

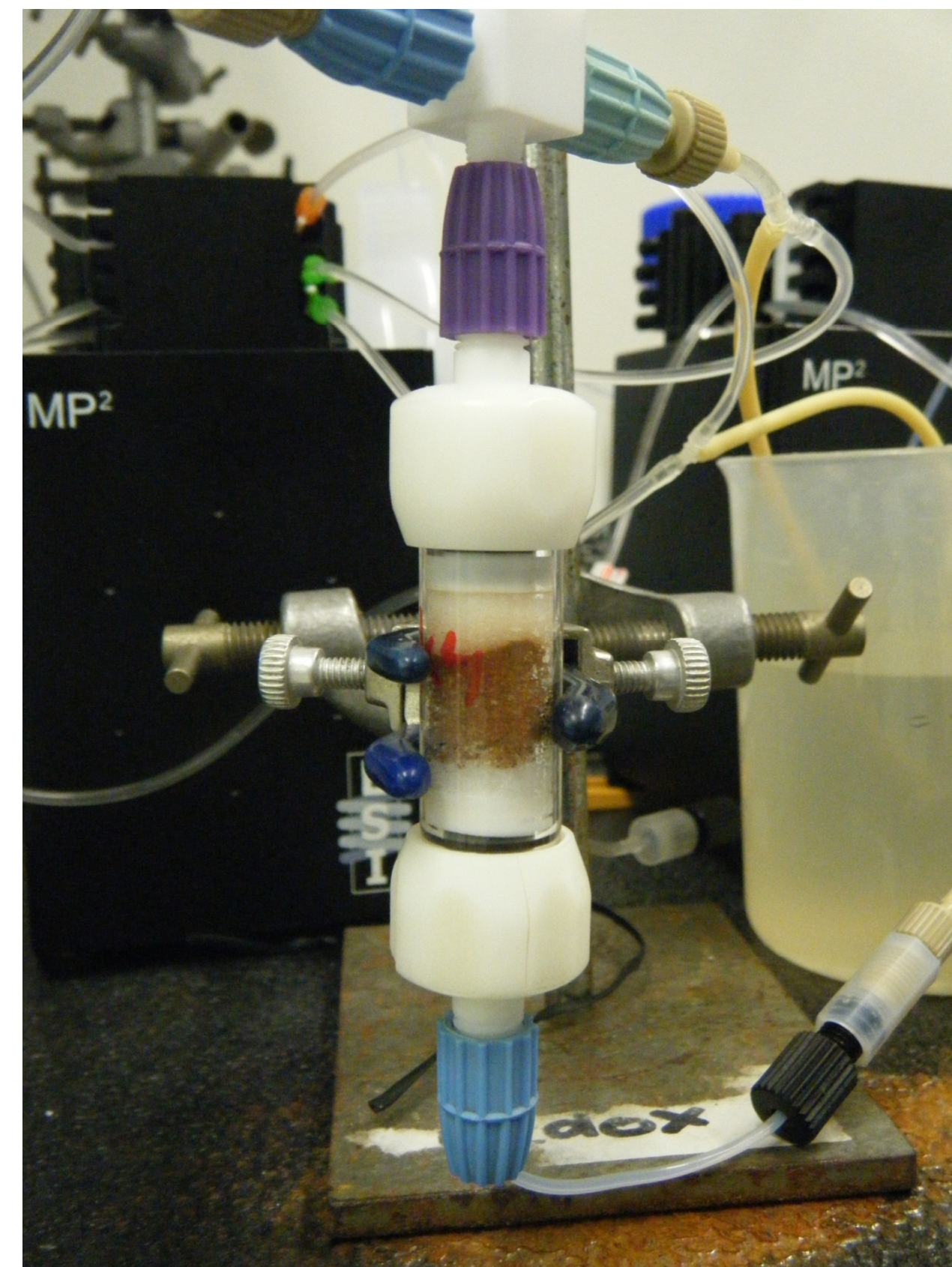
# Potential of on-line continuous leach ICP-MS for linking trace elements to mineralogy: PRELIMINARY RESULTS



## Introduction

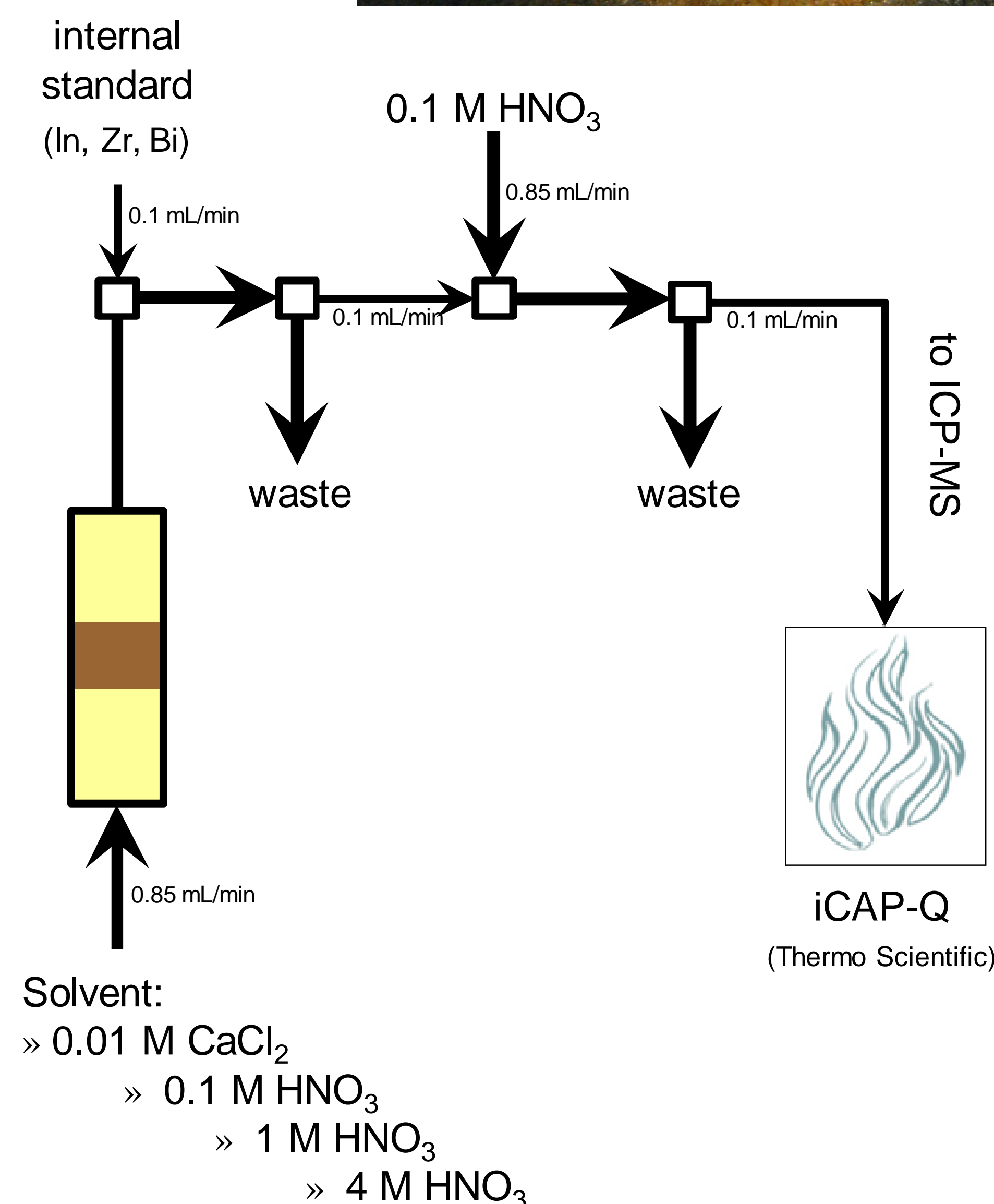
Continuous leach experiments have the advantage of real time (every 2 seconds) full elemental analysis. Mineral breakdown reactions can be monitored via the major elements, with simultaneous associated trace elements analysis, thus eliminating the uncertainties of host mineral-trace element combinations in traditional off-line sequential extractions.

The soil samples used were collected at 5 sites in the Koiliaris River watershed, Crete, Greece). The selection of the sites was based on variability in bedrock (limestone and alluvial sediments) and current land use (grape farming, olive trees). More information, see poster EGU2014-14894.



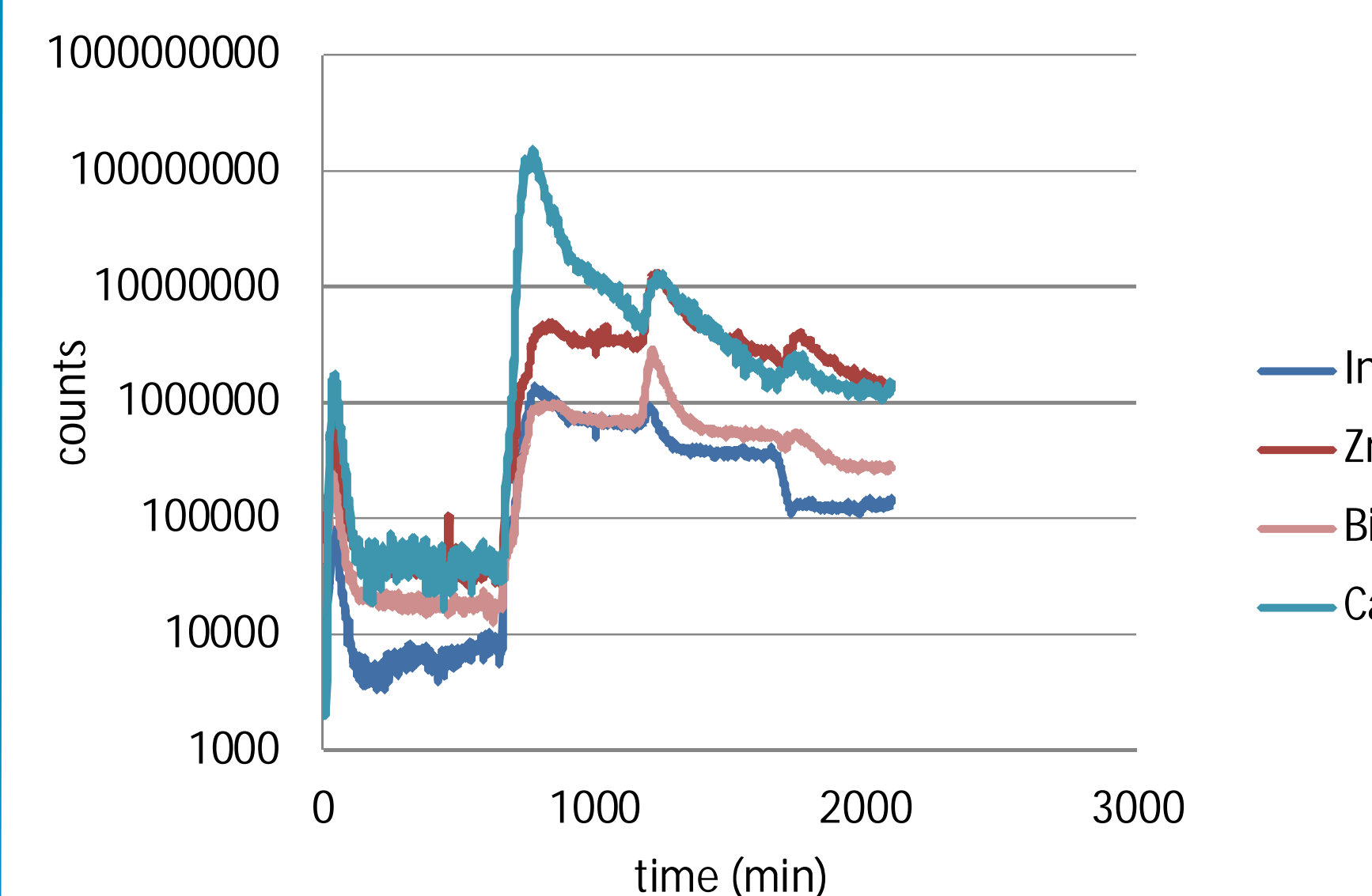
## Method

A set of 5 soil samples was subjected to an on-line continuous leach inductively coupled plasma mass spectrometry experiment, with progressively reactive solvents (0.01M  $\text{CaCl}_2$ , 0.1 M  $\text{HNO}_3$ , 1M  $\text{HNO}_3$ , 4M  $\text{HNO}_3$ ). Each sample was diluted 1:5 with acid washed quartz to prevent clogging and packed in a quartz tube ( $\varnothing = 1$  cm, length 2 cm) sandwiched by layers of quartz.

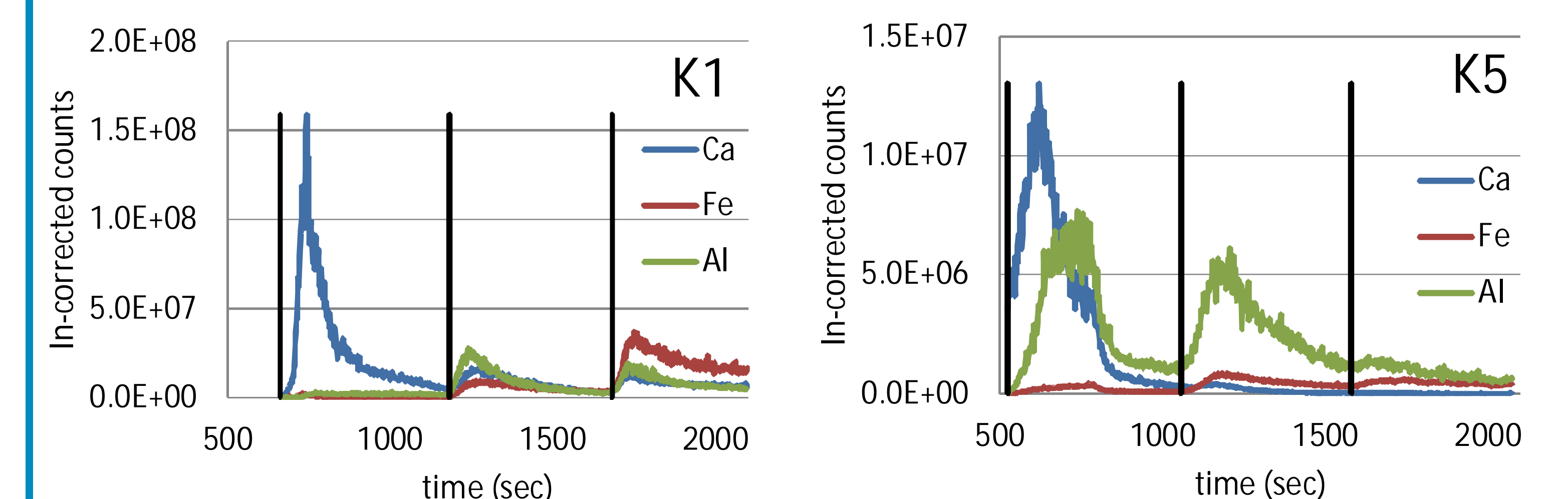


## Matrix effect

Despite the 10-fold dilution with 0.1M  $\text{HNO}_3$ , there is a clear matrix effect. Counts were corrected for the  $^{115}\text{In}$ -signal. Due to the generally limited leaching during the 0.01M  $\text{CaCl}_2$  step and the instability of the signals in this solvent, this step was considered a wash step.



## Leaching of main elements



In-corrected counts for Fe, Al and Ca in 0.1 M, 1 M and 4 M  $\text{HNO}_3$ .

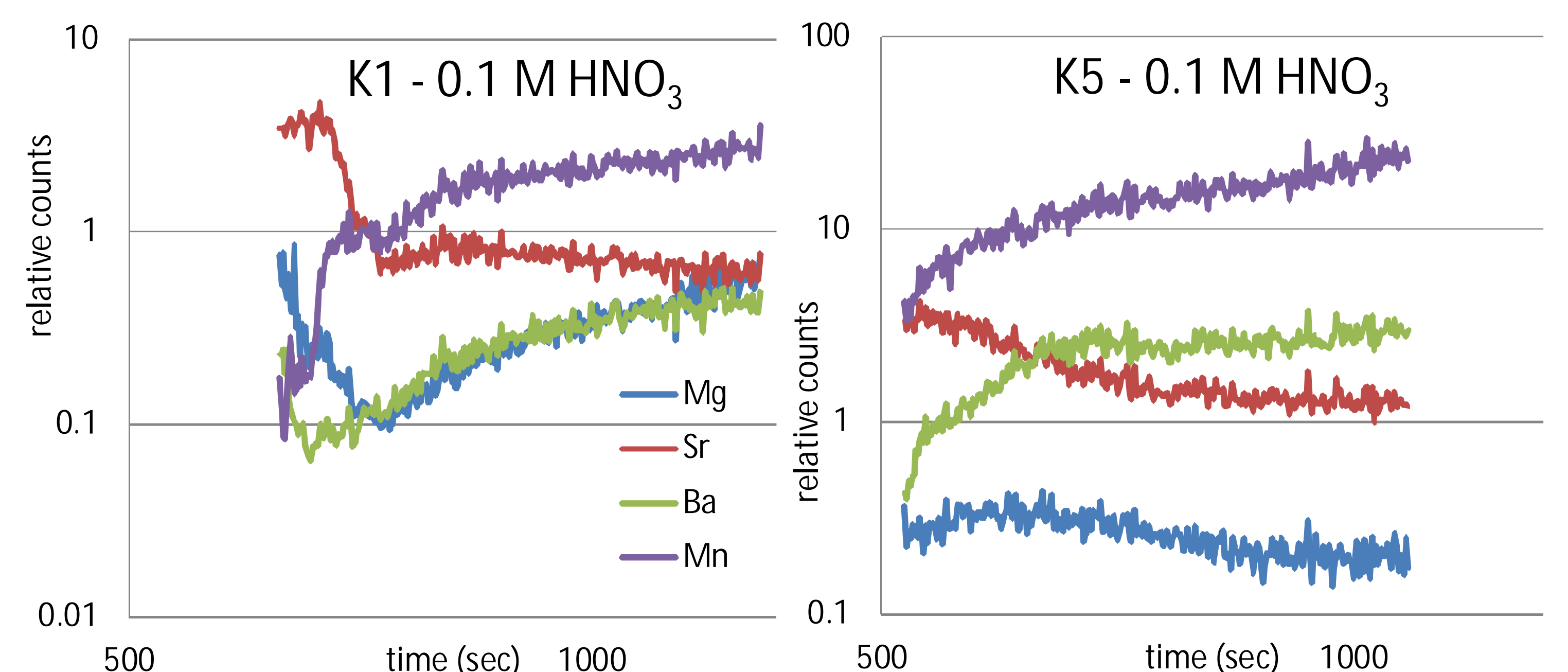
0.1 M  $\text{HNO}_3$  → carbonate-related elements  
 1 M  $\text{HNO}_3$  → clay-related elements  
 4 M  $\text{HNO}_3$  → iron-containing minerals

## Preliminary conclusions

- The data can be used for mineral differentiation.
- Large amounts of data are generated, target specific questions!

## Future work

- Investigate the reliability of the obtained results
- Compare leached amounts to total content;
- Vary in eluents;
- Adjust experiment so a gradual increase in the  $\text{HNO}_3$ -concentration is applied;
- Link elements to mineral phases.
- Compare subsoil to topsoil samples



Counts of several elements in 0.1 M  $\text{HNO}_3$  normalised on the counts for calcium.

- In K1, the carbonates that initially dissolve have a higher Sr and Mg content than carbonates that are harder to dissolve;
- Though a high percentage of the leachable Ba and Mn is released in the first extraction step, these elements are not or just partly related to Ca.

