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October 09, 2017

Enrica Salvatori
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RE: Radiocarbon Dating Results

Enrica Salvatori,

Enclosed are the radiocarbon dating results for two samples recently sent to us. The report sheet contains the Conventional Radiocarbon Age (BP), the method used, material type, and applied pretreatments, any sample specific comments and, where applicable, the two-sigma calendar calibration range. The Conventional Radiocarbon ages have been corrected for total isotopic fractionation effects (natural and laboratory induced).

All results (excluding some inappropriate material types) which fall within the range of available calibration data are calibrated to calendar years (cal BC/AD) and calibrated radiocarbon years (cal BP). Calibration was calculated using one of the databases associated with the 2013 INTCAL program (cited in the references on the bottom of the calibration graph page provided for each sample.) Multiple probability ranges may appear in some cases, due to short-term variations in the atmospheric ^{14}C contents at certain time periods. Looking closely at the calibration graph provided and where the BP sigma limits intercept the calibration curve will help you understand this phenomenon.

Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than ± 30 years, a conservative ± 30 BP is cited for the result.

All work on these samples was performed in our laboratories in Miami under strict chain of custody and quality control under ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 accreditation protocols. Sample, modern and blanks were all analyzed in the same chemistry lines by qualified professional technicians using identical reagents and counting parameters within our own particle accelerators. A quality assurance report is posted to your directory for each result.

Thank you for prepaying the analyses. As always, if you have any questions or would like to discuss the results, don't hesitate to contact us.

Sincerely ,

Darden Hood
Digital signature on file



REPORT OF RADIOCARBON DATING ANALYSES

Enrica Salvatori

Report Date: October 09, 2017

Dip. Civiltà e Forme del Sapere

Material Received: September 18, 2017

Sample Information and Data

Sample Code Number

Conventional Radiocarbon Age (BP) or
 Percent Modern Carbon (pMC) & Stable Isotopes

Calendar Calibrated Results: 95.4 % Probability
 High Probability Density Range Method (HPD)

Beta - 473652

SPSMP171072

450 +/- 30 BP

IRMS $\delta^{13}C$: -26.0 o/oo

Submitter Material: Carbone/Charcoal

(95.4%) 1414 - 1479 cal AD

(536 - 471 cal BP)

Analyzed Material: Charred material

Pretreatment: (charred material) acid/alkali/acid

Analysis Service: AMS-Standard delivery

Percent Modern Carbon: 94.55 +/- 0.35 pMC

Fraction Modern Carbon: 0.9455 +/- 0.0035

D14C: -54.48 +/- 3.53 o/oo

$\Delta^{14}C$: -62.11 +/- 3.53 o/oo(1950:2017)

Measured Radiocarbon Age: (without d13C correction): 470 +/- 30 BP

Calibration: BetaCal3.21: HPD method: INTCAL13

Results are ISO/IEC-17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the ^{14}C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. $d^{13}C$ values are on the material itself (not the AMS $d^{13}C$). $d^{13}C$ and $d^{15}N$ values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.



REPORT OF RADIOCARBON DATING ANALYSES

Enrica Salvatori

Report Date: October 09, 2017

Dip. Civiltà e Forme del Sapere

Material Received: September 18, 2017

Sample Information and Data	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes	
		Calendar Calibrated Results: 95.4 % Probability High Probability Density Range Method (HPD)	
Beta - 473653	SPSMP172005	1230 +/- 30 BP	IRMS δ13C: -27.3 o/oo IRMS δ18O: -17.5 o/oo
Submitter Material: Malta/Mortar		(62.7%) 760 - 882 cal AD	(1190 - 1068 cal BP)
Analyzed Material: Carbonate Pretreatment: (carbonate) acid etch		(32.7%) 688 - 751 cal AD	(1262 - 1199 cal BP)
Analysis Service: AMS-Standard delivery			
Percent Modern Carbon: 85.80 +/- 0.32 pMC			
Fraction Modern Carbon: 0.8580 +/- 0.0032			
D14C: -141.97 +/- 3.20 o/oo			
Δ14C: -148.90 +/- 3.20 o/oo(1950:2017)			
Measured Radiocarbon Age: (without d13C correction): 1270 +/- 30 BP			
Calibration: BetaCal3.21: HPD method: INTCAL13			

Results are ISO/IEC-17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL13)

(Variables: $\delta^{13}\text{C} = -26.0$ o/oo)

Laboratory number **Beta-473652**

Conventional radiocarbon age **450 ± 30 BP**

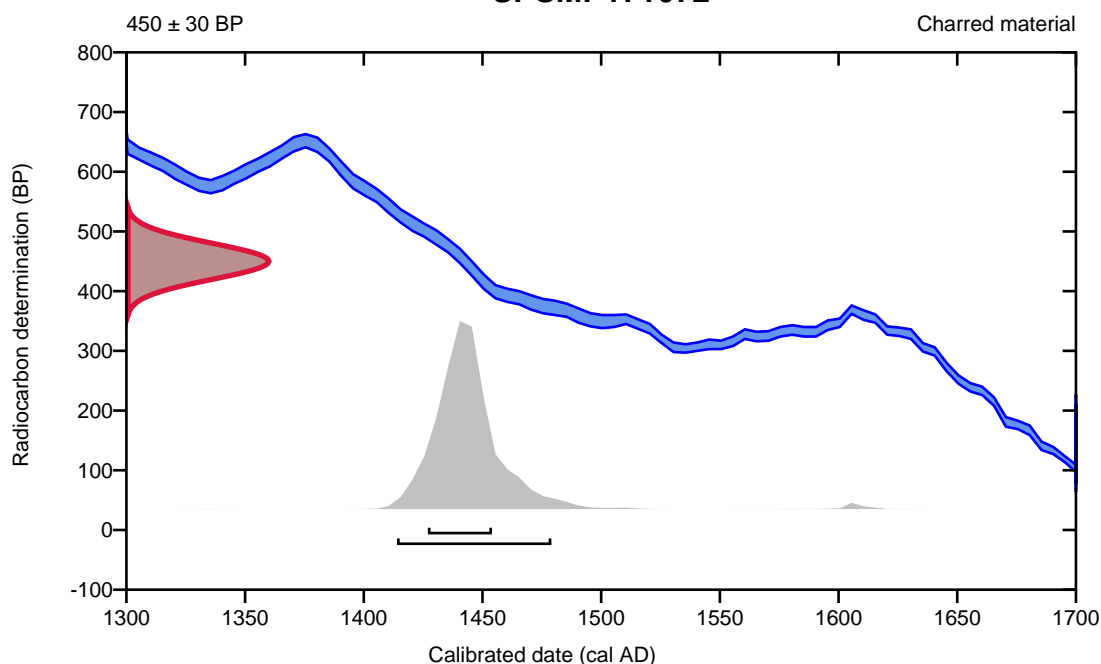
95.4% probability

(95.4%) 1414 - 1479 cal AD (536 - 471 cal BP)

68.2% probability

(68.2%) 1427 - 1454 cal AD (523 - 496 cal BP)

SPSMP171072



Database used
INTCAL13

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. *Radiocarbon*, 51(1), 337-360.

References to Database INTCAL13

Reimer, et.al., 2013, *Radiocarbon*55(4).

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL13)

(Variables: $\delta^{13}\text{C} = -27.3$ o/oo)

Laboratory number **Beta-473653**

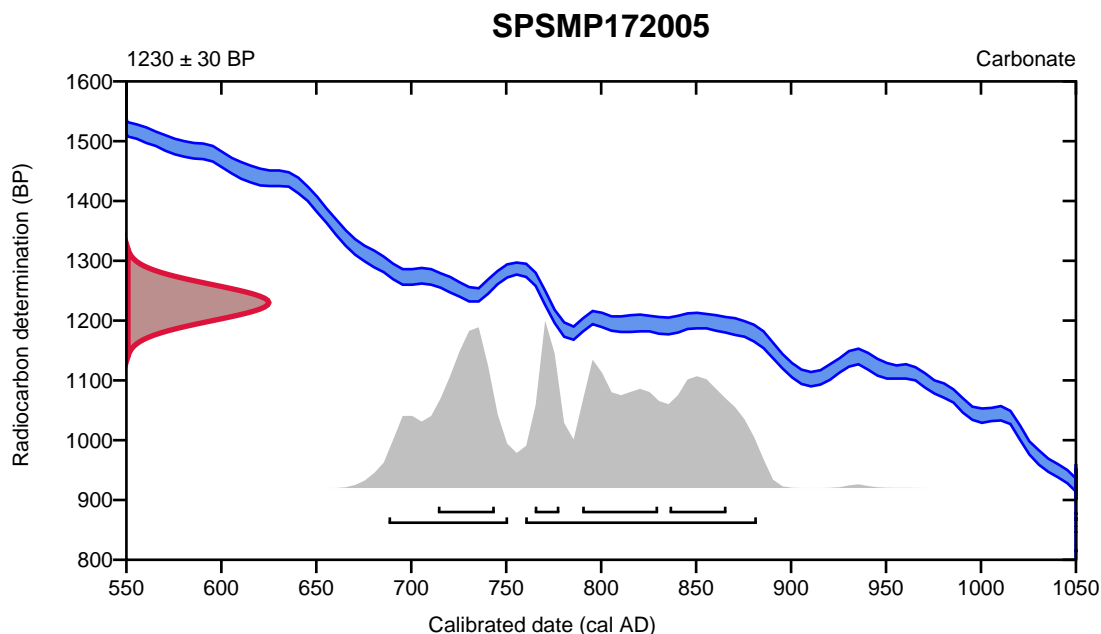
Conventional radiocarbon age **1230 \pm 30 BP**

95.4% probability

(62.7%)	760 - 882 cal AD	(1190 - 1068 cal BP)
(32.7%)	688 - 751 cal AD	(1262 - 1199 cal BP)

68.2% probability

(22%)	790 - 830 cal AD	(1160 - 1120 cal BP)
(20.5%)	714 - 744 cal AD	(1236 - 1206 cal BP)
(16.3%)	836 - 866 cal AD	(1114 - 1084 cal BP)
(9.5%)	765 - 778 cal AD	(1185 - 1172 cal BP)



Database used
INTCAL13

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. *Radiocarbon*, 51(1), 337-360.

References to Database INTCAL13

Reimer, et.al., 2013, *Radiocarbon*55(4).