Center for Applied
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February 17, 2020

Dr. Sturt Manning
Department of Classics
120 Goldwin Smith Hall
Cornell University
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Dear Dr. Manning,
The results of the radiocarbon and stable isotope analyses for the samples received by our lab on January 22, 2020 (Invoice #25011) are presented in Table 1.

Pretreatment

Charcoal

Charcoal was hand-picked from bulk sediment samples for analysis when possible (indicated in Table 1). The charcoal samples were inspected under microscope and manually cleaned prior to acid/alkali/acid (AAA) pretreatment to remove superficial contaminants. Charcoal samples were treated with 1N HCl at 80°C for 1 hour, decanted, and rinsed with MilliQ water. The samples were then treated with 0.1 M NaOH at room temperature to remove humic substances, decanted, and rinsed to neutral with MilliQ water. The samples were treated with HCl a second time at 80°C for 15 minutes, rinsed repeatedly with MilliQ water, and dried at 105°C.

Sediment, bulk organics

Sediment samples were sieved to remove extraneous materials and treated with 1N HCl at 80ºC to remove carbonates, refreshing the acid as needed to remove all carbonates. The sediments were rinsed with MillQ water to neutral and dried at 105ºC.

^{14}C by AMS

The samples were combusted at 900°C in evacuated and sealed quartz tubes in the presence of CuO to produce CO_2. The CO_2 samples were cryogenically purified from the other reaction products and catalytically converted to graphite using the method of Vogel et al. (1984). Graphite $^{14}C/^{13}C$ ratios were measured using the CAIS 0.5 MeV AMS. Sample ratios were compared to the ratio measured from the Oxalic Acid I standard (NBS SRM 4990), and the results are presented as percent Modern Carbon (pMC). The quoted uncalibrated dates are given in radiocarbon years before 1950 (years BP), using the ^{14}C half-life of 5568 years. The error is quoted as one standard deviation and reflects both statistical and experimental errors. The dates have been corrected for isotope fractionation using the $\delta^{13}C$ value measured by IRMS.

Measurement of stable isotopes

Stable isotope ratios ($\delta^{13}C$) were measured using an isotope ratio mass spectrometer housed at the University of Georgia Center for Applied Isotope Studies. Values are expressed as $\delta^{13}C$ with respect to PDB, with an error of less than 0.1‰.

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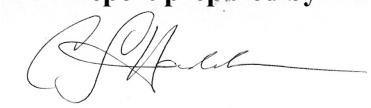
Table 1. Results of the radiocarbon and stable isotope ratio analyses for Invoice #25011.

UGAMS	Sample ID	Material	$\delta^{13}C$, ‰	^{14}C age years, BP	±	pMC	±
46276	BH.17.s.012	charcoal	-25.7	4027	25	60.57	0.161
46277	BH.17.s.013	sediment	-25.1	5840	25	48.33	0.143
46278	BH.17.s.070	sediment	-24.0	4875	25	54.50	0.150
46279	BH.17.s.072	sediment	-25.9	4133	25	59.78	0.162
46280	BH.17.s.093	sediment	-24.4	3913	25	61.44	0.174
46281	BH.17.s.108	sediment	-24.1	4426	25	57.64	0.156
46282	BH.17.s.142	sediment	-23.7	4371	25	58.03	0.157
46283	BH.18.s.003	charcoal	-27.1	28117	80	3.02	0.028
46284	BH.18.s.016	sediment	-24.7	4914	25	54.24	0.151
46285	BH.18.s.039	sediment	-24.6	6535	25	44.33	0.131
46286	BH.18.s.086	sediment	-21.4	4936	25	54.09	0.155
46287	BH.18.s.107	sediment	-26.2	9681	30	29.96	0.099
46288	BH.18.s.133	sediment	-25.0	5535	25	50.20	0.141
46289	BH.18.s.141	sediment	-26.6	3570	25	64.11	0.172
46290	BH.18.s.154	sediment	-23.8	5221	25	52.20	0.145

References:

Vogel, JS, Southon, JR,Nelson, DE, and Brown, TA. 1984. Performance of catalytically condensed carbon for use in accelerator mass spectrometry. Nuclear Instruments & Methods 223(B5):289-293.

Report prepared by



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