

The IRHUM database - bioavailable strontium isotope ratios of France for geochemical tracing of prehistoric human migrations

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ABSTRACT

Strontium isotope ratios ($^{87}\text{Sr}/^{86}\text{Sr}$) determined from human and faunal remains can be used to reconstruct mobility and migration across geologically different terrains. This application is based on the principle that the Sr isotopic composition of skeletal remains (teeth, bones) reflects the dietary sources of Sr available during their formation. Sr isotopic ratios vary between different geological units depending on their age and composition. These Sr isotopes enter the soils, plants, rivers and the food cycle without fractionation. A major constraint for current studies is the lack of reference maps to which the strontium isotope ratios measured in the human or faunal samples can be compared.

The aim of the IRHUM (isotopic reconstruction of human migration) database is to provide a reference database of the bioavailable strontium composition for continental France. The dataset consist of results for plant and soil samples collected from 830 sample locations, covering the major geologic units of France. It is freely available through the IRHUM database web application (irhumdatabase.com), which enables users to explore and map our dataset, as well as add and share their own data. For each sample location metadata is also provided, allowing the user to evaluate the suitability of the sample results for their specific study. Since Sr isotope ratios are used for geochemical tracing in a wide range of fields like forensics and ecology the IRHUM database can enhance collaboration between these different fields by providing a common place to share data.

Finally, we performed several case studies to trace prehistoric human mobility at archaeological sites in France. These sites include a Bell Beaker site (Le Tumulus des Sables) and two Neanderthal sites (Payre, Moula). Using the IRHUM database reference map greatly enhanced our ability to distinguish local individuals from non-local individuals and in some cases enabled us to propose source regions.