Europlanet TNA Report

PROJECT LEADER

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COLLABORATORS

Name:	**Affiliation:**
Isabella von Holstein	NERC PhD student, BioArCh, University of York
Date of TNA visit:	Dates: 7-27 August 2011 Days in Amsterdam: 21, of which • Days working in laboratory: 15 • Days travelling: 2 • Weekend days: 4
Host laboratory:	Isotope Geochemistry Laboratory, Vrije Universiteit Amsterdam

Project Title

Provenancing archaeological wool samples: effect of diagenesis on $^{87}Sr/^{86}Sr$ isotope ratios

Report on the outcomes of the TNA visit (approx 1 page)

In her visit in August, IvH worked up 35 samples and 5 blanks for analysis, receiving training in every aspect of preparation work for Sr analysis. A total of 24 samples were run on the TIMS during the visit, with the remaining 16 analyses completed by Laura Font Morales or Janne Koornneef in September/October 2011.

The main points arising from the work appear to be:

- pre-burial washing with alum salt (as a mordant for the red dye) changes $^{87/86}Sr$ ratio and increases Sr content (ngg^{-1}).
- none of the washing methods remove the dye-associated Sr fraction in control samples.
- burial in a fenland bog and in marine sediment change all samples' $^{87/86}Sr$ ratios, though traces of the original values remain (in that all red-dyed samples remain more depleted than their equivalent undyed samples for a given washing method). However the original difference between control samples is no longer clear.
- HF pretreatment is significantly worse than N_2 and DCM/MeOH cleaning methods at removing exogenous Sr, and indeed may well be fractionating the heavier isotope.
- both archaeological samples buried in Iceland show thoroughly Icelandic $^{87/86}Sr$ ratios. However though C/N/O/D values for sample 9 indicate it comes from somewhere more continental/warmer than Britain, and definitely not from Iceland, which is what we suspected from the morphology of the sample. Therefore it is very likely to have picked up the local $^{87/86}Sr$ signal during burial.

- The work implies that $^{87/86}$Sr ratios of waterlogged wool textiles do not accurately reflect wool provenance. Instead these values reflect a combination of pre-burial treatment of the fibre and post-burial burial site contamination. None of the published washing methods adequately remove these diagenetic contributions.

Publications arising/planned (include conference abstracts etc)

Journal article in *Rapid Communications in Mass Spectrometry*¸ early 2012

The first draft (von Holstein I, Font Morales L, Davies GR, Peacock E, & Collins M (in prep) An assessment of procedures to remove exogenous Sr before ^{87}Sr/^{86}Sr analysis of waterlogged wool textiles. *RCMS*) has been circulated and is being refined.

Host approval

The host is required to approve the report agreeing it is an accurate account of the research performed.
Prof Davies has seen and approved this report.