

Groundwater quality Baseline investigations in Estonia

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Baseline concept

The range of concentrations of a given element, species or chemical substance present in solution, being derived from natural geological, biological or atmospheric sources.



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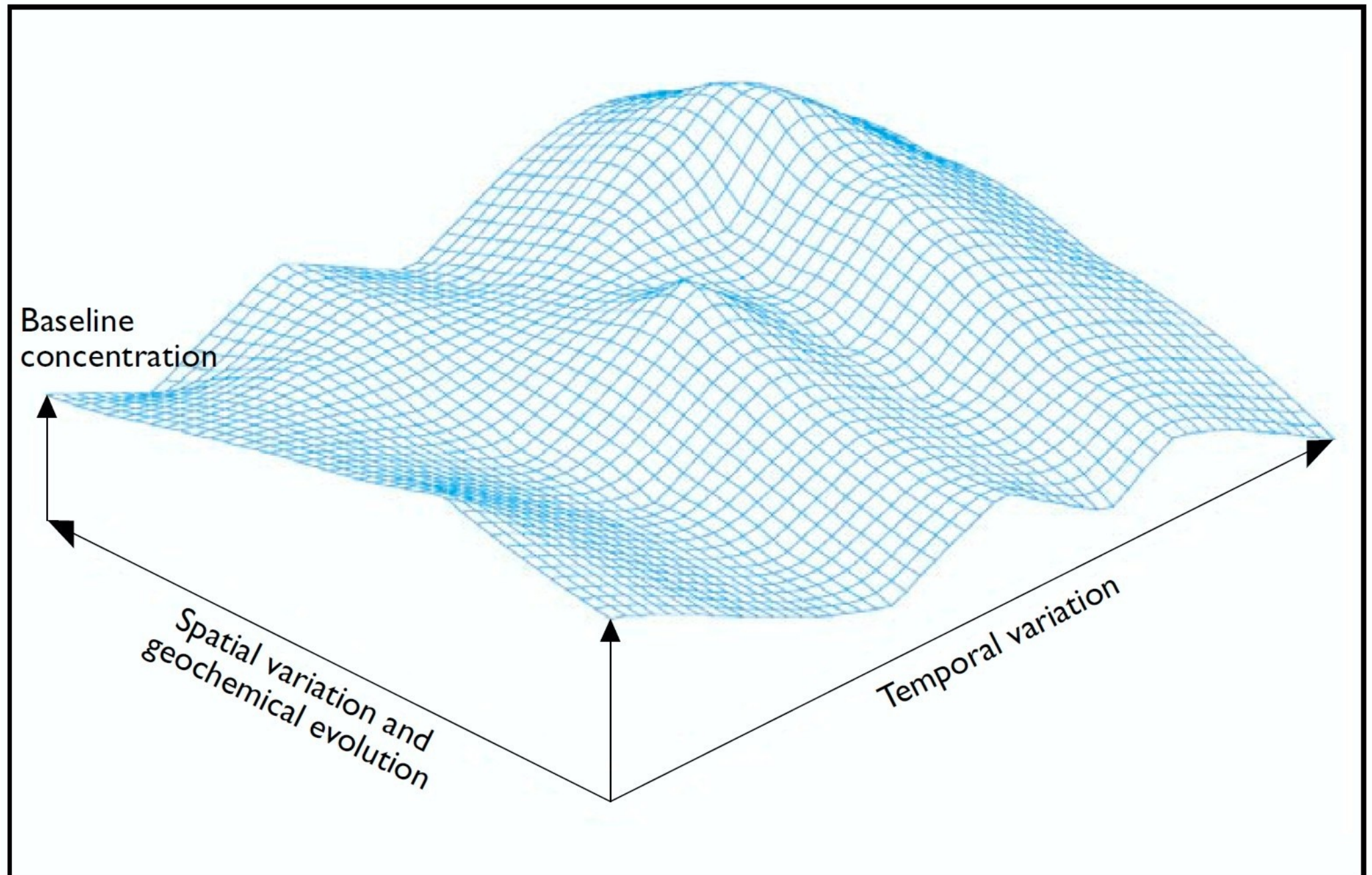
The natural baseline concentration varies spatially in relation to many factors such as geology and temporally with residents time



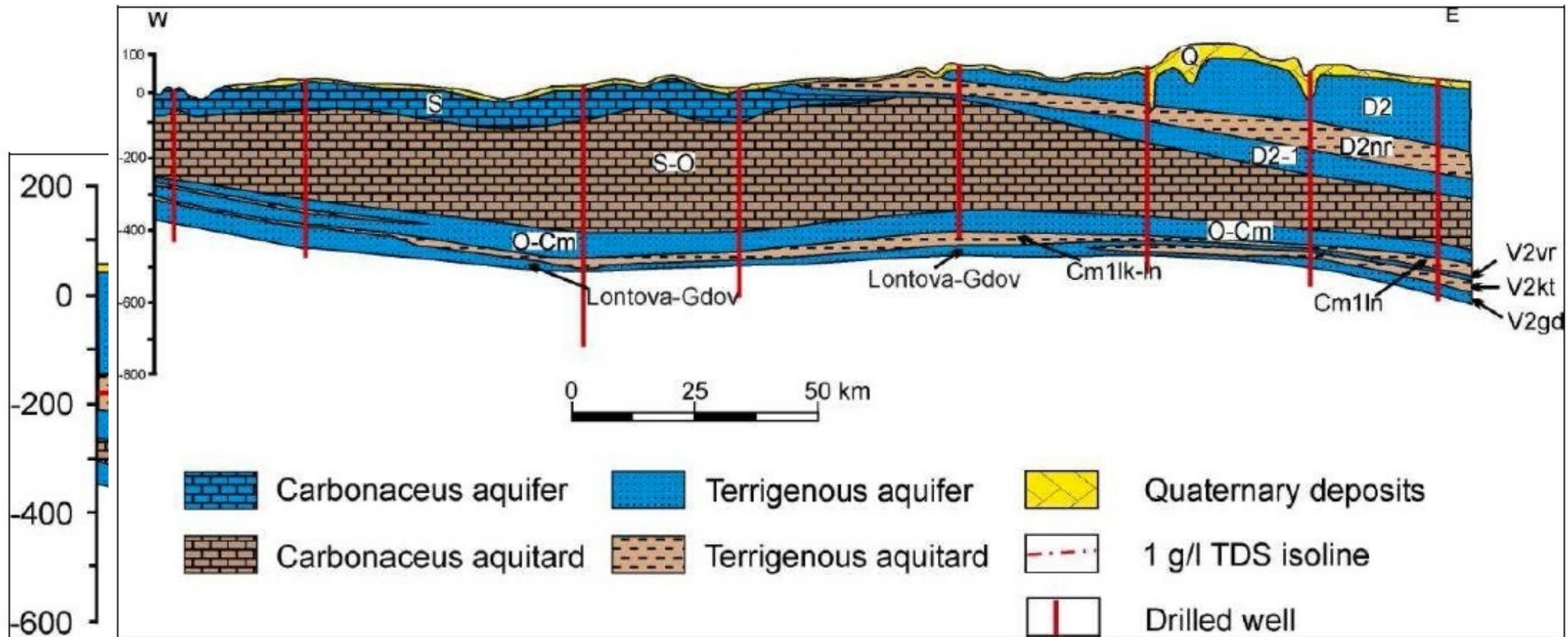
Baseline concept

The range of
species concentrations,
solution, biological

The natural
in relation
temporal



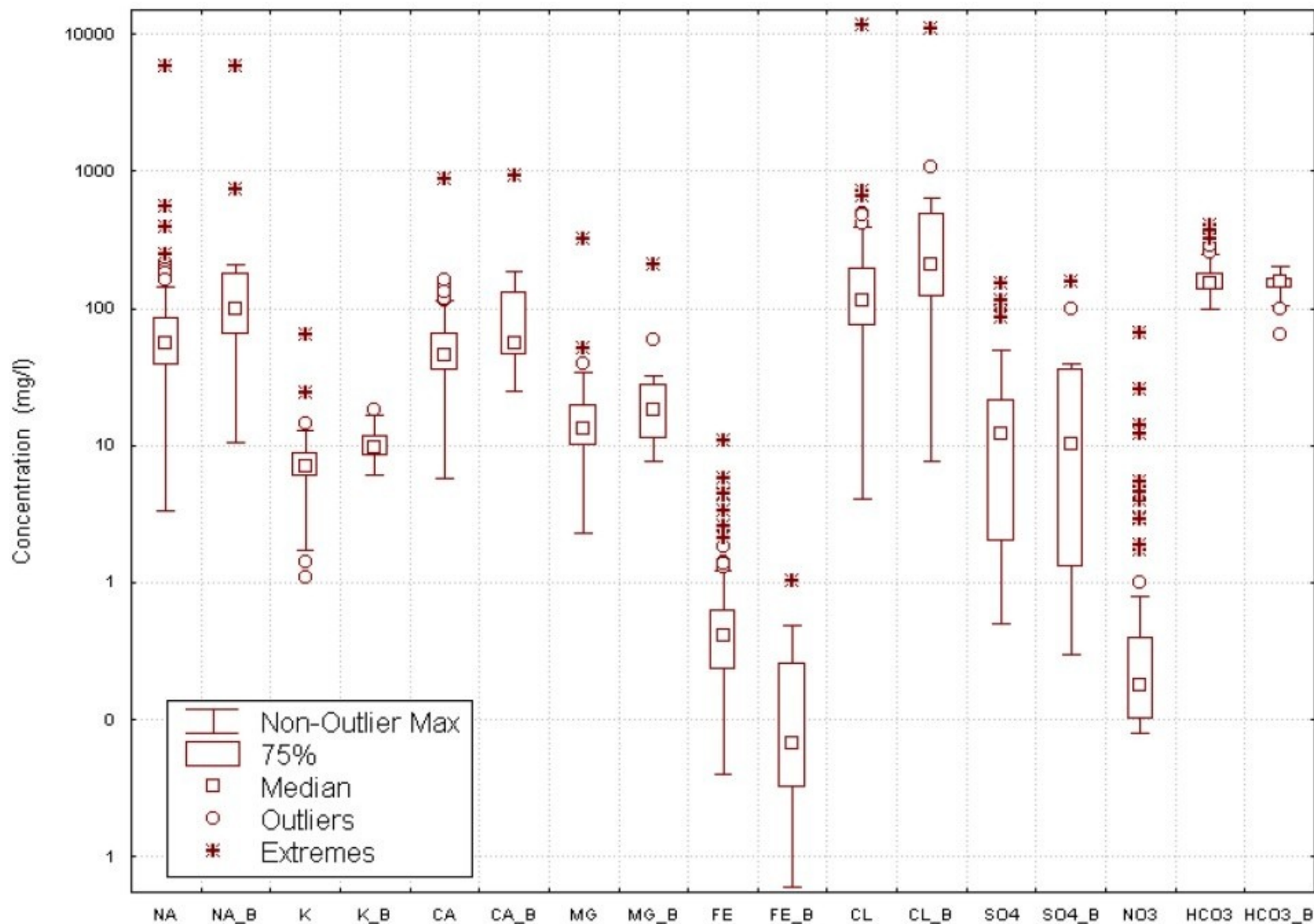
Estonian geology



- | | | | | | |
|--|-----------------------|--|----------------------|--|---------------------|
| | Carbonaceous aquifer | | Terrigenous aquifer | | Quaternary deposits |
| | Carbonaceous aquitard | | Terrigenous aquitard | | 1 g/l TDS isoline |
| | | | Drilled well | | |

C1k-lh - Lütki-Lontova aquifer system
 C1k-lh - Lütki-Lontova aquitard
 Cm-V - Cambrian-Vendian aquifer system

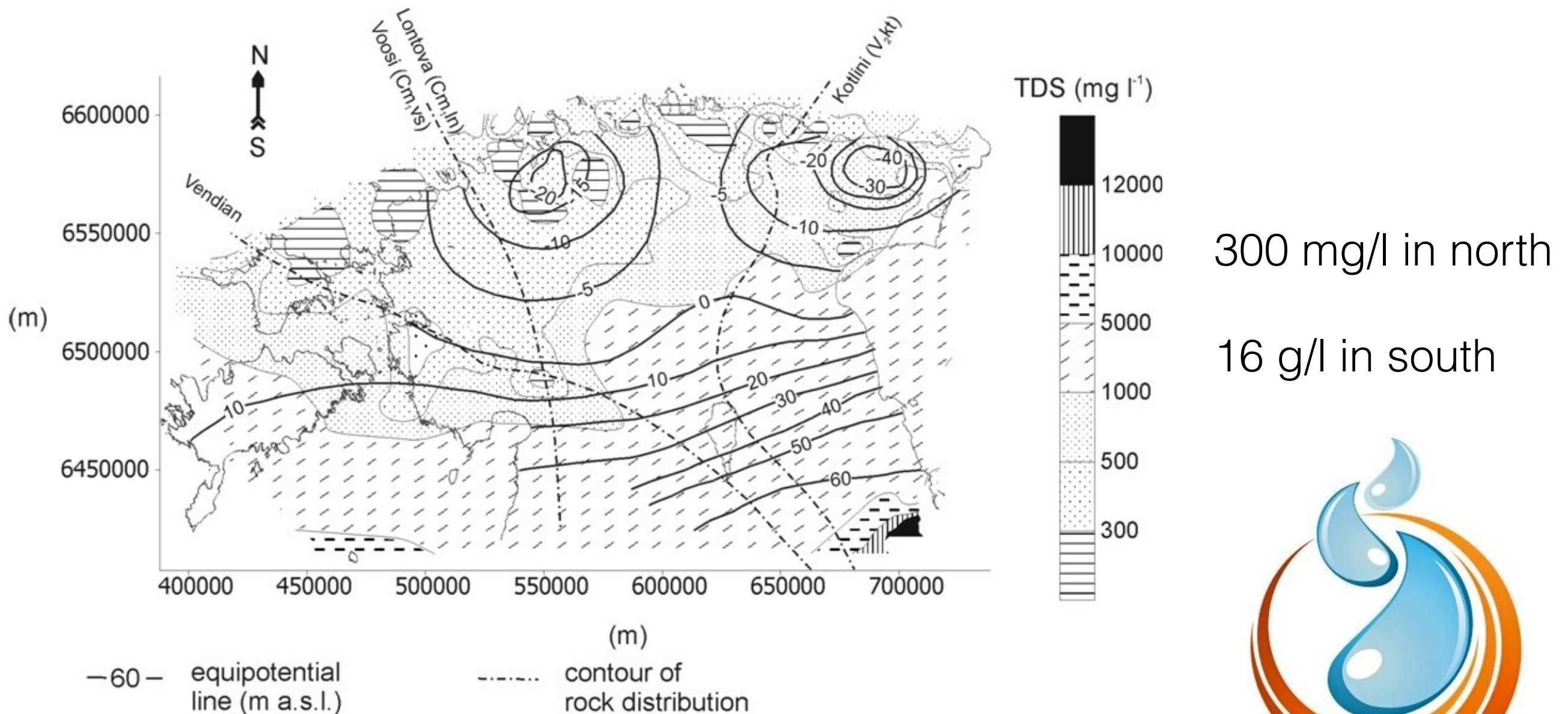
Historical data versus new data



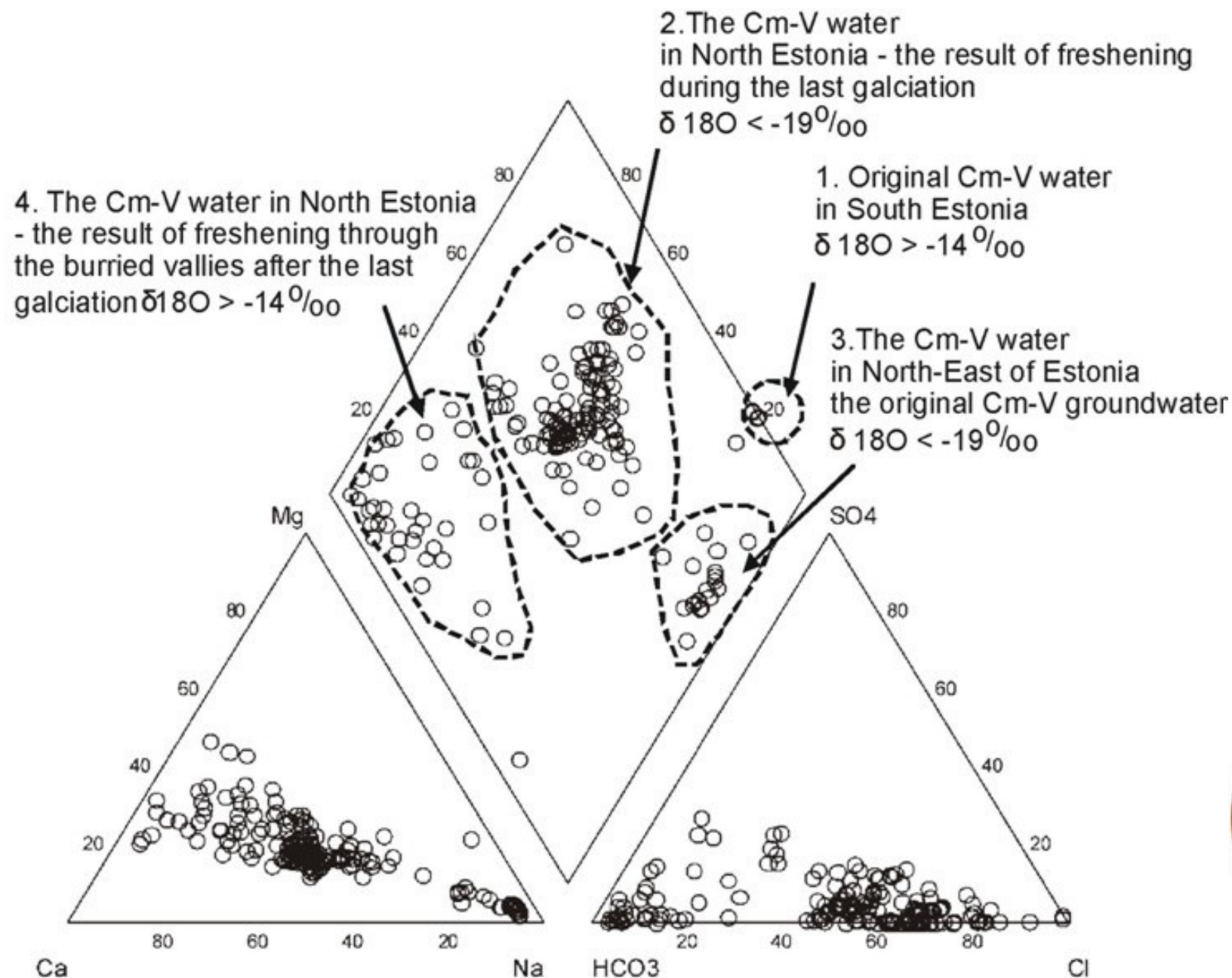
No significant differences between "old" and "new" data



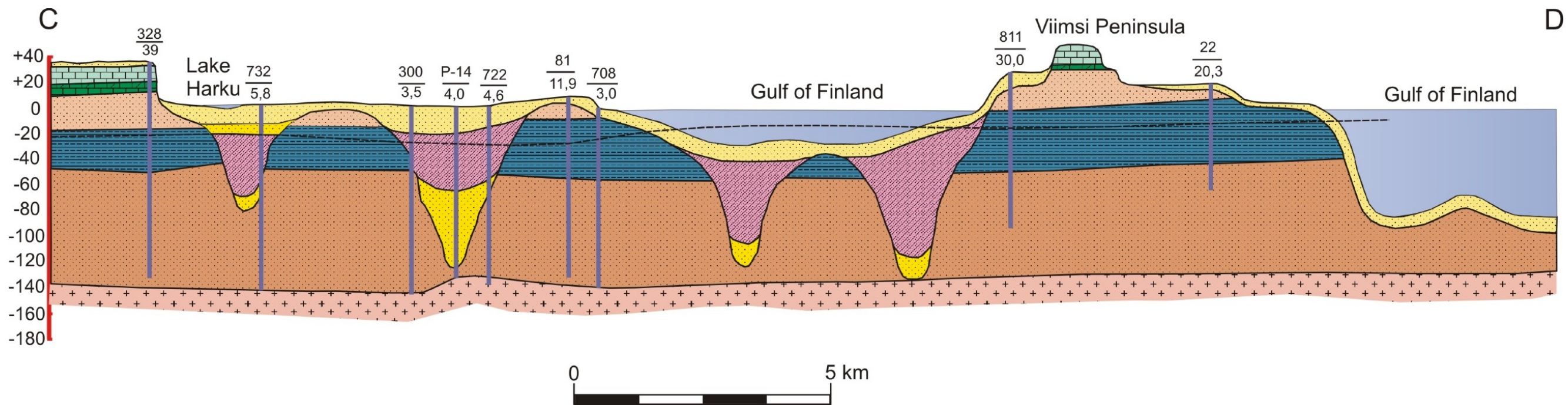
Distribution of TDS in CVAS



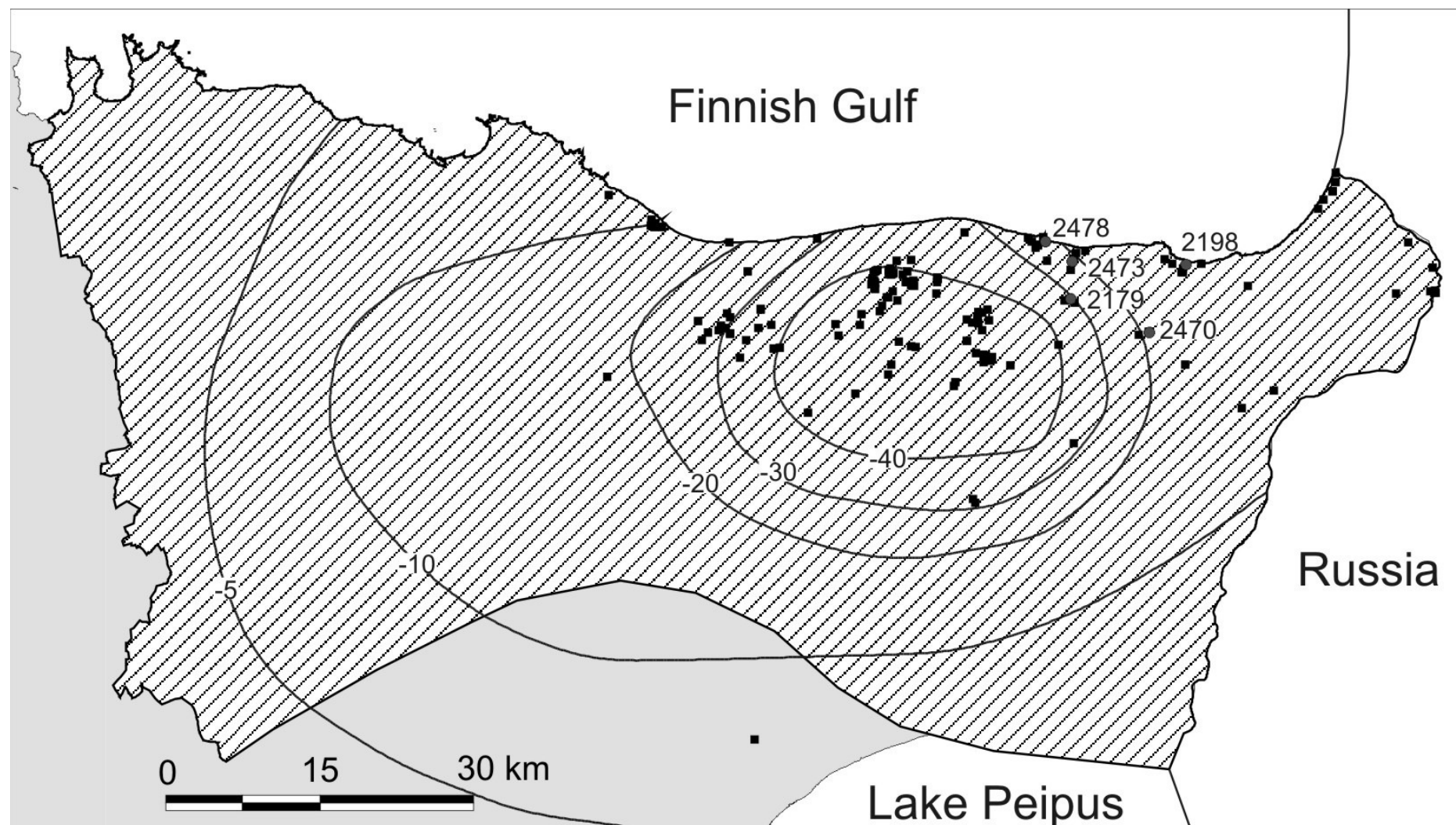
Groundwater chemical types in CVAS



Buried valleys act as recharge areas for CVAS in N-Estonia



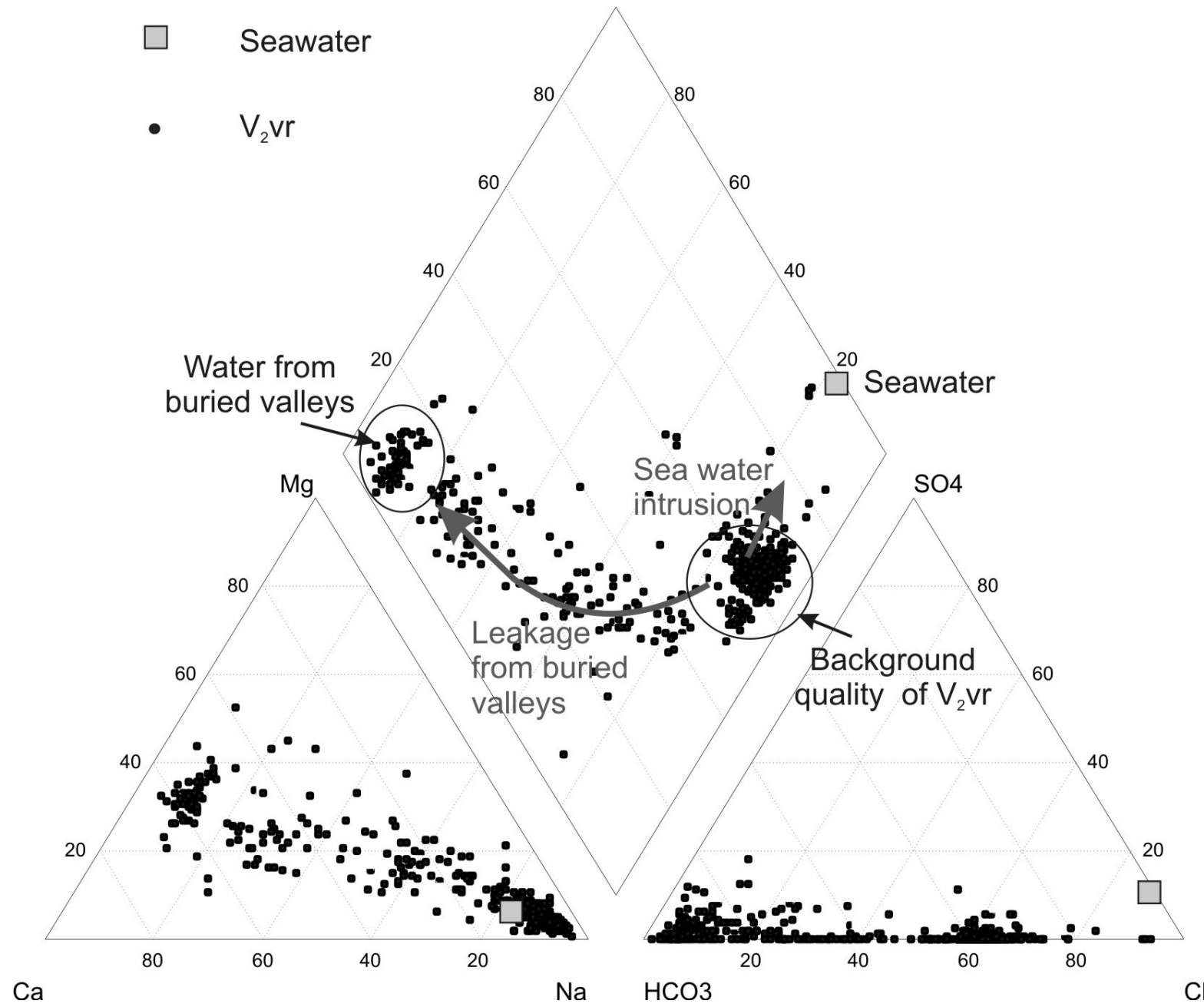
Conceptual model for V2vr in NE-Estonia



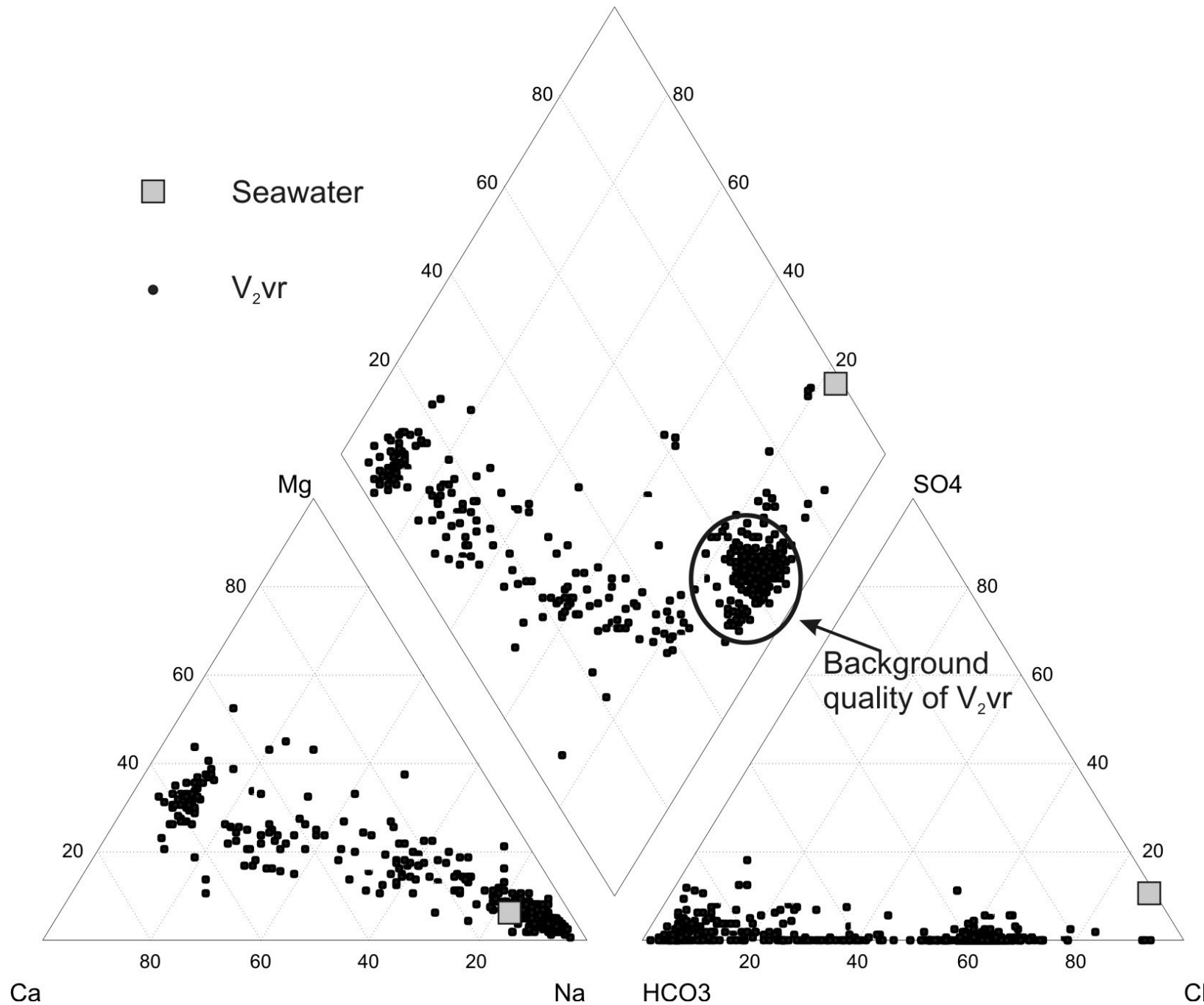
- Intensive abstraction
- Depression cone



Conceptual model for V_2vr in NE-Estonia



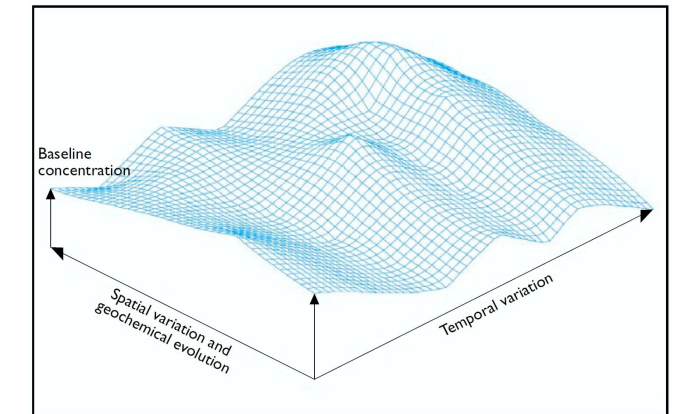
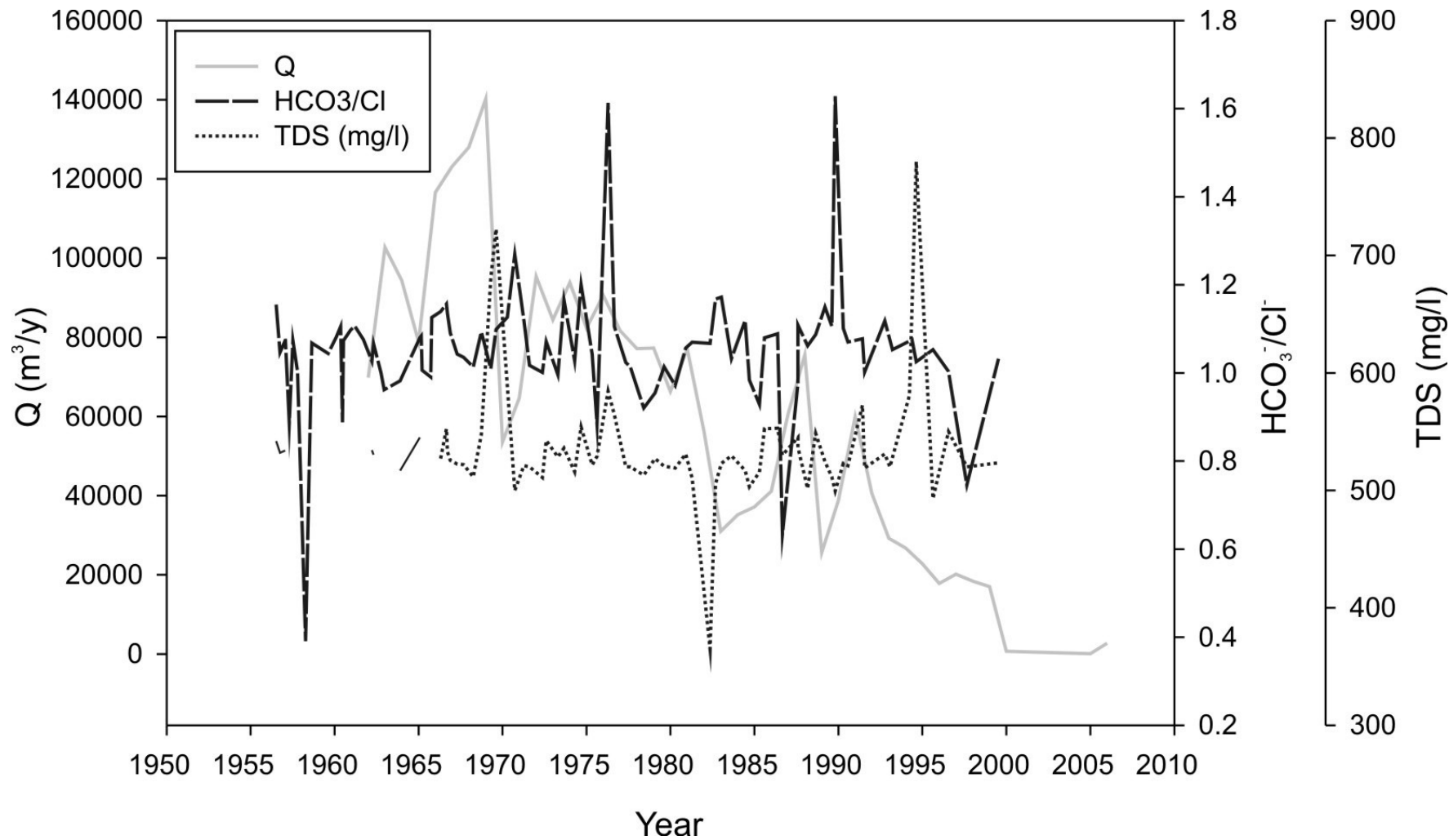
Natural background



- low in SO_4
- Variation in HCO_3/Cl
- High in Na



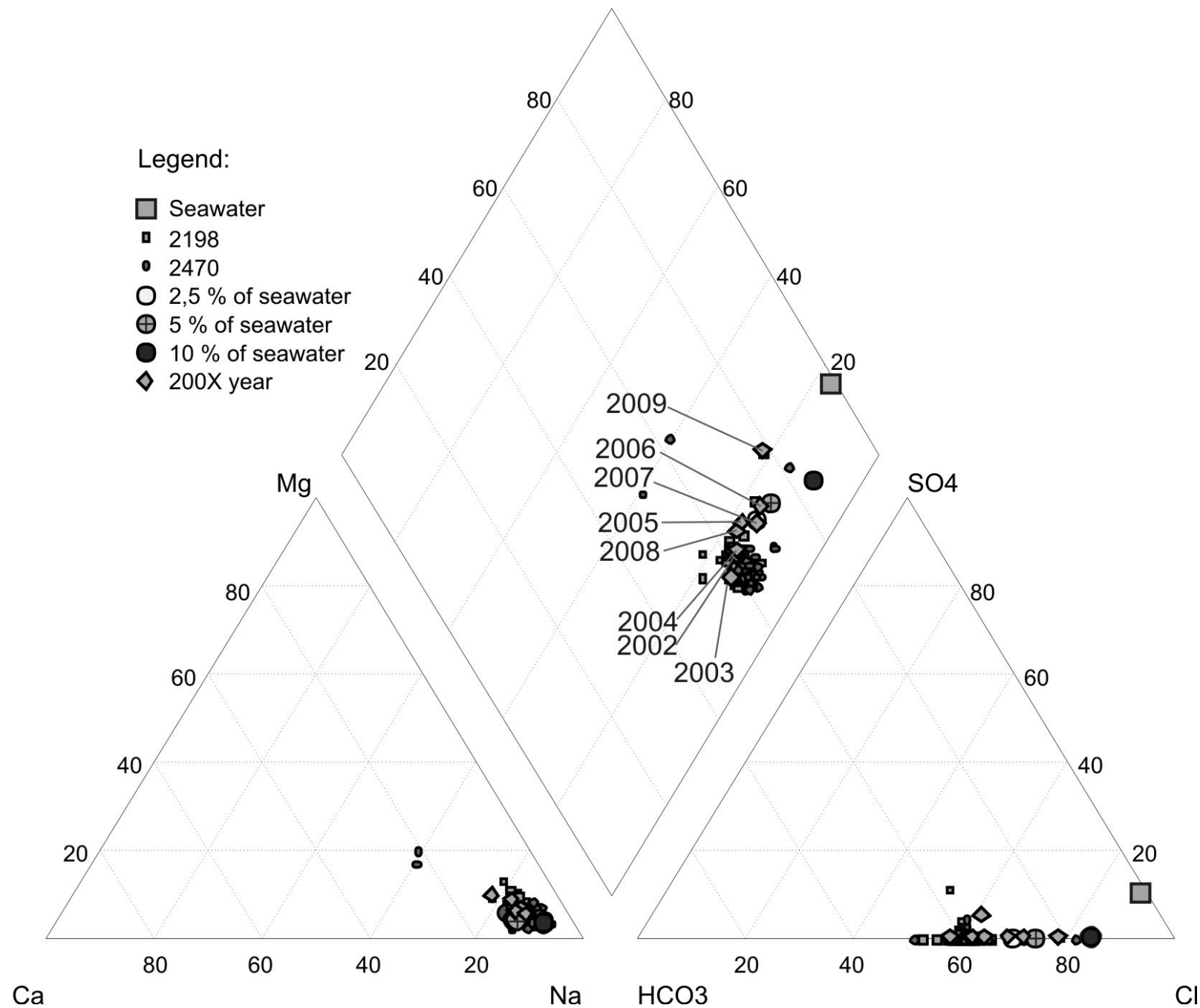
Natural background



- $HCO_3^-/Cl^- \sim 1$



Seawater intrusion

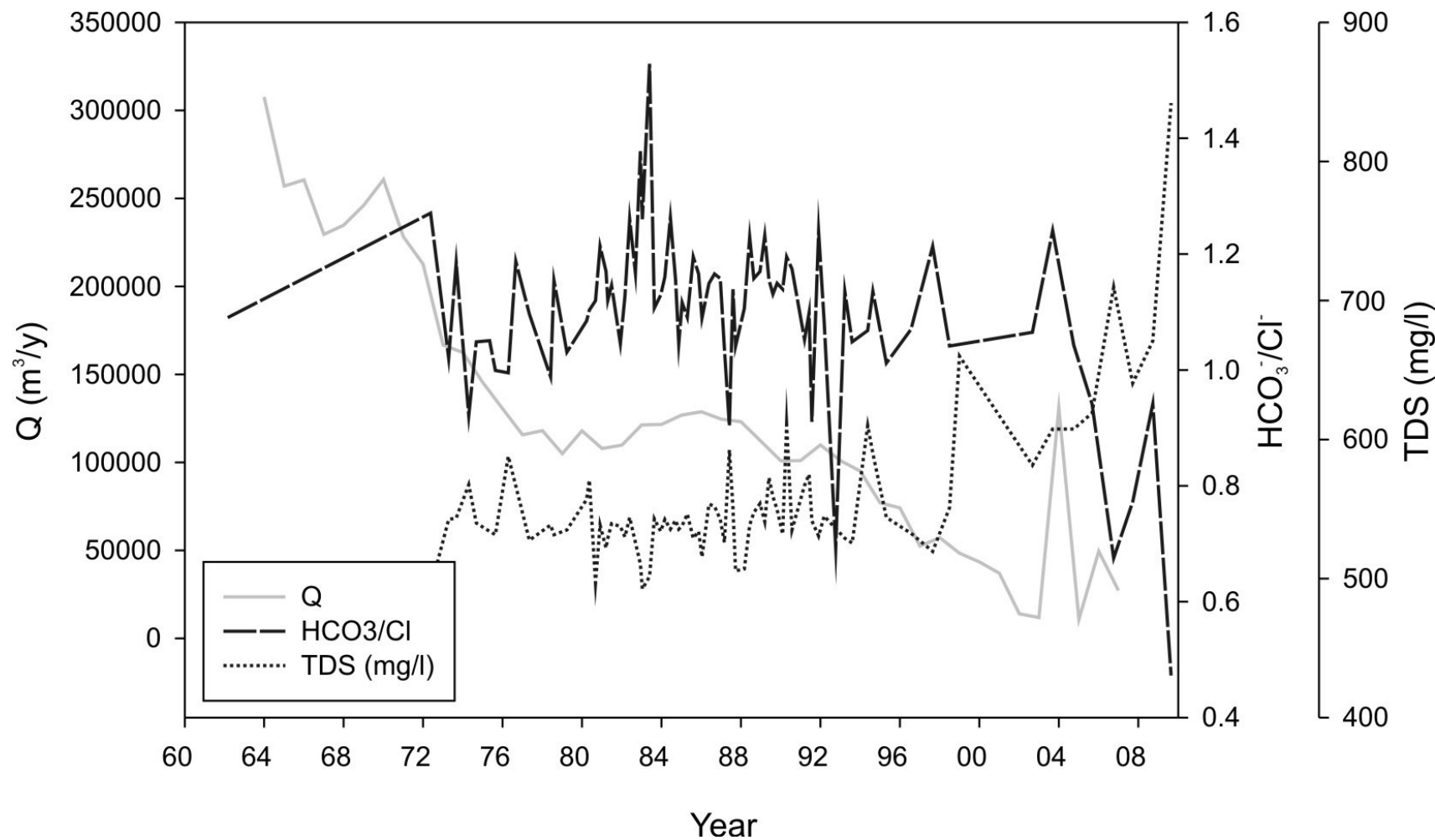


Sillamäe water supply well:

- Change in water type towards seawater
- Increase of Cl content during last 10 year



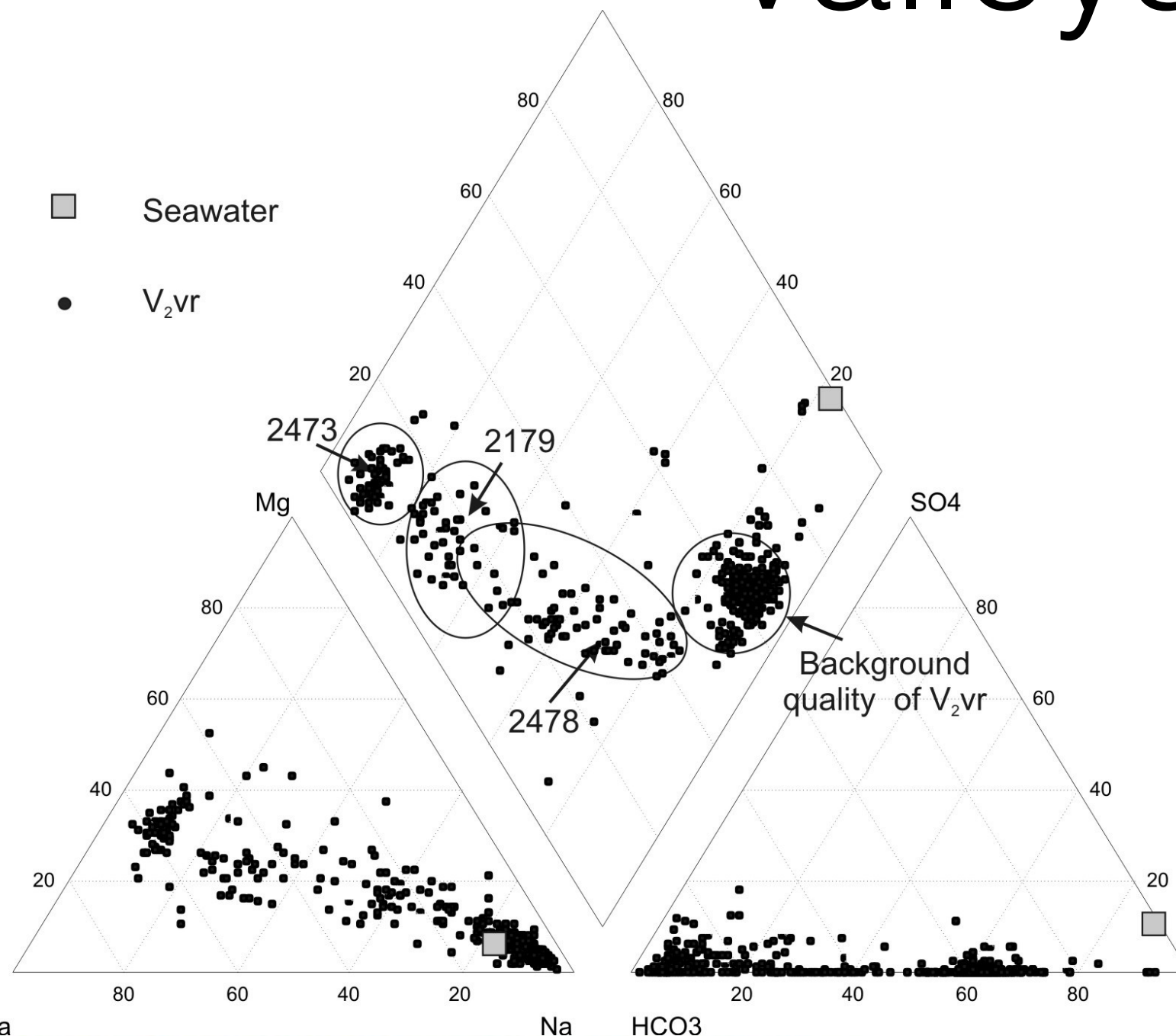
Seawater intrusion



- HCO_3^- decreasing
- TDS increasing



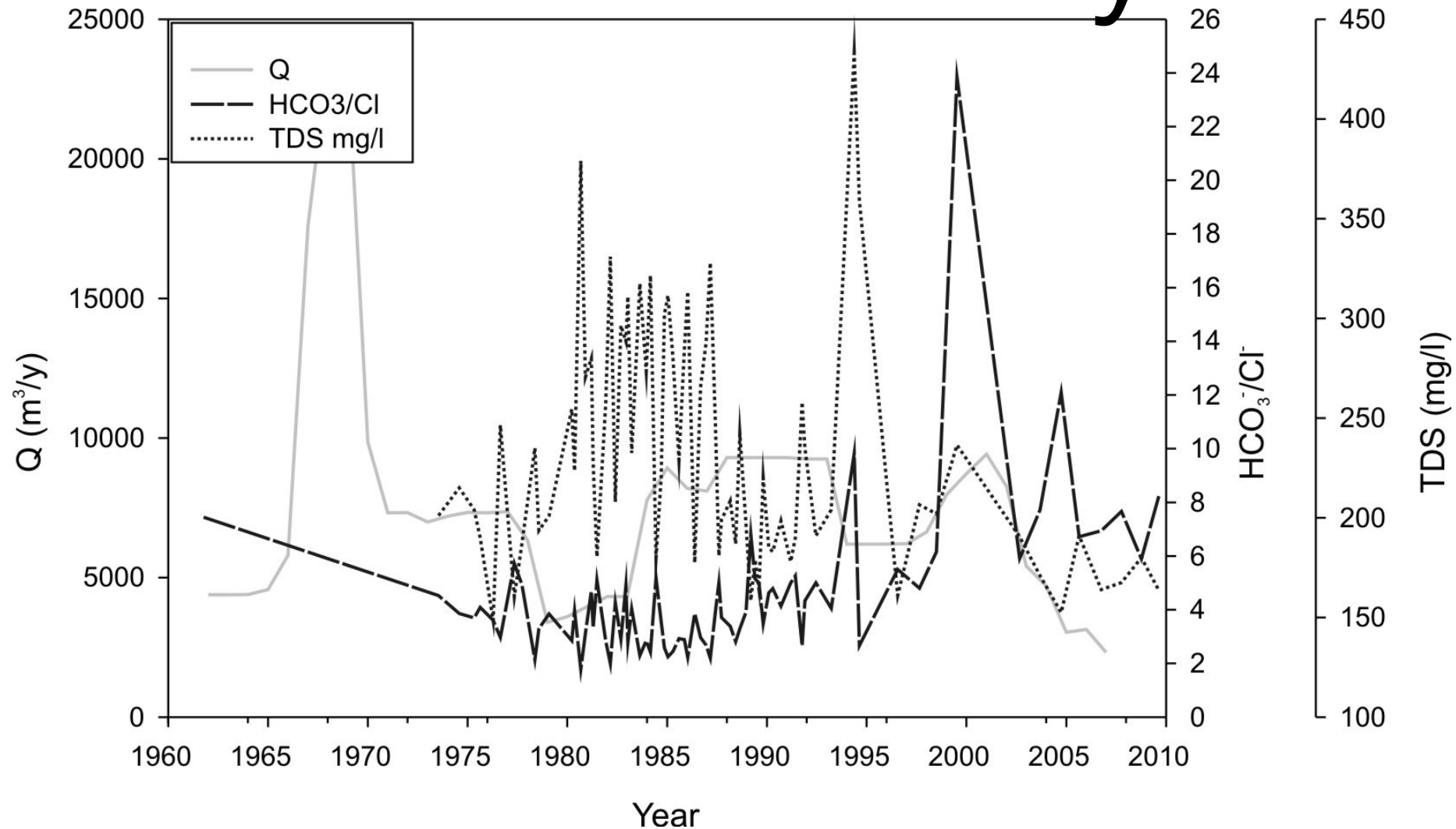
Recharge from buried valleys



- Increase in HCO₃ and Ca



Recharge from buried valleys



- HCO_3^-/Cl^- increasing
- TDS decreasing



Current activities in Estonia



- Stable isotope sampling of water (^{34}S , $^{13}\text{C-DIC}$, ^{18}O , ^2H)
- gas isotopes sampling ($^{13}\text{C-CH}_4$)
- Radioactive isotope sampling (^{14}C)
- Major ion sampling



Thank you for your attention!

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