

Is it possible to allocate archaeological manuscripts to their respective origin solely by using elemental and isotopic analysis of dust?

Introduction



Fig. 1: Kremsmünster Abbey (Upper Austria) and Zwettl Abbey (Lower Austria) and sampling of dust from manuscripts

Dust = indicator of the time and place where a manuscript was made and stored?

Investigation of authentic manuscripts preserved in two Austrian abbeys

- Kremsmünster (documents dated back to 12th century)
- Zwettl (documents dated back to 17th century)

to investigate the potential of elemental and isotopic pattern comparison in historic dust as indicator of authenticity.

Samples & Methodology



Fig. 2: Schematic of methodology

Areas of interest & Focus of study

Areas of interest

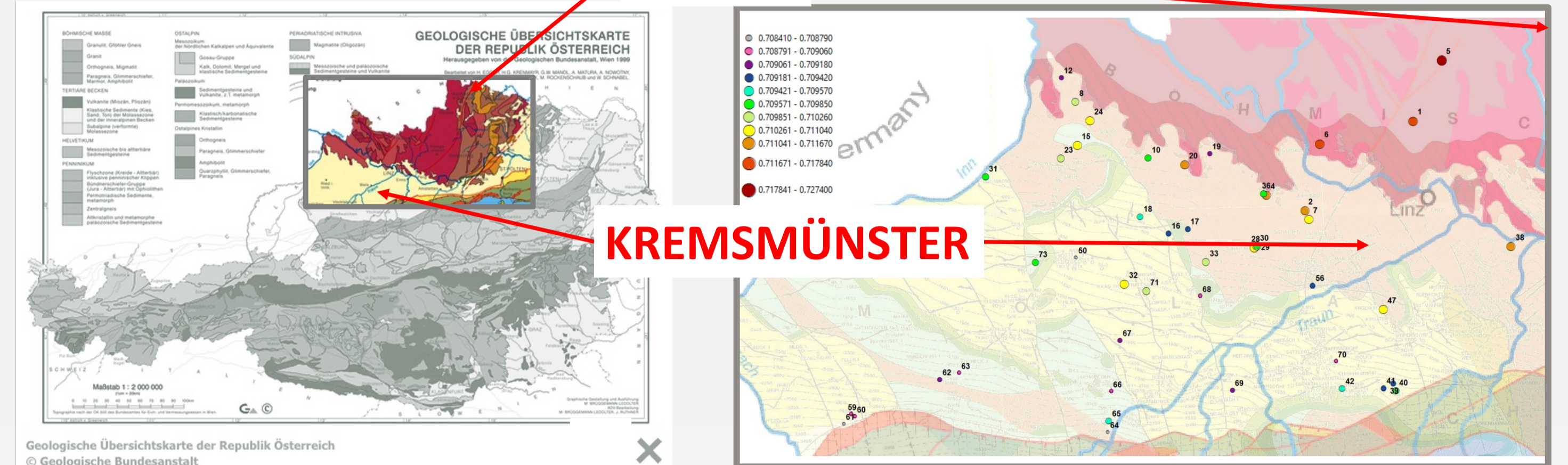


Fig. 3: Geological map of Austria zooming into the region, where the two abbeys of interest are located. (Source: Groß, Götzl, Kriegl, Heidinger, Kralik, Sachsenhofer, Goldbrunner, Hartl, Pytlak, Gusterhuber, Fölsch, Irrgeher: Deep Groundwater Systems in Upper Austria, 2021)

Focus of this work:

- I. Establishment of tracer elemental ratios such as Sr/Ca and ⁸⁷Sr/⁸⁶Sr isotope ratios in dust by analyzing authentic manuscripts from two abbeys located in geologically different regions.
- II. Analysis of local dust compared to historic dust sampled inside of historic manuscripts.

Results

Elemental pattern

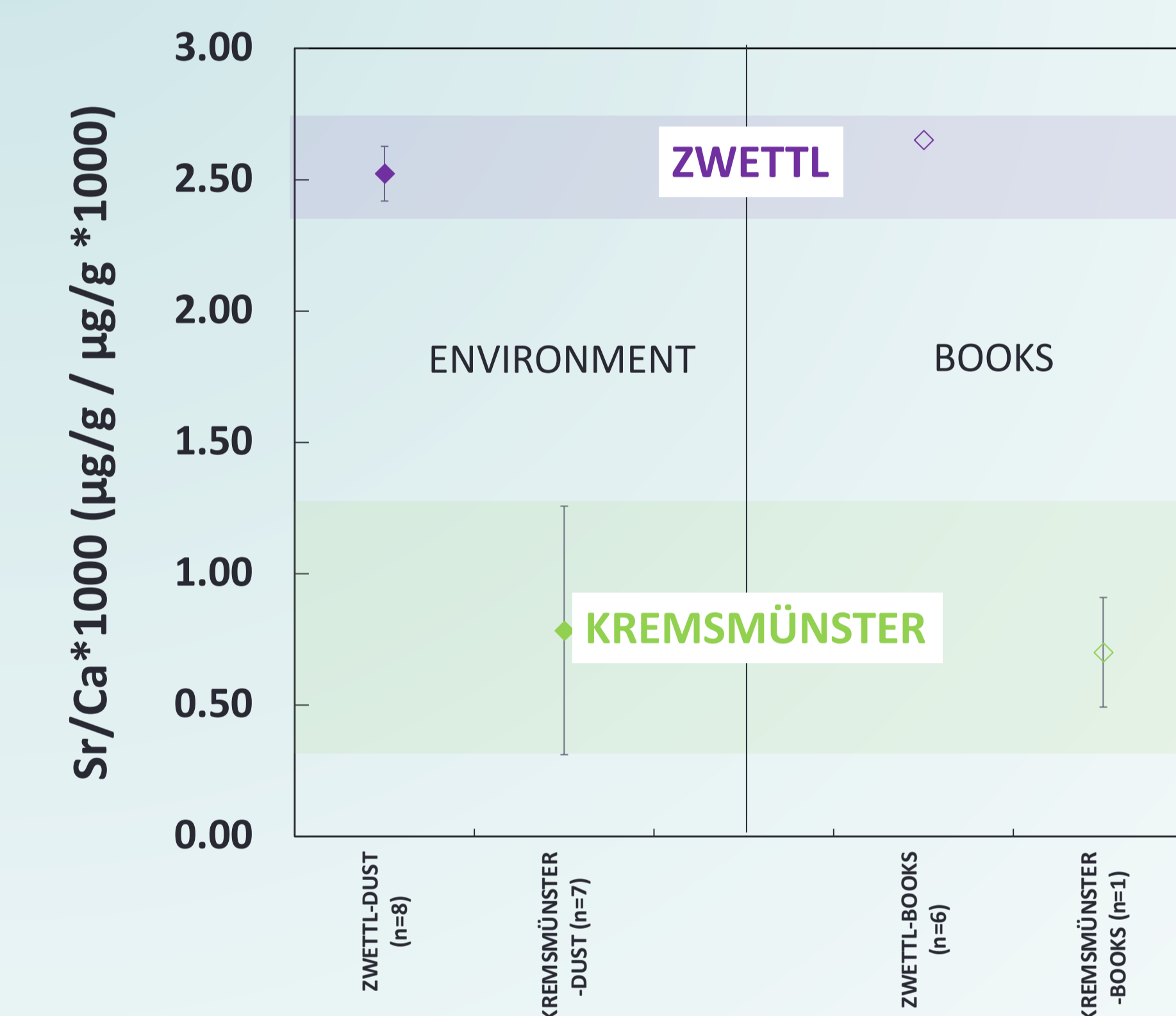


Fig. 4: Sr/Ca elemental mass fraction ratio of dust sampled from the environment and historic books in Kremsmünster and Zwettl (Error bars correspond to U (k=2))

Strontium isotope ratios

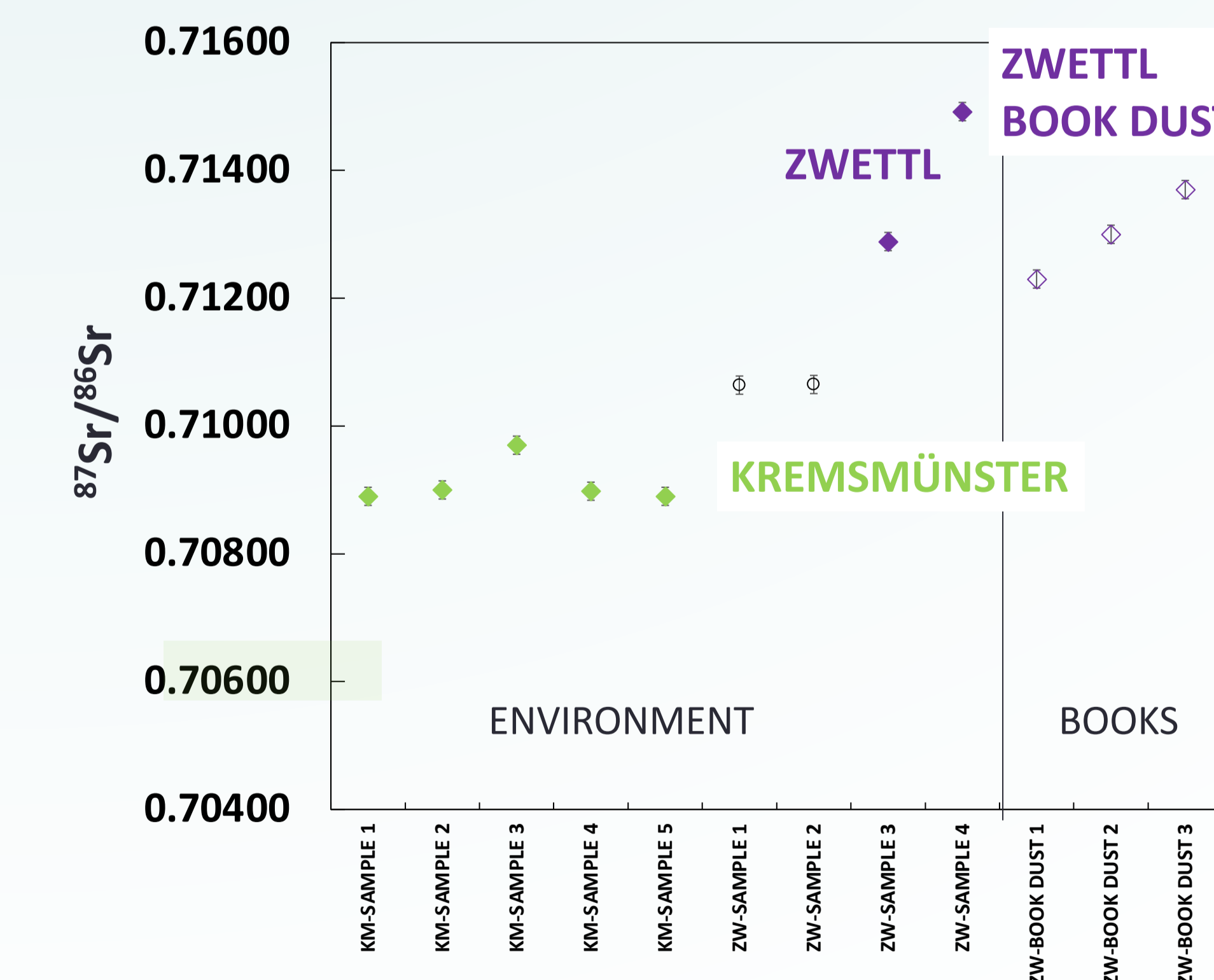


Fig. 5: ⁸⁷Sr/⁸⁶Sr isotope ratios in dust from the environment of Kremsmünster and Zwettl as well as from historic books in Zwettl (Error bars correspond to U (k=2))

Conclusion

Is it possible to allocate archaeological manuscripts to their respective origin solely by using elemental and isotopic analysis of dust?

YES, first results on selected elemental ratios and Sr isotope ratios indicate a significant difference in patterns between the two locations of interest.

