# Depositional characteristics of glacial kettle holes at Kraatz and Rittgarten

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## Introduction

Kettle holes are small inland water bodies located in young moraine landscapes. These highly productive aquatic systems serve as a sink for various substances. Thus, they are hotspots of biogeochemical matter transformations within a rather uniform agricultural landscape. Moreover, kettle holes exhibit a high biodiversity, and are protected by law in their ecological wet habitat functions.

Since there is not much known about kettle holes, the present study aims to compare the recent history of matter accumulation, mainly depending on the use of the direct catchment, using the vertical element distribution of undisturbed sediment cores.

## Study Area


- Northeast Germany, Brandenburg
- Subcontinental climate, negative climatic water balance
- Disconnected from regional groundwater table
- Agriculturally used catchment



**Fig. 1:** A view of the kettle holes at Rittgarten and Kraatz, 23 October 2013.

## Methods

*Vertical element distribution*:

1) *μ*XRF spectroscopy measurements (Croudace et al. 2006)
   - one half sediment core each (6/19/2013)
   - 0.5 mm resolution
   - measured elements: Al, Ar, As, Ba, Ca, Cd, Cl, Cr, Cu, Fe, Ga, Ge, K, Kr, Mg, Mn, Mo, Ni, P, Pb, Rb, S, Si, Se, Sr, Ti, V, Y, Zn, Zr
2) Wet digestion (Andersen 1976), molybdenum blue method
   - one half sediment core each (6/19/2013)
   - 1 cm horizons, duplicate measurements
   - determination of total P and Fe
3) Wet digestion (aqua regia), ICP, and AAS
   - one half sediment core each, (6/19/2013)
   - sliced in 1 cm steps downcore (Fig. 2)
   - duplicate measurements: Fe, Ca, P, Mn, K, Pb, Cd, Cu, Zn, Si, Mo, Zr, Rb, C, V, S




**Fig. 2:** Sediment core (Rittgarten) halved and sliced for further analysis.

*Dating approach combining 1) and 2)*

1) Sediment accumulation
   - one sediment core each (10/23/2013)
   - based on 1 cm horizons
   - density based on dry weight and loss on ignition
2) Sediment traps
   - sampled every 14 days since June 2013

**Fig. 3:** Sediment traps.

*Literature search on land use changes*

## Results

*Vertical element distribution*

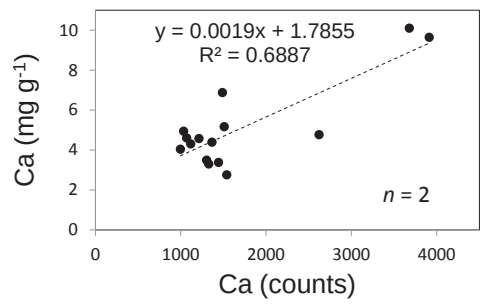


**Fig. 4:** Ca concentration determined by *μ*XRF vs. Ca concentration determined by wet digestion and ICP.

*Dating*

1) Sediment accretion rate
   Rittgarten: 9.4 mm $a^{-1}$ Kraatz: 4.4 mm $a^{-1}$

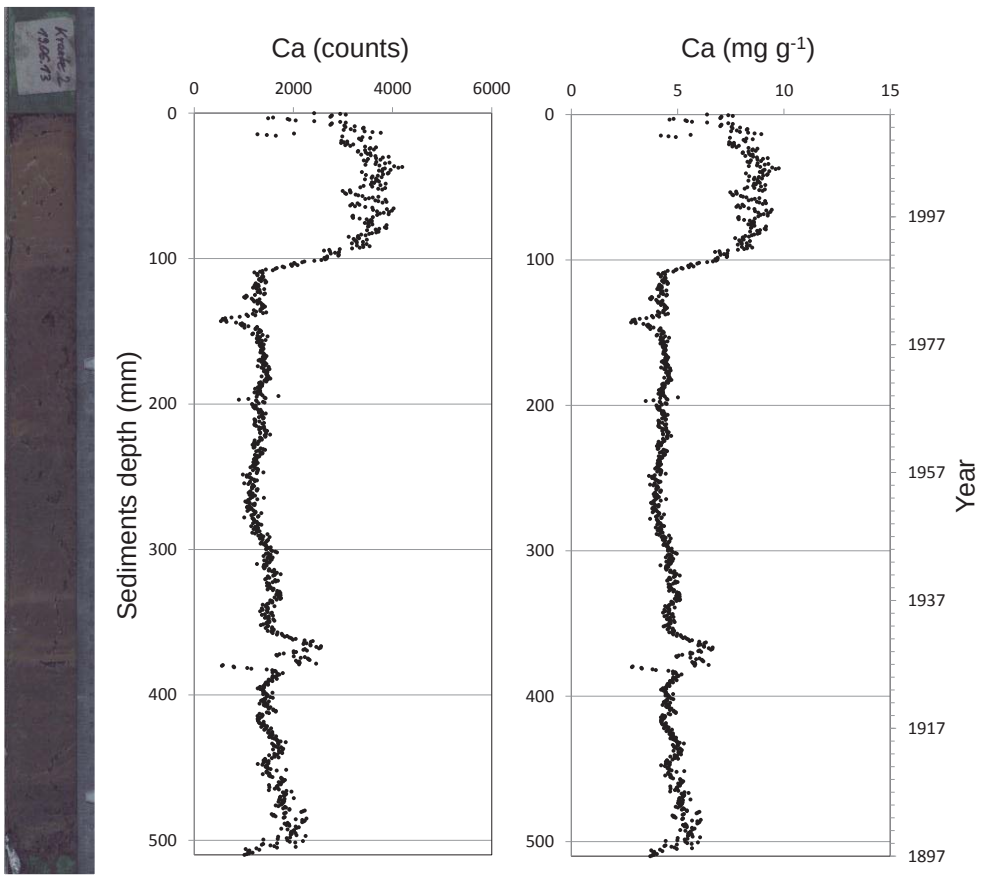


**Fig. 5:** Vertical profile of Ca concentration (Kraatz) determined by *μ*XRF (middle panel), and wet digestion and ICP (right panel).

## Acknowledgements

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## References

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