

# Archaeological Exploration: A Journey into the Past

Jaxon Lee

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## Abstract

This is a brief summary of your paper.

## 1 Introduction

Johnson [2005].

## 2 Strontium Analysis

Strontium isotope analysis is the analysis of Strontium (Sr) isotope ratios to understand geographic movement of humans and animals. - "Provenance" - place of origin

Here is how it works. - Each region of rocks has a unique  $^{87}\text{Sr} / ^{86}\text{Sr}$  ratio - Plants and animals inherit the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of their environment (isoscape) - If we know the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of a region and the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of organic matter, we can tell if that organic matter came from that region.

"Strontium has four naturally occurring isotopes:  $^{88}\text{Sr}$ ,  $^{87}\text{Sr}$ ,  $^{86}\text{Sr}$ , and  $^{84}\text{Sr}$ .  $^{87}\text{Sr}$  is formed as the radiogenic daughter isotope of  $^{87}\text{Rb}$  (rubidium); the decay of  $^{87}\text{Rb}$  leads to different abundances of  $^{87}\text{Sr}$  in rocks depending on their age and their original  $^{87}\text{Rb}$  content (Dickin, 1995). The ratio of the radiogenic  $^{87}\text{Sr}$  to the naturally abundant  $^{86}\text{Sr}$  is variable across lithologies of different ages and with different formation histories. Due to the 48.8 billion year half-life of  $^{87}\text{Rb}$  (Faure and Mensing, 2005, p. 77), the ratio of  $^{87}\text{Sr}$  to  $^{86}\text{Sr}$  does not change significantly over the time scales that are of interest to researchers in archaeology, biology, forensics, food science, and other disciplines that deal with the comparatively recent past. This relative stability of the  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio allows strontium isotopes

to be used to provenance biological materials that have taken up strontium from their environments."

- Domain mapping, contour mapping, machine learning - Sometimes predict - Collect data for Sr ratios in regions today - Combine them using various methods, such as "random forest regression method"

### 3 Major Areas Interrogated

### 4 Specific Case Studies

### 5 Conclusion

### Acknowledgments

### References

Emily A. Johnson. Unearthing ancient civilizations. *Journal of Archaeological Research*, 10(2):123–145, 2005. doi: 10.1234/jar.2005.01002.