



UiO : Department of Chemistry

University of Oslo

What are the data of soil and water in the catchment telling us so far?



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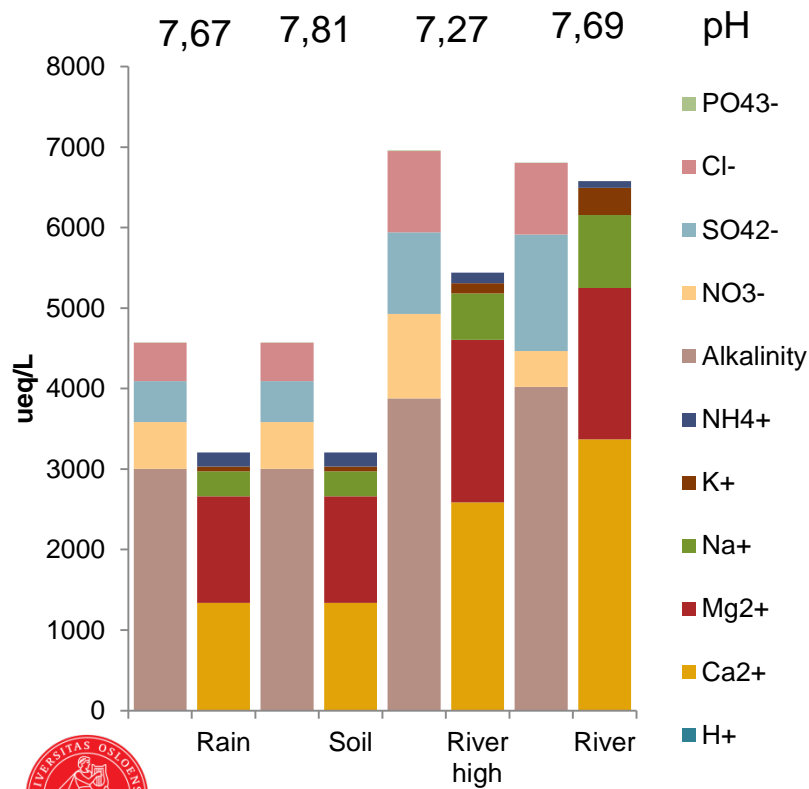
T. Andersen, K. Tominanga
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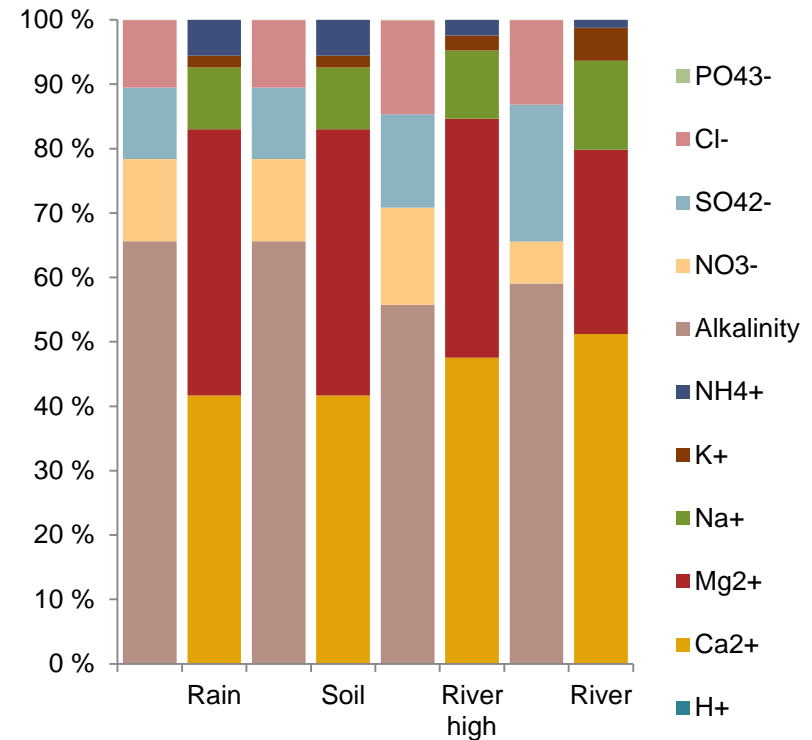
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Water chemistry

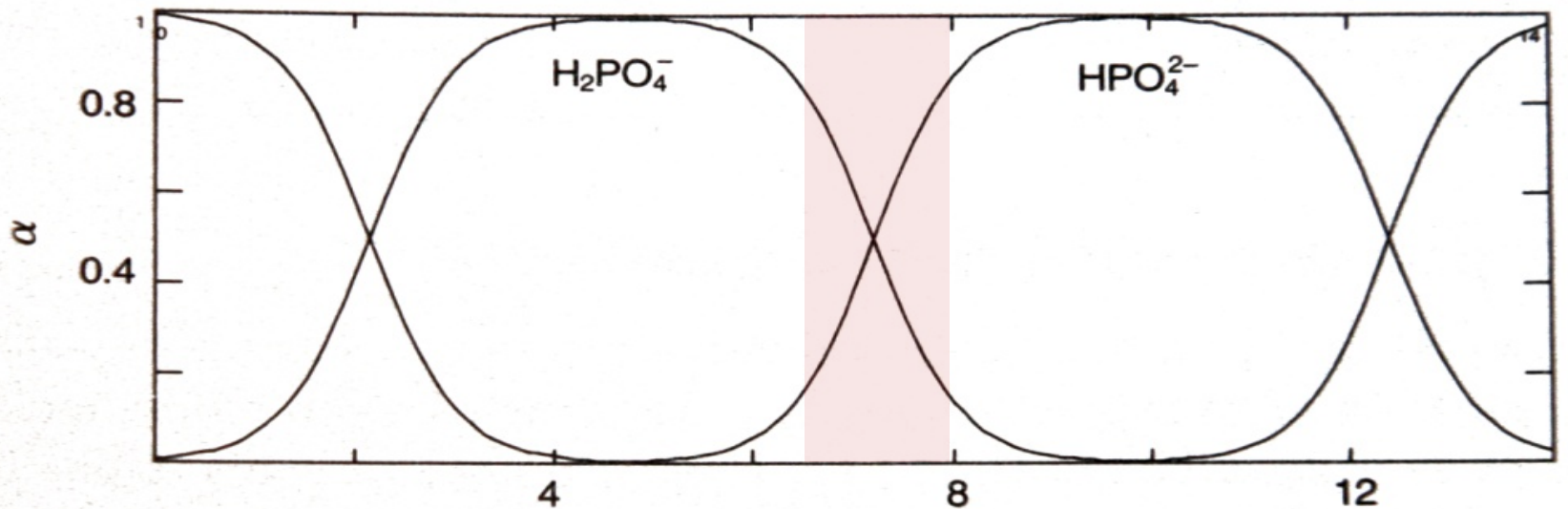
High ionic strength increases



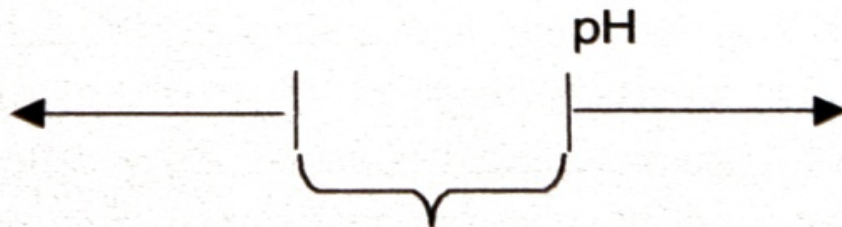
Mainly Ca and Mg carbonates
Rather constant composition



pH percentiles are 6.7 to 8.0
Controlled by Ca solubility



insoluble Fe
and Al
phosphates

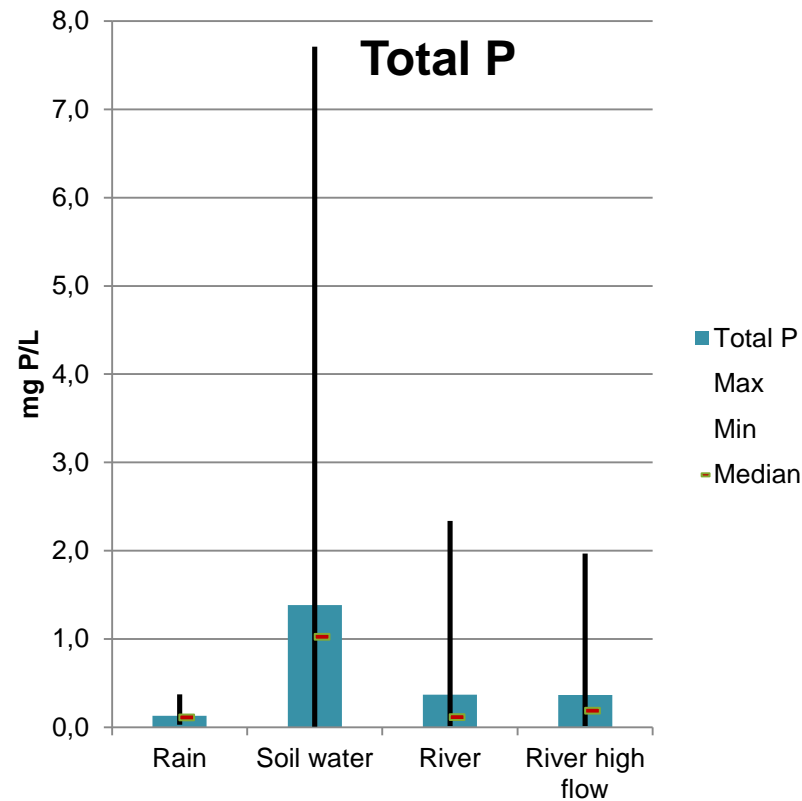


insoluble Ca
phosphates and
fluorophosphates

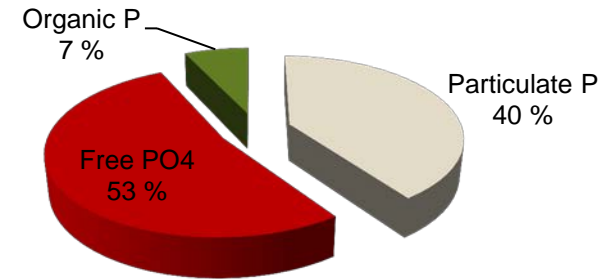
Region of greatest
solubility

P fractions

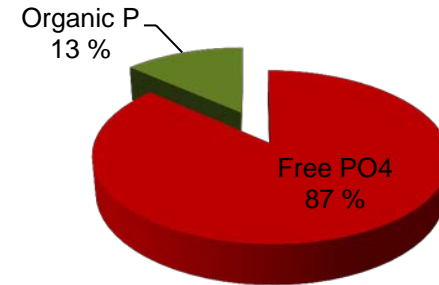
Large variation in soil water
 Surprised that P is not higher at high flow, especially particle P



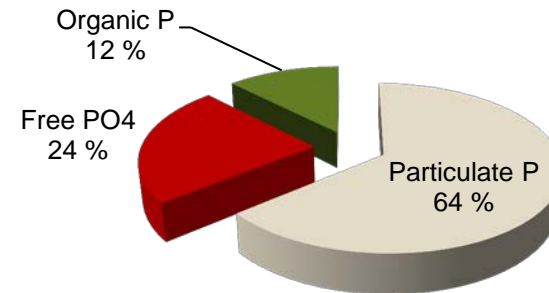
Median Rain water



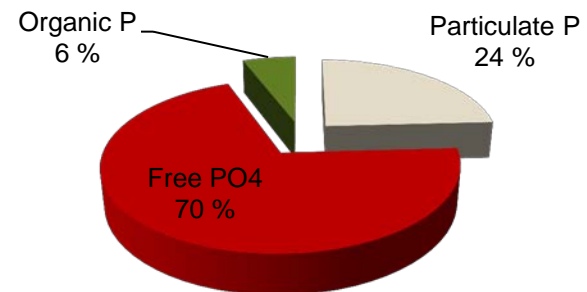
Median Soil water



Median River

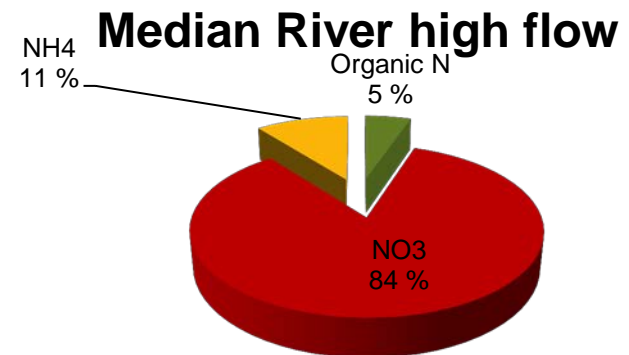
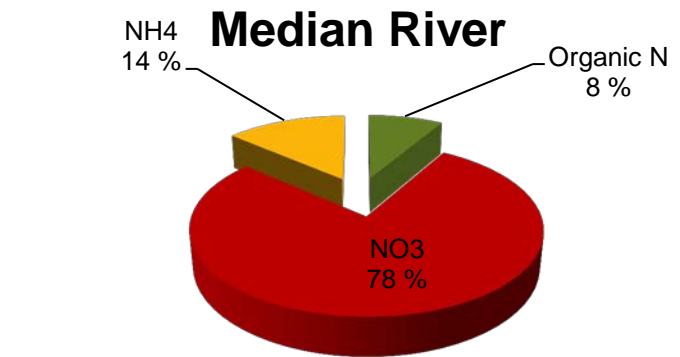
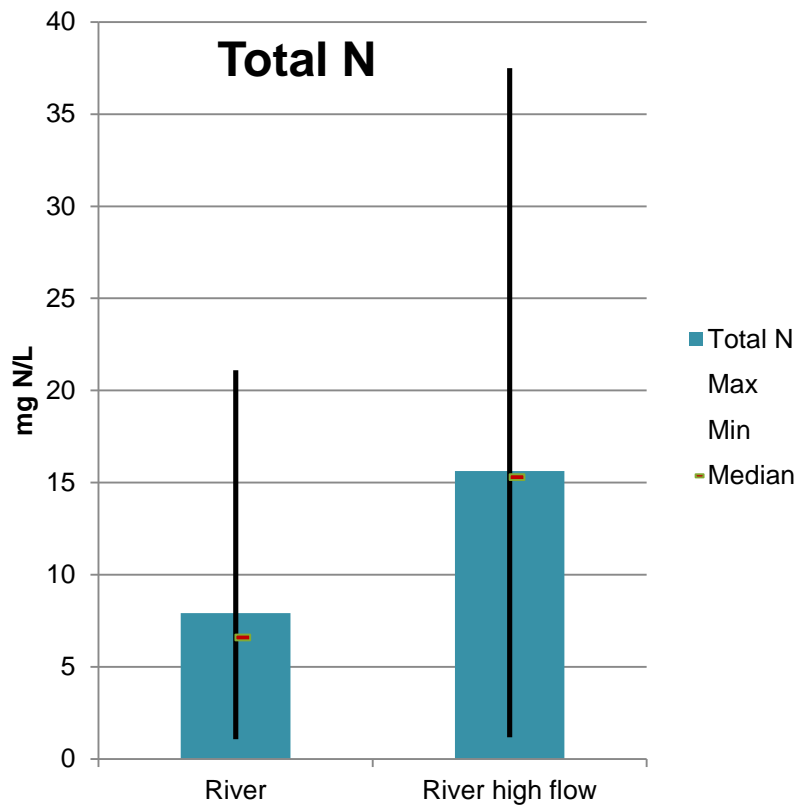


Median River high flow



N fractions

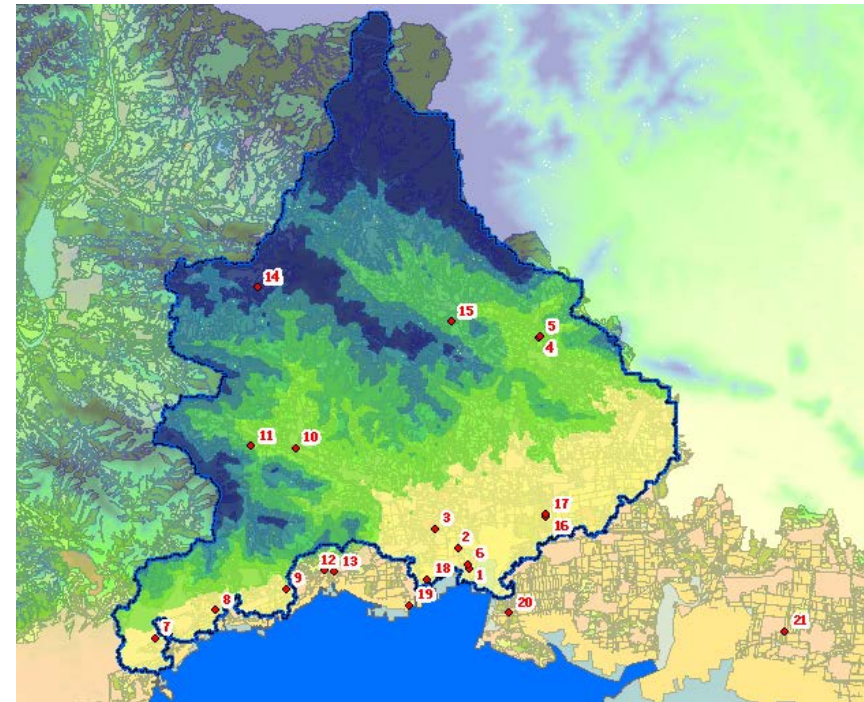
Large variation in river during high flow



Soil water from lysimeters

Covering different soil type, land-use, crop and topography

Profile	Village name	Soil type	Land-use Type	Crop	Topography
1	Dajugezhuang	Wet cinnamon soils	vegetable field	tomato	Plain area
2	Tiancaizhuang	Wet cinnamon soils	farmland	crop rotation	Plain area
3	Yaobaizhuang	Eluvial cinnamon soils	soil orchard	apple	Plain area
4	Sungezhuang	Eluvial cinnamon soils	soil forest	nature pine	Mountain area
5	Sungezhuang	Eluvial cinnamon soils	soil orchard	chestnut	Mountain area
6	Dajugezhuang	Wet cinnamon soils	forest	timber	Plain area
7	Guozhuangzi	Eluvial cinnamon soils	soil farmland	corn	Plain area
8	Xiazhangzi	Eluvial cinnamon soils	soil orchard	grape	Plain area
9	Ximafang	Eluvial cinnamon soils	soil orchard	apple	Plain area
10	Guoxiangyu	Eluvial cinnamon soils	soil farmland	corn	Mountain area
11	Dongjingyu	Eluvial cinnamon soils	soil orchard	nature	Mountain area
12	Haomenbei	Eluvial cinnamon soils	soil forest	timber	Plain area
13	Haomen	Eluvial cinnamon soils	soil vegetable field	cucumber	Plain area
14	Sangshuan	Mountain skeletal soils	orchard	apple	Mountain area
15	Shitouying	Cinnamon soils	orchard	chestnut	Mountain area
16	Yugezhuang1	Wet cinnamon soils	farmland	crop rotation	Plain area
17	Yugezhuang2	Fluvo-aquic soils	farmland	corn	Plain area
18	Daxinzhuang	Wet cinnamon soils	farmland	crop rotation	Plain area
19	Liuxiangying	Wet cinnamon soils	forest	timber	Plain area
20	Niugezhuang -cun	Wet cinnamon soils	orchard	cherry	Plain area
21	Dongliuzhuang-cun	Wet cinnamon soils	vegetable	potato	Plain area

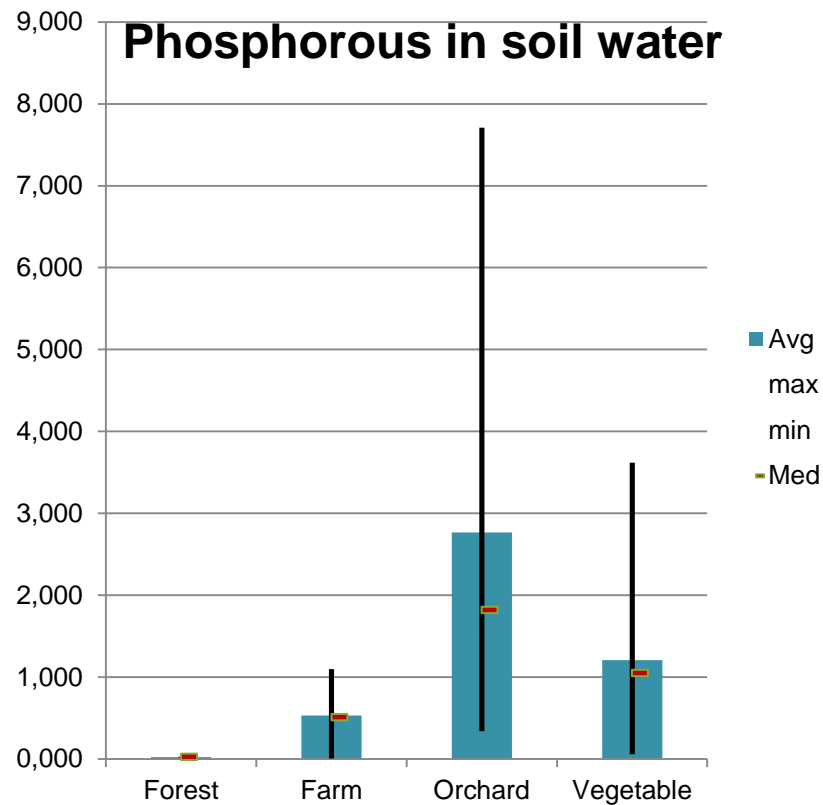


Location of the sites with installed lysimeters

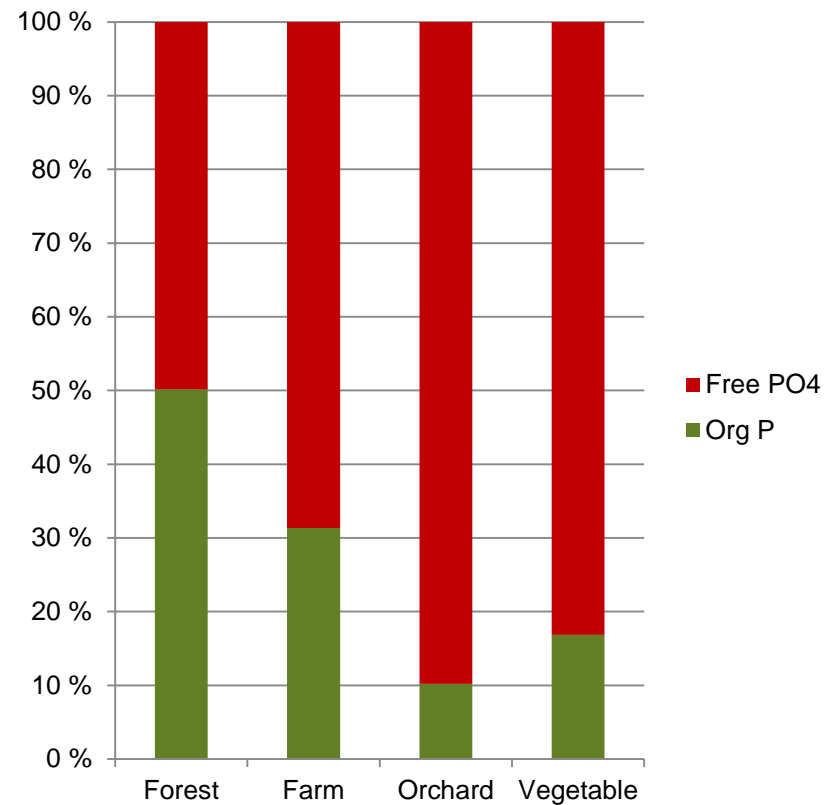


P in soil water

Surprising high values in orchards

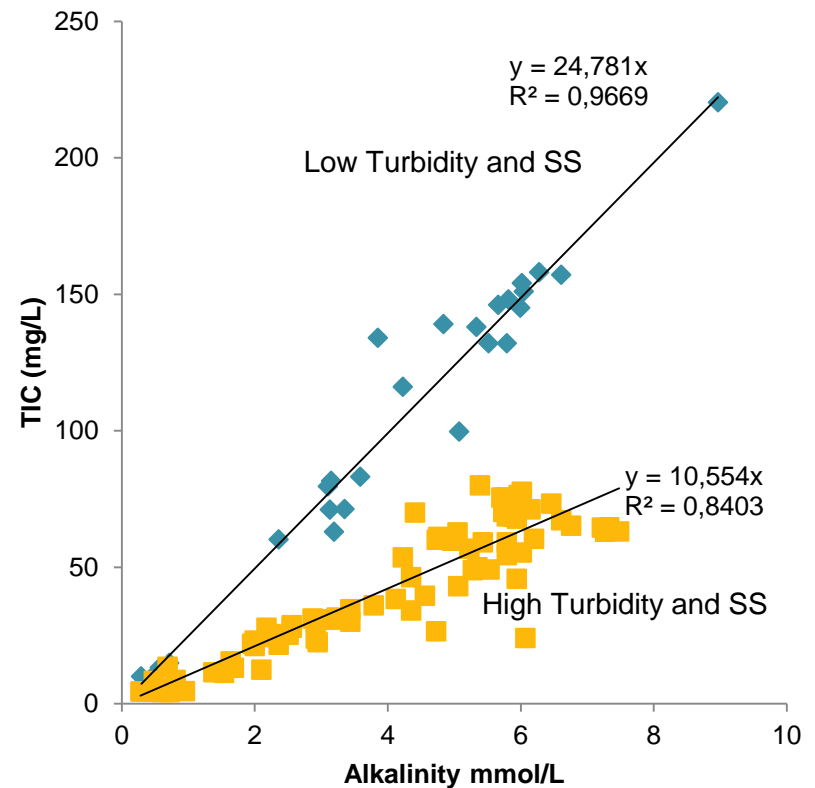
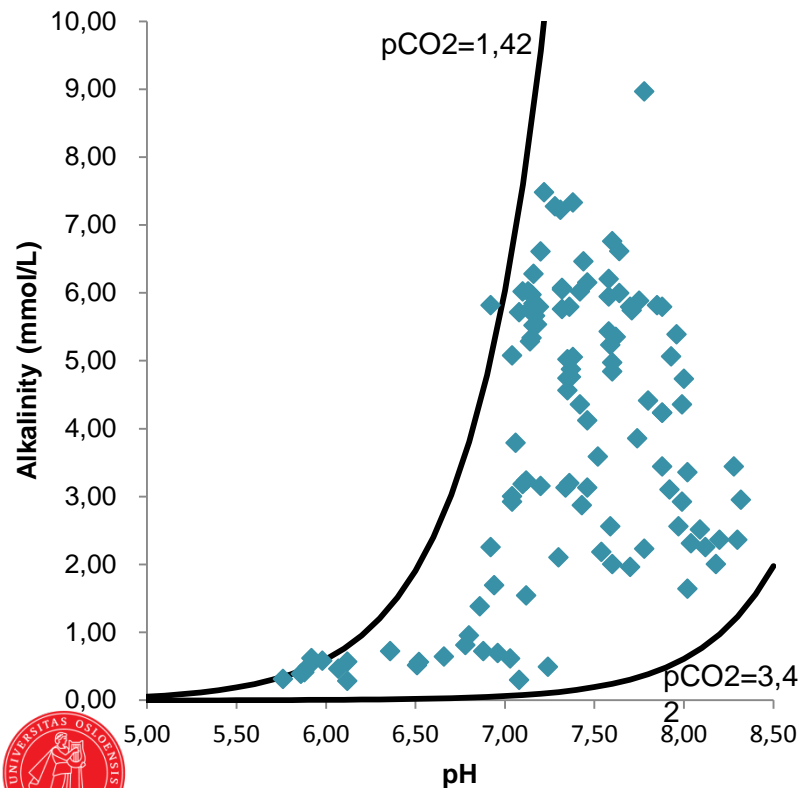


High Free P in Orchards
- Due to over fertilization?



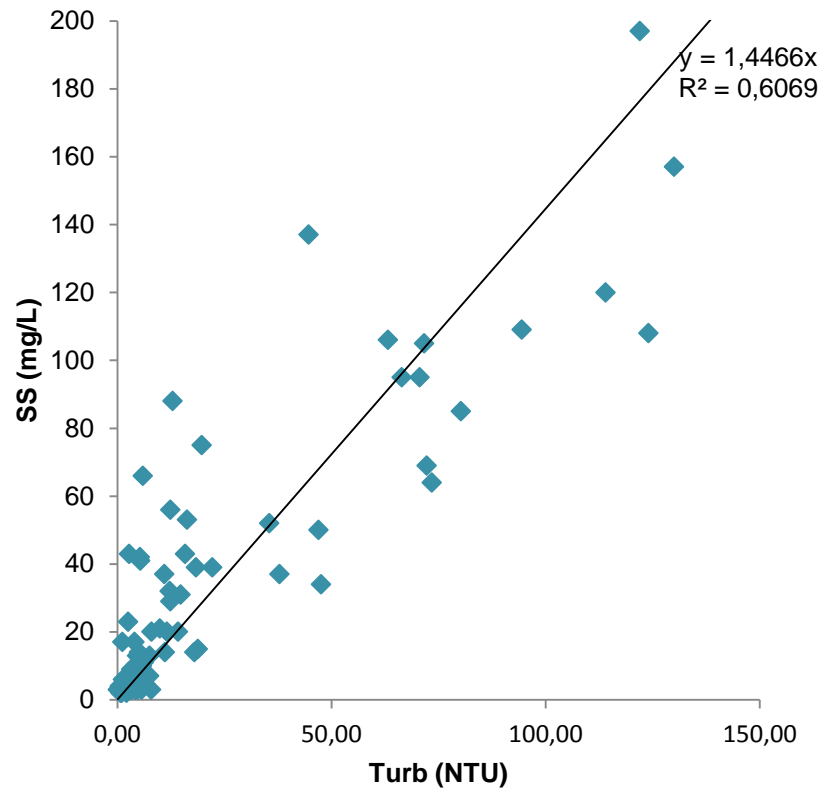
Inorganic carbon

Values of alkalinity (assumed mainly due to HCO_3^-) found between equilibrium with air and 100 times supersaturation of pCO_2

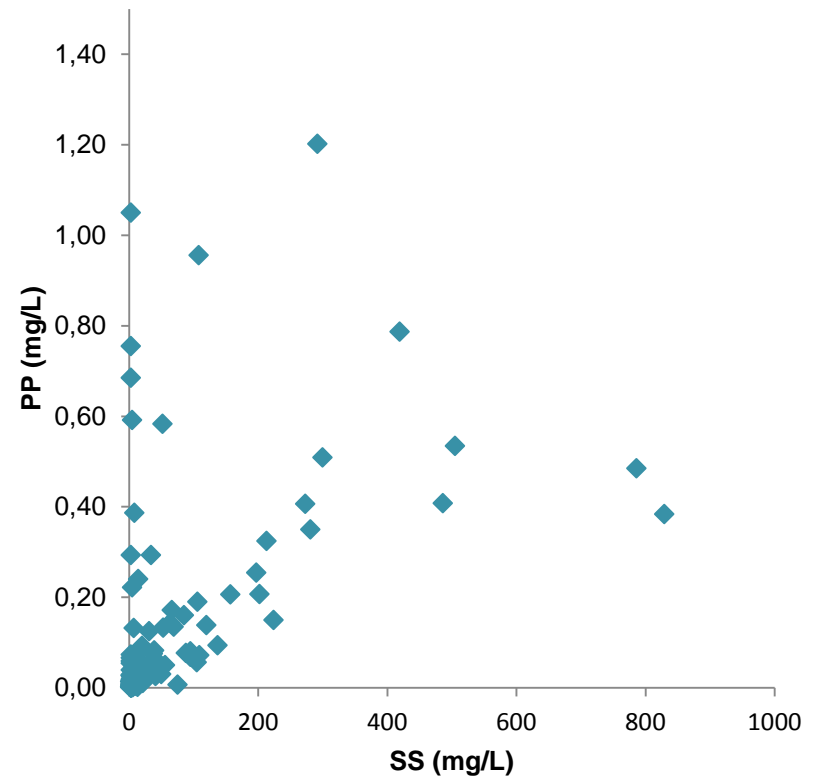


Particles

Close link between SS and Turbidity

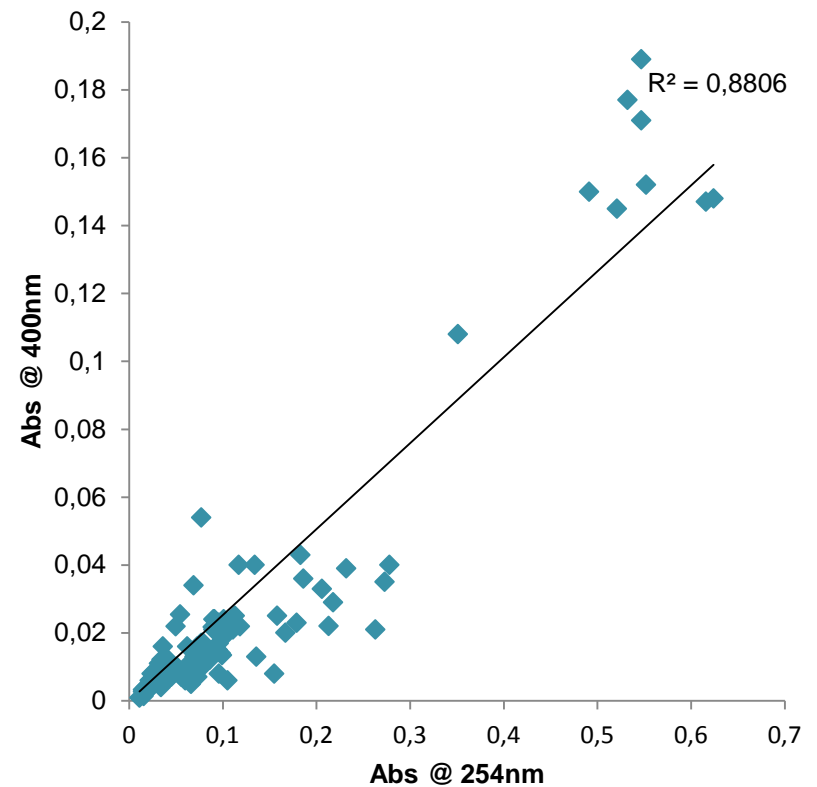
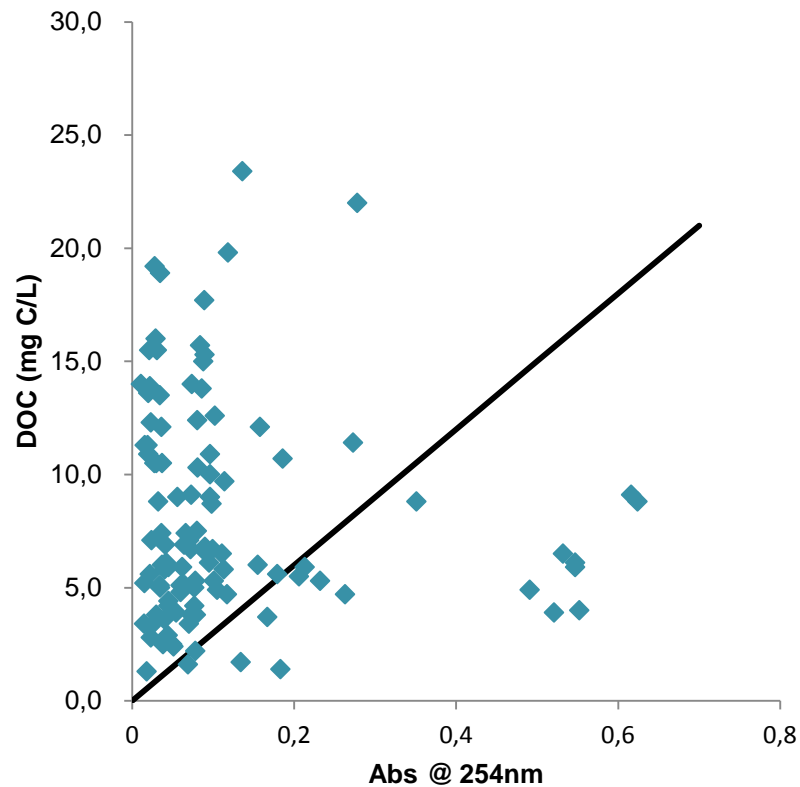


PP linked to SS



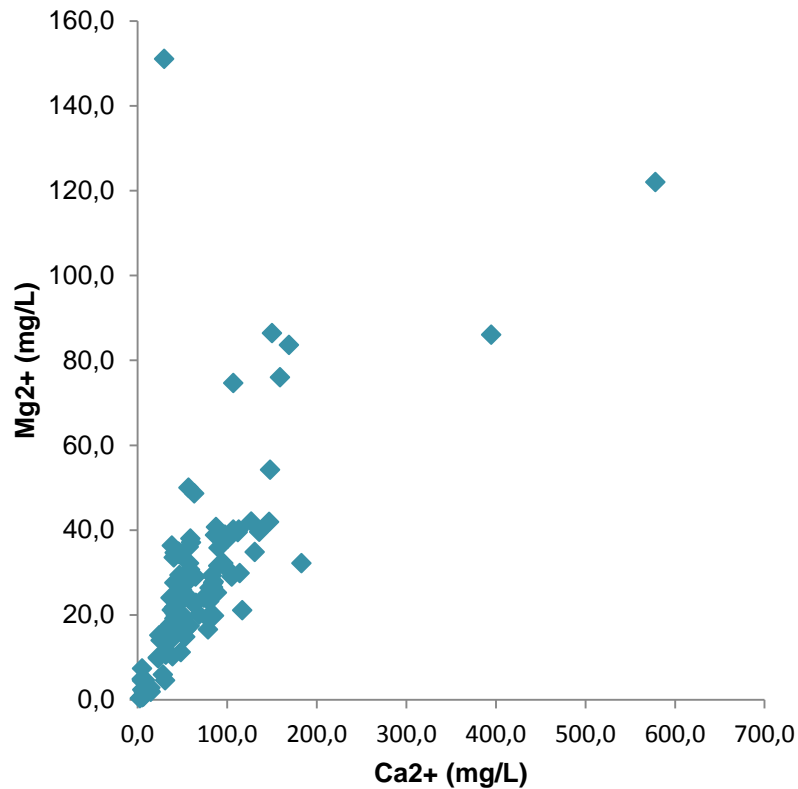
Organic carbon

Poor correlation likely due to not much dissolved natural organic matter

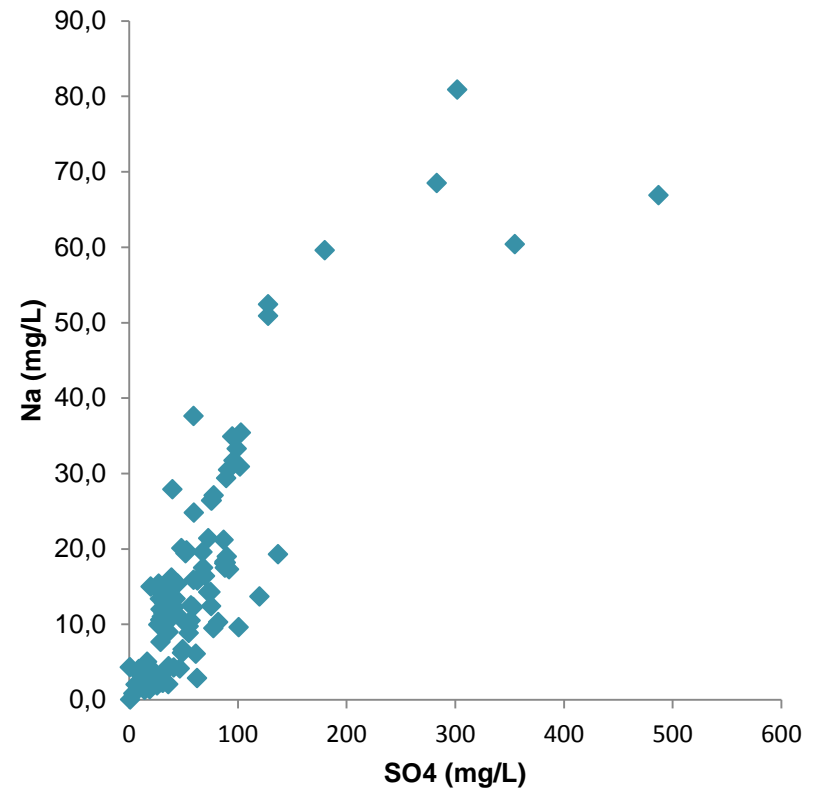


Inorganic ions

Good correlation between Ca and Mg indicating common source
- Weathering and liming?

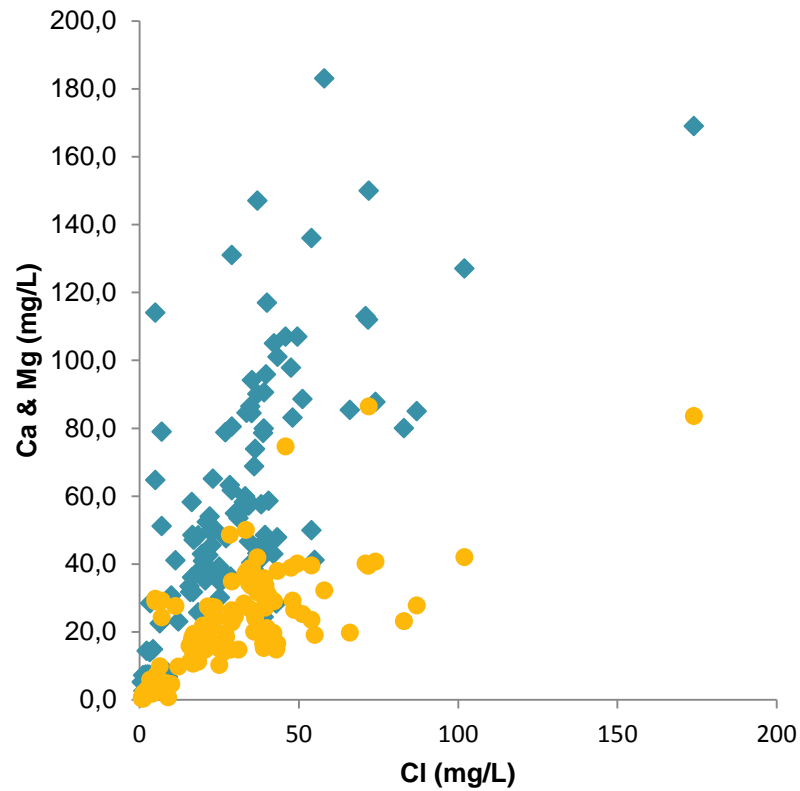


Good correlation between Na and SO₄ indicating common source
- ?

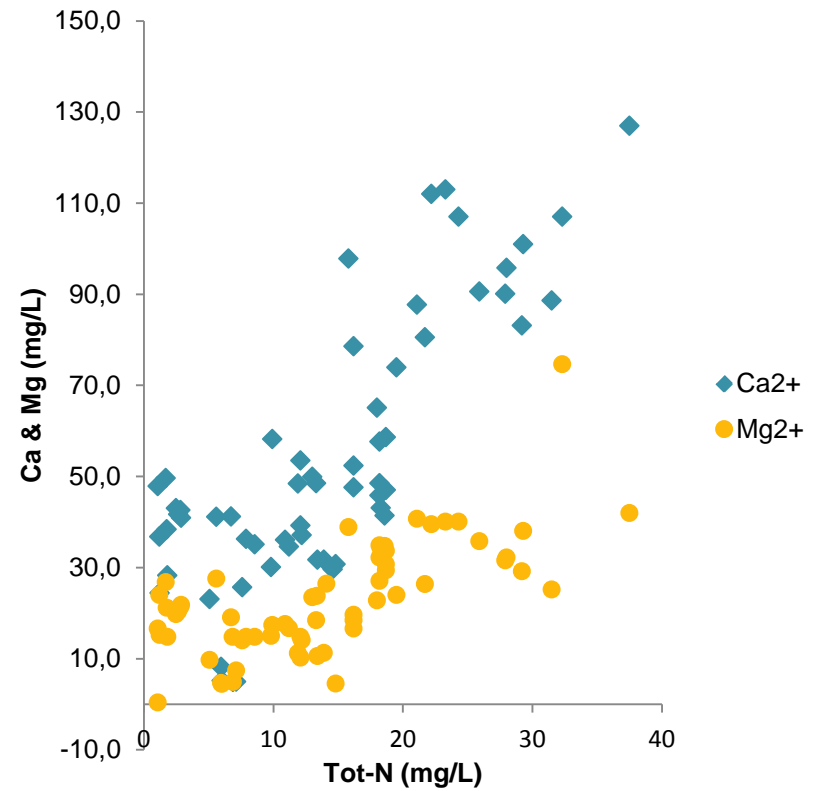


Inorganic ions

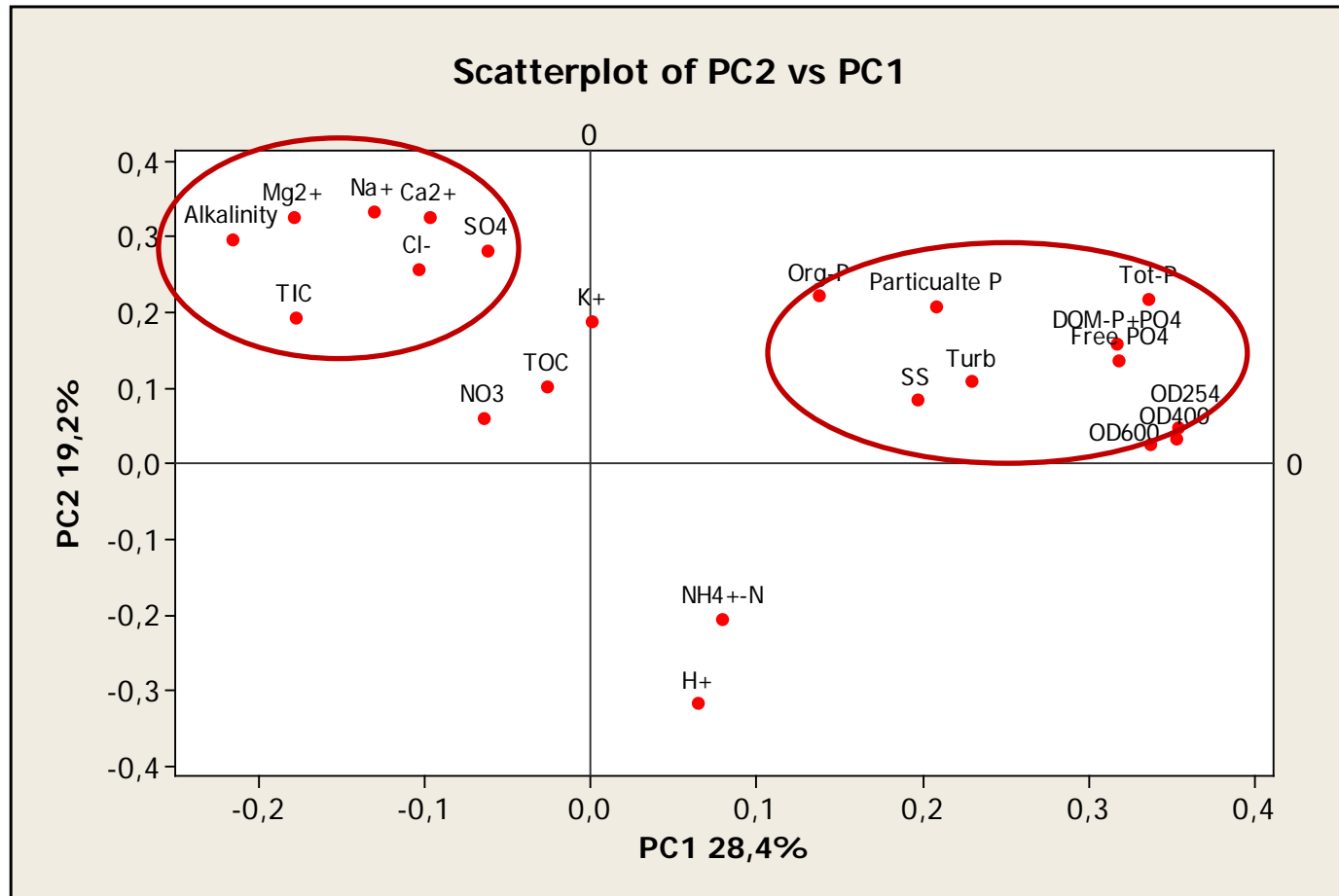
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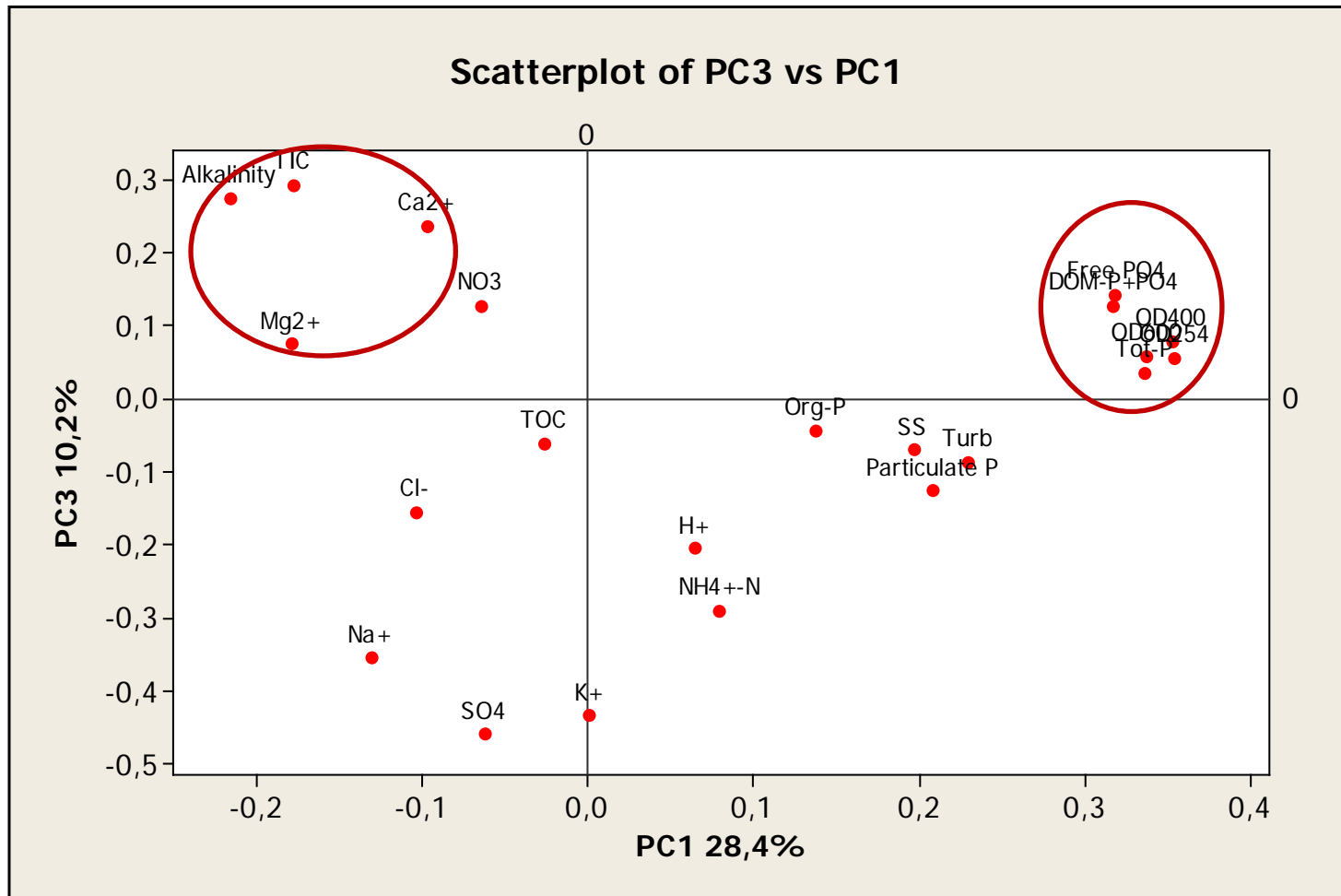


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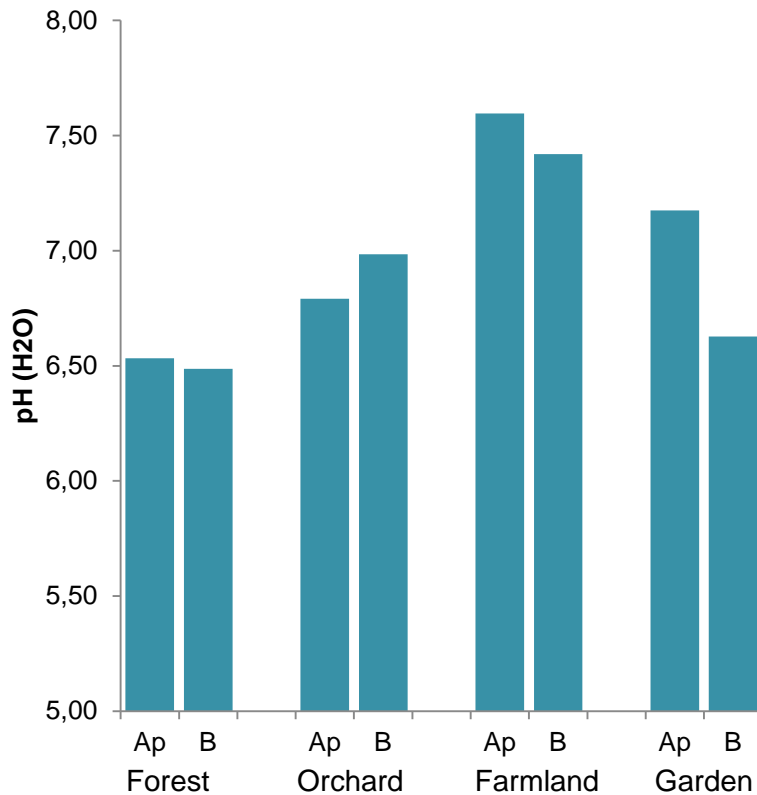
PCA



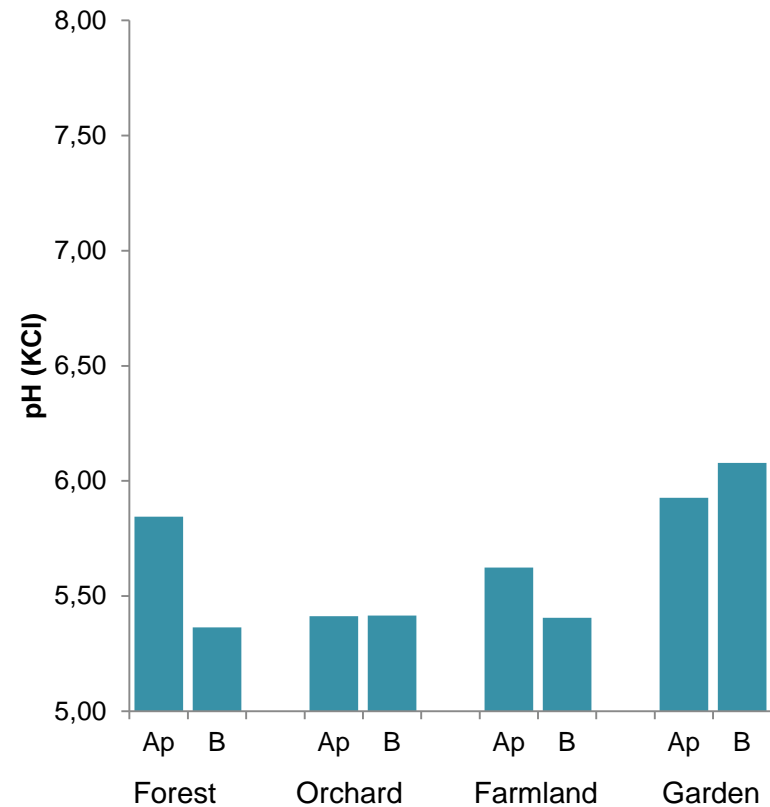


Soil pH

Rather as expected with relatively low pH in forest and high in agricultural land

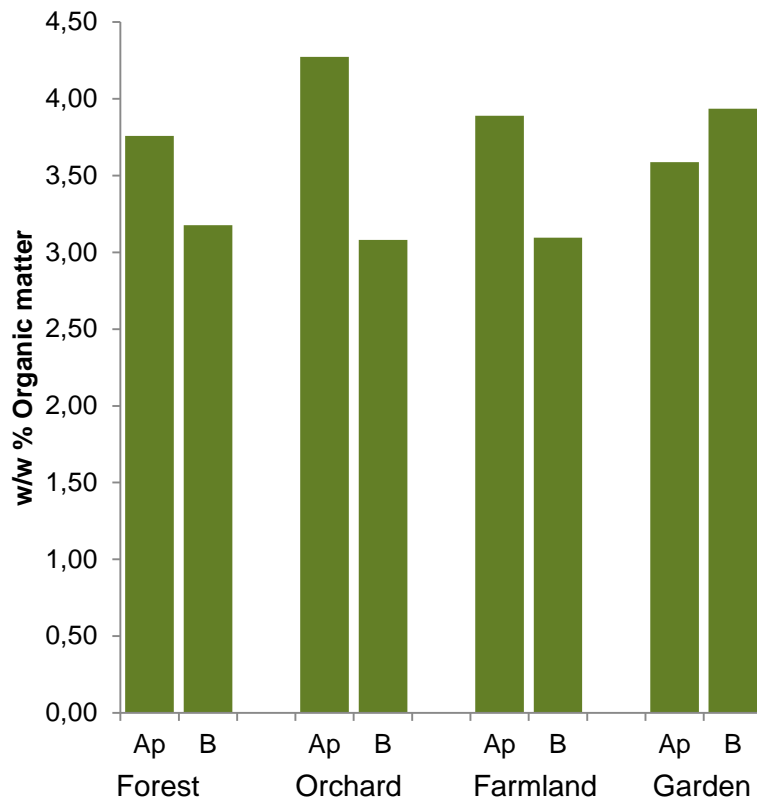


Abnormal pH(KCl) relationship

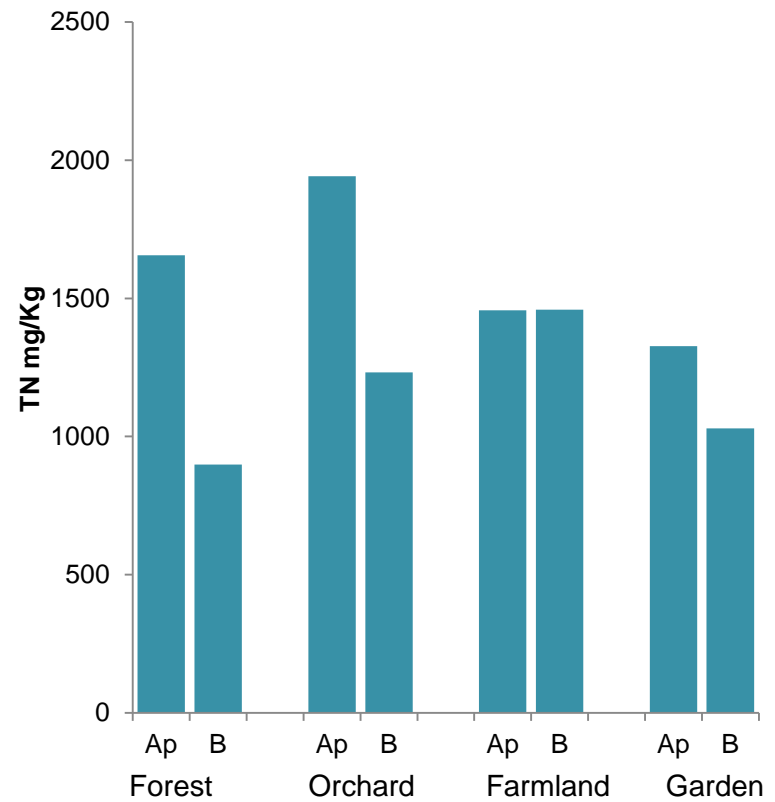


Soil chemistry

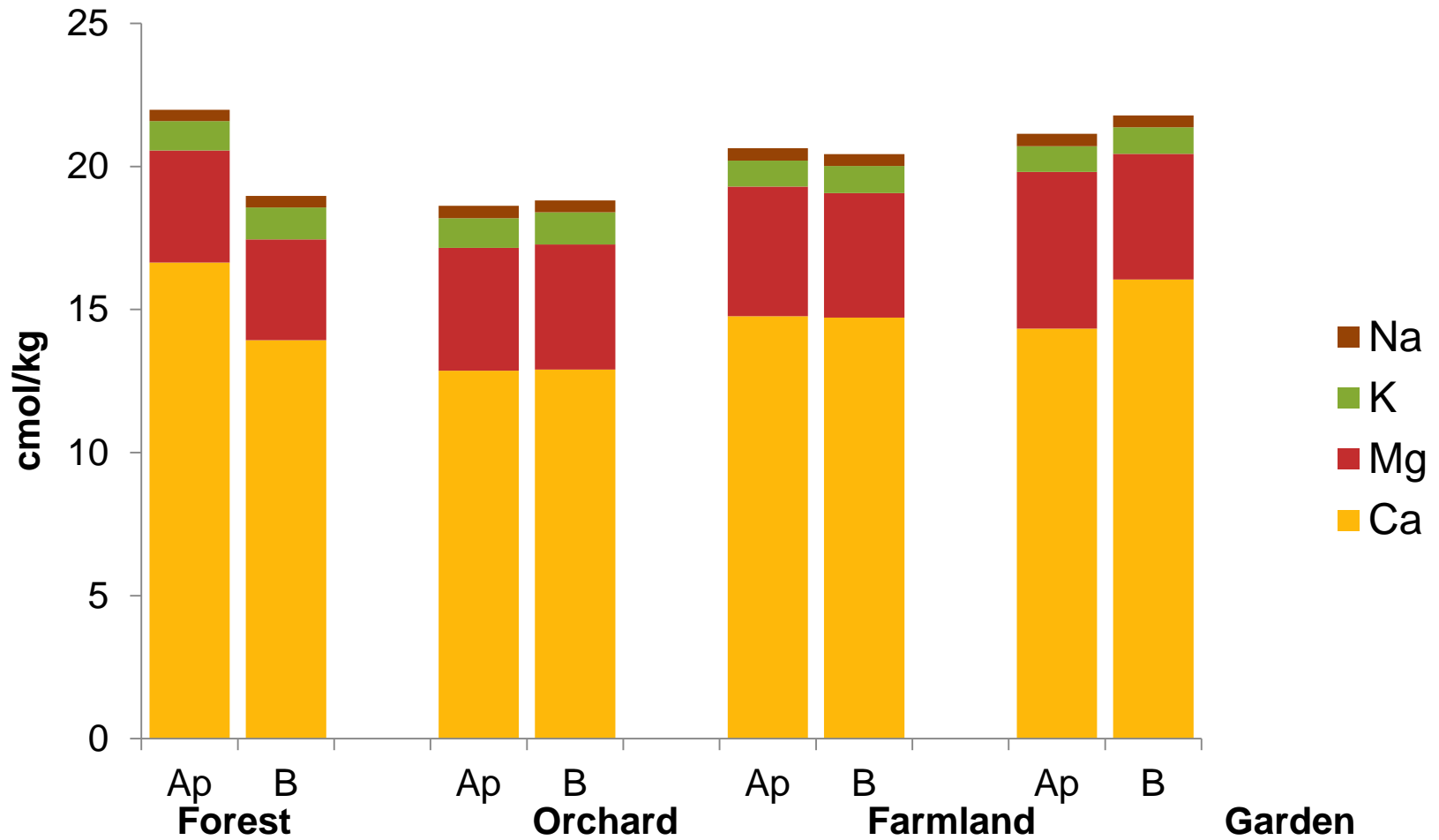
Low organic content
Typically it is usually highest in the Ap



Not large differences in Total N
Highest in the Ap of the Orchards

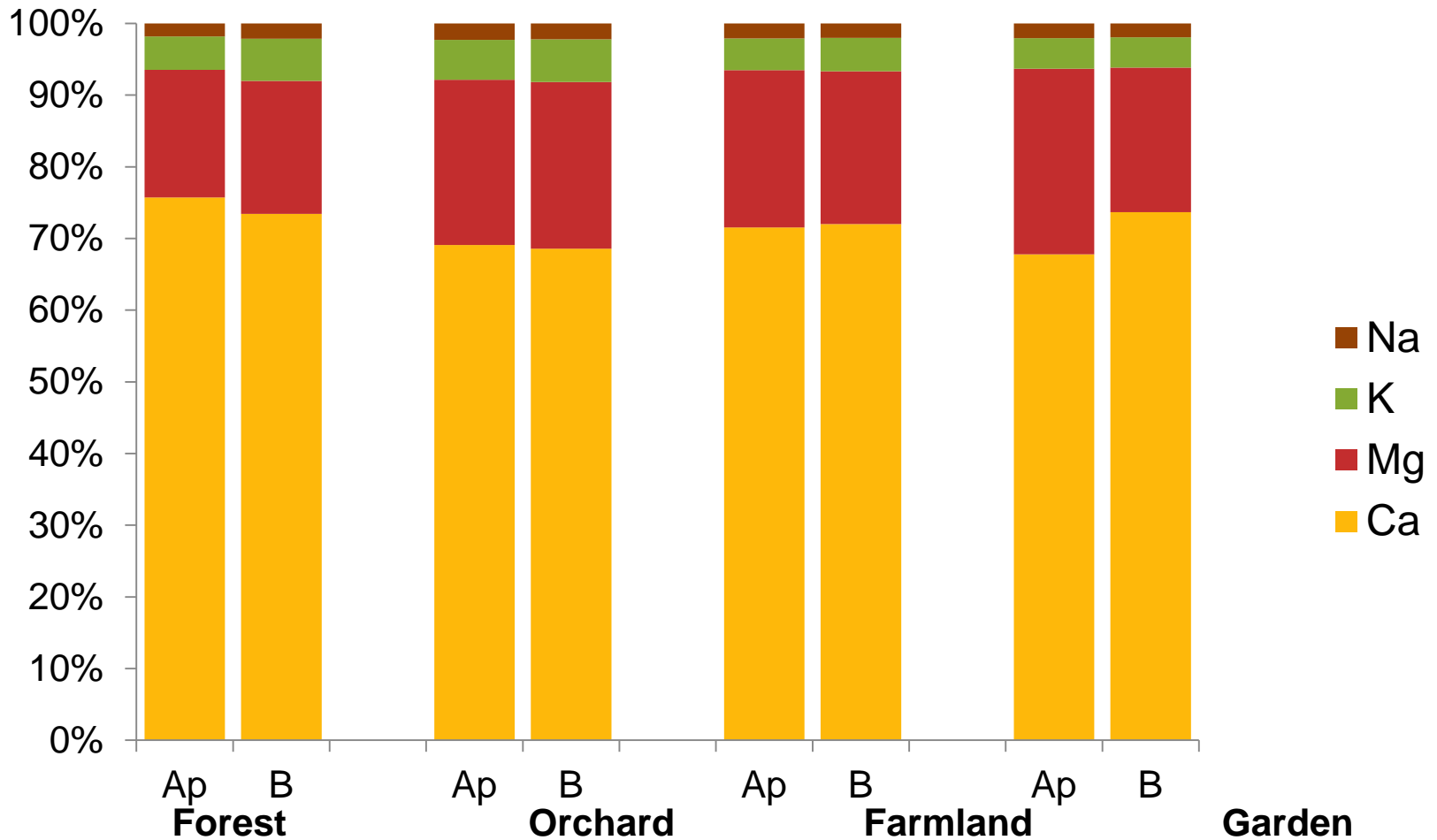


Element composition



Element composition

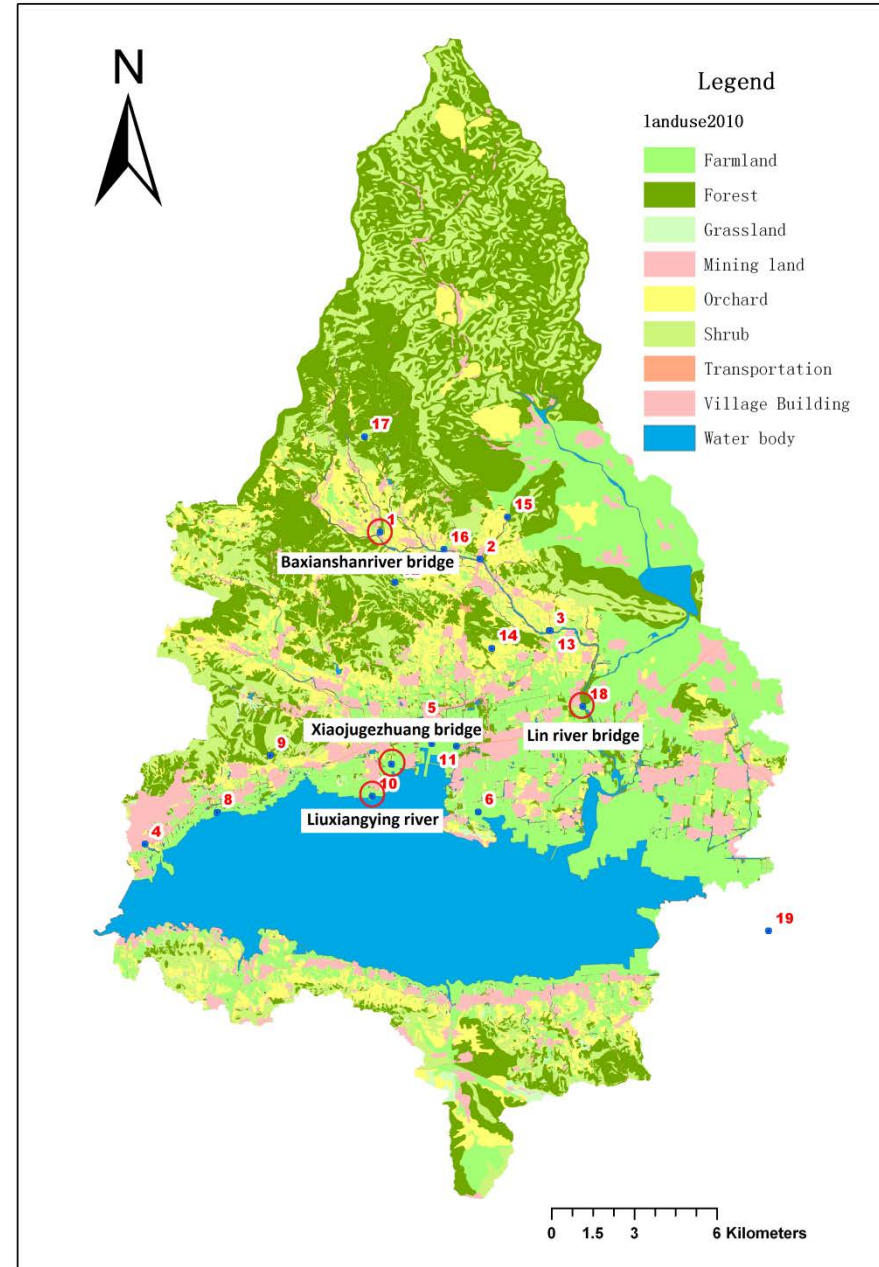
Rather uniform composition



Episode studies

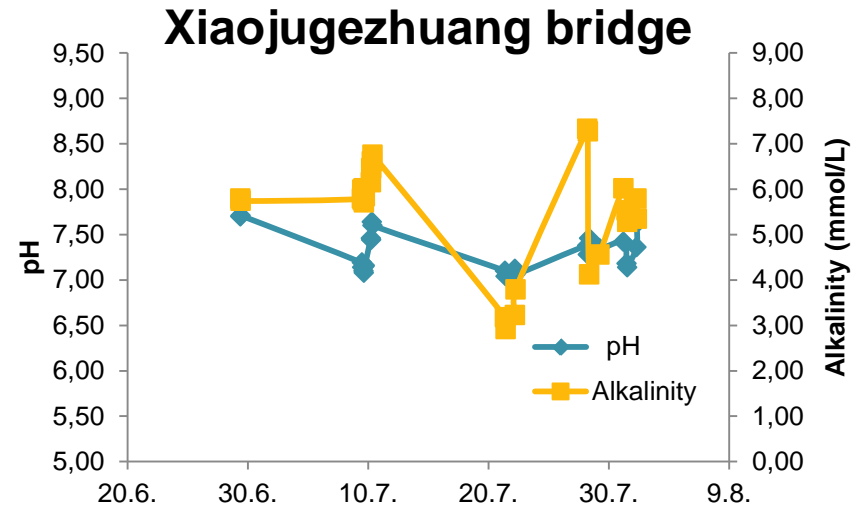
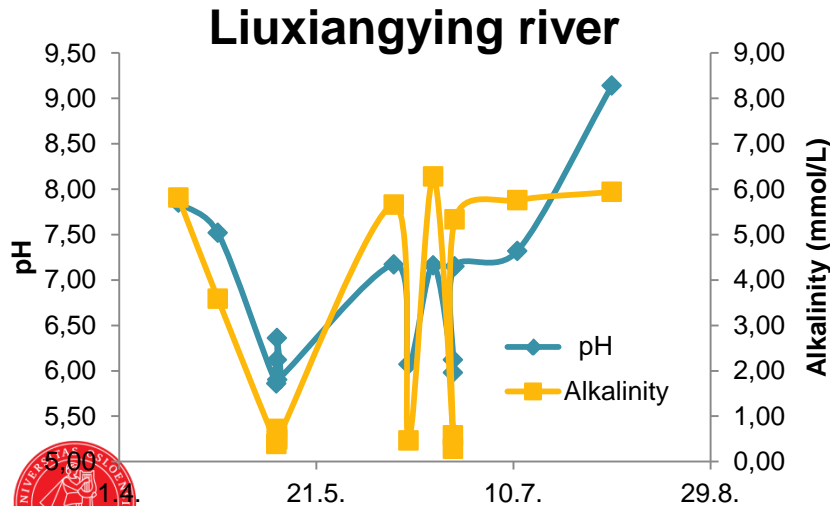
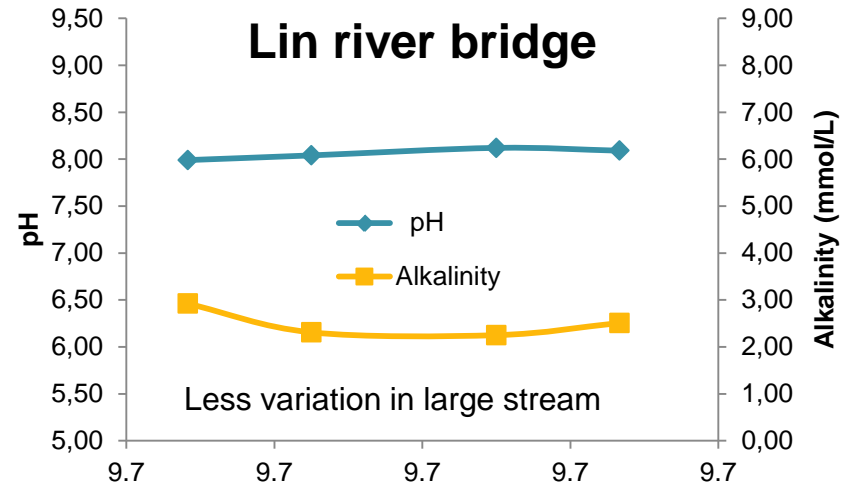
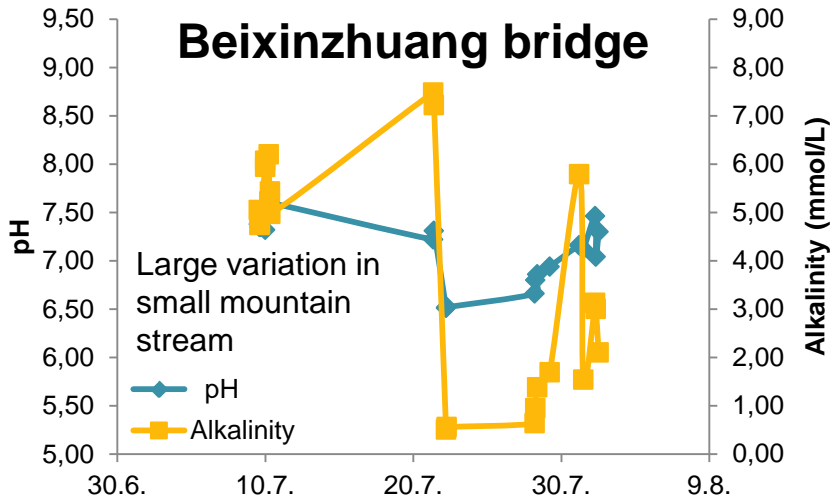
4 streams:

- Baxianshan river bridge
 - Mountain stream
- Lin river bridge
 - Major river
- Liuxiangying river
 - Small stream
- Xiaojugezhuang bridge
 - Typical stream



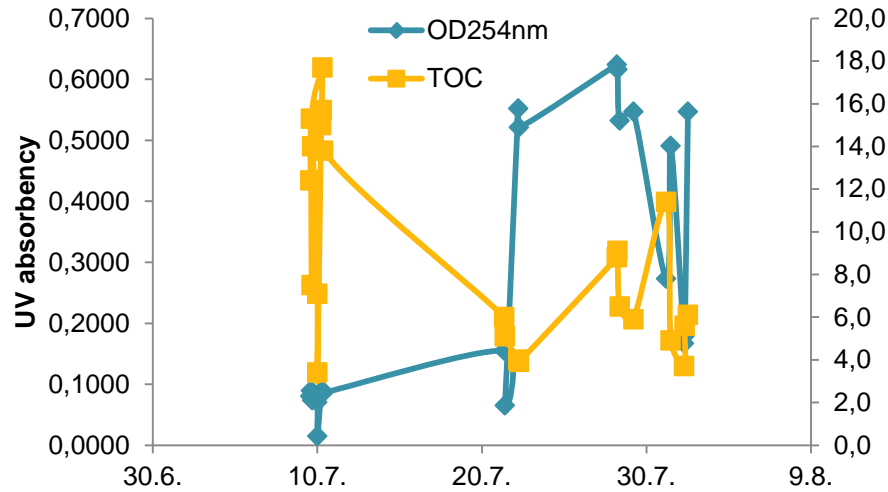
Temporal variation in stream water chemistry

pH and alkalinity: Positive co-variation

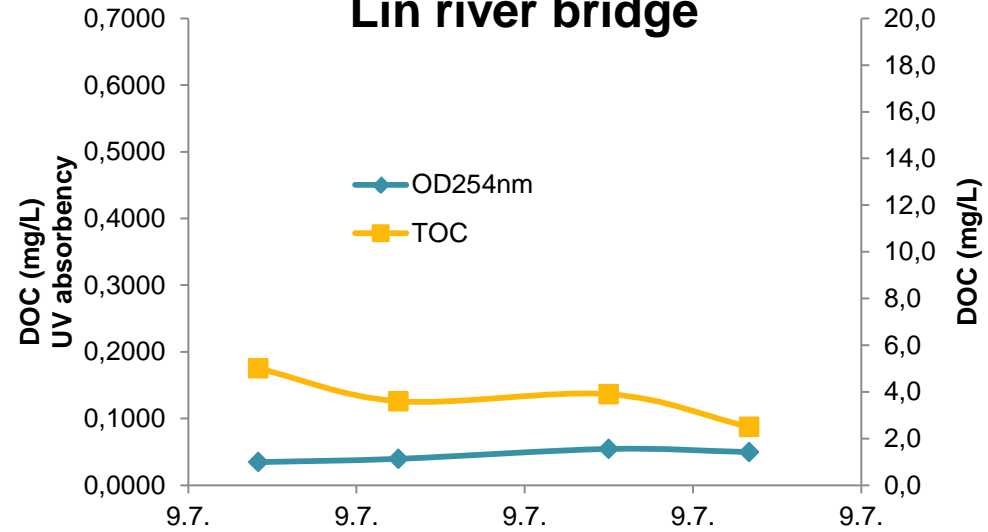


UV abs and TOC: Negative co-variation! – large variation

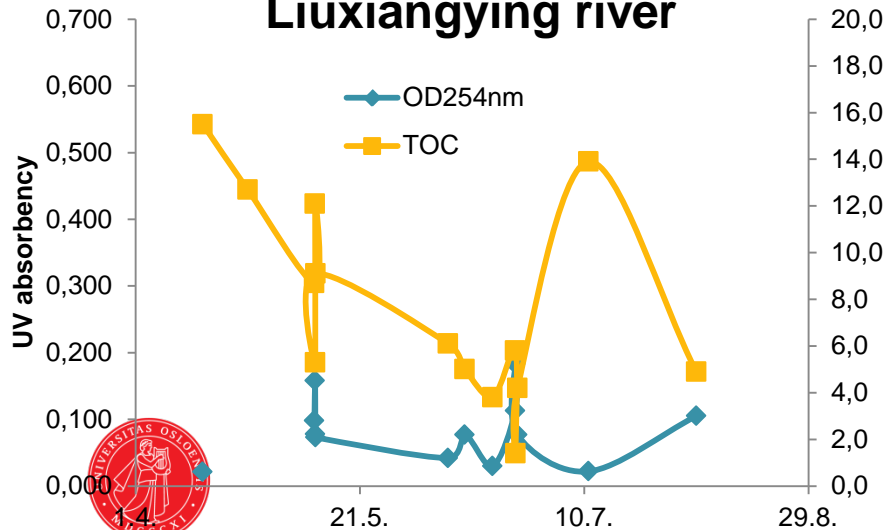
Beixinzhuang bridge



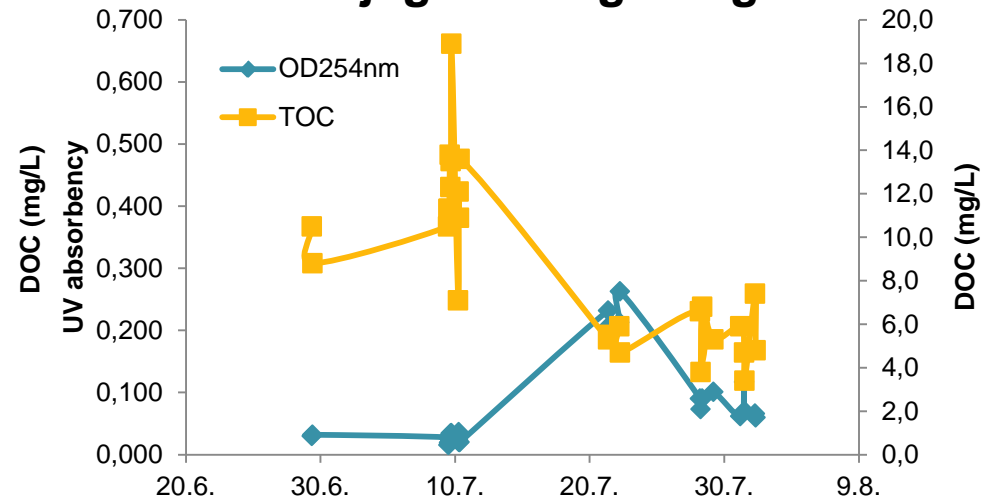
Lin river bridge



Liuxiangying river



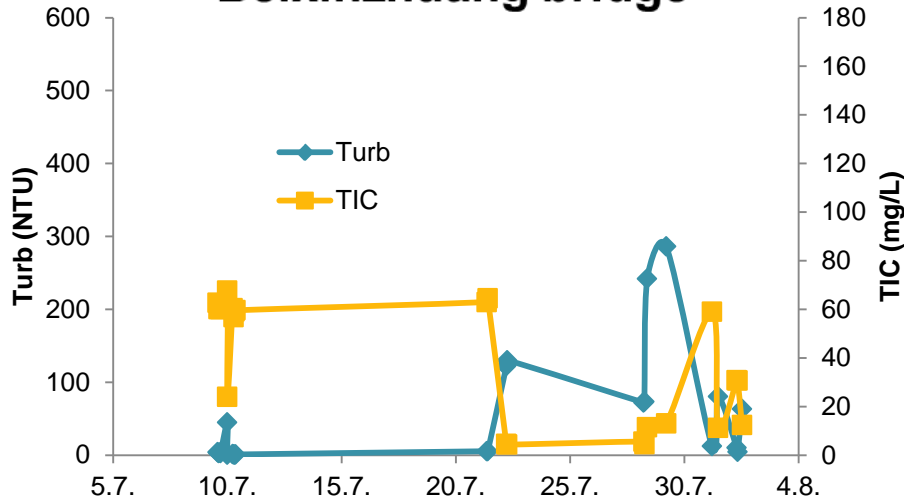
Xiaojugezhuang bridge



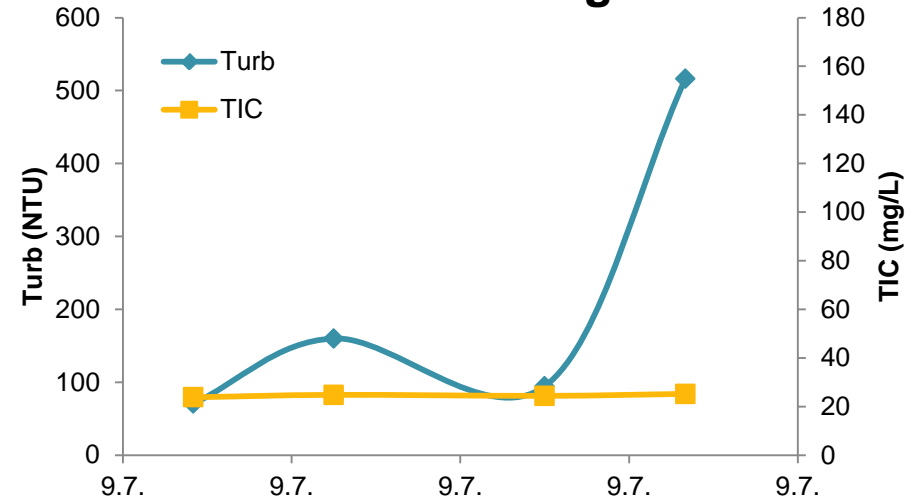
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Turbidity and TIC: Poor negative co-variation – large differences between streams

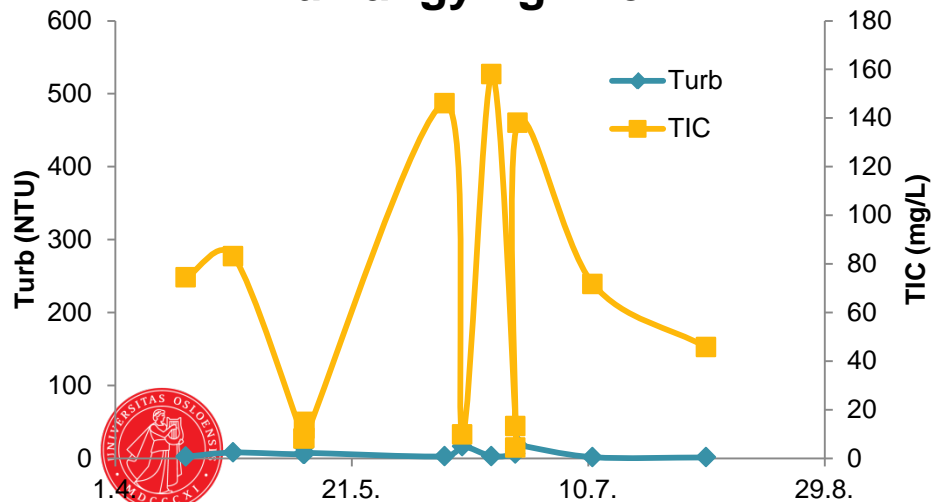
Beixinzhuang bridge



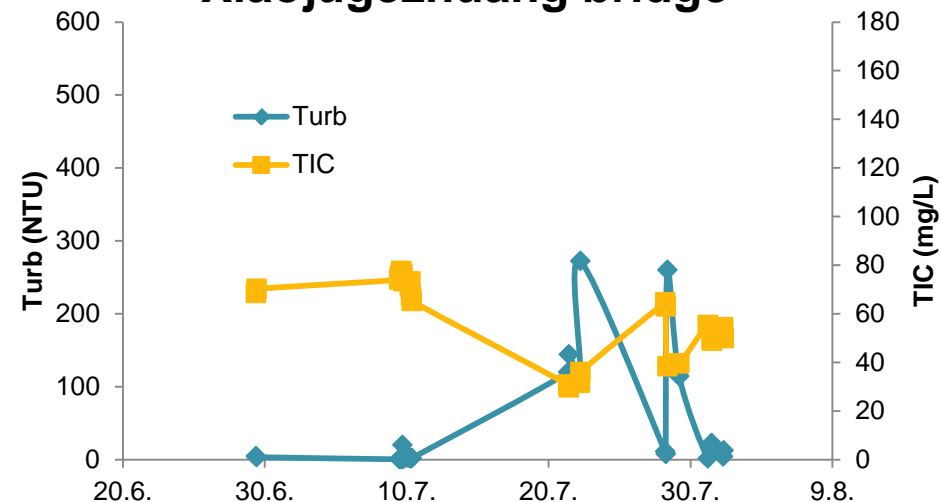
Lin river bridge



Liuxiangying river

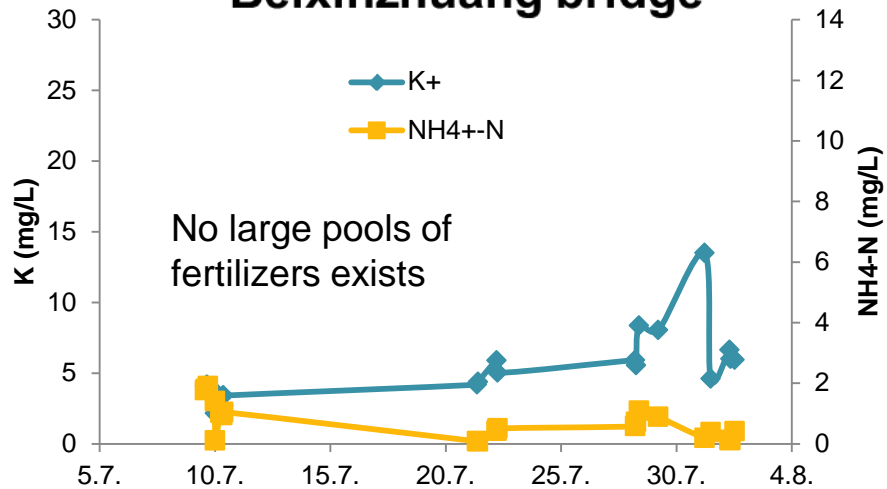


Xiaojugezhuang bridge

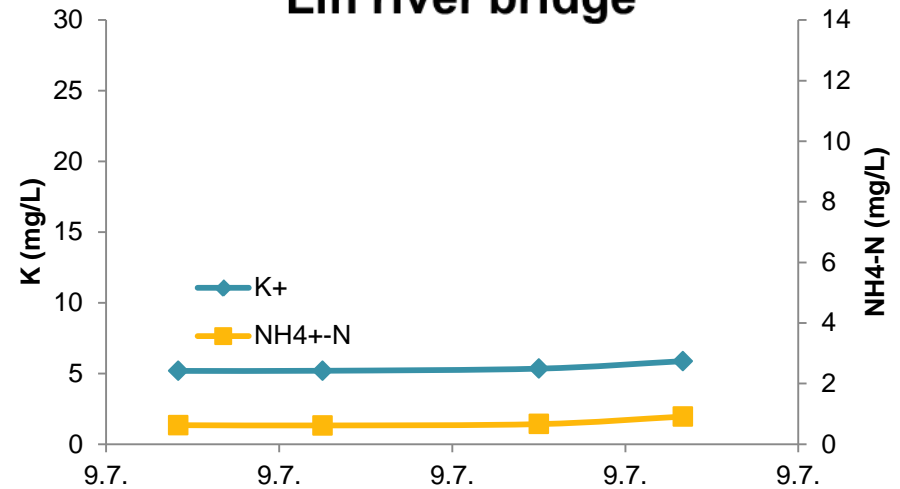


K and NH₄: Tracers of direct input of fertilizers

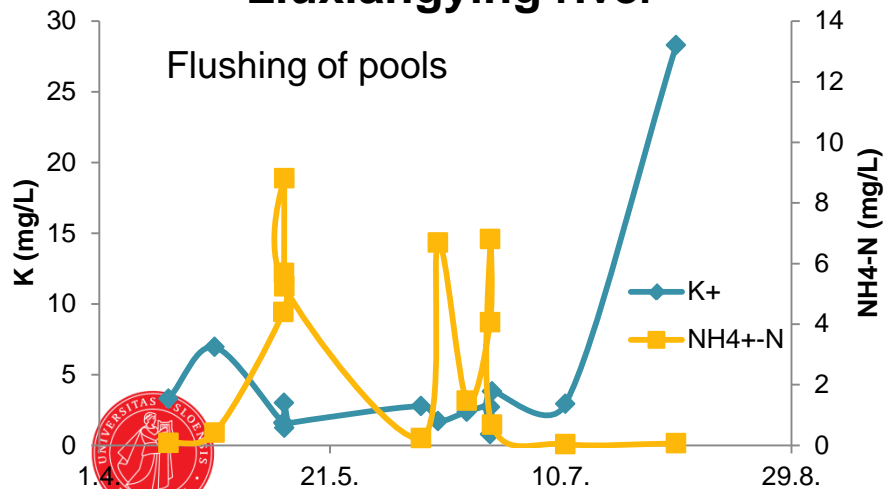
Beixinzhuang bridge



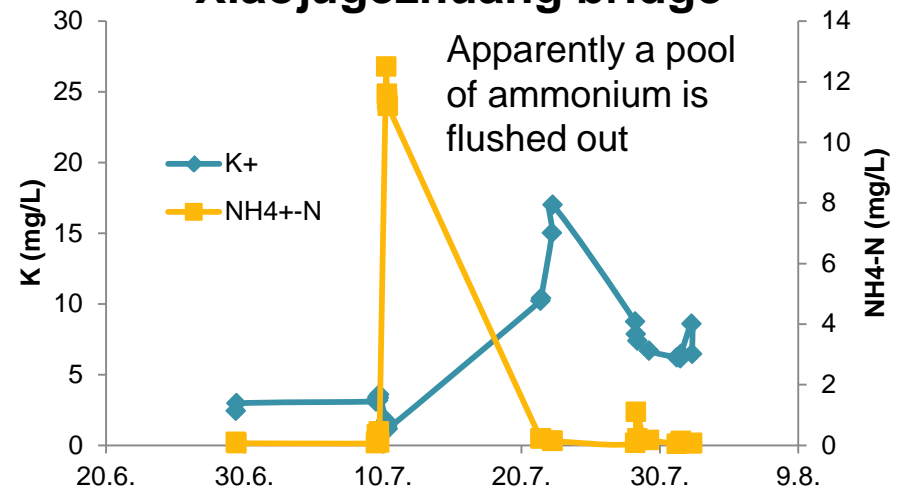
Lin river bridge



Liuxiangying river



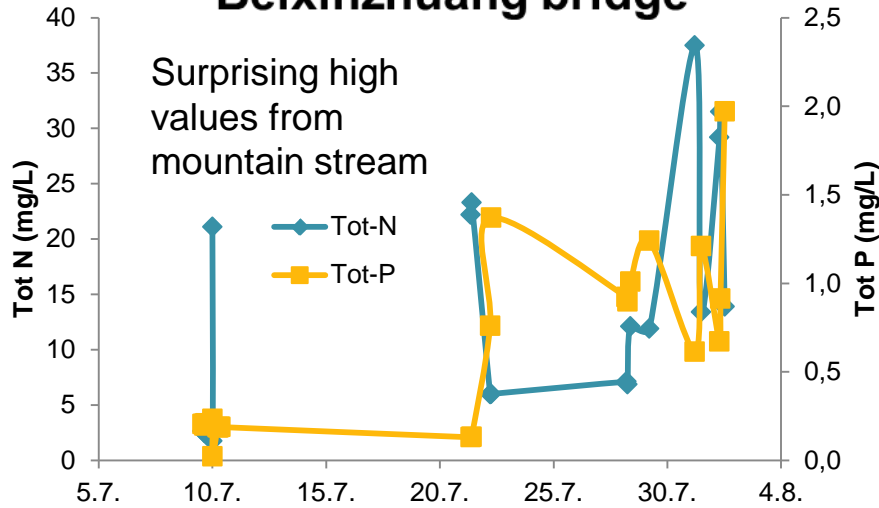
Xiaojugezhuang bridge



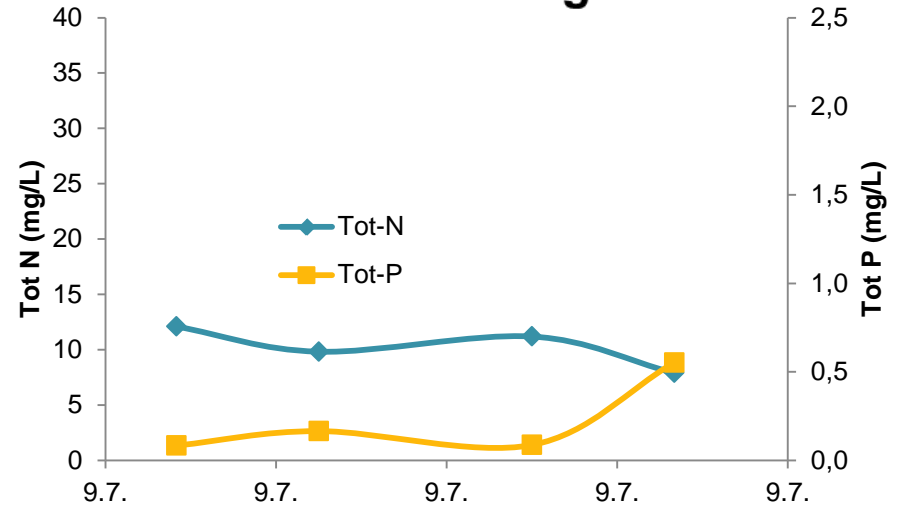
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Tot N and P: Not correlated – large differences between streams

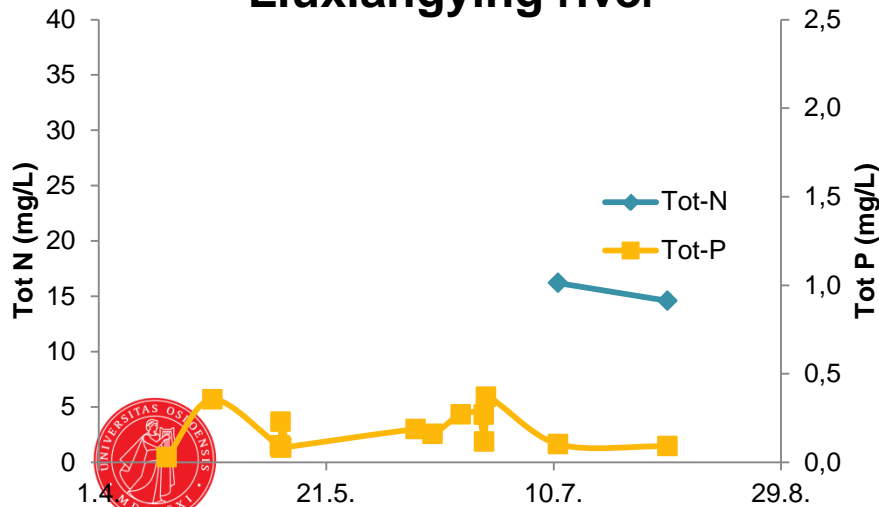
Beixinzhuang bridge



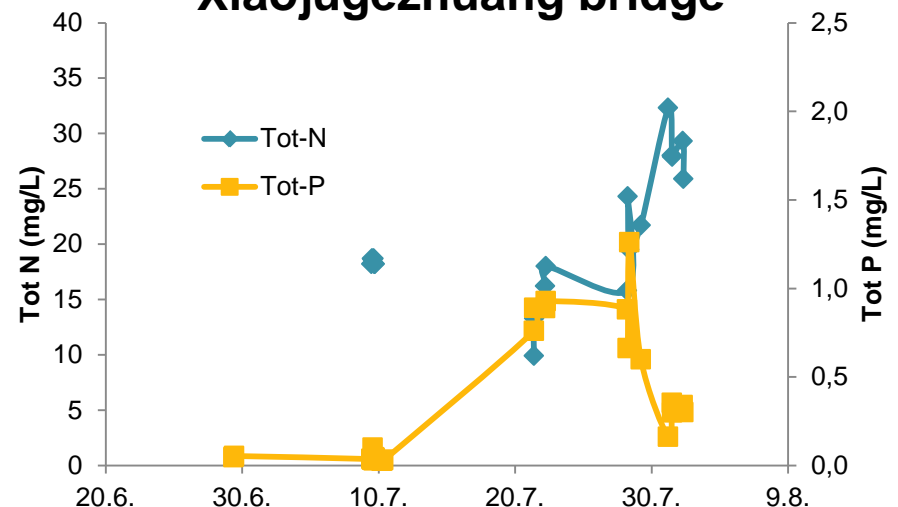
Lin river bridge



Liuxiangying river

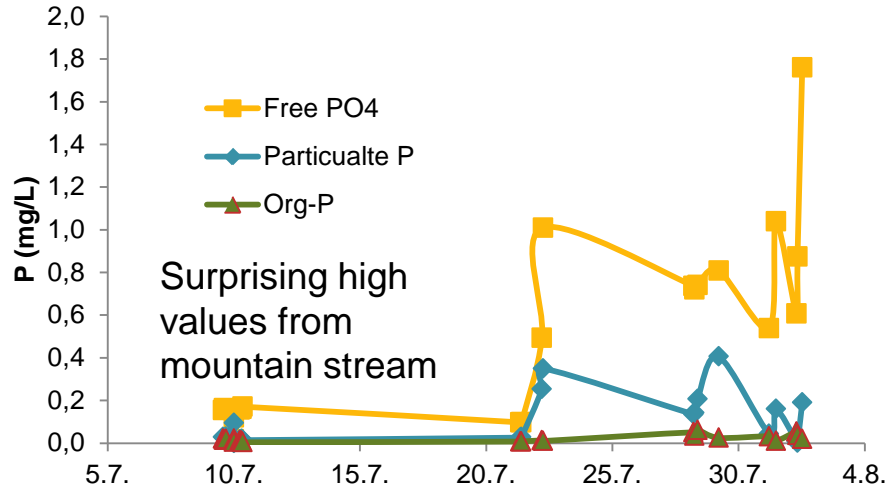


Xiaojugezhuang bridge

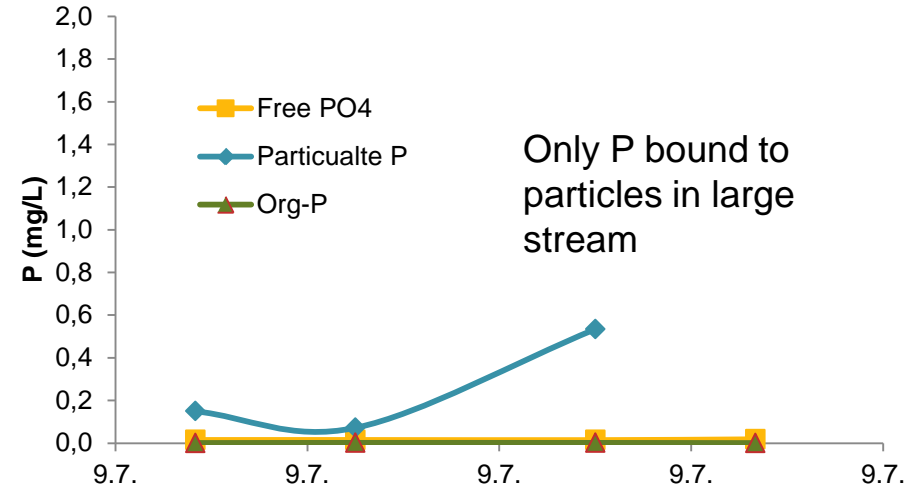


P fractions: Large differences between streams

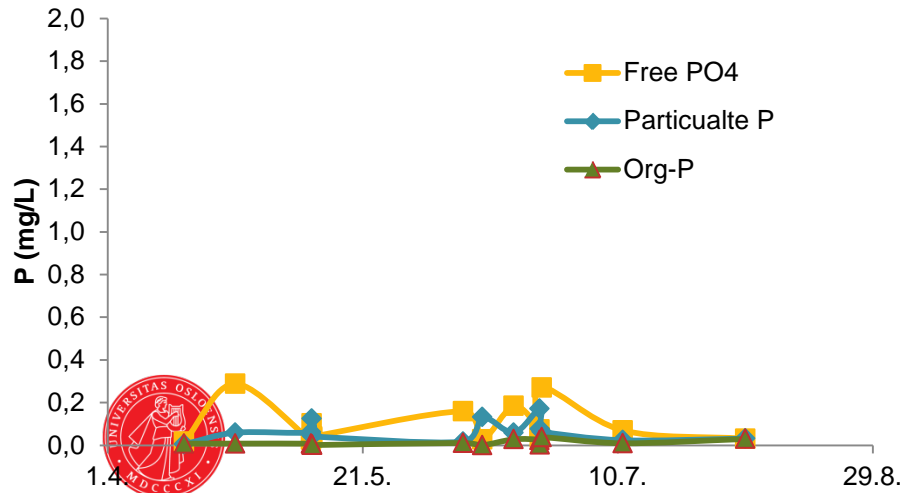
Beixinzhuang bridge



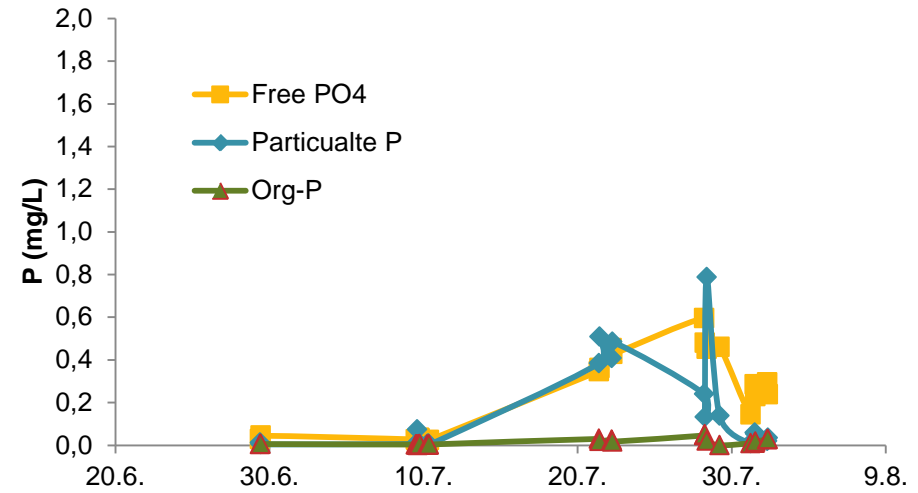
Lin river bridge



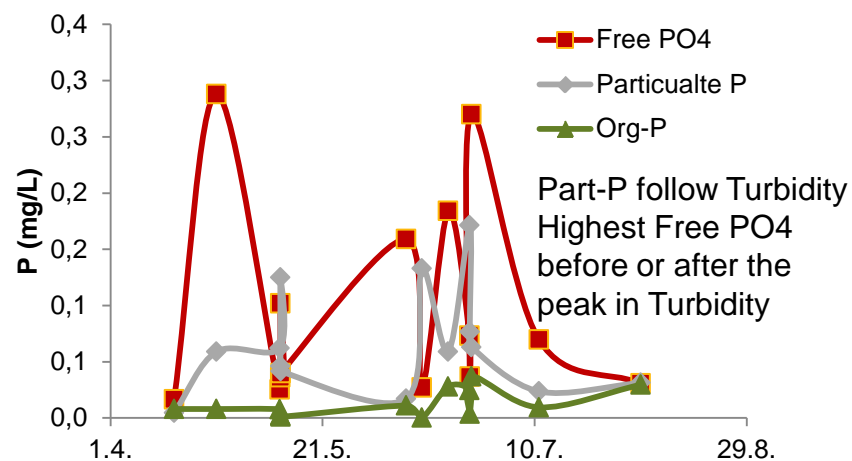
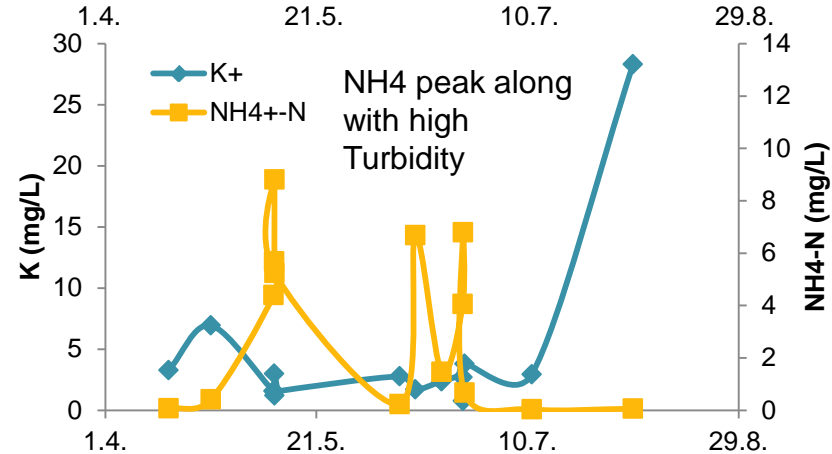
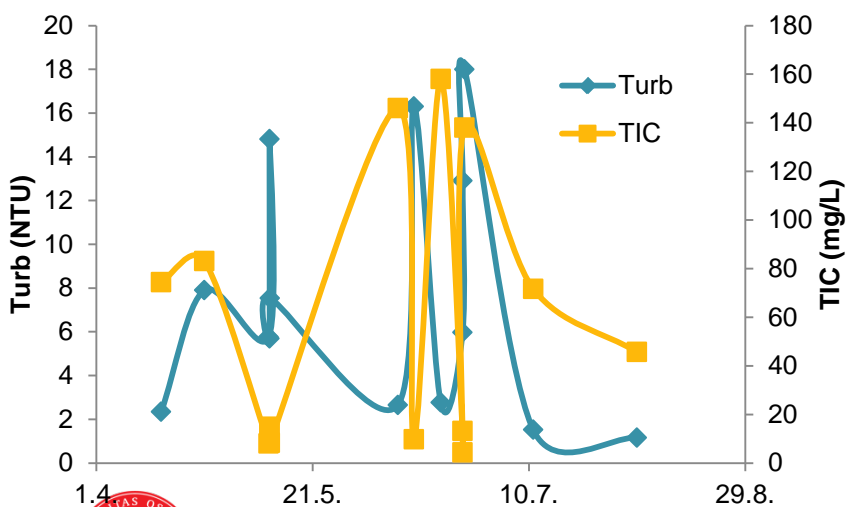
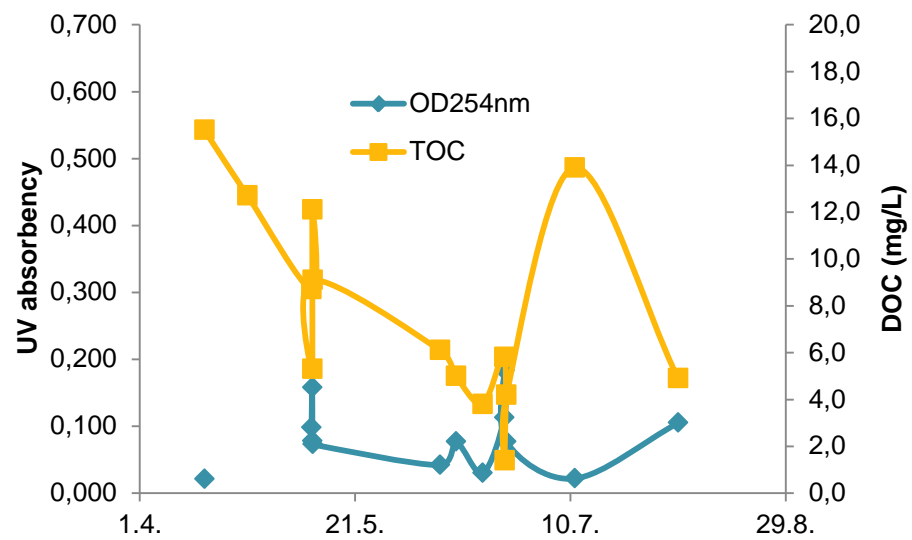
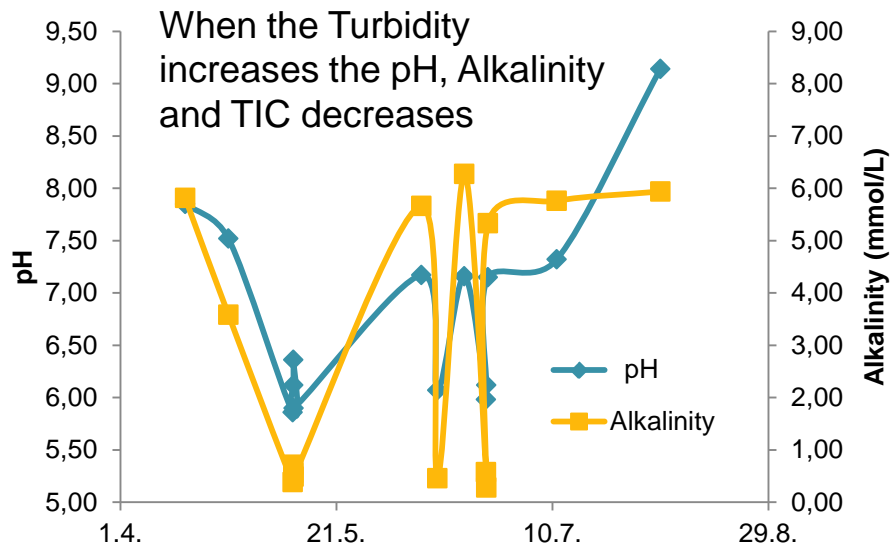
Liuxiangying river



Xiaojugezhuang bridge



UiO : Liuxiangying river



Xiaojugezhuang bridge

