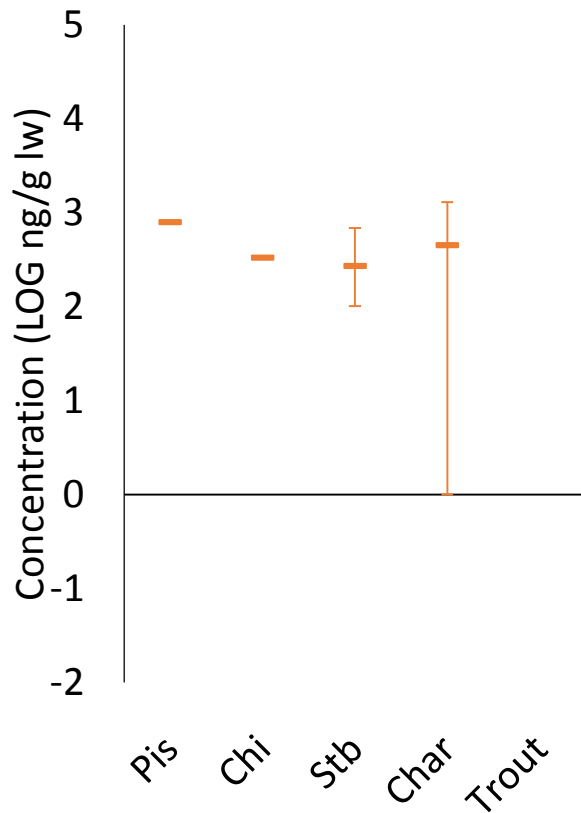


Model evaluation for PCBs

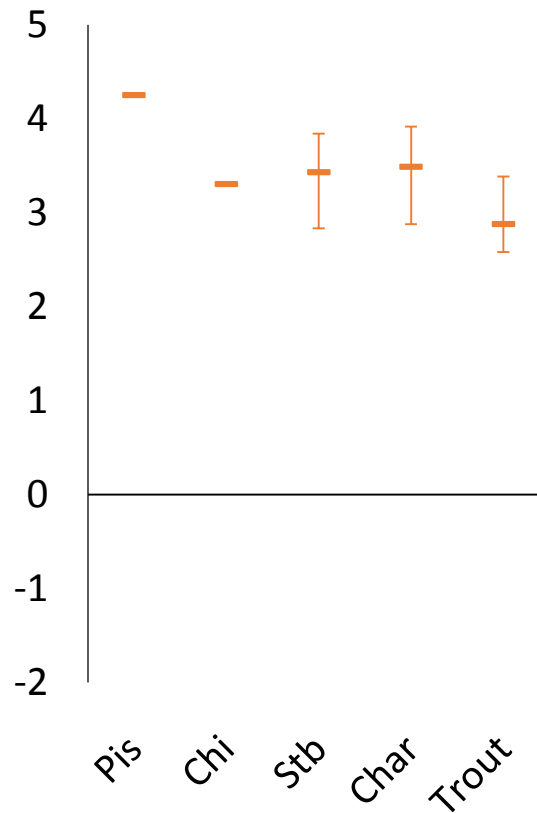


Measured concentrations of cVMS

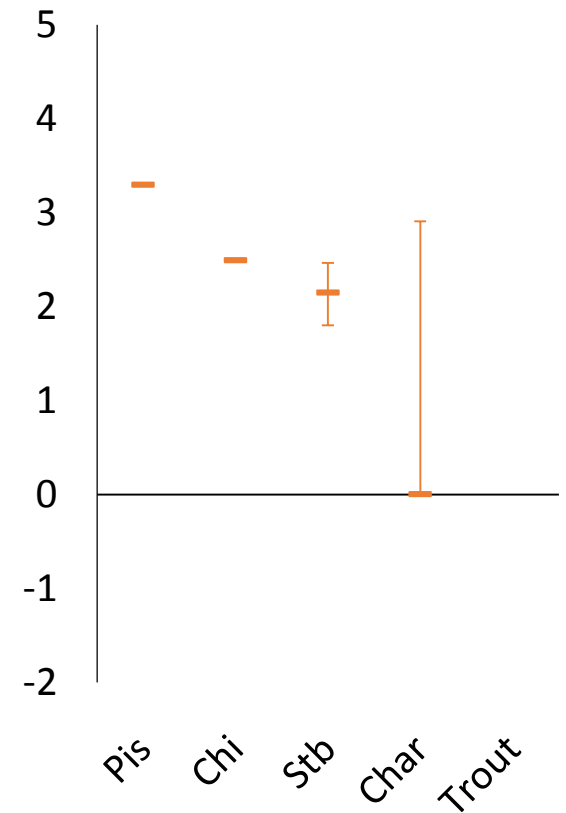
D4



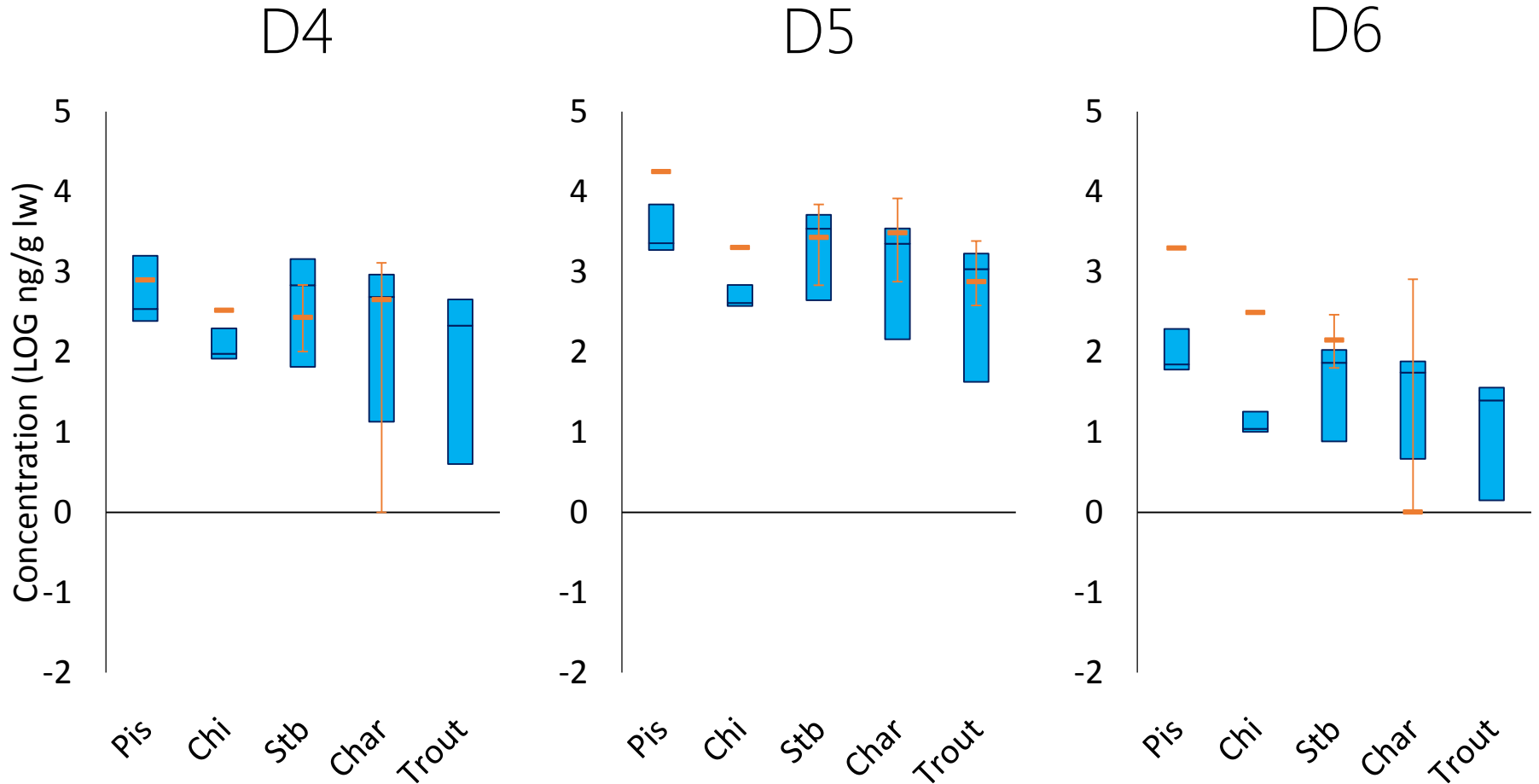
D5



D6

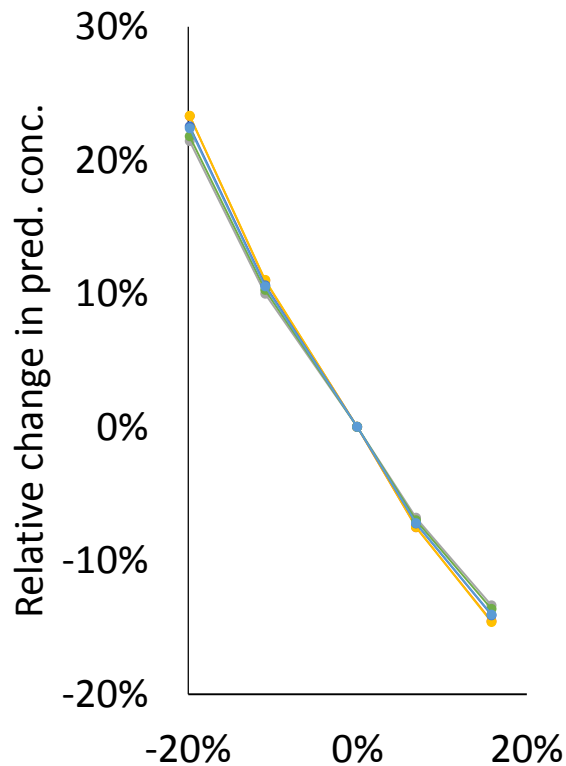


Model performance for cVMS

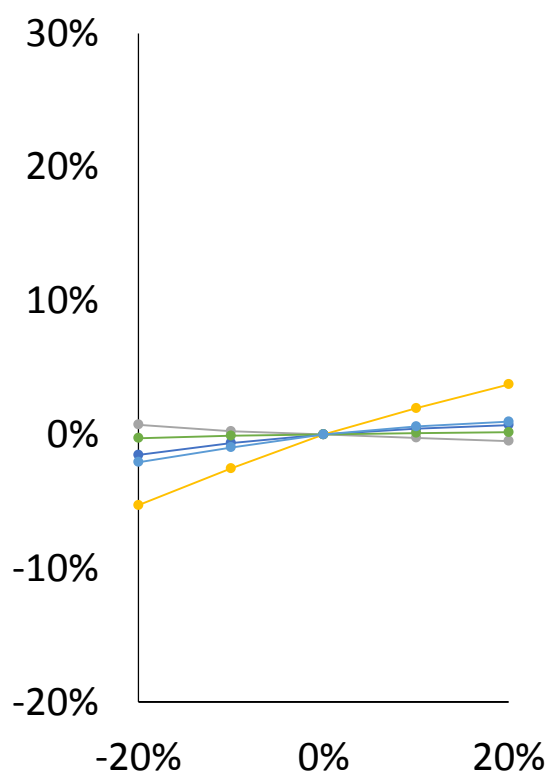


D5: Sensitivity to model input

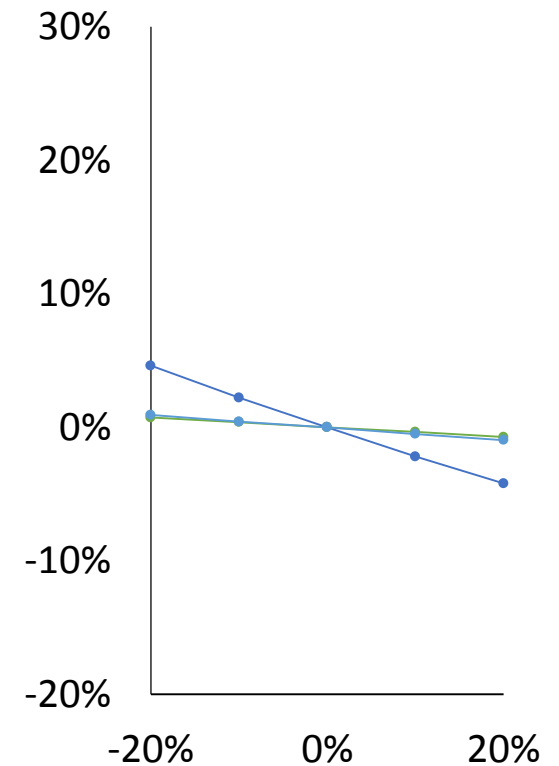
K_{OC}



K_{OW}

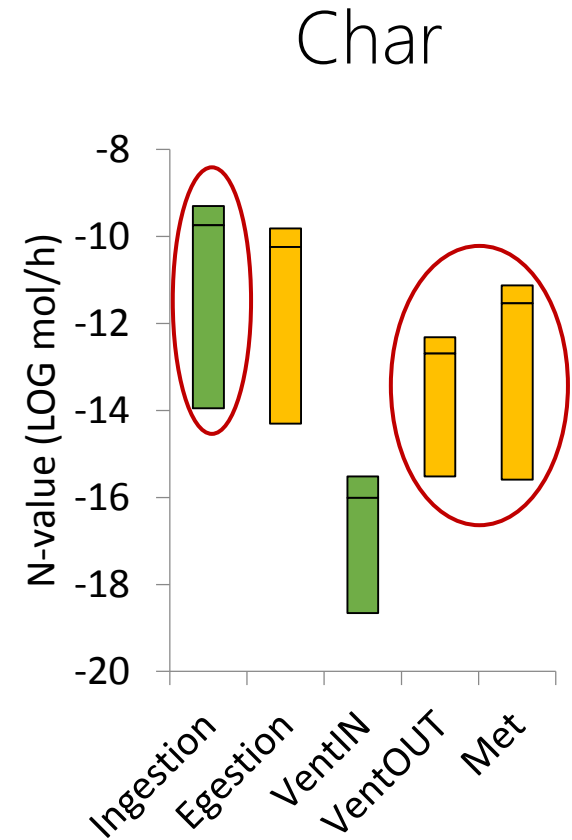
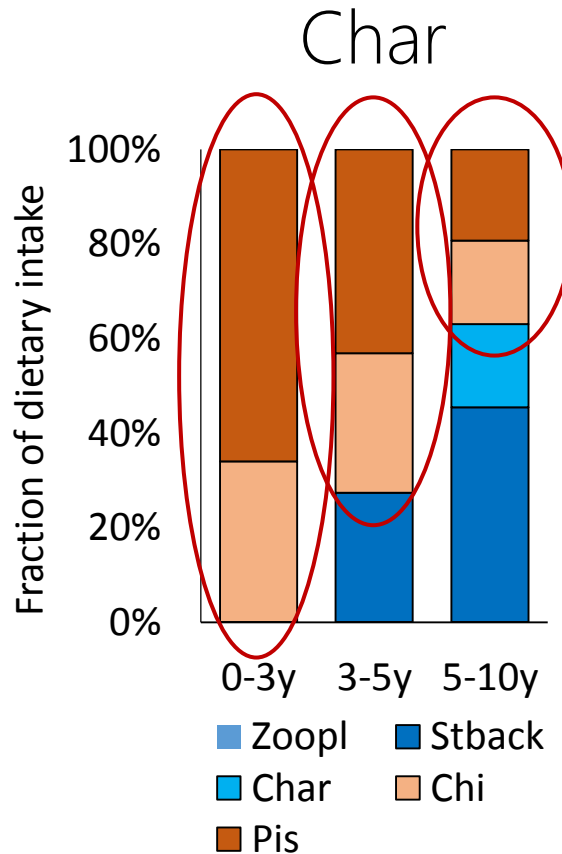
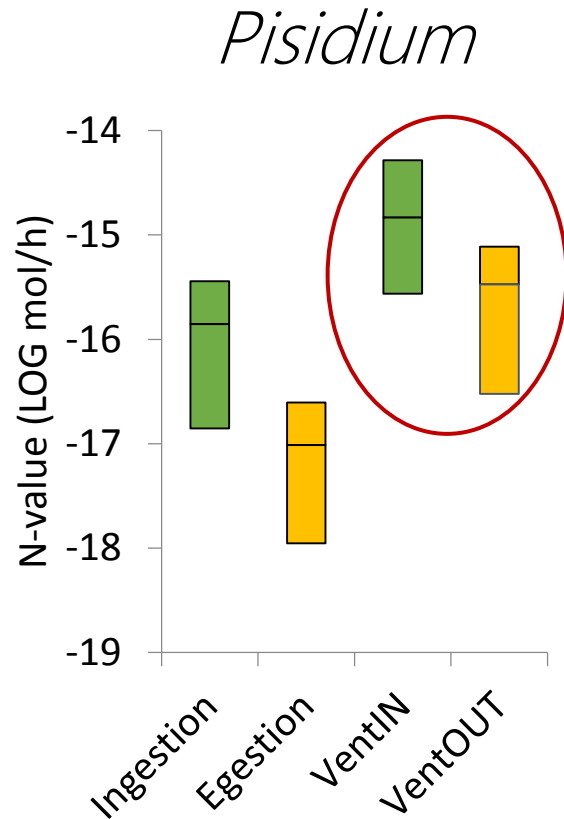


k_M



Relative change in input parameter

Uptake and elimination of D5

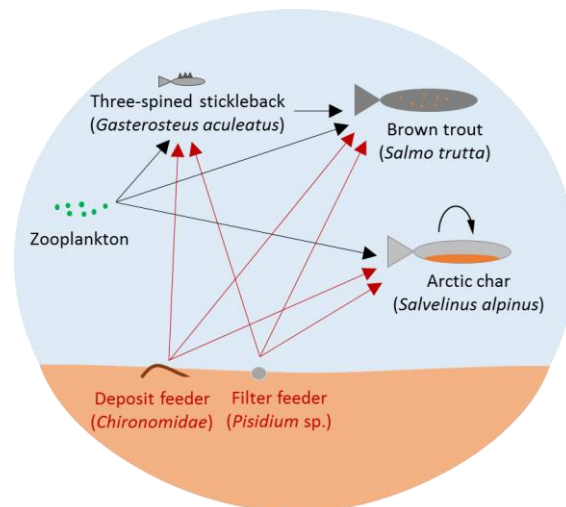


Summary and main findings

New benthopelagic model performed well

Importance of benthic links in systems with disequilibrium between sediment and water

Uncertain properties at low temperatures





Acknowledgements

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Thank you for your attention!