

Re: Problems with the radio carbon dating of the Newport Tower

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On Wed, 05 Dec 2007 20:05:50 GMT, "David B." <tronospamchos@xxxxxxxxxx> wrote:

JerryT wrote:

On 5 Dec, 16:04, "Steve Marcus" <smarcus_spamo...@xxxxxxxx> wrote:

snip

My prior posts have stated that there is difficulty in trying to adjust for the problems of the reservoir effect, and the use of shell lime, because such adjustments will require knowledge of the conditions that existed when the mortar was created, which may not be the same as the conditions that exist today, and also it matters where the shells were obtained from and what percentage of the lime used in the mortar came from shells.

Perhaps some may be interested...an update and indepth of mortar dating.

From: <http://www.kyrkor.aland.fi/Lindroos-JH-AR-MB-AES-2007.pdf>
(650
KB)

MORTAR DATING USING AMS 14C AND SEQUENTIAL DISSOLUTION: EXAMPLES FROM MEDIEVAL, NON-HYDRAULIC LIME MORTARS FROM THE ÅLAND ISLANDS, SW FINLAND

Re: Problems with the radio carbon dating of the Newport Tower

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ABSTRACT. Non-hydraulic mortars contain datable binder carbonate with a direct relation to the time when it was used in a building, but they also contain contaminants that disturb radiocarbon dating attempts. The most relevant contaminants either have a geological provenance and age or they can be related to delayed carbonate formation or devitrification and recrystallization of the mortar. We studied the mortars using cathodoluminescence (CL), mass spectrometry (MS), and accelerator mass spectrometry (AMS) in order to identify, characterize, and date different generations of carbonates. The parameters— dissolution rate, $^{13}\text{C}/^{12}\text{C}$ and $^{18}\text{O}/^{16}\text{O}$ ratios, and ^{14}C age—were measured or calculated from experiments where the mortars were dissolved in phosphoric acid and each successive CO_2 increment was collected, analyzed, and dated. Consequently, mortar dating comprises a CL characterization of the sample and a CO_2 evolution pressure curve, a ^{14}C age, and stable isotope profiles from at least 5 successive dissolution increments representing nearly total dissolution. The data is used for modeling the interfering effects of the different carbonates on the binder carbonate age. The models help us to interpret the ^{14}C age profiles and identify CO_2 increments that are as uncontaminated as possible. The dating method was implemented on medieval and younger mortars from churches in the Åland Archipelago between Finland and Sweden. The results are used to develop the method for a more general and international use.

Interestingly, there's not a single mention of shells in that paper.

I've now found more details of the 19th century study of the Newport Tower mortar, to which I published a rather iffy link a few days ago. The following summary combines information from Edward Peterson "History of Rhode Island" (1853); Harper's New Monthly Magazine article "Newport: Historical and Social" (August 1854); and William H. Boyd "The Newport Directory" (1856).

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In 1848 the Rev. Dr. Jackson of Newport collected samples from: "the mill, Arnold's tomb-vault ["the tombs of Governor Arnold and his wife"], the Bull-house of 1640-1, built for a garrison ["the old stone house in Spring-street, which was built by Henry Bull, one of the first purchasers of the Island, and immediately after the first settlement of the town"], the Easton-house, the Atkinson-house, the Vernon-house, and the Easton-house, (now Southwick), built in 1642-3" "and analyzed and compared them, and found them of the same quality, and composed of shell lime, sand, and gravel; and considered it very strong evidence that they were built not far from the same time- all probably within a period of thirty or forty years from each other."

Does the reference to "shell lime" mean that in that area, seashells were used very extensively as a substitute for limestone in the making of lime?

Yes.

I also wonder whether it would be possible to separate out shell fragments from mortar samples and C14 date them on their own, perhaps sacrificing a few 100-year-old shells from the Rhode Island Natural History Museum to help generate a rough calibration scale.

The most useful thing to do would be to date a whole heap of new shells to get a handle on the magnitude of the local reservoir effect.

Eric Stevens