Title of research need: Stable Isotope Analysis as a Geospatial Tool for Identification

Keyword(s): Stable isotope analysis; provenancing human remains; isoscapes

Submitting subcommittee(s): Anthropology Date Approved: 01/28/2016

(If SAC review identifies additional subcommittees, add them to the box above.)

Background Information:

1. Description of research need:

To advance applications of stable isotope analysis for predicting region of origin and residence patterns of unknown decedents, more research is needed to develop baseline oxygen and hydrogen isotope water maps and geological strontium maps. Improvements in baseline data within the United States and globally will help to refine the use of stable isotope analysis as a geolocation tool. In addition, validation of stable isotope provenancing methods is needed using human tissue samples of known origin. Additional research on isotopic variation caused by sample preparation methods, analytical methods, and diagenesis is also needed to advance the science.

2. Key bibliographic references relating to this research need:


Bowen, Gabriel J., Lesley Chesson, Kristine Nielsen, Thure E. Cerling, and James R. Ehleringer. 2005. Treatment methods for the determination of $\delta^2$H and $\delta^{18}$O of hair keratin by continuous-flow isotope-ratio


3a. In what ways would the research results improve current laboratory capabilities?

New research results would help to better validate the use of stable isotope analysis as a provenancing tool for unidentified human remains cases, new baseline data would improve the precision of isoscape mapping approaches, and additional research on sample preparation and analytical methods would help to improve accuracy and precision of geospatial mapping.

3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

Research results would help to make stable isotope analysis a more commonly used method for unidentified human remains cases, border crosser deaths, and cold cases. It provides an additional line of evidence to an investigation to supplement information from the biological profile.
3c. In what ways would the research results improve services to the criminal justice system?

Improvements in stable isotope methods would aid in unidentified persons cases by providing new investigative leads. It would help by contributing toward the resolution of medicolegal cases, providing closure to families and case resolution.

4. Status assessment (I, II, III, or IV):  

<table>
<thead>
<tr>
<th>Major gap in current knowledge</th>
<th>Minor gap in current knowledge</th>
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</thead>
<tbody>
<tr>
<td>No or limited current research is being conducted</td>
<td>I</td>
</tr>
<tr>
<td>Existing current research is being conducted</td>
<td>II</td>
</tr>
</tbody>
</table>

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.

Approvals:

Subcommittee Approval date: 1/28/2016

(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)

SAC

1. Does the SAC agree with the research need? Yes [ ] No [ ]
2. Does the SAC agree with the status assessment? Yes [ ] No [ ]
   If no, what is the status assessment of the SAC: [ ]

Approval date: [ ]

(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)