

Enhancement of Estonian-Finland regional and cross-sectoral cooperation in marine monitoring for the Gulf of Finland on the example of determining the trend of hazardous substances from sediments

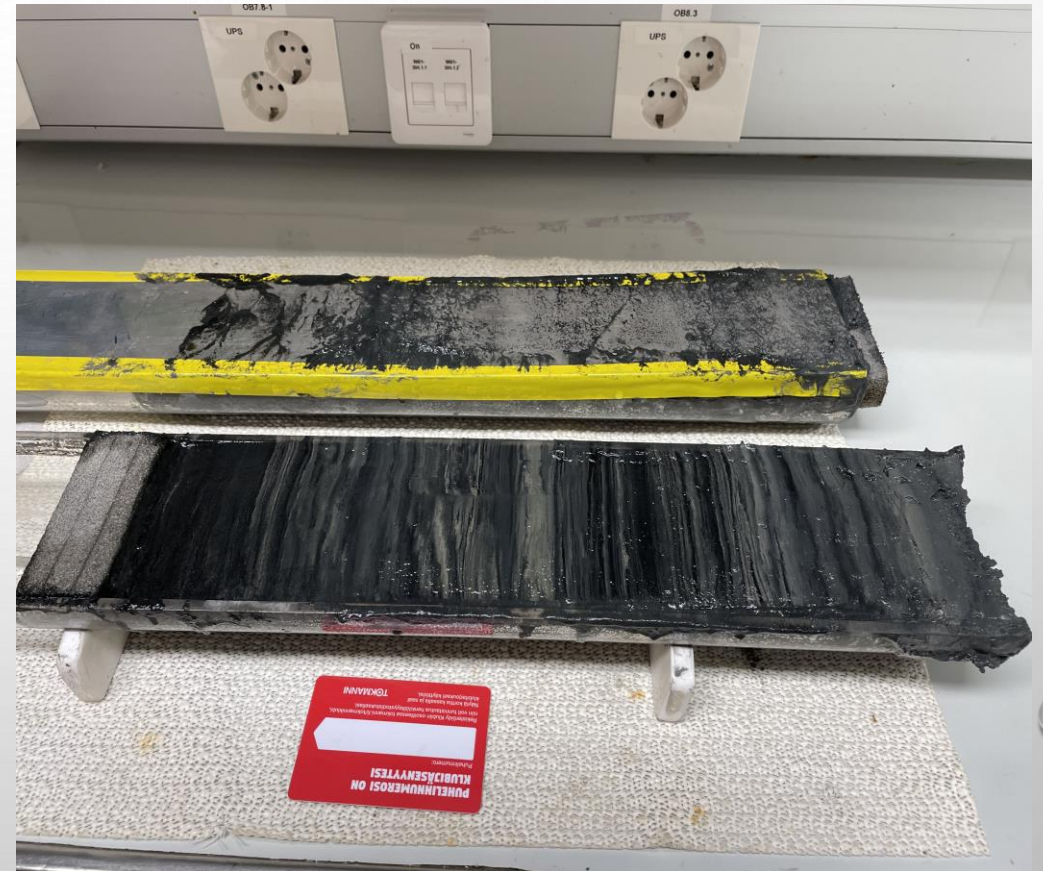
MAILIS LAHT, KRISTA MÕTS (ESTONIAN ENVIRONMENTAL RESEARCH CENTRE)

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LAYER BY LAYER, MARINE SEDIMENTS PRESERVE HISTORY

- SEDIMENT DATING METHODS ALLOWS US TO RECONSTRUCT ITS TIMELINE
- OPPORTUNITY TO GLIMPSE PAST ENVIRONMENTAL CONDITIONS AND LEVELS OF POTENTIALLY HARMFUL COMPOUNDS
- VALID ONLY FOR CONTINUOUS SEDIMENT ACCUMULATION AREAS => GROWING NEED FOR GEOLOGICAL SEABED MAPPING
- CAREFULLY MAP AND DESCRIBE THE SEDIMENTS BEFORE POLLUTION LEVEL STUDIES



SEDIMENT LAYER STUDIES NEED EXPERTISE FROM SEVERAL FIELDS - CROSS-SECTORAL COOPERATION

GEOLOGICAL SURVEYS

- MARINE GEOLOGY KNOWHOW AND SAMPLING METHODS
- SEDIMENT ACCUMULATION AREAS
- SEDIMENT DATING (^{210}Pb , ^{137}Cs)
- CAPACITY
 - RESEARCH VESSEL
 - CORING EQUIPMENT

ENVIRONMENTAL CHEMISTRY

- UNDERSTANDING SUBSTANCE BEHAVIOUR IN THE ENVIRONMENT
- LABORATORY CAPACITY AND CHEMICAL ANALYSIS
 - PERSISTENT HAZARDOUS SUBSTANCES (DIOXINS, PCB, PBDE, HBCDD, PFOS, PAH)
 - METALS
- QUALITY CONTROL AND ACCREDITATION

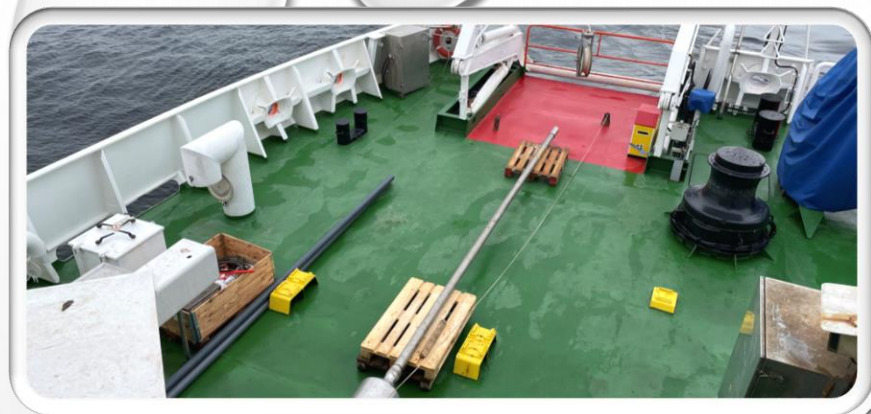
INTERNATIONAL CO-OPERATION COMMON INTERESTS IN ASSESSMENT OF GULF OF FINLAND EXCHANGES OF KNOWLEGE

Joint R/V Aranda cruise 18.10.2022

- SEDIMENT SAMPLES IN ESTONIAN WATER
- A 6-METER-LONG PISTON CORER WAS USED TO GET A SEDIMENT CORE WITH OPTIMAL TEMPORAL RESOLUTION FOR ENVIRONMENTAL STUDIES ON A TIME FRAME OF SOME THOUSAND YEARS
- THE UPPER PART OF THE SEDIMENT COLUMN SAMPLING WITH A GEMAX

KEY DISCUSSION POINTS:

- ESTONIA LACKS CAPABILITY FOR ACQUIRING $> \sim 1$ M SEDIMENT CORES
- R/V ARANDA – SPECIFICALLY DESIGNED RESEARCH VESSEL
- HARMONIZATION OF METHODS AND DATA
- STATE BORDERS DONT EXIST IN NATURE



PREPARATION OF SAMPLING

SELECTING SUITABLE CORING METHOD
(E.G. GRAB, MULTICORER, BOX CORER,
GRAVITY CORER, PISTON CORER ETC.)



SLICING AFTER SAMPLING

SAMPLE PREPARATION FOR ANALYSIS

SLICING SEDIMENT CORES AFTER
SAMPLING ON BOARD OF THE VESSEL



SAMPLING

REQUIRES TIGHT COOPERATION BETWEEN
VESSEL, CREW, CRANE, WINCH,
SCIENTISTS, CORER ETC. => SUSCEPTIBLE
TO ERRORS



Joint R/V Aranda cruise 18.10.2022

COOPERATION BETWEEN INSTITUTIONS IN DIFFERENT FIELDS FOR ESTONIAN NATIONAL ENVIRONMENTAL MONITORING – POSSIBLE PLACES OF OPTIMIZATION

ESTONIAN GEOLOGICAL SURVEY TOOK SAMPLES WITH GEMAX MULTICORER FOR OPEN SEA AREAS

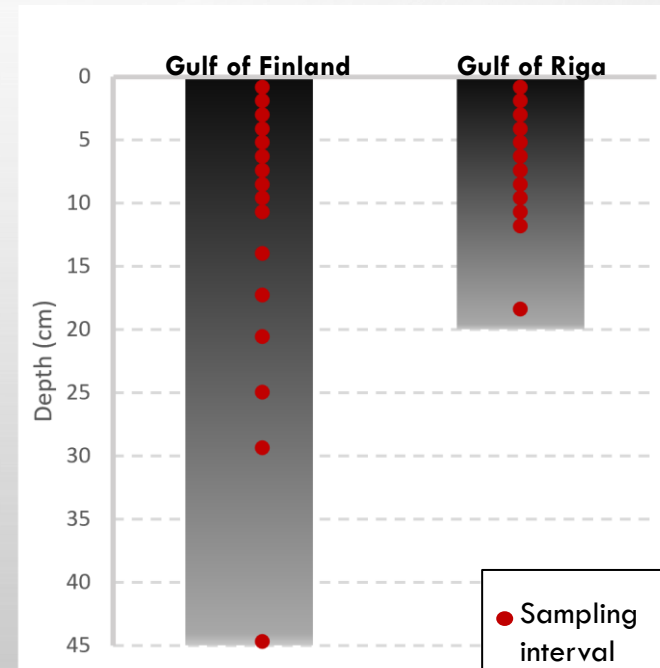
GEMAX multicorer



Sampling sites



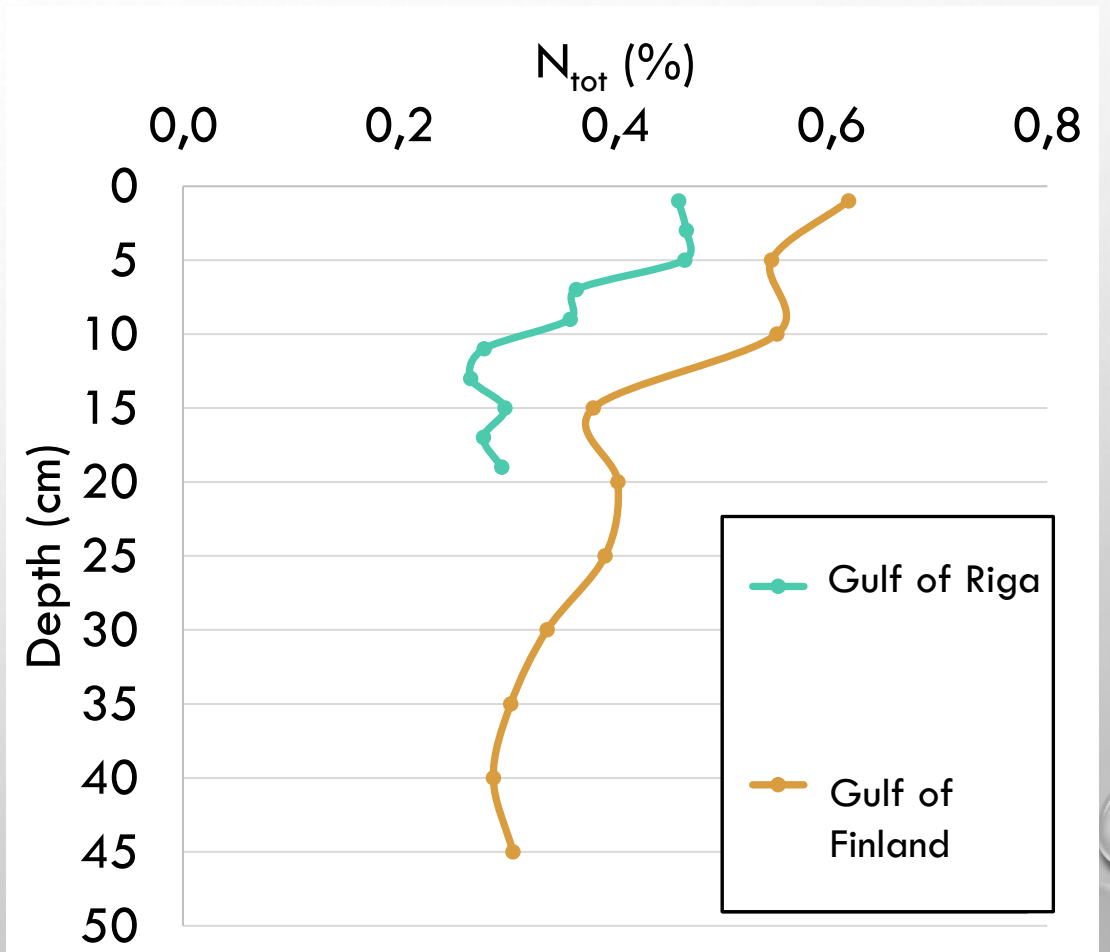
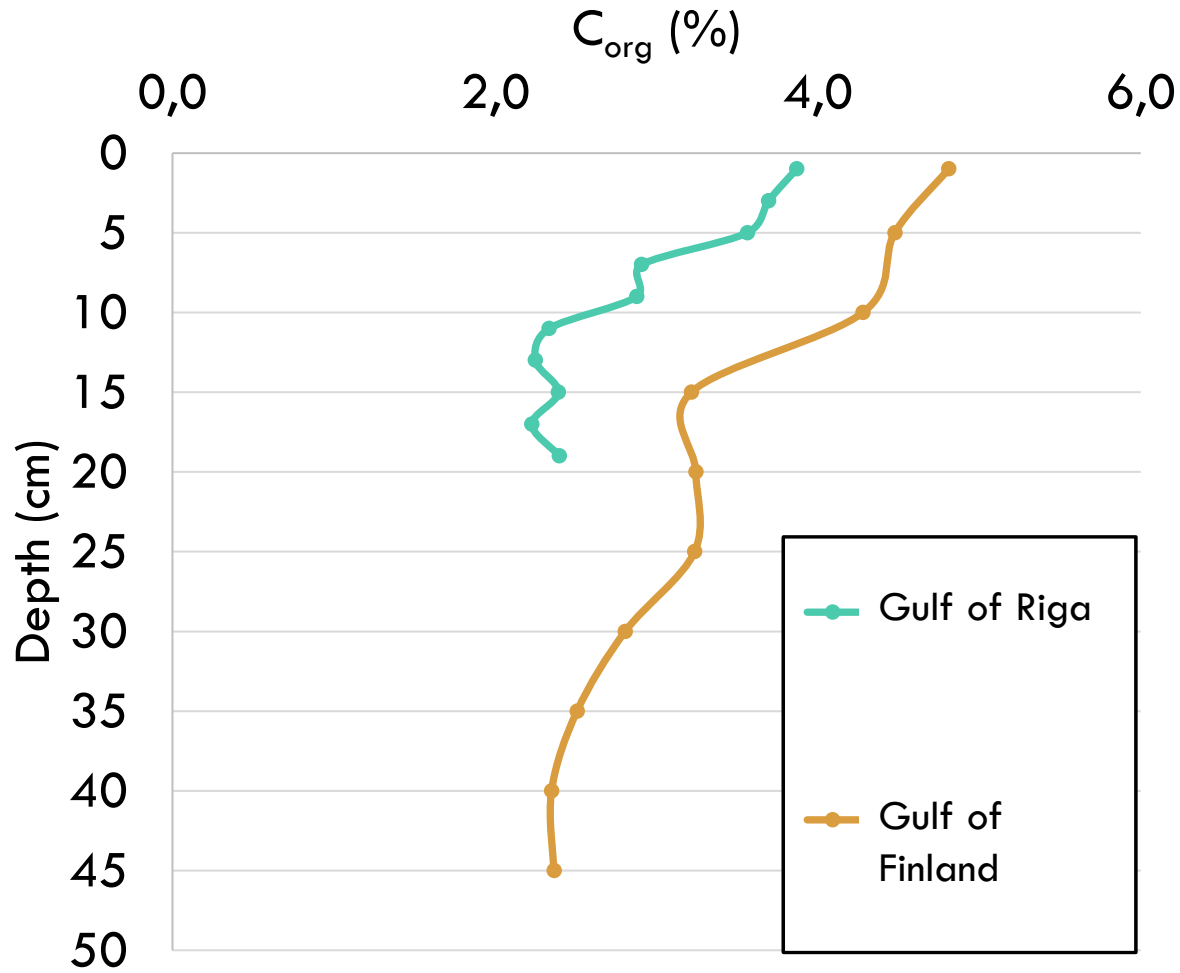
ENVIRONMENTAL RESEARCH CENTRE ANALYSED HAZARDOUS SUBSTANCES TO FILL THE KNOWLEDGE GAP FOR LONG TERM TRENDS ON CONTAMINANTS.



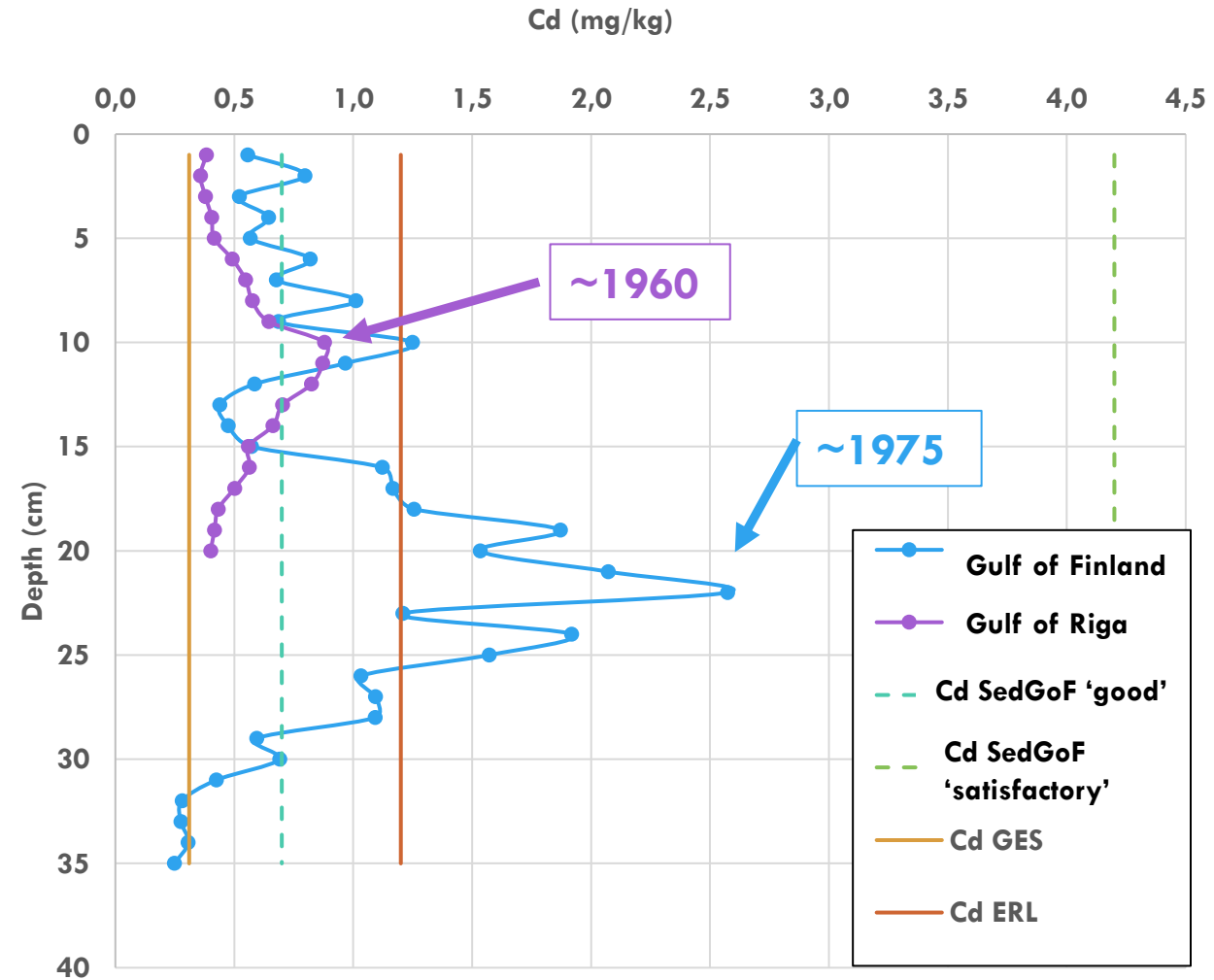
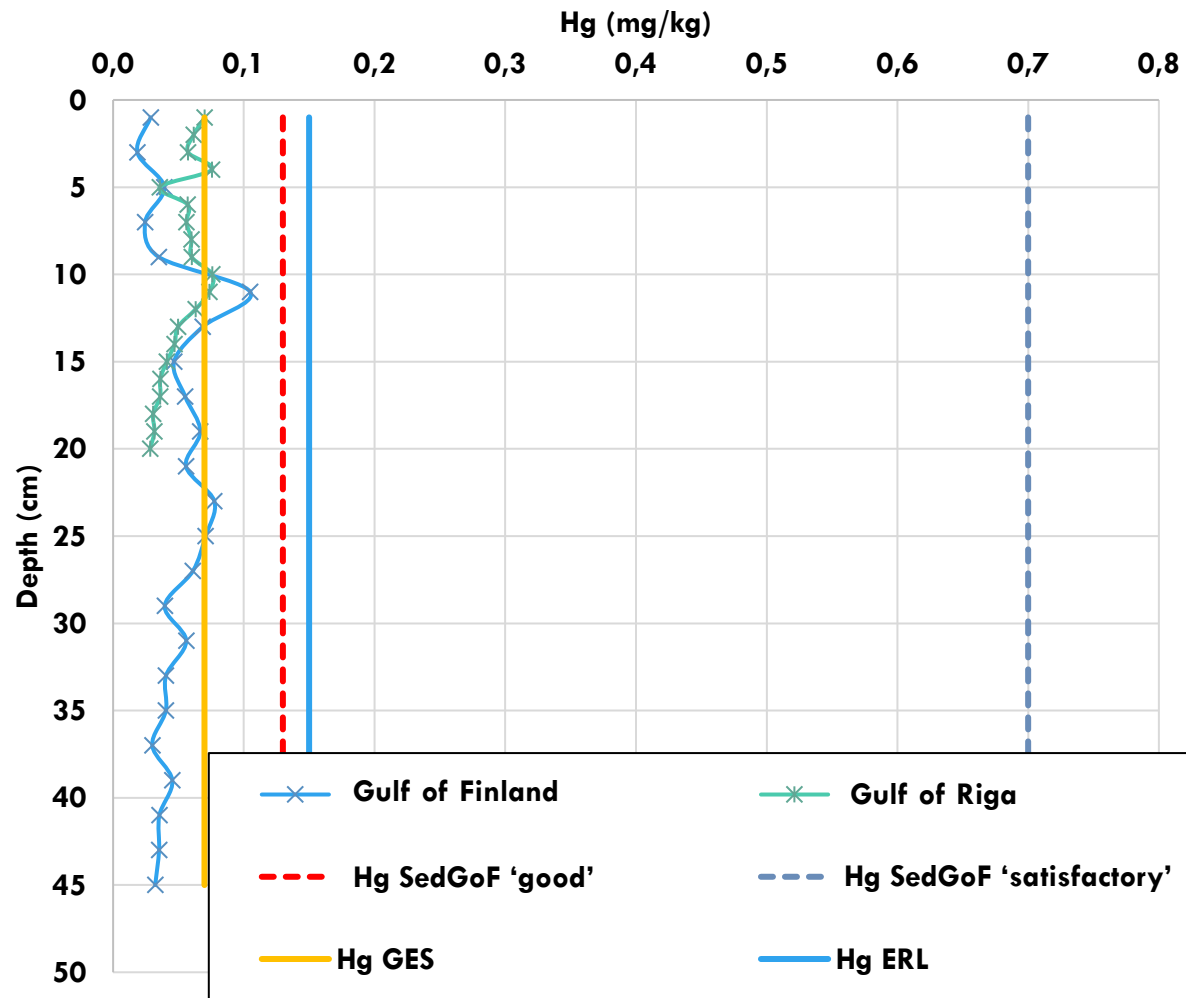
The background features a light gray gradient with several realistic water droplets of various sizes scattered across the surface. The droplets have highlights and shadows, giving them a three-dimensional appearance. The word "RESULTS" is centered in the middle of the page.

RESULTS

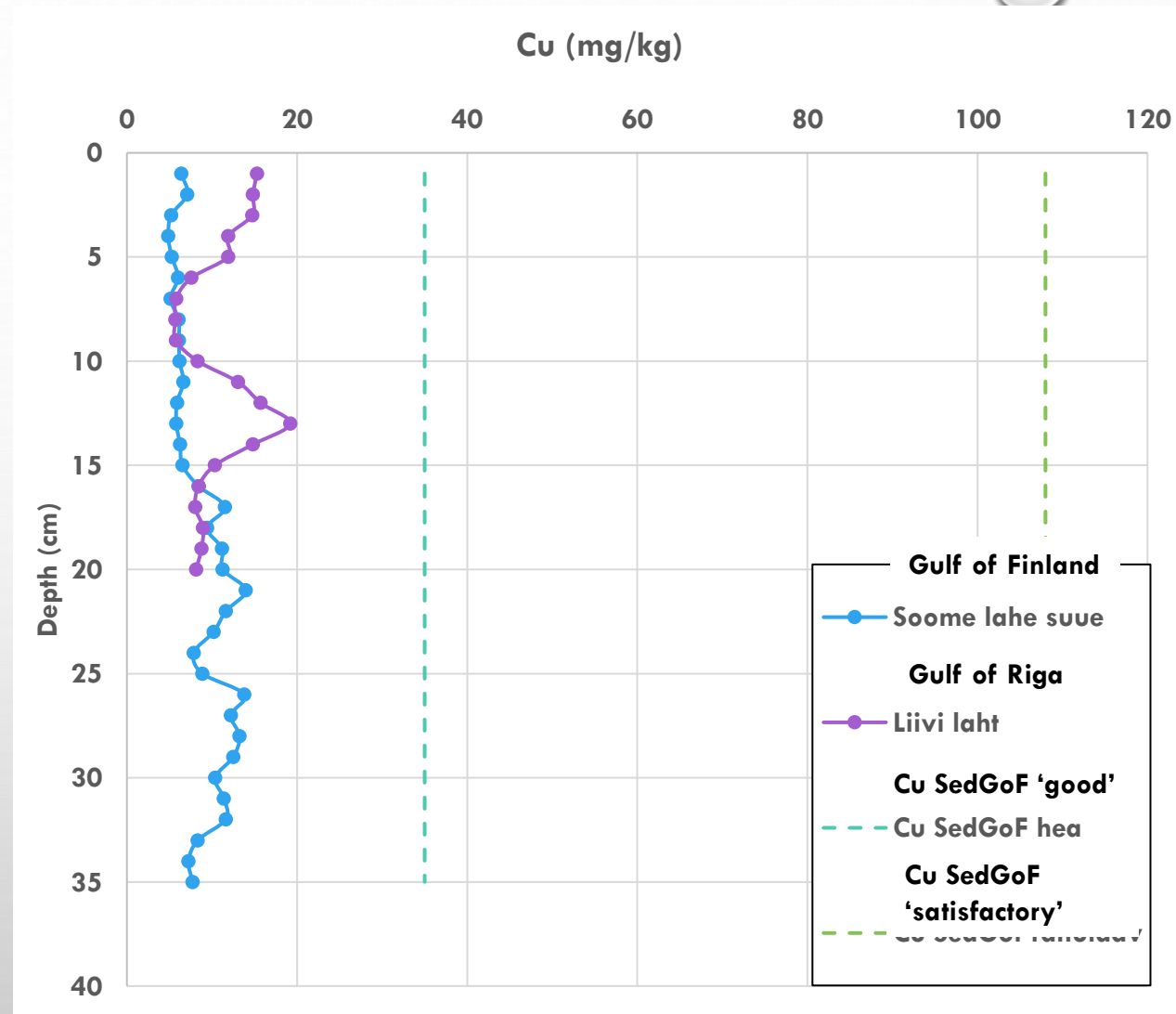
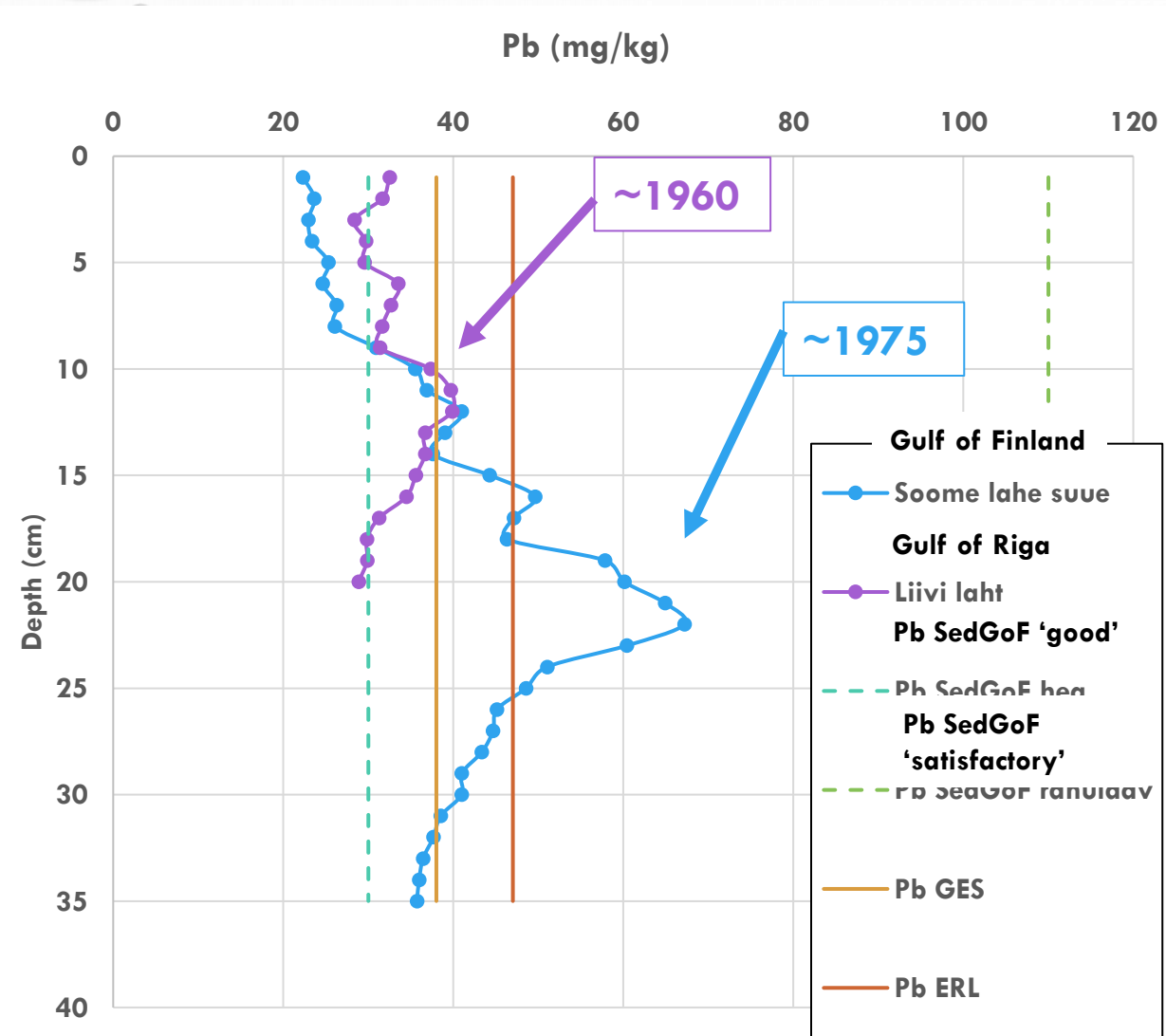
Trends in total nitrogen (N_{tot}) and organic carbon (C_{org}) indicate steady, continuous sediment accumulation



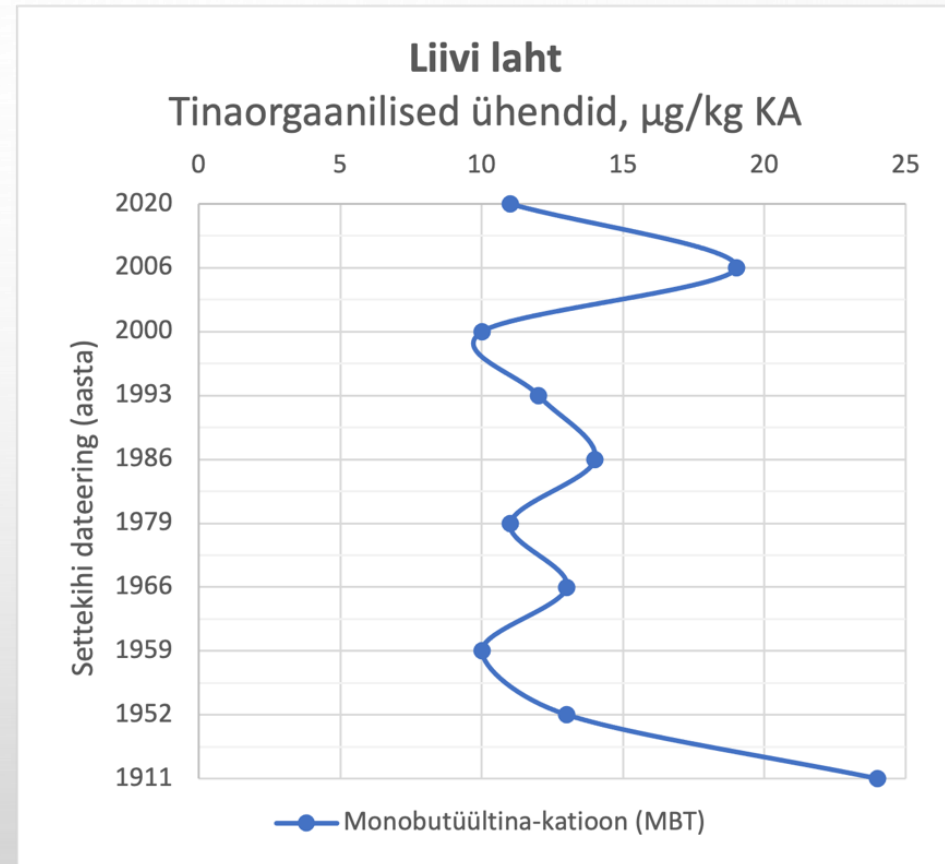
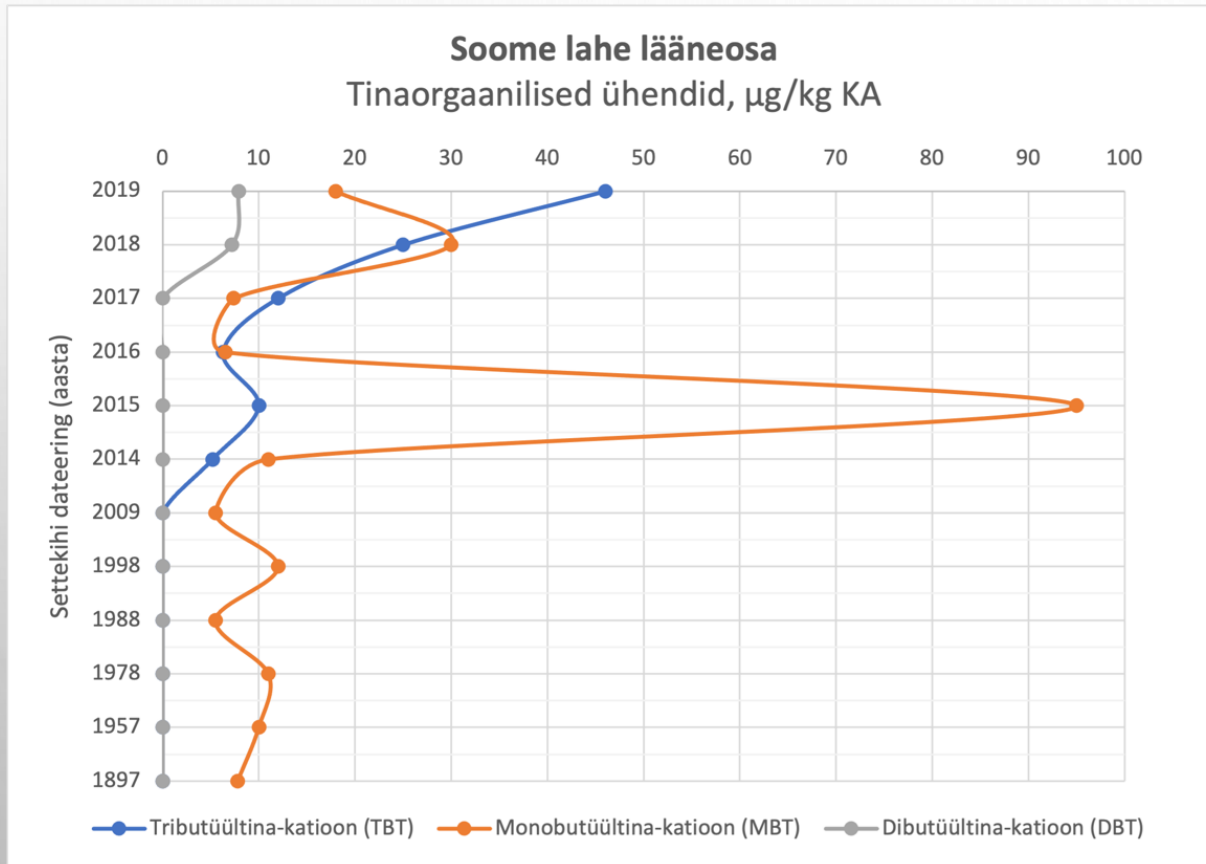
Heavy metals



Heavy metals

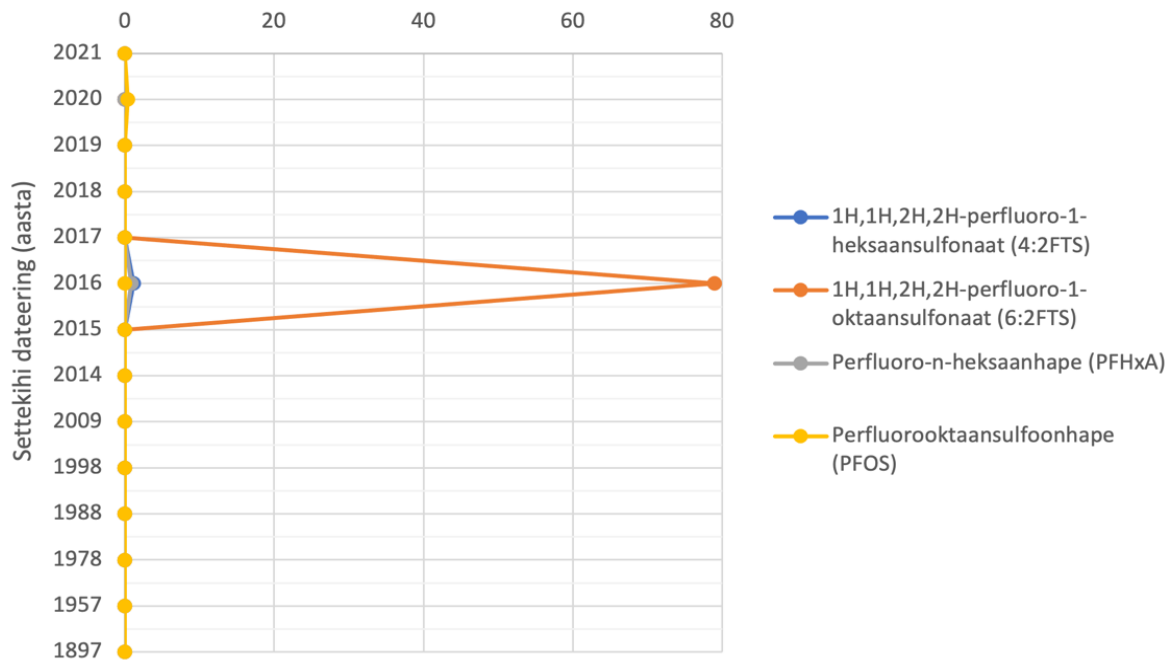


ORGANOTIN COMPAUNDS

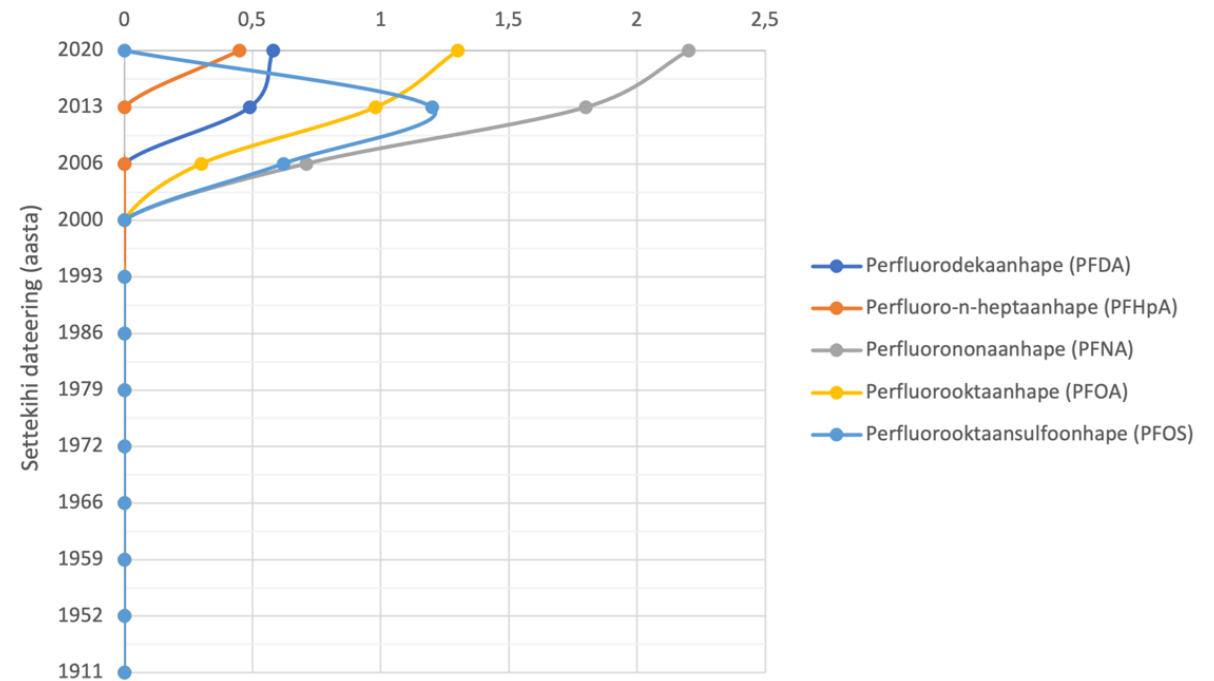


PFAS RESULTS IN SEDIMENTS

Soome lahe lääneosa
Perfluorühendid, µg/kg KA



Liivi laht
Perfluorühendid, µg/kg KA





FINLAND – ESTONIA



- THEMATIC DIRECTIONS FOR COOPERATION: MARINE GEOLOGY DOES NOT KNOW BORDERS, JOINT MAPPING AND RESEARCH CRUISES ARE NEEDED ALSO IN THE FUTURE
- EXTENDING SAMPLE COLLECTION CAPACITIES (RESEARCH VESSEL) AND METHODS, KNOWLEDGE AND EQUIPMENT SHARING IN BETWEEN TWO COUNTRIES
- **HIGHLIGHTS THE NEED FOR STRENGTHENING THE LONG-TERM ENVIRONMENTAL MONITORING COOPERATION BETWEEN ESTONIA AND FINLAND ON THE NATIONAL LEVEL IN FIELD OF SEDIMENT ANALYSIS FOR MULTIPLE PURPOSES!**