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The Beginning of the Mediterranean Climate: 4.5-5.5 ka in Tel Mevorakh, Israel

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The Beginning of the Mediterranean Climate: 4.5-5.5 ka in Tel Mevorakh, Israel

A Thesis submitted in partial satisfaction of the requirements
for the degree Master of Science

in

Earth Sciences

by

Kristen Plat

Committee in charge:

Professor Richard Norris, Chair
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2023

The Thesis of Kristen Plat is approved, and it is acceptable in quality and form for publication on microfilm and electronically.

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2023

DEDICATION

Thank you to everyone who supported me through this difficult process, I could not have done it without the support from my close friends and family. I want to dedicate this project to all the aspiring scientists. I never knew that I wanted to become a geologist until I came to college and from that point on, I had to work hard to get to where I am today. Just know that while it will be challenging, the reward is one of the greatest feelings in the world. I want to dedicate this project to my closest friends; Elena, Sumi, and Yanna. You have all been my backbone throughout this process and I could not have done it without you. I want to thank my parents and brothers, Mom, Dad, Bryan, and Kyle for supporting my dreams.

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ABSTRACT OF THE THESIS

The Beginning of the Mediterranean Climate: 4.5-5.5 ka in Tel Mevorakh, Israel

by

Kristen Plat

Master of Science in Earth Sciences

University of California San Diego, 2023

Professor Richard Norris, Chair

The African Humid Period (AHP) was a period of unusually warm and wet climatic conditions from 6-11 kilo-annum (ka; 1000 years before present), that affected North Africa and the Mediterranean. The termination of the AHP was rather abrupt, lasting from 500-800 years and led to the modern Mediterranean climate. This transition was not linear and included fluctuations between extreme dry and wet conditions. These variations in climatic conditions are reflected in vegetation communities and water availability within the region. Here I report a multi-proxy analysis of sediment core Tel Mevorakh-5 (TM5) from just north of Tel Mevorakh, NW Israel to reconstruct the paleoenvironmental conditions of the late Holocene at ~ decadal resolution between 5.5-4.5 ka. My study builds on previous work in the area within the Kebara Marsh and Tel Dor. I identified seven distinct facies in TM5 that reflect changes of wetness of the climatic conditions during the mid Holocene. Core TM5 records an overall drying pattern associated with the termination of the AHP beginning with the appearance of brackish water facies at 5.4 ka and the first seasonally arid terrestrial soils at 4.75 ka. Aridity in the core begins to increase ~5.0 ka with seasonally dry conditions. During the late Holocene, the first settled societies began to develop in the Levant reaching a peak in radiocarbon dates and inferred settlement density during the drying phase from the AHP, potentially caused by seasonal climates advantageous to agriculture.

1. Introduction

The African Humid Period (AHP) consisted of abnormally wet and warm conditions from Central Africa to the Mediterranean between 11.5-5.5 thousand years ago (Renssen et al., 2006). An increase in the Northern Hemisphere summer insolation resulted in a northward expansion of the monsoonal rainbelt and an increase in its intensity (Shanahan *et al.,* 2015). The Sahara Desert turned into immense grasslands with lakes across the region and has been described as the "Green Sahara" (Claussen *et al.,* 2017). After the last glacial maximum (LGM) 20 ka, the intertropical convergence zone (ITCZ) strengthened and shifted north, causing a stronger monsoon response in the Mediterranean and Northern Africa (Burrough and Thomas, 2013); melting of large ice sheets may have initiated the AHP (Shanahan *et al.,* 2015). The AHP terminated around 5-6 thousand years ago, but the timing and duration of the transition to the modern-day climate has been subject of debate. Records off the Horn of Africa indicate that an abrupt end to the AHP was not contained to the western Sahara and was a wider phenomenon (Tierney and deMenocal, 2013). Saharan dust records from marine sediments off the coast of northern Africa increased abruptly around 4.9 thousand years ago suggesting an increase in Saharan aridity and the end of the Green Sahara period (McGee *et al.,* 2013). Here, I examine the shift between the wet climate of the AHP into the seasonally arid modern Mediterranean climate in coastal Israel.

The project site is on the Carmel coast of NW Israel, 1.7 km inland from the Mediterranean Sea near the archaeological site of Tel Mevorakh. The sediment core TM5 was recovered from agricultural fields adjacent to the tel at UTM 32°N 3204; 34°E 5506. The coring project was a collaboration between the Scripps Center for Marine Archaeology, Haifa University, and Utah State University, supported by the Koret Foundation, to gain better insight into the environmental impacts on coastal societies within the Levant. We created a decadal-resolution paleoclimate archive spanning the end of the African Humid Period into the late Holocene. In this thesis, I will be comparing the paleoenvironmental record of TM5 to other regions of the Levant including the nearby Kebara Marshes and Tel Dor further up the coast. The objective of my thesis is to create a larger paleoclimate archive of the region.

Fig 1. Regional map including Africa, the Mediterranean Sea, and the study site highlighted by a yellow box. Taken from Google Earth, 2023.

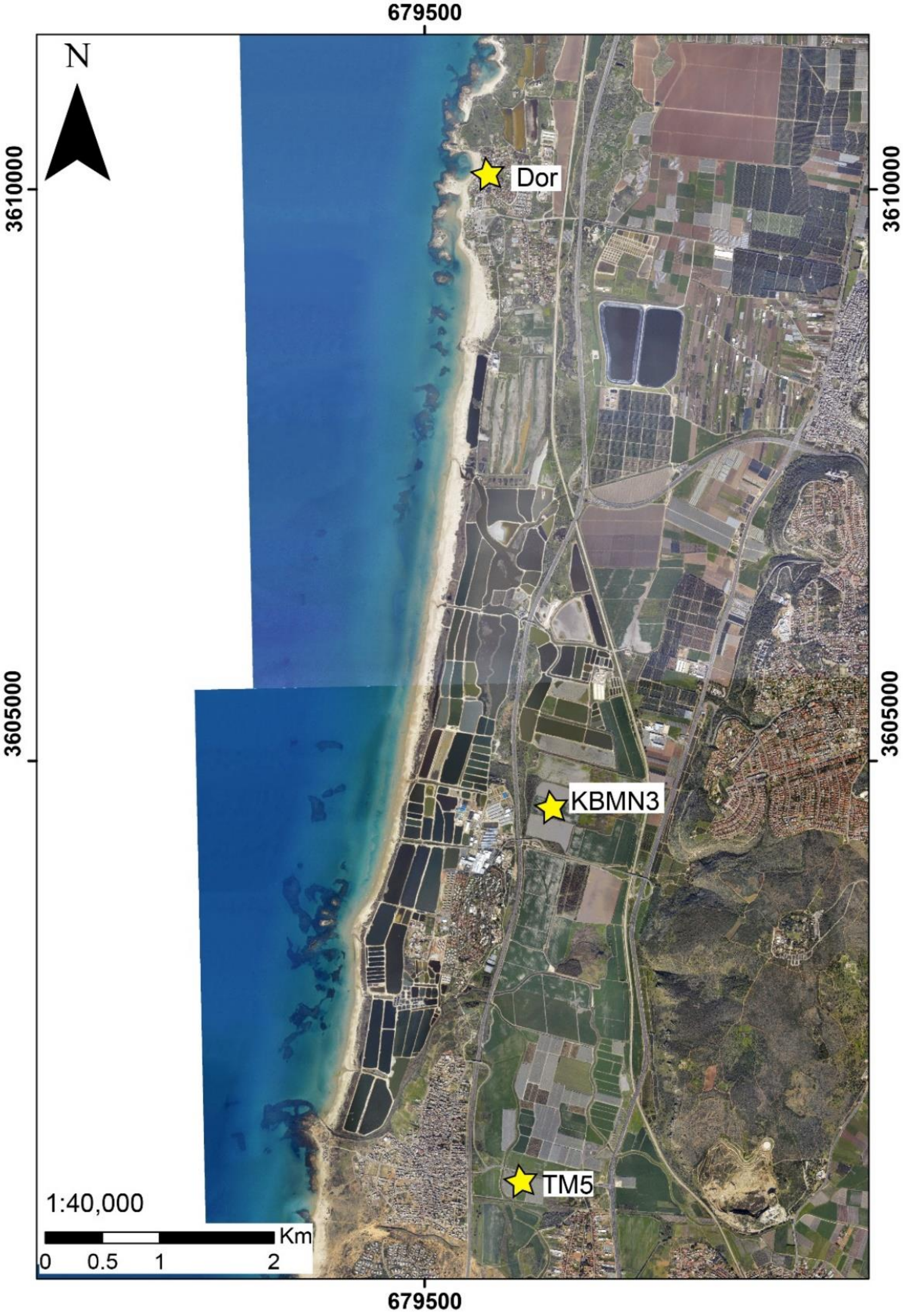

Fig 2. Core site for the Tel Mevorakh, Kebara Marsh, and Tel Dor sites. The northernmost site is the Tel Dor site, the middle site is the Kebara Marsh site known as KBMN3 and the southern site is the focus of this study, TM5. Adapted from Dr. Gilad Shtienberg (personal communication, 2023).

2. Methods

2.1 Coring Project

The core was taken from the Tel Mevorakh site using a Geoprobe systems hydraulic line extruder. Seven cores were extracted from the area around the Tel, labeled TM1-TM7. For this project we will be focusing on the findings from TM5. The cores were collected in plastic liners that were 1.5 meters long and 3.5 centimeters wide. TM5 was taken in 10 sections, each 1.5 meters in length, equaling 15 meters total. Two full cores were taken at each coring location–the first of these was dedicated to lithostratigraphy (TM5) and the second to Optically Stimulated Luminescence (OSL) dating (TM5L). An OSL core was drilled approximately 1 m from the original coring location and the core liners were painted black before collection to avoid exposing the sediment to sunlight. Shortly after collection, the OSL sections were wrapped in aluminum foil as an extra hedge against light contamination of the OSL signal. OSL cores were later covered with plastic wrap to keep the foil in place during transportation.

2.2 TM5 Core Analysis

TM5 was split lengthwise upon reaching San Diego and preserved in working and archive halves in the core locker at the SIO Geological Collections. TM5 was then stored in the core locker until research began on the core in April 2022. Each section of the core was described using the Munsell color chart and categorized by sediment descriptions. After the lithological description was recorded, samples were taken from each 1.5-meter section (labeled A-J, including two OSL sections BL and HL); altogether, 90 samples taken 15-20 centimeters apart. An Avaatech X-ray fluorescence (XRF) “core scanner” was used to characterize the elemental variations (photon counts per second, CPS) at a 1 cm resolution in a non-destructive manner.

Excitation voltage of 10 kV, 35 kV (kilovolts), and a 2 cm diameter beam were used, enabling relative difference assessment for each unit (Leowemark et al., 2011; Rothwell, 2015). Counts of S and Mn helped to detect paleo-oxidation fronts and reducing conditions while Br and Ca were used to identify variation of biological activity along with the presence of organic matter within the environment. Particle-size analysis was conducted with a Malvern Instruments Mastersizer 200 laser particle-size analyzer on 93 samples from TM5 at Utah State University. Sorting values were calculated in GRADISTATv9.1. Total organic carbon (TOC) measurements were conducted using a Costech 4010 Elemental Combustion Analyzer System and a Thermo Delta V Isotope ratio mass spectrometer (IRMS).

2.3 Optically Stimulated Luminescence (OSL) Dating

Eleven OSL samples were selected based on changes in lithology, particle size, and color, which were presumed to represent changes in environmental conditions within the region. All samples were opened and processed under dim amber safelight conditions in the Utah State University Luminescence Laboratory. The 125-215 mm quartz fraction was isolated using wet sieving and treated with 10% hydrochloric acid (HCl) and 5% hydrogen peroxide (H2O2) to remove carbonates and organic material and sodium polytungstate (2.7 g/cm3) to remove heavy minerals. Feldspar and other non-quartz minerals were removed using three 30-min etchings in concentrated hydrofluoric acid (47% HF) followed by hydrochloric acid (45% HCl) to prevent formation of fluorite precipitates (Rittenour et al., 2005). Conversion factors of Guerin *et al.* (2011) were used to calculate dose rates based on K, Rb, Th and U concentrations analyzed by ICP-MS and ICP-AES (Table 2). Cosmic contribution was calculated using sample depth, elevation, latitude/longitude, and water content following Prescott and Hutton (1994). OSL analysis followed the single-aliquot regenerative (SAR) dose method on small aliquots (1 mm) of quartz sand (Murray and Wintle, 2000, 2003; Wintle and Murray, 2006). Optical measurements were performed on Risø TL/OSL Model DA-20 readers, with stimulation by blue-green light emitting diodes (LED; 470 ± 30 nm). The luminescence signal was detected through 7.5-mm UV filters (U-340) over 40 s (250 channels) at 125 C with LED diodes at 70% power (36e45 mW/cm2). Equivalent dose values were calculated using the central age model (Galbraith and Roberts, 2012). OSL ages and dose rate information are presented in Tables 1 and 2.

2.4 Proxy Analysis

2.4.1- Sample Preparation

Each section of TM5 was sampled every ~15-20 centimeters, with a total of 90 samples. TM5L was sampled in 12 places to fill stratigraphic gaps in TM5. The samples were dried in a 50˚C oven and weighed. Each sample was washed over a 63 µm sieve, dried and weighed once more. Data for the sample location, depth reported in m relative to mean sea level (rmsl), and weight are reported in the appendix (Table A2).

2.4.2- Proxy Counting

With the use of a binocular microscope, ten environmental proxies were counted at different size fractions for each sample. Freshwater/brackish shells, marine shells, ostracods, charcoal, opercula, calcite, gypsum, and pyrite were counted at a fraction larger than 250 µm and quartz and carbonate grains from 150-250 µm. Samples that contained more than ~500 grains of specific proxies or large amounts of sediment were repeatedly halved using a sample splitter until the sample contained less than 500 grains of the given proxy. Total counts were reported normalized to 5.09 g in Table A1.

3. Results

This study examined core TM5 representing the southern edges of an ancient wetland, northwest of Tel Mevorakh (Figure 2.). The identification of each unit and subunit presented below builds on Mahony (2022). This classification relies on unit thicknesses, paleoelevations from the core depth, geochemical properties, sedimentological characteristics, lithostratigraphic relations and OSL derived age constraints (Figure 4.). The reconstruction of the depositional environment is mainly based on paleontological (Figures 4. and 5.) and geochemical results.

3.1 OSL Results

Table 1. OSL Ages

Sample Number	True Depth (m)	Num. of aliquots	Dose rate (Gy/kyr)	±	Equivalent Dose (Gy)	± 2σ	OSL age (ka)	± 1σ
TM5_B_0.7-0.85	3.01	16 (19)	1.06	0.10	2.12	0.29	2.00	0.21
TM5_C_0.95-1.0	1.21	27 (29)	1.41	0.10	6.26	0.33	4.45	0.38
TM5_D_0.25-0.44	0.50	23 (29)	0.67	0.10	2.96	0.32	4.39	0.44
TM5_D_0.75-0.9	-0.06	43 (46)	0.98	0.10	4.84	0.23	4.92	0.42
TM5_D_1.0-1.15	-0.32	17 (19)	0.91	0.10	4.41	0.24	4.83	0.42
TM5_D_1.23-1.35	-0.55	26 (30)	1.27	0.10	6.75	0.36	5.30	0.46
TM5_F_0.95-1.08	-3.27	18 (24)	1.00	0.10	4.84	0.30	4.86	0.43
TM5_H_0.37-0.5	-5.69	22 (24)	1.02	0.10	5.20	0.37	5.08	0.46
TM5_I_0.35-0.5	-7.16	22 (24)	0.92	0.10	4.91	0.42	5.35	0.50
TM5_I_0.65-0.7	-7.46	20 (26)	1.11	0.10	5.80	0.26	5.22	0.44
TM5_I_0.8-0.9	-7.62	21 (18)	0.95	0.10	8.16	0.67	8.62	0.79

1 Number of aliquots used in age calculation (number of aliquots analyzed)
2 OSL ages in thousands of years before 2022 (ka)

Table 2. Dose Rate Information

Sample Number	In Situ H_2O (%)	Grain Size (μm)	K (%)[1]	Rb (ppm)[1]	Th (ppm)[1]	U (ppm)[1]	Cosmic (Gy/kyr)
TM5_B_0.7-0.85	19.6	150-250	A: 0.65 B: 0.54	32.8 29.2	4.49 3.68	1.2 1.0	0.14
TM5_C_0.95-1.0	20.0	150-250	A: 1.08 B: 0.62	54.5 38.5	7.63 5.71	1.4 1.1	0.11

Table 2. Dose Rate Information, continued

Sample Number	In Situ H_2O (%)	Grain Size (μm)	K (%)[1]	Rb (ppm)[1]	Th (ppm)[1]	U (ppm)[1]	Cosmic (Gy/kyr)
TM5_D_0.25-0.44	30.0	150-250	A: 0.51 B: 0.35	24.0 15.9	3.19 2.07	0.8 0.6	0.10
TM5_D_0.75-0.9	92.0	150-250	A: 1.15 B: 1.14	44.5 45.7	6.7 6.76	1.1 1.1	0.10
TM5_D_1.0-1.15	70.0	150-250	A: 1.11 B: 1.06	46.0 49.3	6.9 7.62	1.0 1.2	0.10
TM5_D_1.23-1.35	20.0	150-250	A: 0.63 B: 0.56	33.0 20.6	4.9 3.0	0.85 0.6	0.09
TM5_F_0.95-1.08	54.7	150-250	A: 1.14 B: 1.06	50.4 52.4	8.16 7.89	1.4 1.5	0.07
TM5_H_0.37-0.5	28.3	150-250	A: 0.47 B: 0.85	21.6 50.1	3.02 7.27	0.7 1.3	0.06
TM5_I_0.35-0.5	29.7	150-250	A: 0.56 B: 0.71	25.2 31.9	3.62 4.63	0.7 0.9	0.05
TM5_I_0.65-0.7	50.9	150-250	A: 1.01 B: 0.88	50 44	7.81 7.12	1.3 2.5	0.05
TM5_I_0.8-0.9	50.0	150-250	A: 0.73 B: 0.37	33.6 14.3	5.39 1.8	2.7 0.9	0.05

[1]Radioelemental concentrations determined using ICP-MS and ICP-AES techniques; dose rate is derived from concentrations by conversion factors from Guerin et al. (2011).

Ages obtained from the OSL analysis (Table 1) are plotted against depth Figure 3. The data shows three distinct groups of dates separated by gaps in time that are interpreted as two unconformities. The unconformities exist at depths of 1.99 m rmsl and -7.51 m rmsl and the locations were chosen based on changes in lithology and XRF data. The core is divided into 3 units based on the unconformities.

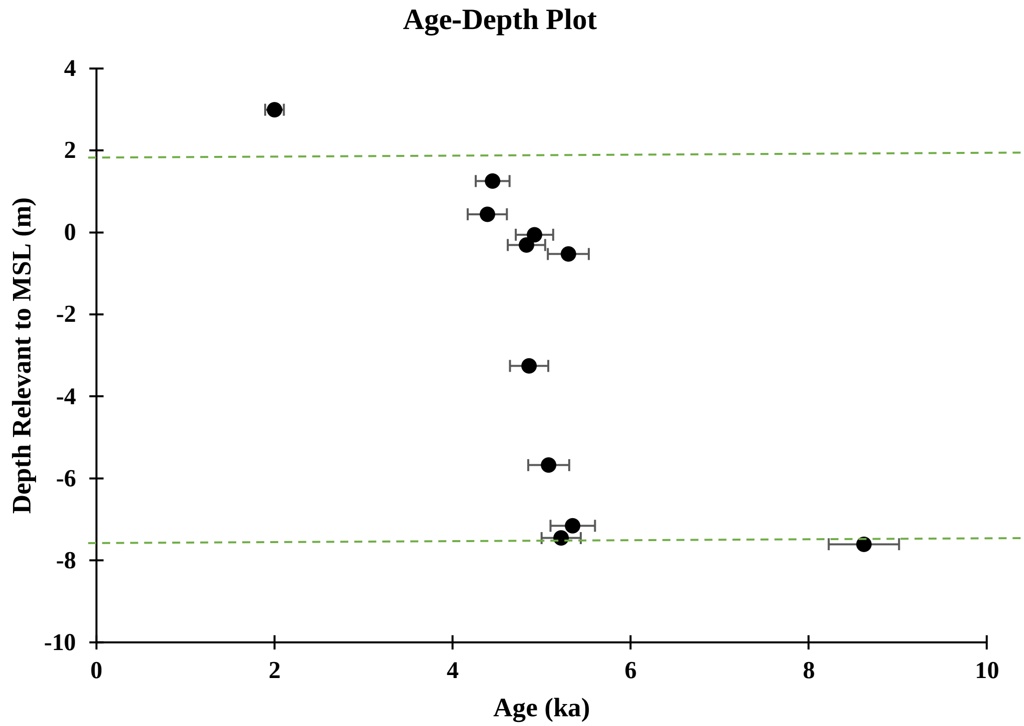

Fig 3. Age-depth plot. OSL dates from USULL are plotted against depth relevant to mean sea level. Unconformities are shown as green dashed lines.

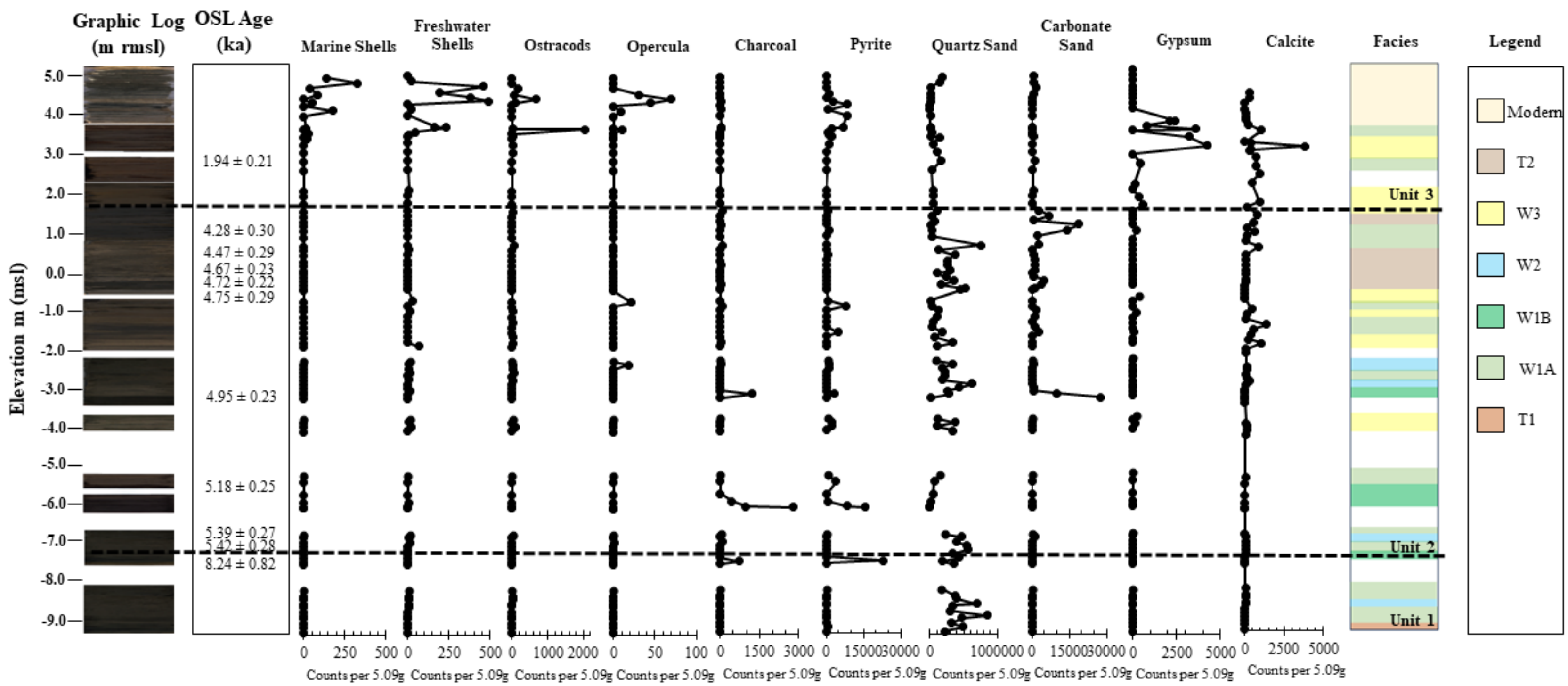

Fig 4. Core TM5 with graphic log, optically stimulated luminescence (OSL) ages, relevant proxies, and facies locations. The OSL ages shown are modeled ages according to the Bayesian model. The graphic log is a compilation of photos of TM5 relevant to depth. The white areas in the graphic log and facies description are core gaps associated with coring retrieval errors.

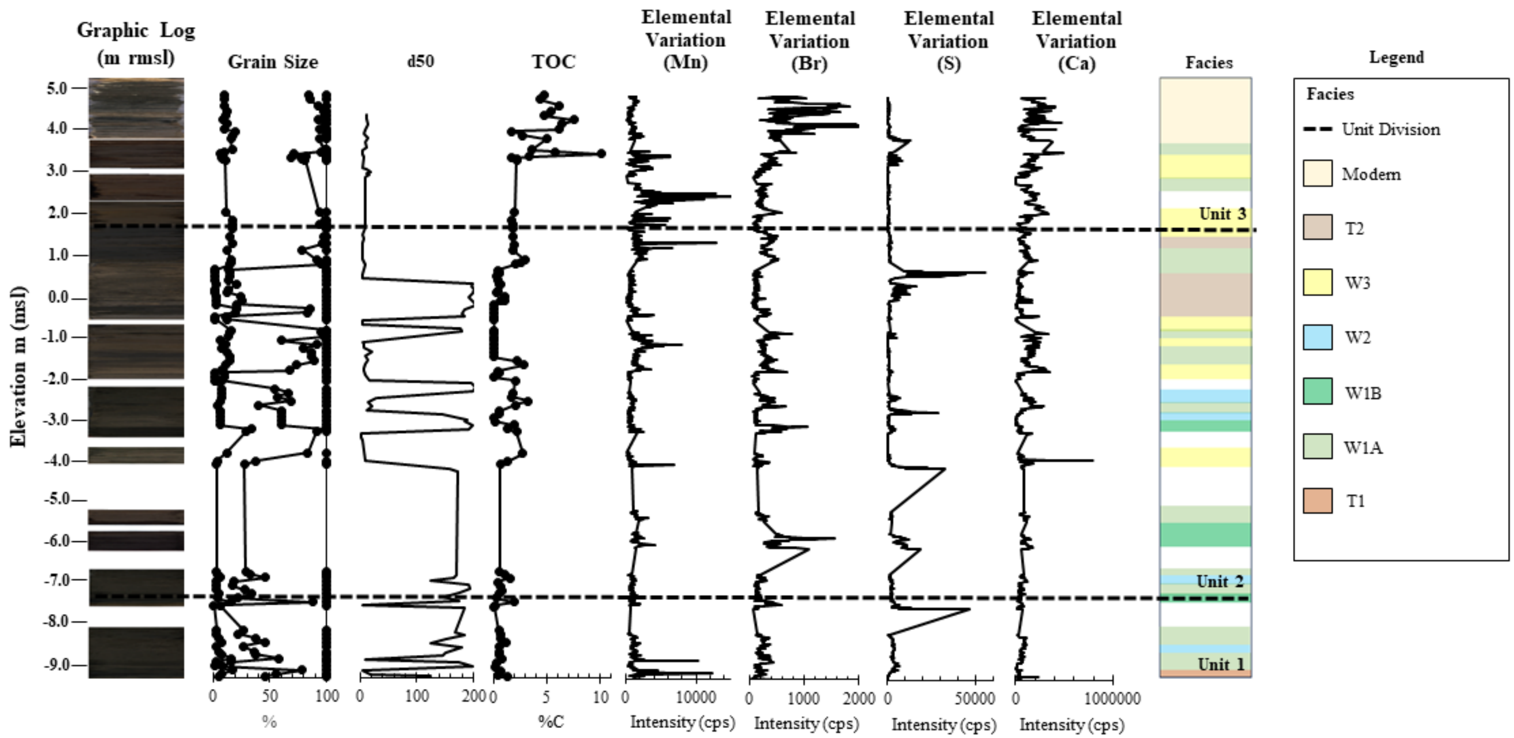

Fig 5. Core TM5 with graphic log, optically stimulated luminescence (OSL) ages, grain texture, d50, total organic carbon (TOC), relevant elemental variations, facies locations, and unit divisions. The OSL ages shown are modeled ages according to the Bayesian model. The graphic log is a compilation of photos of TM5 relevant to depth. The white areas in the graphic log and facies description are core gaps associated with coring retrieval errors.

3.2 Facies Descriptions

Facies T1 occurs between -9.54 and -9.44 m rmsl at the base of the core and is composed of red-brown sandy-clay. This unit is categorized by high amounts of quartz sand and the highest manganese (Mn) XRF counts of 2620 cps recorded for TM5. The value of d50 is high compared to other parts of the core (123.39), and the total organic carbon (TOC) is low, ranging from 0.43-1.3%. Based on these characteristics and lithostratigraphic correlation with previously collected cores (Figure 5 and Figure 6; Mahony, 2022), T1 is interpreted as a paleosol that locally is known as Hamra.

Facies W1 consists of clay and sand with abundant pyrite and brackish water ostracods. The facies is divided into two facies (W1A and W1B) separated by the presence or absence of coalified plant material. Facies W1A is composed of alternating gray silty clays and tan sands and occurs eleven times between -9.41 and 3.64 m rmsl. This facies is categorized by high counts of pyrite, brackish ostracods (*Cyprideis torosa*) along with high amounts of sulfur (S) XRF counts (up to 4537 cps) and low XRF counts of bromine (Br; 81 cps). Facies W1A contains TOC Wt% of 0.06-3.27% and d50 counts of 146.11. W1A is interpreted as a brackish wetland due to the presence of sulfur and pyrite.

Facies W1B, a sub-facies of W1 consists of dark silty-clay wetland deposits. This facies is composed of high counts of charcoal and pyrite and occurs three times between -7.61 and -2.9 m rmsl. TOC is high, varying between 0.75-2.12 Wt%, while d50 values range between 2.62 and 2.97. Facies W1B is classified as a burned sub-oxic brackish wetland due to the presence of burned organic material as well as pyrite.

Facies W2, the second wetland facies, consists of gray silty-clay deposits. Between -8.76 and -2.03 m rmsl, the facies occurs four times. W2 is categorized by large amounts of freshwater gastropods and gastropod operculum paired with low amounts of quartz sand. TOC varies from 0.19-5.87 Wt% while d50 is relatively higher with values from 27.61 to 197.89. Facies W2 is interpreted as a seasonal freshwater pond environment.

Facies W3 is composed of gray silty-clay and tan sands. Occurring between -4.22 and 3.64 m rmsl, facies W3 is composed of d50 counts that vary between 8.19 to 171.76, and lower amounts of TOC (0.66-2.78%) compared to sub-facies W1B. Facies W3 includes high counts of gypsum and calcite, evaporite minerals formed when excess water is removed from the system. W3 occurs six times throughout the core and alternates with W1A in the upper portion of Unit 2 and is interpreted as a seasonally arid evaporite pond.

Facies T2 is composed of tan sands with high amounts of imported quartz sand. Occurring twice between -0.32 and 1.68 m rmsl, T2 is a terrestrial facies that is distinct in color and mineralogy from the Hamra terrestrial facies, T1. TOC is low, ranging between 0.26-2.62 Wt% but still higher than the Hamra Facies T1, while d50 is the highest in the core, ranging between 182.85 and 199.23.

Above 3.95 m rmsl, the core is categorized as modern agricultural soils, including dark soils with high amounts of gastropod shells. This section of the core was not analyzed for this study.

3.3 Unit Stratigraphy

Unit 1 (-9.54 to -7.41 m rmsl): the lowest unit contains mostly tan sands and wetland deposits. The oldest layer contains the only appearance of the "Hamra" paleosols of facies T1, followed by brackish wetland deposits of facies W1A (-9.49 to -9.09 and -7.68 to -7.41 m rmsl) and W2 (-9.09 to -7.68 m rmsl). Quartz sand deposition is the highest throughout the core along with high amounts of d50.

Unit 2 (-7.41 to 1.68 m rmsl) lies unconformably on top of Unit 1. This unconformity is evident by a sharp jump in OSL ages (8.24 ± 0.82 ka to 5.42 ± 0.28 ka) from -7.61 m rmsl to -7.41 m rmsl, along with changes in lithology and depositional environments. Unit 2 begins with the first appearance of facies W1B (-7.61 to -7.41 m rmsl), containing high amounts of pyrite and the first appearance of charcoal in the sediment sequence. This unit contains the highest deposition rate of 7.97m/ka and contains all the wetland facies. TOC ranges from 0.0% to 3.27% and coincides with our wetland facies. The occurrence of facies W1A increases within this unit, with a total number of seven occurrences throughout the unit. Facies W3 and T2 first occur within the unit at -4.19 m rmsl and -0.22 m rmsl respectively. In the bottom half of Unit 2, the deposition of wetland facies is higher than in the upper half of the unit. The top of the unit ends with facies T2, where there is an increase in d50 and a drop in TOC. Counts of calcite and gypsum begin to increase above -4.19 m rmsl. Throughout Unit 2, facies W2 occurs three times, facies W1B occurs three times, facies W3 occurs five times, and facies T2 occurs twice.

Unit 3 (1.68 to 5.19 m rmsl) sits unconformably on top of Unit 2. Facies W1A and W3 are seen in this unit. The d50 is the lowest in the core throughout the unit and contains mostly clays. Above 3.64 m rmsl lies anthropogenic soils which contain this highest amount of TOC and bromine within the sediment sequence.

4. Discussion

4.1 Age-Depth Model

Table 3. Bayesian model correction of OSL dates

		Original		Bayesian Model	
Sample Number	**True Depth (m)**	**OSL Age (ka)**	**Uncertainty (ka)**	**OSL Age (ka)**	**Uncertainty (ka)**
TM1	2.99	2.00	0.21	1.94	0.21
TM2	1.25	4.45	0.38	4.29	0.30
TM3	0.44	4.39	0.44	4.47	0.29
TM4	-0.06	4.92	0.42	4.67	0.23
TM5	-0.31	4.83	0.42	4.72	0.22
TM6	-0.53	5.30	0.46	4.75	0.22
TM7	-3.26	4.86	0.43	4.95	0.23
TM8	-5.68	5.08	0.46	5.19	0.25
TM9	-7.16	5.35	0.50	5.38	0.27
TM10	-7.46	5.22	0.44	5.43	0.28
TM11	-7.61	8.62	0.79	8.24	0.82

Adjusted OSL ages using Bayesian model in thousands of years before 2022 (ka)

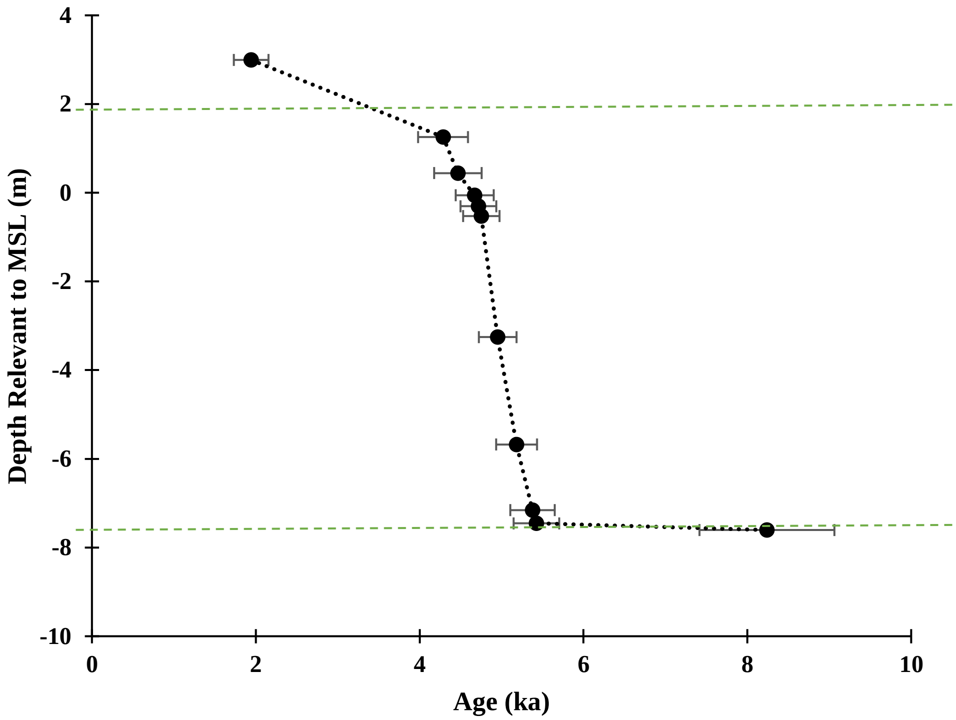

Fig 6. Age-depth plot. OSL dates plotted are adjusted ages and their associated uncertainties from the Bayesian model. The black dotted lines represent the linear interpolations between the dates derived from the model. Unconformities are shown as green dashed lines.

To account for the large uncertainties obtained from the OSL dating as well as reversals in the age results, Dr. Gilad Shtienberg (personal communication, 2023) used OxCal to apply a Bayesian model to the data (Figure 4.). This model is applied to convert our record from depth to age and considers the central ages along with the uncertainty bounds to adjust the age-depth points. This age-depth model resolves the reversals between 4.4 ka and 5.35 ka which are accommodated within the reported uncertainties in the age estimates. Unit 2 contains the thickest interval of continuous deposition in TM5 between 4.5 ka and 5.5 ka and will be the focus of this study.

4.2 Depositional Environments

Facies T1 is composed of Hamra paleosols that are interpreted as quartz sands that were transported as atmospheric dust and aeolian sand. This facies has a distinctive red coloring due to aeolian Sahara dust leaching iron into the soils. The Mn XRF counts are high, which can be explained by the presence of Mn-Fe nodules found in the soils. These nodules are indicative of periodic water-logging episodes (Tsatskin *et al*., 2009). These quartz grains are rounded and frosted, indicating transport by wind. The wetness index in Figure 8. refers to the wetness of each facies in relation to the other facies, representative of the changes in the hydrology of the area. The wetness index was developed originally for core KBMN3 and adapted to TM5 while accounting for the different facies present within the cores. Facies T1 is classified as dry in comparison to wetland facies.

Facies W1A is composed of alternating gray silty clays and tan sands with high amounts of pyrite and sulfur (S), consistent with anoxic conditions during deposition. Facies W1A also contains calcareous microfossils of brackish ostracods (*Cyprideis torosa*). The formation of pyrite is likely from the presence of sulfate in seawater infiltrating the marsh environment (Dellwig *et al.*, 2002). Sulfate is converted to pyrite by bacterial sulfate reduction, a metabolic system indicative of bacterial sulfate reducing bacteria living under anoxic conditions. We suggest that Facies W1A formed in brackish wetlands influenced by saltwater intrusion during times or reduced freshwater flow from the adjacent Taninim stream and nearby Timsach spring. This facies is classified as semi-wet on the wetness index due to the decrease in presumed freshwater influence that allowed saltwater intrusion.

Sub-facies W1B consists of dark silty clays with high amounts of pyrite and charcoal. High counts of Br, and moderate amounts of S. The frequent occurrence of charcoal suggests that the marsh was periodically burned. Br suggests higher amounts of organic material and S indicates the presence of pyrite, which is reflected in the counts. Sub-facies W1B is associated with a brackish wetland that dries periodically and burns leaving behind burned organic material; this facies is classified as semi-wet on the wetness index.

Facies W2 consists of gray silty clays with the presence of freshwater shells such as snail operculum and various gastropods and TOC over 0.19 Wt %. Facies W2 is classified as wet on the wetness index and is interpreted as shallow oxic ponds that are short lived. These oxic ponds exist for up to a few decades and form seasonally; they are probably confined to low lying areas within the wetland and periodically dry out.

Facies W3 is composed of gray silty clays and alternating sand layers. Facies W3 contains high amounts of evaporites (calcite and gypsum) along with freshwater calcareous microfossils in some layers and brackish calcareous microfossils in other layers. The main identifying factor is the evaporites within the layers along with high amounts of Ca. This facies occurs in periodic episodes, often alternating with Facies W1. This suggests repeating wet and dry cycles where saltwater infiltrates the system, creating a brackish wetland and then dries to create evaporites and leave calcareous microfossils behind. This cycle repeats four times then turns into a terrestrial environment after the last drying episode.

Facies T2 is composed of tan sands and mostly consists of transported quartz grains presumed to be from the dune fields that used to exist to the south of the project site. These quartz grains are rounded and frosted, indicating transport by wind. Facies T2 is classified as dry in comparison to wetland facies (Figure 7.).

4.3 Climatic Interpretation

4.3.1 Early Holocene Climate

During the early Holocene, the Levant experienced an increase in temperature as well as precipitation after the Last Glacial Maximum (LGM) around 20 ka before present (BP) (Hughes *et al.,* 2013). This increase in temperatures and the melting of Northern Hemisphere ice sheets resulted in an increase in sea level observed off the coast of Israel. With this sea level rise, sand from the Nile delta was transported up the coast and deposited along the Israeli coast (Box *et al.,* 2011). In Core TM5, the "Hamra" paleosols date to as young as 8.24 ± 0.82 ka which most likely resulted from the increased deposition rates along the coast. Around 18 ka, the Mediterranean Sea rose dramatically from -125 m rmsl to -7 m rmsl by 7 ka (Mahoney, 2022; Lambeck and Bard, 2000).

The African Humid Period (AHP) resulted in extraordinary wet and warm climates in Northern Africa and the East Mediterranean from 11.5 to 5.5 ka (Shannahan *et al.,* 2015). Our sediment core has an unconformity between the first and second unit, signified by an age gap from 8.24 ± 0.82 ka and 5.42 ± 0.28 ka. The core features an area of high deposition from 5.5 to 4.5 ka, creating a highly detailed record of part of the termination of the AHP. Within this period, the area was mostly a wetland until around 4.75 ka when the area around core TM5 transitioned to an arid climate. Regionally, records at Marina di Ugento, located off the coast of Italy near the Ionian Sea indicate an increase in autochthonous sand from 4.3 to 4.0 ka (Vincenzo and Massimo, 2015). At Tel Mevorakh, sediment deposition from 5.5 to 4.5 ka was 7.74 m/1000 years and later decreased to 1.55 m/1000 years from 4.5 to 3.5 ka. The falloff in sedimentation rates after 4.5 ka can be attributed to a drop in precipitation at the end of the African Humid Period.

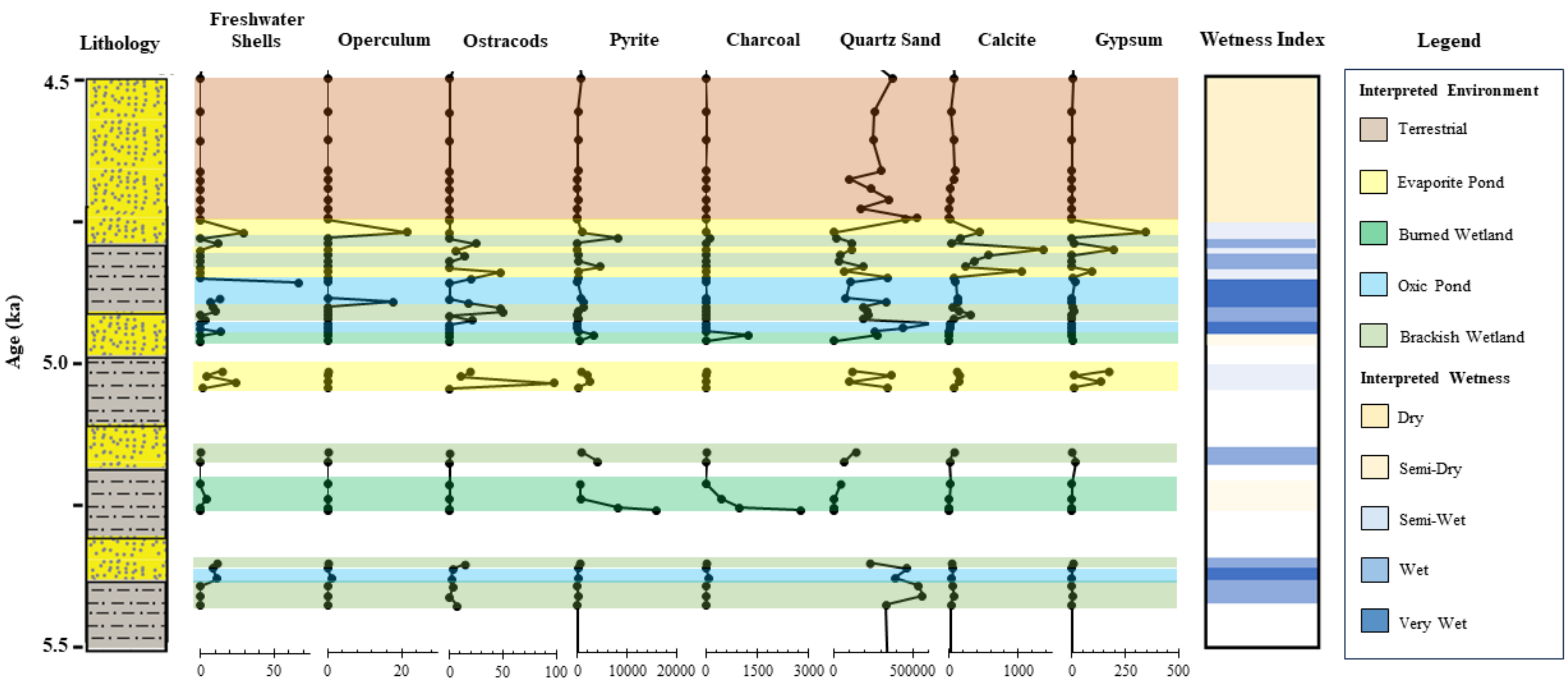

Fig 7. Core TM5 from 4.50-5.50 ka with lithology, relevant counts and interpreted wetness index. Each facies is identified by one to two proxies; freshwater shells and operculum (Facies W2, freshwater pond), ostracods and pyrite (Facies W1A, brackish wetland), charcoal (Facies W1B, burned wetland), quartz sand (Facies T2, terrestrial), calcite and gypsum (Facies W3, evaporite pond). The wetness index represents the wetness of each facies relative to each other; dry (terrestrial), semi-dry (burned wetland), semi-wet (evaporite pond), wet (brackish wetland), very wet (freshwater pond). The white areas in the facies description are core gaps associated with coring retrieval errors.

4.3.2 ~5.4-5.15 ka

Conditions during this period were dominated by brackish wetlands with some intermittent freshwater ponds. The brackish wetlands existed for fifty years on average and were interrupted by freshwater ponds lasting twenty years on average. There is one episode of wetland burning as evidenced by charcoal and pyrite contained within the samples. This episode is immediately followed by the re-establishment of the brackish wetland. Overall, the period from ~5.4-5.15 ka is predominately wetter climates that are associated with the peak AHP conditions.

4.3.3 ~5.15-5.0 ka

This period is associated with the first drying episode within the sediment sequence. Gypsum and calcite appear in the core as in situ evaporite minerals. Evaporites form when water leaves the system through evaporation, leaving the crystals behind in the sediment record. The presence of evaporites suggest that the wetland was becoming persistently cut off from both marine and freshwater flow creating episodic saltpans.

4.3.4 ~ 5.0- 4.77 ka

Brackish wetlands and evaporite layers dominate this period. From ~5.0- 4.85 ka brackish wetlands last an average of 40 years with reversals to freshwater ponds lasting around 20 years. These brackish wetlands contain high amounts of pyrite and brackish ostracods. From ~4.85-4.77 ka the brackish conditions lessen and become shorter episodes; in between the brackish episodes, evaporite ponds exist for an average of 23 years. These findings indicate that the wetland began to dry out more often and for longer periods of time as more seasonal aridity associated with the modern Mediterranean climate system asserted itself.

4.3.5 ~4.77-4.5 ka

Terrestrial facies T2 dominates this period. The arid conditions are inferred from the abundant quartz sand present in the core and the absence of other wetland proxies. We infer that the presence of quartz sand represents the advancing of the dune fields from the south. The sand was likely transported by wind made possible by less vegetation to hold the sand grains in place. The dune field may also represent the deposition of sufficient beach sand originating by longshore drift from the Nile River to contribute to dune formation. Dunes were still present south of Tel Mevorakh in the early 1900's before the area was given over to agriculture and industrial development. This time signals the end of wet conditions associated with the AHP.

After this period, deposition rates decrease, leaving an age gap in the data. Facies W1A does return later in the core sequence around 2.0 ka, indicating the brief return of brackish conditions.

4.4 Regional Comparisons

4.4.1 The Kebara Marsh

Previously, cores were taken north of the Tel Mevorakh site in the Kebara Marshes. Core KBMN3 (UTM 36N 680613;3604663) is located west of the Carmel Mountains and presumed to be the center of the past wetland. KBMN3 was extracted using the same methods as TM5. The period of highest deposition rate was from 7.8-5.8 ka, whereas TM5 had its highest deposition rate from 5.5-4.5 ka. KBMN3 and TM5 share two facies throughout the core: T1 and W1A (which is labeled W2 in KBMN3). T1 is the "Hamra" paleosol facies from the early Holocene that contains high amounts of quartz and has a characteristic reddish-brown appearance. W1A/W2 is the gray silty-clay brackish wetland facies containing high amounts of pyrite and brackish ostracods. In KBMN3, T1 occurs in the lower section of the core, occurring from -10.19 and -7.09 m rmsl; in TM5 T1 occurs once from -9.54 to -9.41 m rmsl. W1A/W2 occurs nine times in KBMN3 starting at -9.76 to -0.92 m rmsl and occurs eleven times in TM5 from -9.41 to 3.64 m rmsl.

KBMN3 has a very detailed climatic record starting at 7.8 ka that begins on top of the Hamra paleosol. From 7.0-7.8 ka, the region was dominated by an overall wetland climate with brief dry periods. These dry periods can be seen through the paleosol records; eight rapid climatic transitions were observed within the first 710 years of wetland growth with an average of one climatic reversal per century (Mahoney, 2022). From 6.3-7.0 ka, the trend of wetland deposits continues, but gives way to brackish wetlands with more anoxic conditions. These brackish wetland depositions are seen as slightly less wet–reflecting insufficient freshwater input to hold saltwater intrusion at bay–and suggest that the termination of the AHP in the Levant began near 6.3 ka BP. From 5.8-6.3 ka, terrestrial facies begin to dominate the sediment sequence, representing a shift in climate to seasonally dry episodes that are observed in the modern Mediterranean climate. Meanwhile, TM5 shows the continuation of seasonally wet conditions in the southern part of the Kebara wetlands until ~4.8 ka when arid soils become the norm.

4.4.2 Tel Dor

Cores from Tel Dor to the north of Tel Mevorakh were studied using similar techniques and revealed similar climatic patterns from 6.8 ka to 4 ka, further strengthening our interpretation thus far. Core NW4 shows similar deposition patterns to Core TM5, with alternating layers between brackish wetlands and beach dunes and overwash cycles. Wetlands were first observed in the northern section of Tel Dor from 7.6-6.2 ka, consistent with the record from Core KBMN3. Following this, beginning about 6.8 ka, an increase of Nile sand was observed due to erosion of the Nile delta caused by increasing sea level rise (Shtienberg *et al.,* 2022). The appearance of abundant Nile-sourced sand at Tel Dor, a coastal site, is about 2000 years earlier than the widespread development of dunes south of Tel Mevorakh in the interior of the Kebara wetland.

4.5 Wetness Index Comparison

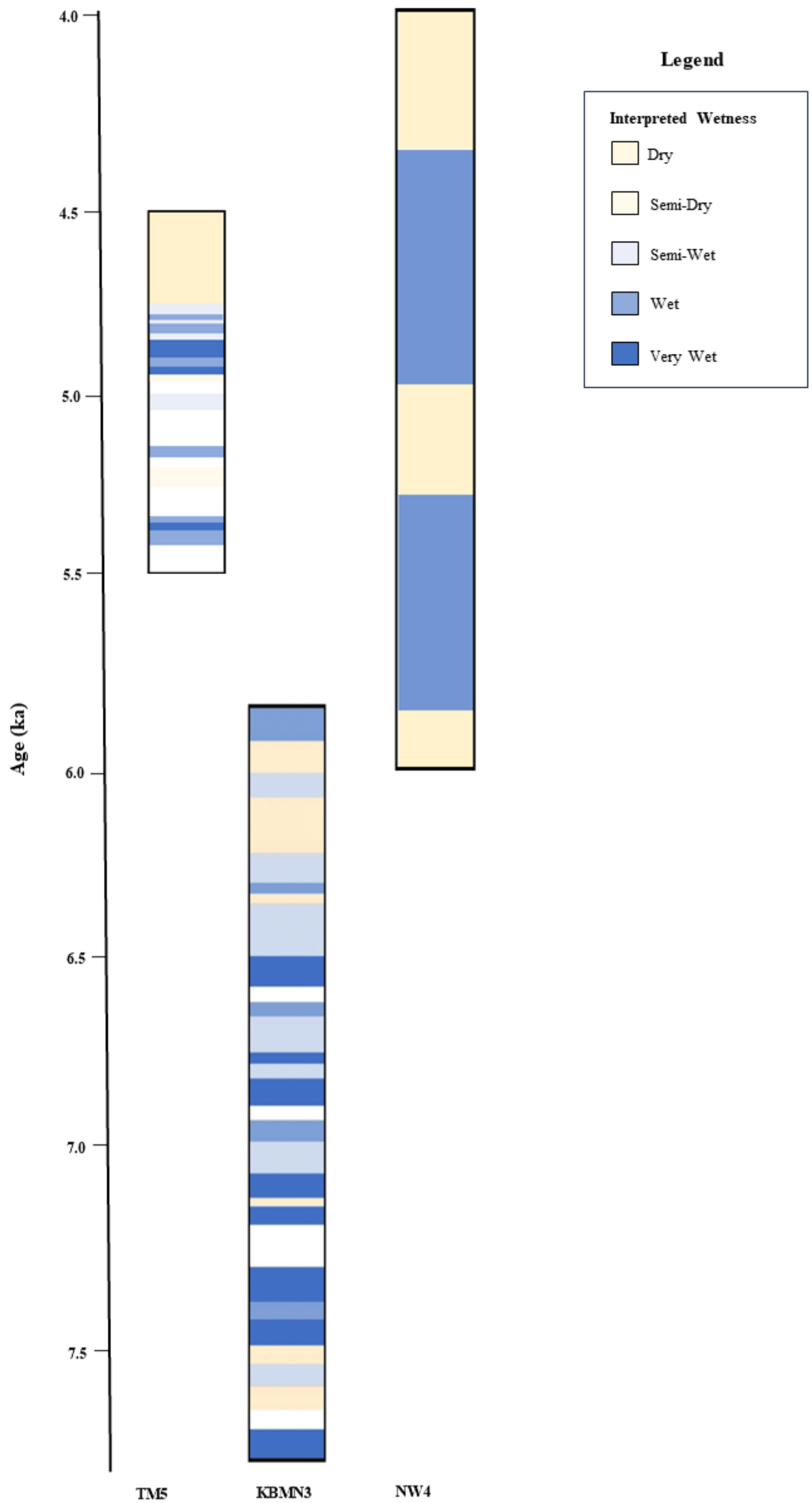

Fig 8. Core TM5, KBMN3, and NW4 wetness indices plotted against age. Plotted from 4.0 ka to 7.8 ka with interpreted wetness relevant to each section. Wetness index includes dry, semi-dry, semi-wet, wet, very wet.

With records from the Kebara Marsh and Tel Dor, we compiled a wetness index for the region from 7.8 ka to 4.0 ka. Core KBMN3 has an extensive sediment record from 7.8-5.8 ka, Core TM5 has its peak of sediment accumulation from 5.5-4.5 ka, and Tel Dor has an extensive depositional record from ~6.0-4.0 ka. Together with all these ages, the wetness index is shown in Figure 7. Starting at 7.8 ka, the area was wet to semi-wet until 6.2 ka with a brief dry episode from ~7.65-7.5 ka. From 6.2 ka, the area became dry in the center of the presumed wetland in Kebara Marsh until around 5.9 ka.

From 6.0 ka, the record in Tel Dor shows a drying episode around the same period that lasts until 5.8 ka. Then the wetland returns until 5.25 ka in the form of a brackish/freshwater wetland; after 5.25 ka, another dry episode is observed that lasts 450 years until 4.8 ka, which is reinforced in the Tel Mevorakh record that shows a wetland/ transitional wetland from 5.5 ka to 4.8 ka. After 4.8 ka, both the Tel Dor and Tel Mevorakh records show a 2800 year long dry episode lasting until 2.0 ka when the transitional wetland returns for a brief period.

Altogether, the four seasonally dry periods from 7.5-7.8 ka, 5.8-6.3 ka, 5.0-5.4 ka and <4.0-4.7 ka are evidence for dry episodes in what is otherwise a fairly continuous record of wetland deposition. The youngest of these arid events does not fully match between Tel Mevorakh in the wetland interior and coastal Tel Dor, but the overall increase in brackish water facies and arid paleosols after ~6.3 ka is consistent with the waning of the African Humid Period and the increasing assertion of seasonal climatology associated with the modern Mediterranean ecosystem. The last brackish episode in Core NW4 in Tel Dor was recorded at ~ 4.3 ka, which does not line up with Core TM5 which may be the result of differences in elevation and placement in the marsh. The core top of Core TM5 begins at 5.19 m rmsl, whereas the elevation of the core top for Core NW4 begins at 3.2 m rmsl. This distinction of elevations between the cores signifies that areas with higher elevation tend to dry faster than those with lower elevations. The locations of the cores also differ; TM5 lies more inland in agricultural fields whereas NW4 is located closer to the bay of Dor on coastal sand deposits. Even today, the coastal dune fields around Core NW4 feature brackish coastal ponds that may be analogs for the wetland facies found in the area.

4.5 Anthropological Implications

Human settlement patterns are directly impacted by factors such as shifting climates. When climate systems change on a long term scale, the people living in the region will have time to acclimate to changes associated with the ecosystem; this human calculation changes when long term climatic shifts become decadal climatic shifts particularly into seasonal aridity. The end of the African Humid Period was abrupt, indicated by dust records from Northern Africa (Shannahan *et al.*, 2015) and lasted ~800 years in the Horn of Africa (Tierney and deMenocal, 2013); our data shows that drying in the Kebara wetland began ~6.3 ka and was largely an arid land system by 4.8 ka, some 1500 years later.

The onset of the AHP coincides with an increase of larger human settlements in the Levant. After the LGM, the climate became much more suitable for societies; the Natufian people emerged in the region around 13 ka and were a hunter-gatherer society (Twiss, 2007). This changed around 10.3 ka when the Neolithic began. The Neolithic is broken up into the pre-pottery Neolithic A (10.2-9.4 ka), pre-pottery Neolithic B (9.5-7.9 ka), pre-pottery Neolithic C (7.9-7.5 ka), and pottery Neolithic (7.5-6.0 ka), each representing cultural and technological changes. The PPNA was the world’s oldest Neolithic age and small scale agriculture emerged during this time with each of the Neolithic stages unfolding largely before the periods of rapid sedimentation we see in the Kebara wetlands. This evidence of local agriculture shows the beginning of domesticated crops, although it is believed that these societies mainly used these crops as supplements to the hunter-gatherer lifestyle (Goring-Morris and Belfer-Cohen, 2011). The PPNB saw more reliance on agriculture with domesticated crops such as barley, winter wheat, and horsebeans in ‘Ain Ghazal and Yiftahel (Banning, 1998) and more permanent homes made of stone and mud, indicating a stable climate pattern suitable for agriculture–a period well within the relatively predictable rains of the African Humid Period. The archaeological site of ‘Ain Ghazal was around 32 acres, one of the largest known Neolithic sites in the Near East (Rollefson *et al.,* 1992) and indicating, by its size, a semi-permanent settlement. The PPNC saw a decline in thriving settlements where some villages shrank to a fraction of their previous size, although the cause of this transition is debated (Twiss, 2008). Finally, the PN was the age of pottery in the Neolithic; the reliance on domestic animals and crops continued to increase during a time when the Kebara record shows the predominance of relatively wet climatology in the coast of the Levant.

During the Chalcolithic, population reached a peak in the Levant from 6.1-5.8 ka (Palmisano *et al.,* 2019); in the Bronze Age, there were multiple peaks in population. Notably, this population peak corresponds with one of the cycles of seasonal aridity recorded in both Tel Mevorakh and Tel Dor. The Early Bronze age can be divided into four periods of time EBA IA, IB, II, and III, which, respectively, coincide with the years 5.75/5.55-5.25 ka broadly terminating in one of the arid phases of the Kebara wetland, 5.25-5.0/4.95 ka, when wetland facies are re-established in both the coastal and interior parts of the Kebara wetland, 5.0/4.95-4.8/4.75 ka, ending as relatively wet climatology comes to an end in Kebara sites, and 4.8/4.75-4.45 ka, when both Tel Dor and Tel Mevorakh are associated ~4.8 ka chert flake found within Core TM5. The flint flake dates to the Early Bronze Age when settlements were large and prosperous. Other notable cultural episodes in the Levant were during the Early Bronze Age (5.4-4.6 ka) and Intermediate Bronze Age (4.2-4.0 ka) (Palmisano *et al.,* 2019) which are associated with the youngest high-deposition record in the Kebara Wetland. During the transition of Early Bronze Age II to III about 4.75 ka, settlements such as towns and villages began to disappear–a period when the Kebara wetland preserves mainly seasonal arid soil facies. Arad, Tell el-Far'ah, and Tell es-Sa'idiya are examples of fortified towns that disappeared during EBA III (Greenberg, 2017).

The emergence of short term climate fluctuations influenced human settlements in the Levant affected how long and how prosperous these civilizations were. Shifting climatic conditions forced civilizations to adapt to the changing conditions through agricultural and societal advancements or collapse entirely. I recorded a major climatic transition around 4.8 ka towards more arid conditions which coincided with a decrease in settlements in the Levant around the same time (Palmisano *et al.,* 2019). The shift from seasonally wet to mostly arid conditions around 5.0 ka is supported through a study on human settlements in the Levant, but future research in this area would be beneficial to gain a better understanding of the climatic shifts at the termination of the African Humid Period. The climatic record of Tel Mevorakh supplements local archaeological and climatological records to better grasp the evolution of communities within the Levant during the Holocene.

5. Conclusions

The palaeoclimatological record from Tel Mevorakh, Israel provides a decadal-resolution record of the termination of the AHP that broadly agrees with the palaeoclimatological record collected in the Kebara marshes and Tel Dor. Overall wet to semi-wet conditions are seen from 5.4-5.15 ka with the appearance of brackish wetlands with short reversals to freshwater ponds. The first evaporite series occurs from 5.15-5.0 ka with a continuing trend of brackish wetlands and burning episodes. From 5.0-4.77 ka evaporitic episodes became longer and occurred at a higher frequency and finally from 4.77-4.5 ka the modern seasonal terrestrial climate occurs signaling the end of the African Humid Period in this region. This transition to the modern climate was not consistent and had multiple reversals from wetter conditions to dry conditions and vice versa. Brackish wetlands occurred in Tel Mevorakh for around 750 years, indicating a slow transition to the Mediterranean climate observed today. The climatic shifts likely had many effects on the settlements in the area, impacting the evolution and advancement of these societies. Our record contributes to the existing paleoclimatic records in the Mediterranean region, providing a higher resolution dataset similar to studies in the Kebara Marshes. This record describes the variability of the termination of the African Humid Period along with the effects in the Levant during the Holocene and adds on to the records of the Kebara marshes and Tel Dor.

APPENDIX

Table A1. Normalized Proxy Counts

Samp-le ID	Dry Weight (g)	True Depth (m)	Age (ka)	Freshwat-er Shells	Ostracods	Opercula	Charcoal	Quartz Sand	Carbonate	Pyrite	Calcite	Gypsum
A	4.687	4.96	0.63	0	9	0	0	174389	800	61	287	0
A	4.142	4.82	0.73	19.67	0	0	0	144473	669	59	285	0
A	6.445	4.69	0.81	460.66	184	0	0	2064	1622	0	9	0
A	8.136	4.52	0.93	195.02	55	30	0	1414	634	1507	18	6
A	5.989	4.41	1.00	376.5	687	70	0	1541	175	0	35	0
A	6.440	4.31	1.07	488.31	94	45	45	3065	90	2768	75	0
A	3.812	4.23	1.12	0	0	0	0	427	0	8549	64	0
A	2.992	4.1	1.21	25.76	0	9	26	584	34	894	206	17
A	3.494	3.95	1.31	0	0	0	0	1679	93	8255	1049	0
B	3.533	3.64	1.52	163.56	30	0	45	1606	59	6691	0	2379
B-L	4.849	3.62	1.53	232.63	2028	10	40	2751	0	2432	405	2104
B	7.289	3.51	1.60	46.32	0	0	3	23186	53	987	3785	794
B-L	1.641	3.43	1.66	8.83	18	0	0	7767	0	1284	424	3601
B	3.401	3.39	1.68	0	0	0	12	144697	551	2479	323	12
B-L	2.754	3.22	1.80	0	36	0	0	43383	0	1066	729	3208
B-L	5.728	3	1.94	0	30	0	0	96912	0	111	711	4265
B-L	4.102	2.78	2.23	0	5	0	0	169692	1305	61	979	0
B-L	0.642	2.54	2.55	0	0	0	0	25674	267	301	446	446
C	3.912	2.02	3.26	7.38	4	0	0	46054	590	52	945	118
C	3.757	1.88	3.45	0	0	0	0	40109	459	48	153	0
C	3.420	1.68	3.72	0	8	0	0	53130	130	317	779	390
C	1.443	1.48	3.99	0	17	0	102	107101	2990	968	544	544
C	0.430	1.34	4.18	0	0	0	0	31295	7207	47	130	0
C	2.445	1.22	4.29	0	0	0	0	67761	954	10	636	0
C	3.043	1.12	4.31	0	0	0	25	4158	18941	166	115	0
C	2.338	0.98	4.35	0	0	0	0	21750	14221	1046	35	0
C	5.533	0.82	4.38	0	0	0	0	26287	2079	4	910	195
D	8.875	0.59	4.43	0	73	0	92	750364	2938	55	28	0
D	7.689	0.47	4.46	3.97	11	0	13	124985	212	140	37	0

Table A1. Normalized Proxy Counts, Continued

Samp-le ID	Dry Weight (g)	True Depth (m)	Age (ka)	Freshwat-er Shells	Ostracods	Opercula	Charcoal	Quartz Sand	Carbonate	Pyrite	Calcite	Gypsum
D	8.835	0.33	4.51	0	0	0	0	369511	885	678	69	5
D	11.949	0.19	4.57	0	0	0	10	256619	1527	51	27	0
D	11.025	0.07	4.62	0	0	0	26	252343	1538	152	63	0
D	10.525	-0.06	4.67	0	0	0	6	303354	1115	141	85	0
D	8.649	-0.14	4.68	0	0	0	2	100393	452	11	61	0
D	10.394	-0.23	4.69	0	0	0	0	233539	627	0	4	0
D	2.870	-0.33	4.70	0	0	0	0	352030	4997	37	14	0
D	1.270	-0.43	4.70	0	0	0	20	170417	3978	0	0	0
D	7.539	-0.53	4.71	0	0	0	0	524341	1383	0	0	0
D	9.933	-0.56	4.72	0	0	0	0	453079	0	0	4	0
E	2.402	-0.86	4.74	29.84	0	22	11	3126	0	857	434	347
E	1.482	-0.99	4.75	0	0	0	110	22763	440	8083	165	0
E	6.584	-1.11	4.76	12.38	25	0	0	118413	1584	25	25	12
E	4.093	-1.27	4.78	0	6	0	0	112955	1373	6	1373	196
E	6.799	-1.4	4.79	0	14	0	0	39373	0	94	576	0
E	2.465	-1.53	4.80	0	0	0	6	31684	1246	150	356	0
E	2.095	-1.67	4.81	0	0	0	0	189139	2800	4666	233	0
E	7.554	-1.78	4.82	0	48	0	0	63500	190	30	1047	95
E	7.894	-1.93	4.84	0	21	0	21	341377	0	95	67	5
E	7.816	-2.03	4.84	66.46	0	0	0	103584	0	5	94	16
F	1.951	-2.41	4.88	13.05	0	0	10	78285	84	783	115	0
F	4.591	-2.49	4.89	6.66	18	18	18	329984	568	1242	124	0
F	3.437	-2.61	4.90	8.89	47	0	12	184256	0	1067	47	6
F	4.865	-2.71	4.90	10.47	50	0	8	216134	134	243	142	8
F	8.119	-2.79	4.91	0	0	0	0	221602	321	10	301	0
F	7.421	-2.9	4.92	3.43	22	0	3	184628	176	55	69	0
F	8.090	-3.01	4.93	0	0	0	0	624973	0	2	13	0
F	6.657	-3.11	4.94	0	0	0	0	436725	783	18	18	0
F	4.355	-3.19	4.95	14.03	0	0	2	261068	599	177	0	0
F	0.111	-3.27	4.95	0	0	0	1240	280664	9919	3260	0	0
F	2.368	-3.37	4.96	0	0	0	0	5110	27426	301	0	2
G	1.054	-3.91	5.01	14.49	19	0	0	113629	464	754	97	174

Table A1. Normalized Proxy Counts, Continued

Samp -le ID	Dry Weight (g)	True Depth (m)	Age (ka)	Freshwat -er Shells	Ostracods	Opercula	Charcoal	Quartz Sand	Carbonate	Pyrite	Calcite	Gypsum
G	3.718	-4	5.02	4.11	11	0	0	368195	0	2093	142	11
G	4.160	-4.11	5.03	24.49	98	0	10	97941	0	2488	147	137
G	14.132	-4.22	5.04	1.44	0	0	0	337828	0	52	61	9
H-L	5.927	-5.37	5.15	0	0	0	7	137976	28	626	62	0
H-L	4.223	-5.55	5.17	0	0	0	10	67848	58	4081	10	19
H-L	3.382	-5.87	5.21	0	0	0	0	45082	0	468	15	0
H-L	1.666	-6.07	5.24	4.04	0	0	452	3616	0	666	0	0
H-L	1.411	-6.19	5.25	0	0	0	982	888	0	8257	0	0
H-L	2.000	-6.22	5.25	0	0	0	2770	825	0	15888	0	0
I	3.555	-6.91	5.35	11.46	14	0	17	226310	23	344	23	4
I	4.922	-6.98	5.35	8.28	3	0	1	464025	1059	29	51	0
I	5.381	-7.11	5.37	11.36	2	1	98	387130	0	57	35	0
I	8.319	-7.2	5.38	0	3	0	5	537982	0	12	50	0
I	3.580	-7.31	5.40	0	0	0	4	559456	91	36	63	1
I	3.464	-7.41	5.42	0	7	0	10	331691	0	9	29	0
I	5.930	-7.51	6.36	0	6	0	1	433853	0	2	11	1
I	1.945	-7.61	8.24	0	0	0	712	177125	251	22753	0	0
I	5.611	-7.68		0	0	0	8	347448	0	19	0	0
J	6.043	-8.34		5.06	12	0	1	167195	0	80	55	0
J	6.078	-8.51		3.35	17	0	10	378392	215	190	89	3
J	8.261	-8.59		4.93	25	0	0	402442	0	187	94	0
J	7.328	-8.71		3.47	5	0	1	696716	0	172	24	0
J	8.708	-8.76		9.36	0	0	0	328165	0	51	66	0
J	7.542	-8.9		0.68	3	0	0	294035	0	77	22	0
J	5.179	-9.01		0.98	10	0	3	850836	0	459	22	1
J	8.966	-9.09		1.14	5	0	0	473160	0	14	20	0
J	9.167	-9.21		0	0	0	0	320974	142	1	0	0
J	6.091	-9.31		0	2	0	8	492702	0	560	1	0
J	14.098	-9.44		0	0	0	0	218708	0	15	7	0

Table A2. Sample processing data and raw counts

Column ID	True Depth (m)	Dry Weight (g)	Dry Coarse Fraction (>63 µm)	% >63 µm	Freshwat -er Shells	Ostracods	Operculum	Charcoal	Quartz Sand	Carbonate	Pyrite	Calcite	Gypsum
A	4.96	6.984	4.6873	67.11%	0	8	0	0	160512	736	56	264	0
A	4.82	6.911	4.1419	59.93%	16	0	0	0	117504	544	48	232	0
A	4.69	8.552	4.422	51.71%	400	160	0	0	1792	1408	0	8	0
A	4.52	11.563	6.685	57.81%	256	72	40	0	1856	832	1976	24	8
A	4.41	9.044	4.653	51.45%	344	628	64	0	1408	160	0	32	0
A	4.31	9.513	5.423	57.01%	520	100	48	48	3264	96	2944	80	0
A	4.23	6.74	3.8124	56.56%	0	0	0	0	320	0	6400	48	0
A	4.1	5.219	2.372	45.45%	12	0	4	12	272	16	416	96	8
A	3.95	7.119	3.494	49.08%	0	0	0	0	1152	64	5664	720	0
B	3.64	6.196	2.74	44.22%	88	16	0	24	864	32	3596	0	1280
B	3.51	11.616	6.157	53.00%	56	0	0	4	28032	64	1192	4576	960
B	3.39	11.44	3.4012	29.73%	0	0	0	8	96640	368	1656	216	8
BL	3.62	8.878	4.028	45.37%	184	1604	8	32	2176	0	1924	320	1664
BL	3.43	4.44	1.154	25.99%	2	4	0	0	1760	0	291	96	816
BL	3.22	4.605	2.235	48.53%	0	16	0	0	19040	0	468	320	1408
BL	3	8.554	5.502	64.32%	0	32	0	0	104704	0	120	768	4608
BL	2.78	6.142	3.995	65.04%	0	4	0	0	133120	1024	48	768	0
BL	2.54	3.221	0.457	14.19%	0	0	0	0	2304	24	27	40	40
C	2.02	11.727	2.76	23.54%	4	2	0	0	24960	320	28	512	64
C	1.88	8.581	2.129	24.81%	0	0	0	0	16768	192	20	64	0
C	1.68	7.118	2.509	35.25%	0	4	0	0	26176	64	156	384	192
C	1.48	6.328	1.199	18.95%	0	4	0	24	25216	704	228	128	128
C	1.34	4.059	0.4296	10.58%	0	0	0	0	2640	608	4	11	0
C	1.22	7.625	2.049	26.87%	0	0	0	0	27264	384	4	256	0
C	1.12	10.19	2.822	27.69%	0	0	0	14	2304	10496	92	64	0
C	0.98	7.828	2.3377	29.86%	0	0	0	0	9984	6528	480	16	0
C	0.82	13.577	5.016	36.94%	0	0	0	0	35840	2048	4	896	192
D	0.59	9.94	8.8747	89.28%	0	128	0	160	1307648	5120	96	48	0
D	0.47	8.742	7.6888	87.95%	6	16	0	20	188704	320	212	56	0
D	0.33	9.749	8.8345	90.62%	0	0	0	0	641024	1536	1176	120	8

Table A2. Sample processing data and raw counts, continued

Column ID	True Depth (m)	Dry Weight (g)	Dry Coarse Fraction (>63 μm)	% >63 μm	Freshwat-er Shells	Ostracods	Operculum	Charcoal	Quartz Sand	Carbonate	Pyrite	Calcite	Gypsum
D	0.19	13.152	11.9488	90.85%	0	0	0	24	602112	3584	120	64	0
D	0.07	11.942	11.025	92.32%	0	0	0	56	546304	3328	328	136	0
D	-0.06	11.754	10.5248	89.54%	0	0	0	12	626944	2304	292	176	0
D	-0.14	9.823	8.6486	88.04%	0	0	0	4	170496	768	18	104	0
D	-0.23	11.283	10.3943	92.12%	0	0	0	0	476672	1280	0	8	0
D	-0.33	9.093	2.8701	31.56%	0	0	0	0	198400	2816	21	8	0
D	-0.43	6.792	1.2699	18.70%	0	0	0	5	42496	992	0	0	0
D	-0.53	8.396	7.5386	89.79%	0	0	0	0	776192	2048	0	0	0
D	-0.56	10.361	9.9328	95.87%	0	0	0	0	883712	0	0	8	0
E	-0.86	4.741	1.877	39.59%	11	0	8	4	1152	0	316	160	128
E	-0.99	3.386	1.4819	43.77%	0	0	0	32	6624	128	2352	48	0
E	-1.11	9.816	6.5838	67.07%	16	32	0	0	153088	2048	32	32	16
E	-1.27	7.009	3.324	47.42%	0	4	0	0	73728	896	4	896	128
E	-1.4	18.123	5.662	31.24%	0	16	0	0	43776	0	104	640	0
E	-1.53	4.389	1.831	41.72%	0	0	0	2	11392	448	54	128	0
E	-1.67	5.871	2.0954	35.69%	0	0	0	0	77824	1152	1920	96	0
E	-1.78	10.774	6.847	63.55%	0	64	0	0	85376	256	40	1408	128
E	-1.93	8.486	7.8937	93.02%	0	32	0	32	529152	0	148	104	8
E	-2.03	8.817	7.8158	88.64%	102	0	0	0	158976	0	8	144	24
F	-2.41	2.895	1.9505	67.37%	5	0	0	4	29984	32	300	44	0
F	-2.49	5.716	4.5908	80.31%	6	16	16	16	297472	512	1120	112	0
F	-2.61	4.844	3.4369	70.95%	6	32	0	8	124352	0	720	32	4
F	-2.71	6.105	4.8647	79.68%	10	48	0	8	206464	128	232	136	8
F	-2.79	8.774	8.1186	92.53%	0	0	0	0	353280	512	16	480	0
F	-2.9	8.291	7.4213	89.51%	5	32	0	4	269056	256	80	100	0
F	-3.01	8.42	8.0895	96.07%	0	0	0	0	992768	0	3	20	0
F	-3.11	7.097	6.6569	93.80%	0	0	0	0	570880	1024	24	24	0
F	-3.19	7.463	4.3545	58.35%	12	0	0	2	223232	512	151	0	0
F	-3.27	3.833	0.1109	2.89%	0	0	0	27	6112	216	71	0	0
F	-3.37	6.405	2.3678	36.97%	0	0	0	0	2376	12752	140	0	1

Table A2. Sample processing data and raw counts, continued

Column ID	True Depth (m)	Dry Weight (g)	Dry Coarse Fraction (>63 µm)	% >63 µm	Freshwat-er Shells	Ostracods	Operculum	Charcoal	Quartz Sand	Carbonate	Pyrite	Calcite	Gypsum
G	-4	4.76	3.7178	78.11%	3	8	0	0	268800	0	1528	104	8
G	-4.11	5.45	4.1597	76.32%	20	80	0	8	80000	0	2032	120	112
G	-4.22	16.144	14.1318	87.54%	4	0	0	0	937472	0	144	168	24
HL	-5.37	7.156	5.9267	82.82%	0	0	0	8	160576	32	728	72	0
HL	-5.55	6.571	4.2225	64.26%	0	0	0	8	56256	48	3384	8	16
HL	-5.87	6.96	2.74	39.37%	0	0	0	0	24256	0	252	8	0
HL	-6.07	7.009	1.262	18.01%	1	0	0	112	896	0	165	0	0
HL	-6.19	8.779	1.4112	16.07%	0	0	0	272	246	0	2288	0	0
HL	-6.22	5.877	2.0001	34.03%	0		0	1088	324	0	6240	0	0
I	-6.91	4.326	3.5554	82.19%	8	10	0	12	158000	16	240	16	3
I	-6.98	5.377	4.9223	91.54%	8	3	0	1	448512	1024	28	49	0
I	-7.11	5.967	5.3814	90.19%	12	2	1	104	409088	0	60	37	0
I	-7.2	13.195	8.3192	63.05%	0	5	0	8	878848	0	20	82	0
I	-7.31	4.157	3.5799	86.12%	0	0	0	3	393280	64	25	44	1
I	-7.41	4.192	3.4637	82.63%	0	5	0	7	225600	0	6	20	0
I	-7.51	6.574	5.9302	90.21%	0	7	0	1	505216	0	2	13	1
I	-7.61	3.202	1.9445	60.73%	0	0	0	272	67632	96	8688	0	0
I	-7.68	7.546	5.6114	74.36%	0	0	0	9	382848	0	21	0	0
J	-8.34	6.86	6.043	88.09%	6	14	0	1	198400	0	95	65	0
J	-8.51	8.547	6.0776	71.11%	4	20	0	12	451584	256	227	106	3
J	-8.59	10.226	8.2606	80.78%	8	40	0	0	652800	0	304	152	0
J	-8.71	9.103	7.3276	80.50%	5	7	0	2	1002496	0	248	34	0
J	-8.76	10.429	8.7081	83.50%	16	0	0	0	561152	0	88	112	0
J	-8.9	9.401	7.5419	80.22%	1	5	0	0	435456	0	114	33	0
J	-9.01	7.567	5.179	68.44%	1	10	0	3	865280	0	467	22	1
J	-9.09	10.748	8.9657	83.42%	2	8	0	0	833024	0	24	36	0
J	-9.21	9.562	9.1672	95.87%	0	0	0	0	577792	256	2	0	0
J	-9.31	12.004	6.0911	50.74%	0	2	0	10	589312	0	670	1	0
J	-9.44	17.364	14.0975	81.19%	0	0	0	0	605440	0	41	20	0

Table A3. Particle Size Analysis

Sample Name	True Depth (m)	d (0.1)	d (0.5)	d (0.9)	% Clay	% Silt	% Sand
TM5_a_1f	4.98	1.94	11.51	189.00	9.78	74.65	15.57
TM5_a_2d	4.88	1.95	12.46	187.63	9.75	75.30	14.95
TM5_a_3c	4.73	1.97	13.09	48.07	9.62	82.81	7.57
TM5_a_4c	4.58	1.60	8.77	31.32	12.58	84.62	2.80
TM5_a_5b	4.48	1.74	7.52	25.10	11.52	87.20	1.28
TM5_a_6b	4.38	2.14	13.96	50.95	8.70	83.57	7.73
TM5_a_7b	4.28	1.64	9.52	32.40	12.19	86.34	1.47
TM5_a_8c	4.14	1.81	11.88	44.29	10.69	83.26	6.05
TM5_a_9b	4.08	1.24	4.56	18.14	19.93	80.05	0.02
TM5_a_10b	3.98	1.34	4.69	14.69	17.39	82.61	0.00
TM5_a_11c	3.90	1.35	6.68	33.88	15.83	77.73	6.44
TM5_b_12b	3.63	1.34	5.33	19.63	16.90	81.83	1.27
TM5_b_13c	3.58	1.93	11.13	37.96	9.82	85.41	4.76
TM5_b_14d	3.52	2.95	19.38	418.00	6.30	65.02	28.68
TM5_b_15b	3.46	2.02	11.73	211.59	9.25	72.98	17.77
TM5_b_16c	3.43	2.32	16.72	291.17	7.69	60.83	31.48
TM5_b_17b	3.40	2.02	11.68	257.50	9.23	69.27	21.49
TM5_b_18b	3.37	1.76	9.56	240.17	11.20	69.70	19.10
TM5_c_19b	2.08	1.73	8.49	42.51	11.46	81.95	6.59
TM5_c_20b	1.88	1.39	4.97	17.49	16.88	81.80	1.32
TM5_c_21d	1.78	1.35	5.67	29.51	16.78	77.71	5.51
TM5_c_22b	1.68	1.36	5.18	18.33	16.80	82.95	0.25
TM5_c_23b	1.48	1.46	5.23	20.60	15.24	82.43	2.32
TM5_c_24b	1.28	1.32	5.10	22.37	17.16	78.98	3.86
TM5_c_25d	1.14	1.80	9.67	260.64	13.09	65.81	21.11
TM5_c_27d	0.88	1.44	5.08	27.97	15.61	76.55	7.84
TM5_c_28c	0.82	1.44	4.94	20.36	15.83	78.43	5.74
TM5_c_29b	0.78	1.48	5.29	20.83	14.95	80.63	4.41
TM5_d_30b	0.64	11.87	199.23	299.85	1.75	11.49	86.76
TM5_d_31b	0.58	9.37	195.06	295.90	1.91	13.47	84.63

Table A3. Particle Size Analysis, continued

Sample Name	True Depth (m)	d (0.1)	d (0.5)	d (0.9)	% Clay	% Silt	% Sand
TM5_d_32b	0.48	9.16	199.64	301.65	1.99	12.51	85.50
TM5_d_33b	0.38	11.08	199.44	300.38	1.85	11.78	86.37
TM5_d_34b	0.28	5.32	190.52	296.47	2.51	18.85	78.63
TM5_d_35b	0.14	11.54	201.36	302.15	1.81	11.56	86.63
TM5_d_36b	0.08	17.04	202.25	302.01	1.49	10.72	87.80
TM5_d_37b	-0.02	6.27	184.84	298.50	2.48	21.64	75.87
TM5_d_38b	-0.12	4.64	179.59	283.50	2.77	23.10	74.13
TM5_d_39b	-0.22	5.32	182.85	269.62	2.71	17.72	79.58
TM5_d_40e	-0.32	1.19	4.81	148.01	20.74	64.60	14.67
TM5_d_41d	-0.42	1.25	4.65	185.82	19.52	63.48	17.00
TM5_d_42c	-0.52	22.19	177.59	259.85	1.97	9.38	88.65
TM5_d_43c	-0.60	25.60	180.02	285.23	1.89	10.24	87.88
TM5_e_44b	-0.86	1.44	5.23	17.10	15.69	84.31	0.00
TM5_e_45d	-0.92	1.44	5.96	24.63	15.20	80.03	4.77
TM5_e_46d	-1.02	1.53	5.92	19.92	13.99	83.42	2.59
TM5_e_47b	-1.12	2.81	21.73	327.69	6.06	54.33	39.61
TM5_e_48d	-1.22	1.81	8.73	53.93	10.75	80.32	8.93
TM5_e_49d	-1.32	2.19	13.64	222.23	8.30	70.76	20.94
TM5_e_50d	-1.42	1.61	8.14	179.03	12.71	73.51	13.78
TM5_e_51d	-1.52	1.47	6.53	162.04	14.54	72.70	12.77
TM5_e_52d	-1.62	1.44	5.50	88.20	15.31	74.33	10.36
TM5_e_53b	-1.72	1.78	9.48	271.65	11.01	62.50	26.50
TM5_e_54c	-1.86	2.38	15.56	299.78	7.14	60.96	31.90
TM5_e_55b	-1.92	64.43	196.04	282.79	1.27	8.68	90.04
TM5_e_56b	-2.02	39.33	203.72	301.82	1.26	9.09	89.65
TM5_e_57b	-2.12	123.69	197.89	282.23	1.15	6.21	92.63
TM5_f_58b	-2.32	2.37	27.61	268.30	7.45	47.37	45.18
TM5_f_59b	-2.42	2.28	12.76	251.22	7.59	58.86	33.55
TM5_f_60b	-2.52	2.38	21.51	265.47	7.40	49.41	43.19
TM5_f_61b	-2.62	2.41	12.62	244.16	7.08	62.16	30.77
TM5_f_62b	-2.72	3.67	146.11	292.19	4.40	35.95	59.65

Table A3. Particle Size Analysis, continued

Sample Name	True Depth (m)	d (0.1)	d (0.5)	d (0.9)	% Clay	% Silt	% Sand
TM5_f_63b	-2.86	7.00	189.74	295.51	6.06	54.32	39.61
TM5_f_64b	-2.92	6.30	183.55	292.52	6.06	54.32	39.61
TM5_f_65b	-3.02	120.34	197.44	281.58	6.06	54.32	39.61
TM5_f_66b	-3.12	112.32	190.33	272.53	6.06	54.32	39.61
TM5_f_67b	-3.22	0.97	2.97	39.71	6.06	54.32	39.61
TM5_f_68b	-3.32	0.95	2.62	7.49	34.46	65.54	0.00
TM5_f_69b	-3.39	0.97	3.39	45.38	29.03	62.42	8.55
TM5_g_70b	-3.92	1.64	8.19	185.22	12.46	71.23	16.32
TM5_g_71b	-4.12	3.65	158.79	288.29	4.02	33.66	62.32
TM5_g_72b	-4.2	4.50	171.76	285.81	3.21	24.58	72.20
TM5_i_73b	-6.86	4.22	169.75	283.91	3.21	25.77	71.02
TM5_i_74b	-6.92	3.99	165.50	285.69	3.52	29.33	67.15
TM5_i_75b	-7.02	2.68	123.41	281.52	5.98	40.25	53.77
TM5_i_76b	-7.12	6.43	192.10	292.82	2.38	15.87	81.75
TM5_i_77b	-7.22	6.47	193.52	294.42	2.55	14.64	82.81
TM5_i_78b	-7.32	3.80	174.58	290.09	3.51	24.95	71.54
TM5_i_79b	-7.42	2.82	148.05	274.82	5.67	28.13	66.21
TM5_i_80b	-7.52	3.91	174.98	277.42	3.91	18.05	78.04
TM5_i_81d	-7.62	1.43	5.33	110.57	16.07	71.50	12.43
TM5_i_82b	-7.7	115.24	184.02	269.67	0.80	5.53	93.66
TM5_i_83b	-7.75		-	-	-	-	-
TM5_j_84b	-8.32	4.40	167.78	280.58	3.44	23.19	73.37
TM5_j_85b	-8.42	5.18	184.25	285.08	2.48	19.11	78.41
TM5_j_86b	-8.52	2.98	151.47	275.11	5.21	31.89	62.90
TM5_j_87b	-8.62	2.39	123.32	272.39	7.17	38.44	54.40
TM5_j_88b	-8.72	4.95	180.09	285.18	2.50	23.96	73.54
TM5_j_89b	-8.86	2.85	151.27	271.69	5.61	30.38	64.02
TM5_j_90b	-8.92	2.39	146.23	274.14	7.18	30.16	62.66
TM5_j_91b	-9.02	1.41	9.11	243.29	16.29	41.78	41.93
TM5_j_92b	-9.12	7.56	174.14	273.96	2.53	13.28	84.18
TM5_j_93b	-9.22	123.46	198.19	282.22	1.16	6.34	92.50
TM5_j_94b	-9.32	1.39	5.45	201.10	16.71	61.38	21.91

Table A3. Particle Size Analysis, continued

Sample Name	True Depth (m)	d (0.1)	d (0.5)	d (0.9)	% Clay	% Silt	% Sand
TM5_j_95b	-9.42	2.24	18.35	279.94	7.62	47.73	44.65
TM5_j_96b	-9.46	2.87	123.39	305.01	5.44	40.16	54.40

Table A4. Isotopic Analysis

Identifier 1	True depth (m)	%C	d 13C/12C	%N	C/N
TM5_A_1	4.98	4.796	-13.6515723	0.091	52.7033
TM5_A_2	4.88	4.355	-11.76918221	0.091	47.85714
TM5_A_3	4.73	6.17	-11.70653691	0.117	52.73504
TM5_A_4	4.58	5.413	-12.66743492	0.091	59.48352
TM5_A_5	4.48	4.782	-14.69532376	0.097	49.29897
TM5_A_6	4.38	7.572	-9.762599047	0.085	89.08235
TM5_A_7	4.28	6.445	-21.3287784	0.191	33.74346
TM5_A_8	4.14	6.205	-9.551807616	0.09	68.94444
TM5_A_9	4.08	1.723	-17.33092941	0.056	30.76786
TM5_A_10	3.98	2.765	-10.00832416	0.041	67.43902
TM5_A_11	3.90	5	-6.620155299	0.04	125
TM5_B_12	3.63	3.556	-9.664944503	0.042	84.66667
TM5_B_13	3.58	5.749	-10.62462074	0.09	63.87778
TM5_B_14	3.52	10.096	-2.160784172	0.021	480.7619
TM5_B_15	3.46	3.389	-6.451428055	0.009	376.5556
TM5_B_16	3.43	1.773	-9.225148801	0.004	443.25
TM5_B_17	3.40	2.24	-8.899405343	0.008	280
TM5_B_18	3.37	2.21	-9.699025645	0.01	221
TM5_C_19	2.08	1.982	-12.41163923	0.013	152.4615
TM5_C_20	1.88	1.734	-12.42812743	0.02	86.7
TM5_C_21	1.78	1.882	-12.67863994	0.016	117.625
TM5_C_22	1.68	1.889	-13.78987203	0.025	75.56
TM5_C_23	1.48	1.811	-19.93466443	0.037	48.94595
TM5_C_24	1.28	1.963	-13.12939434	0.025	78.52
TM5_C_25	1.14	1.897	-14.23072536	0.019	99.84211
TM5_C_27	0.88	2.989	-14.01156134	0.024	124.5417
TM5_C_28	0.82	2.624	-13.16873562	0.017	154.3529
TM5_C_29	0.78	2.074	-14.163009	0.021	98.7619
TM5_D_30	0.64	0.387	nr	nr	nr
TM5_D_31	0.58	0.616	-7.051044943	nr	nr
TM5_D_31	0.58	0.546	-8.55	0.013	42
TM5_D_32	0.48	0.296	nr	nr	nr

Table A4. Isotopic Analysis, continued

Identifier 1	True depth (m)	%C	d 13C/12C	%N	C/N
TM5_D_33	0.38	0.412	nr	nr	nr
TM5_D_34	0.28	0.583	-9.222557924	nr	nr
TM5_D_34	0.28	0.752	-9.34	0.008	94
TM5_D_35	0.14	0.413	nr	nr	nr
TM5_D_36	0.08	0.256	nr	nr	nr
TM5_D_37	-0.02	1.114	-6.916568642	nr	nr
TM5_D_38	-0.12	0.664	-9.474576327	nr	nr
TM5_D_38	-0.12	1.011	-8.16	0.014	72.21429
TM5_D_39	-0.22	0.028219	-37.54117321	0.448	0.062988
TM5_D_40	-0.32	0.054655	-18.33250748	1.347	0.040576
TM5_D_41	-0.42	0.04587	-17.25259927	1.048	0.043769
TM5_D_42	-0.52	0.02597	-37.54721747	0.155	0.167549
TM5_D_43	-0.60	0.02358	-37.5633355	0.278	0.08482
TM5_E_44	-0.86	0.06958	-14.71199433	1.841	0.037794
TM5_E_45	-0.92	0.062437	-13.58977629	2.071	0.030148
TM5_E_46	-1.02	0.063831	-12.43834431	2.789	0.022887
TM5_E_47	-1.12	0.037996	-8.902450841	2.953	0.012867
TM5_E_48	-1.22	0.041695	-10.0065361	2.341	0.017811
TM5_E_49	-1.32	0.039415	-8.607289363	2.455	0.016055
TM5_E_50	-1.42	0.04272	-10.08007462	2.113	0.020218
TM5_E_51	-1.52	0.052564	-11.18113775	3.379	0.015556
TM5_E_52/53	-1.62	2.177	-12.8816513	0.888	2.451577
TM5_E_54	-1.72	2.806	-7.227846792	0.046	61
TM5_E_55	-1.86	0.441	-8.818480624	0.045	9.8
TM5_E_56	-1.92	0.599	-6.578534763	0.036	16.63889
TM5_E_57	-2.02	0.094	nr	0.034	2.764706
TM5_E_58	-2.12	2.053	-9.354454386	0.05	41.06
TM5_F_59	-2.42	1.858	-10.1724486	0.058	32.03448
TM5_F_60	-2.52	1.741	-10.49200505	0.054	32.24074
TM5_F_61	-2.62	3.274	-9.068899417	0.064	51.15625
TM5_F_62	-2.72	2.077	-8.045893162	0.048	43.27083
TM5_F_64	-2.92	0.518	-9.378291515	0.05	10.36

Table A4. Isotopic Analysis, continued

Identifier 1	True depth (m)	%C	d 13C/12C	%N	C/N
TM5_F_65	-3.02	0.096	nr	0.044	2.181818
TM5_F_66	-3.12	0.16	nr	0.034	4.705882
TM5_F_67	-3.22	1.919	-19.4916952	0.083	23.12048
TM5_F_68	-3.32	1.269	-21.50501329	0.086	14.75581
TM5_F_69	-3.39	2.17	-14.9457169	0.077	28.18182
TM5_G_70	-3.92	2.778	-13.36781958	0.075	37.04
TM5_G_71	-4.12	1.322	-9.907090777	0.047	28.12766
TM5_G_72	-4.20	0.663	-11.84364577	0.035	18.94286
TM5_I_73	-6.86	0.573	-12.86853589	0.035	16.37143
TM5_I_74	-6.92	1.039	-9.904562825	0.046	22.58696
TM5_I_75	-7.02	1.567	-11.27152057	0.052	30.13462
TM5_I_76	-7.12	0.436	-11.53979452	0.041	10.63415
TM5_I_77	-7.22	0.745	-10.82300872	0.044	16.93182
TM5_I_78	-7.32	0.776	-11.66454637	0.041	18.92683
TM5_I_79	-7.42	0.557	-17.14131738	0.05	11.14
TM5_I_80	-7.52	0.25	nr	0.037	6.756757
TM5_I_81	-7.62	1.959	-19.19016855	0.079	24.79747
TM5_I_82	-7.70	0.19	nr	0.04	4.75
TM5_I_83	-7.75	0.084	nr	0.034	2.470588
TM5_J_84	-8.32	0.512	-10.58896908	0.037	13.83784
TM5_J_85	-8.42	0.721	-10.85	0.025	28.84
TM5_J_86	-8.52	0.739	-12.46	0.029	25.48276
TM5_J_87	-8.62	1.255	-13.1	0.057	22.01754
TM5_J_88	-8.72	0.582	-11.98	0.02	29.1
TM5_J_89	-8.86	0.589	-13.05	0.026	22.65385
TM5_J_90	-8.92	0.516	-15.95	0.047	10.97872
TM5_J_91	-9.02	0.77	-17.56	0.042	18.33333
TM5_J_92	-9.12	0.352	-37.5	0.031	11.35484
TM5_J_93	-9.22	0.122	-37.66	0.027	4.518519
TM5_J_94	-9.32	0.719	-21.87	0.04	17.975
TM5_J_95	-9.42	0.432	-18.51	0.027	16
TM5_J_96	-9.46	1.375	-11.9	0.021	65.47619

Table A5. X-ray Fluorescence data

Section	True Depth (m)	Al Area	Si Area	S Area	Ca Area	Ti Area	Mn Area	Fe Area	Br Area	Zr Area
A	5.14	1625	27147	436	206741	7427	681	65648	452	6005
A	5.13	2001	32579	255	260766	7730	1036	74538	615	6052
A	5.12	2260	34289	825	232936	9016	1002	79490	660	7100
A	5.11	2430	36544	261	273530	8826	1190	88431	873	7405
A	5.10	2276	34406	564	276343	7583	945	82880	1012	7895
A	5.09	2413	35630	613	244216	8322	961	83239	814	7232
A	5.08	1524	25563	472	166031	6592	926	65223	450	5782
A	5.07	73	4031	295	45170	1630	313	17058	220	1904
A	5.06	677	12698	420	94696	4123	572	35973	296	3968
A	5.05	1316	21965	823	151579	6443	991	60797	517	5592
A	5.04	3318	43390	620	208134	10889	1108	96923	646	8769
A	5.03	3479	47369	502	217391	11007	1192	103466	721	9306
A	5.02	1411	21101	273	161201	6185	501	60332	429	6058
A	5.01	2792	38984	399	201780	9313	1019	88284	564	8858
A	5.00	1620	26861	335	156723	8330	976	74078	464	7289
A	4.99	3796	48364	235	264066	11696	1378	112238	880	9448
A	4.98	4718	59745	540	287564	13022	1470	120438	1041	11178
A	4.97	1093	17226	238	131631	5467	796	53047	508	4362
A	4.96	241	5868	199	51636	2977	484	23567	163	2437
A	4.95	1560	24214	261	129419	7348	730	64251	430	6026
A	4.94	1561	25130	192	139727	8036	1109	71129	516	7092
A	4.93	1879	29134	377	157623	9041	1109	79509	498	7582
A	4.92	2359	35565	401	190877	10346	1529	96825	653	8609
A	4.91	2329	36578	440	192746	10957	1347	97122	548	9838
A	4.90	1872	28186	539	203175	8443	1095	84383	724	7628
A	4.89	2047	29377	521	172451	8620	1286	81666	553	7444
A	4.88	2456	38471	440	174797	10386	1364	89769	470	8847
A	4.87	3219	49180	554	220065	11656	1912	102473	566	9148
A	4.86	3323	48527	562	239441	11758	1882	106189	718	10675
A	4.85	3520	49309	578	268982	11845	1741	115030	808	10895

A	4.84	2942	41521	457	249515	10441	1389	103370	1066	9722
A	4.83	2190	33006	839	291670	8245	1150	94616	1630	8172
A	4.82	1928	31470	304	302508	7849	1318	94770	1615	7779
A	4.81	2331	32043	555	296714	7850	1161	94690	1588	7019
A	4.80	2123	32324	467	280382	8358	1302	97660	1597	8002
A	4.79	1287	22804	650	219401	6072	1047	72573	1444	6873
A	4.78	1583	28471	378	284518	6651	1432	83003	1645	7578
A	4.77	2336	37062	186	383019	8330	1316	103783	1844	7544
A	4.76	2830	40331	399	407043	7822	1184	103993	1507	7710
A	4.75	2081	32944	583	374899	6809	1252	90013	1484	7255
A	4.74	2213	33143	381	389906	7223	1098	91154	1343	7541
A	4.73	2555	35783	662	350804	8112	1007	91738	1590	7426
A	4.72	1177	18524	248	263199	4217	798	53812	949	5362
A	4.71	107	4473	395	84527	1727	364	19123	345	1908
A	4.70	311	5531	392	81971	1891	472	20265	452	2166
A	4.69	482	10426	596	132382	3398	361	35498	668	3600
A	4.68	2228	29329	138	289538	5876	932	68012	1035	6176
A	4.67	2446	32725	669	368290	7276	1090	80787	1250	7327
A	4.66	2749	38606	416	368341	9534	1141	105744	1350	8940
A	4.65	3677	46500	429	282265	12846	800	140828	1489	11031
A	4.64	5314	62887	324	219973	18799	661	185970	1653	13192
A	4.63	4389	49518	497	145780	14734	835	159231	1211	10794
A	4.62	3037	38583	614	230409	9500	410	99762	763	7626
A	4.61	2119	28368	747	146051	8518	616	92802	499	6266
A	4.60	1730	22809	756	109486	7430	356	82943	378	5809
A	4.59	1899	25719	524	113867	8365	465	84132	511	7856
A	4.58	4334	49291	661	140108	15479	531	145561	1471	10315
A	4.57	2896	33974	374	156883	10959	636	99746	1307	9163
A	4.56	2160	27597	839	207060	6587	359	60747	931	6835
A	4.55	4174	48034	514	294877	10760	910	108902	1091	9542
A	4.54	4653	54689	413	242957	14322	722	134663	861	12081
A	4.53	1265	16421	215	136045	5215	480	53151	433	7214
A	4.52	1975	23241	266	140019	7372	333	72166	518	8095
A	4.51	3530	41185	352	221249	12211	432	113327	720	10178

A	4.50	3762	43784	297	243856	13267	553	118968	779	10771
A	4.49	2200	27019	351	182878	8477	787	80015	670	9018
A	4.48	2776	33882	863	217472	8841	453	85769	760	8832
A	4.47	2439	32961	567	297308	7598	613	72517	741	6930
A	4.46	927	15060	655	173897	4117	358	41340	514	4536
A	4.45	408	7837	212	117270	2659	384	24777	368	2783
A	4.44	339	7476	370	128463	2217	346	22443	413	3095
A	4.43	145	4811	407	90291	2078	323	17232	269	1948
A	4.42	121	5103	346	117210	1757	379	15561	191	1740
A	4.41	81	4305	442	94617	1877	184	15150	299	2182
A	4.40	528	10651	468	173514	3608	404	33866	365	3938
A	4.39	2227	30415	3	341148	7160	315	64234	582	7122
A	4.38	2679	37327	39	401016	8232	767	77927	700	9236
A	4.37	2983	40461	-150	463442	8593	448	74197	749	9040
A	4.36	2740	35838	271	463171	7060	692	59269	700	7080
A	4.35	970	15677	358	248259	4466	301	37153	583	4818
A	4.34	1417	19834	441	227994	5417	865	48298	498	5146
A	4.33	2984	37047	547	230296	9966	499	89915	932	8444
A	4.32	5741	67898	734	141708	21450	1325	186735	1926	15296
A	4.31	5812	67038	1043	99582	23630	851	207371	1729	17022
A	4.30	5650	63913	1266	69681	24435	577	216504	1839	16886
A	4.29	5734	65857	1065	72076	23192	825	219481	2069	14736
A	4.28	6248	71453	1053	54644	25817	805	235856	1573	14520
A	4.27	4983	57468	1658	68493	21094	989	219513	1977	12201
A	4.26	6513	69700	1081	43702	23714	990	225022	915	12267
A	4.25	7716	81682	1074	40069	27431	808	242225	819	13447
A	4.24	6320	67253	696	31682	22939	973	210940	905	12177
A	4.23	6281	68990	1118	32115	25025	966	231853	1190	14279
A	4.22	7055	76312	1079	61560	25577	1262	247252	1018	13489
A	4.21	6637	70403	764	247029	19434	1482	203364	1125	11070
A	4.20	5381	61490	561	254289	16918	1425	176846	959	10388
A	4.19	2810	35462	301	408450	8246	821	83418	664	6422
A	4.18	2114	30617	530	190875	9060	1017	99407	707	6139
A	4.17	2689	34657	773	25799	14516	1252	185246	933	6959

A	4.16	2807	35052	905	49105	14153	940	161173	945	7537
A	4.15	3090	40520	502	112946	14585	695	142766	410	8607
A	4.14	3223	37851	617	84428	15122	724	139573	337	9333
A	4.13	5934	62313	526	109340	22300	1200	204302	422	13300
A	4.12	6191	65285	582	126231	24248	1079	222887	542	14639
A	4.11	6574	70359	390	97503	27173	1259	246124	832	16310
A	4.10	4115	46247	299	70423	19608	1228	197336	1187	13114
A	4.09	5059	50070	400	72326	18572	553	171565	383	12234
A	4.08	4051	44988	914	77292	19797	1100	180659	469	11794
A	4.07	4151	48319	822	97889	19610	855	182672	544	10321
A	4.06	2857	30835	685	58433	13869	486	131697	449	9215
A	4.05	4133	47901	723	88175	18889	2081	189934	398	10284
A	4.04	4054	44758	470	76592	18901	2164	197500	477	11539
A	4.03	6913	70923	683	131423	24449	1441	217537	488	14534
A	4.02	7214	74578	711	148827	26634	1763	241375	515	15249
A	4.01	6616	70223	2634	147083	25032	1093	258437	574	13439
A	4.00	6263	66084	4982	134777	23218	1034	244922	513	12183
A	3.99	5517	61293	661	184479	20217	1966	175063	421	12256
A	3.98	6506	69733	674	168024	23869	2379	202503	358	13268
A	3.97	6421	63988	3703	121314	24684	2280	223353	540	12756
A	3.96	5270	58801	6591	149360	21224	2030	211012	495	13792
A	3.95	6395	66239	7300	143607	23687	1529	231666	435	12439
A	3.94	5572	63335	6711	159495	21711	656	250146	570	10844
A	3.93	5464	61989	12595	226965	19672	1033	212538	520	11858
A	3.92	5204	63550	2898	268930	19965	576	201162	467	12304
A	3.91	4770	55036	5839	356279	15072	1270	161306	543	10731
A	3.90	4472	55022	11545	382967	15221	1262	169519	580	9666
BL	3.64	6170	68258	3702	276521	14815	650	164730	753	9708
BL	3.63	2659	31150	2672	360585	5788	744	63381	545	5184
BL	3.62	1619	21171	1703	412974	3386	915	37659	534	4345
BL	3.61	5337	56663	772	488350	10803	3220	134860	849	7785
BL	3.60	3421	38271	899	312061	9625	3325	110383	478	5869
BL	3.59	2416	28710	1093	184958	8729	1146	98955	413	5342
BL	3.58	416	7452	823	89040	2473	384	30230	209	1911

BL	3.57	1272	18538	905	158746	5821	865	75111	449	4138
BL	3.56	1996	24934	1217	169272	7585	1002	90046	433	6344
BL	3.55	4340	48839	4527	195636	13406	962	125502	395	9439
BL	3.54	3331	41697	944	150831	12607	1519	116849	350	9767
BL	3.53	4172	47671	446	165974	14226	1136	122650	271	10936
BL	3.52	6079	66928	388	207273	18507	2481	154482	380	14131
BL	3.51	7053	83013	2122	228127	21602	1005	161295	403	20640
BL	3.50	7017	76194	1598	200212	20578	6211	153913	379	20512
BL	3.49	5514	59455	6834	171193	16137	1406	121853	386	16021
BL	3.48	7673	82857	1256	214557	20326	1444	156977	491	17601
BL	3.47	8279	83054	801	190325	21432	6204	180979	399	14789
BL	3.46	8757	89738	1156	197154	23317	2229	192087	448	16688
BL	3.45	7582	80648	4400	190958	20320	3390	164603	479	18228
BL	3.44	4549	53033	504	128684	15574	1291	121022	378	13549
BL	3.43	8021	85938	3511	203491	21998	2402	164057	443	17099
BL	3.42	6374	68331	8182	187247	18363	975	139899	380	16045
BL	3.41	4270	50606	4549	152731	15030	488	121216	380	12423
BL	3.40	5319	61335	915	160175	17744	690	136090	356	13723
BL	3.39	4273	51530	858	137832	16327	706	118224	348	13642
BL	3.38	6674	70415	809	140209	20514	2179	165334	372	14909
BL	3.37	8741	80990	1025	128090	25071	3007	212014	499	15478
BL	3.36	7362	70955	467	131759	23142	3177	190326	441	17792
BL	3.35	7230	70727	1178	127207	20940	2061	175816	388	16164
BL	3.34	3256	38357	5823	105717	13823	1602	119113	263	9572
BL	3.33	2690	33347	3356	84790	13461	1061	111996	269	9123
BL	3.32	3148	38339	4638	121925	13768	488	119253	384	11070
BL	3.31	4037	45617	5317	185050	12502	146	118368	558	11481
BL	3.30	1995	24240	1027	101831	9498	555	82083	390	9137
BL	3.29	1099	13606	309	50208	5147	439	44663	209	5219
BL	3.28	3559	39412	470	121813	12876	938	104266	373	10981
BL	3.27	2098	25367	493	91515	9471	1171	81370	246	7519
BL	3.26	5153	54155	423	166564	15507	1545	129950	320	11386
BL	3.25	8933	86470	387	205086	23878	1129	180048	384	14640
BL	3.24	7858	74951	201	216675	20246	2264	170642	368	13360

BL	3.23	7066	73593	308	264225	18418	3410	147124	330	13564
BL	3.22	5320	60383	120	199546	14607	2762	124427	358	12730
BL	3.21	4331	52339	4	201292	13714	2265	113953	279	11735
BL	3.20	4524	55925	372	214577	14876	3833	106515	166	10027
BL	3.19	3263	39730	398	159392	11586	3724	106798	236	9374
BL	3.18	4160	47323	338	212310	13734	3706	110881	221	10910
BL	3.17	3716	46408	150	192170	13689	2113	98587	253	12266
BL	3.16	2036	28549	55	134700	9558	2233	74671	242	10886
BL	3.15	2325	30787	257	135331	10290	2852	88838	217	8819
BL	3.14	2215	28781	484	139650	10072	2772	92056	259	6355
BL	3.13	1868	20552	567	101445	8396	1475	78703	195	5572
BL	3.12	496	7219	324	29300	3879	954	42375	123	3125
BL	3.11	510	7957	153	41759	4073	477	35569	121	3300
BL	3.10	1083	15055	281	77514	6489	713	52944	142	5007
BL	3.09	1404	17066	395	82220	7167	525	57337	154	5416
BL	3.08	1987	23759	390	98135	8625	627	77278	209	6224
BL	3.07	2466	30373	476	132123	10520	936	82838	192	6949
BL	3.06	2114	26511	382	136842	8894	1117	70701	150	6880
BL	3.05	911	16969	384	116486	4508	1401	33366	125	4685
BL	3.04	124	7906	325	40113	1471	365	9300	96	2105
BL	3.03	1019	24012	338	122222	3503	978	25271	181	5125
BL	3.02	672	15274	323	79196	3759	1115	26534	101	4174
BL	3.01	460	10427	187	71928	3375	523	21823	90	3301
BL	3.00	-4	1127	326	6750	1172	162	2962	152	544
BL	2.99	7	471	315	700	359	118	471	73	170
BL	2.84	3	324	439	767	1288	286	533	143	153
BL	2.83	-4	363	439	1102	2399	265	524	392	222
BL	2.82	3113	33588	176	56606	12827	309	84012	380	7933
BL	2.81	11394	99730	666	155253	33458	1944	229021	280	25122
BL	2.80	12397	103907	357	143794	32059	1595	238439	309	23009
BL	2.79	10429	90885	869	126400	29557	1478	238815	325	22946
BL	2.78	9583	94709	379	148047	29192	1461	202815	260	23599
BL	2.77	9300	90344	787	135632	30012	1826	199759	239	21379
BL	2.76	9813	92596	452	130611	28323	1771	190756	219	21474

BL	2.75	8897	86816	676	133493	26511	1766	179762	252	21057
BL	2.74	8214	79781	855	119195	25107	1493	188843	206	18089
BL	2.73	5601	62052	368	106318	20374	1455	181607	235	16270
BL	2.72	4740	48813	591	90698	17446	1439	180405	291	14591
BL	2.71	2978	33628	618	60327	13755	1290	146677	242	10594
BL	2.70	4258	48392	719	84758	18219	1975	191189	305	13570
BL	2.69	5236	56636	615	108003	19838	1319	143849	188	15998
BL	2.68	5200	57917	713	109791	20112	1351	136292	163	17105
BL	2.67	3224	36752	443	79141	16628	1647	110827	189	12688
BL	2.66	5332	52488	644	93228	20877	1921	149073	153	15369
BL	2.65	5988	57372	715	91729	21026	1987	164026	110	15452
BL	2.64	8672	84566	528	146881	26009	2413	206511	233	19161
BL	2.63	9696	95757	616	172034	28785	2191	210478	260	22624
BL	2.62	8910	90664	548	185004	27203	4005	195136	266	22593
BL	2.61	8204	80898	391	165817	27123	2208	187065	274	22039
BL	2.60	7642	75258	186	216293	21977	4816	203372	220	15281
BL	2.59	8830	88593	233	245193	25628	5028	214889	291	17910
BL	2.58	8796	86473	562	201354	26938	2754	226748	179	19363
BL	2.57	8873	86354	453	154120	27435	3443	220374	245	19772
BL	2.56	6585	69833	495	139848	21898	12689	188821	182	18038
BL	2.55	8986	91389	418	171779	28255	7649	198601	233	24067
BL	2.54	7095	78305	437	196395	23545	8258	228261	210	25791
BL	2.53	9333	95926	527	175836	28784	5271	220431	314	25362
BL	2.52	9185	95004	523	164193	28189	2319	184680	254	26738
BL	2.51	8364	91042	-75	183067	27905	1741	192111	276	23434
BL	2.50	8910	100172	89	205410	28159	2639	179352	242	25086
BL	2.49	8624	100587	54	212218	26700	8020	177492	199	27585
BL	2.48	8325	88669	1	193074	26141	15679	205409	278	25900
BL	2.47	9059	99136	148	194257	28850	5103	192811	200	27097
BL	2.46	9180	100254	565	183106	28013	3484	179567	193	26358
BL	2.45	8446	94055	415	216226	23102	5544	164251	218	22701
BL	2.44	7543	91193	527	199082	22874	5192	150730	247	22334
BL	2.43	7623	87105	345	192541	22071	4502	136658	231	22836
BL	2.42	4259	56153	249	166285	16563	11168	125795	183	15641

BL	2.41	1741	30055	241	94897	11036	5265	77420	176	12661
BL	2.40	3266	40098	89	98966	15193	6234	101697	138	14324
BL	2.39	3202	44962	284	98818	16187	8225	106639	208	20338
BL	2.38	2493	38800	243	96888	15272	2557	98267	139	19317
BL	2.37	4949	59522	336	119778	21118	1968	123255	215	20729
BL	2.36	4494	51994	449	95449	19738	1251	117447	115	18422
BL	2.35	3652	48060	315	112305	16822	1745	108548	157	17275
BL	2.34	6294	72102	521	143845	19539	6743	126622	216	24392
BL	2.33	1851	37899	475	120694	5442	2178	44888	142	8070
BL	2.32	5311	71007	445	181221	13240	3718	83095	241	10910
BL	2.31	7643	89855	719	248550	17912	4547	111499	242	12859
BL	2.30	6176	76520	638	217902	14530	3450	94828	233	13277
BL	2.29	3149	52509	631	209520	7856	3098	56202	154	9367
BL	2.28	3950	57307	612	217147	12873	4278	88363	230	11869
BL	2.27	4670	64663	574	261166	15043	3839	97890	203	13192
BL	2.26	5415	69850	788	275862	17319	3715	120195	202	14843
BL	2.25	4917	59380	460	219886	15902	2999	99924	225	13436
BL	2.24	4907	59196	582	204833	16185	2742	104656	239	13842
BL	2.23	5201	64949	411	243582	17247	3361	115843	312	13945
BL	2.22	5331	60130	706	193860	16814	2765	116045	247	12569
C	2.12	4670	54224	1129	323522	10856	1471	104502	582	6465
C	2.11	4769	55280	999	337380	11188	1713	105519	497	8308
C	2.10	3300	44785	619	278410	10796	1180	88225	357	7903
C	2.09	3491	47308	662	251055	11243	1263	92431	425	8673
C	2.08	3784	50302	752	248997	11432	1622	93507	454	7731
C	2.07	3190	43867	399	201002	9715	1429	77233	335	11109
C	2.06	2905	40547	604	125570	13179	1267	80254	209	17339
C	2.05	3094	41010	667	90237	16015	3671	106705	209	14704
C	2.04	2842	36031	497	78407	14649	2628	91278	157	12672
C	2.03	580	11182	234	43597	5960	827	37012	83	6298
C	2.02	1302	20553	411	54115	9170	1059	59157	77	9055
C	2.01	2807	41474	401	105286	14400	1386	89223	139	15030
C	2.00	3612	54308	549	126527	15263	1755	89919	139	17494
C	1.99	5236	64641	579	144366	20443	1642	144107	213	17629

C	1.98	7203	82233	776	165258	23966	2628	166918	183	21204
C	1.97	6626	79177	1053	134993	25135	1396	163074	201	23775
C	1.96	4759	65135	536	117075	20370	1114	153059	166	19793
C	1.95	5134	57929	400	105041	21257	1467	152655	144	17571
C	1.94	4976	63899	713	125044	20489	6236	143024	177	18914
C	1.93	4045	50256	397	118094	17659	2171	121625	123	15085
C	1.92	4810	57222	597	119188	19748	2601	142805	204	16322
C	1.91	5077	56737	570	145612	19160	3620	181562	182	14869
C	1.90	3179	40218	-182	131013	15477	5896	165764	163	11822
C	1.87	1298	17630	388	47297	9495	789	71951	102	6885
C	1.86	714	10468	568	31021	6710	621	49861	74	4600
C	1.85	707	9114	437	27013	5569	1157	48375	114	3590
C	1.84	928	11513	425	18653	7440	554	56496	86	4066
C	1.83	1437	16534	328	22343	9991	677	86644	119	5507
C	1.82	2000	22246	207	35390	13013	1002	102629	142	7571
C	1.81	2885	31058	378	47991	15044	1553	120654	94	9441
C	1.80	2089	23173	343	45922	12461	4908	106147	138	7410
C	1.79	2691	29475	388	48584	14988	5610	118758	125	8337
C	1.78	3515	34965	521	43698	17719	1441	138934	159	10542
C	1.77	2768	34883	459	73749	15060	1540	107756	175	11472
C	1.76	3526	42274	356	91161	16801	1487	119892	116	13604
C	1.75	3284	41488	639	94629	16529	1853	114204	138	13027
C	1.74	3713	43790	625	89229	17395	1298	118250	194	13445
C	1.73	3015	36522	488	82713	15489	1017	111336	182	12916
C	1.72	1849	23882	327	61935	12745	1057	87710	82	9073
C	1.71	1533	22124	487	55179	11331	674	74812	99	8790
C	1.70	1311	17582	269	45188	9706	388	70478	128	7090
C	1.69	573	9400	264	26260	6078	291	45544	91	4485
C	1.68	236	6469	310	21556	4595	328	34675	133	2981
C	1.67	1240	16122	470	36942	9038	414	64401	165	6253
C	1.66	1757	22775	284	48435	12060	538	88120	157	7830
C	1.65	3110	37040	379	71019	16321	840	118670	228	11590
C	1.64	5417	54909	650	83223	22009	995	156610	234	14865
C	1.63	9577	89866	825	115931	29380	2615	215042	327	19367

C	1.62	8463	87054	809	155952	27139	2129	196701	307	19823
C	1.61	7348	81604	884	156558	25713	1237	171375	323	19454
C	1.60	6754	78171	943	134061	23905	1345	162163	277	18084
C	1.59	6503	77898	906	115947	23321	1244	166674	380	16594
C	1.58	6325	77486	1112	99944	23811	1129	171382	363	16203
C	1.57	6507	78528	1142	82304	25421	1003	178613	394	17879
C	1.56	6733	83374	1415	77909	26670	1162	191336	350	18909
C	1.55	6971	87702	1523	77255	28413	1307	199960	429	19604
C	1.54	7443	89913	1106	89671	29188	1648	217517	490	19040
C	1.53	7975	89484	1603	98221	28567	2228	209779	509	18351
C	1.52	7488	87910	1365	86033	28897	1355	205640	439	20378
C	1.51	7451	90761	1901	61945	30522	1521	218914	402	22476
C	1.50	7250	91739	1566	44918	30926	1168	213531	372	22644
C	1.49	6742	84475	1372	47202	28427	1776	198566	342	20517
C	1.48	6997	90401	1555	23472	30491	994	208669	208	22974
C	1.47	6380	86166	1221	24549	30989	1391	212799	354	22694
C	1.46	6249	81760	1798	31112	28831	1134	207699	485	21484
C	1.45	6885	87209	1670	42320	28758	1364	208858	373	21879
C	1.44	7246	87899	1609	40580	29884	1129	202930	448	21300
C	1.43	6245	81327	1207	40104	26864	856	177698	366	18947
C	1.42	7143	86107	1188	65431	28952	1251	195759	361	19611
C	1.41	6626	83703	1597	90829	27223	1833	198450	370	19294
C	1.40	6594	77350	708	87418	26133	2201	191757	452	19964
C	1.39	7084	87172	2587	76096	29181	1379	222241	384	20757
C	1.38	7955	92895	1544	56123	31848	1707	228753	373	23090
C	1.37	7853	94882	1233	48973	32875	1216	240042	404	23919
C	1.36	7390	89545	1269	65030	30446	1645	218747	348	21002
C	1.35	7006	88437	1276	42005	30639	1151	208691	357	24574
C	1.34	4892	63301	831	89529	20809	4687	145212	318	19636
C	1.33	2358	31592	395	105710	10795	12795	78371	331	10774
C	1.32	6406	79304	531	80457	25277	1664	171672	306	23895
C	1.31	8315	98002	671	78134	32381	1202	230217	325	25405
C	1.30	7474	91520	1394	82277	28645	1511	200943	312	22776
C	1.29	6807	84561	850	100771	24904	1902	169083	220	25095

C	1.28	6098	79454	1313	131406	23366	1251	155371	280	20397
C	1.27	6925	88533	1280	108838	26567	979	188243	272	19980
C	1.26	6634	85433	1310	133801	25039	1173	179239	278	18611
C	1.25	6153	80505	1497	134766	22809	1293	164671	280	18083
C	1.24	6473	82530	954	113643	24274	1445	178626	231	19356
C	1.23	6610	80539	976	109264	24903	1628	181393	272	19081
C	1.22	6425	78808	1024	99027	25446	3354	208018	344	16475
C	1.21	4609	59228	650	100680	19026	6407	156641	294	12724
C	1.20	6376	77698	1417	113299	25404	3821	193566	393	16156
C	1.19	7318	88135	988	110978	29349	3103	227241	335	19614
C	1.18	6191	75185	1068	87256	25098	1694	206328	289	17928
C	1.17	3186	41053	718	49598	17857	896	146888	259	13489
C	1.16	4918	60882	984	100309	19450	2711	161529	302	13271
C	1.15	4264	76223	1023	115006	12600	2936	101888	231	9370
C	1.14	2022	64746	1038	110534	4750	1807	34147	207	4893
C	1.13	5430	70364	1237	120389	17109	2416	132463	253	10406
C	1.12	5931	71338	1278	117331	21373	2265	165345	312	13725
C	1.11	5459	66534	955	104637	20661	1711	162708	242	13960
C	1.10	4296	56032	958	91137	19573	1544	161950	232	12100
C	1.09	3533	48702	995	96223	17603	1557	143349	271	11621
C	1.08	4146	54326	1227	105425	18054	1360	149535	287	12340
C	1.07	3859	48990	1018	140994	15196	2728	124042	323	9888
C	1.06	5135	61122	1191	88484	20361	1590	159130	336	13071
C	1.05	6850	78866	1158	111084	24804	1888	200742	471	15529
C	1.04	7251	83878	1391	117171	25751	1892	203643	440	16141
C	1.03	7212	84058	1413	117295	25071	1876	203491	346	16715
C	1.02	6841	79559	1407	155277	23379	2393	182912	421	15609
C	1.01	6915	83608	1348	131544	24644	2064	200634	436	16704
C	1.00	7238	85490	1394	101183	26576	1964	212735	440	18265
C	0.99	7780	90388	767	143903	27694	2126	224825	441	18055
C	0.98	7758	92921	894	141144	28834	2050	238261	463	19281
C	0.97	7799	92957	1020	137512	29211	1984	237708	519	19214
C	0.96	7665	91056	948	167881	27805	1795	231626	475	17875
C	0.95	7427	90490	901	148284	28084	1742	228116	507	18270

C	0.94	4806	57763	1202	189958	16799	2902	133223	406	10798
C	0.93	6383	73151	1658	227084	21339	2961	169651	438	14153
C	0.92	7244	79644	1750	143044	24184	1408	192167	490	14138
C	0.91	5939	69249	946	148850	22234	1806	177326	411	13692
C	0.90	7793	87219	1171	132675	26636	1660	217592	407	16750
D	0.67	676	43964	9460	33544	2083	778	9996	99	3768
D	0.66	2247	95566	19476	83002	4657	684	28022	151	6569
D	0.65	3449	119126	20779	114987	7137	687	44141	155	8533
D	0.64	3554	99133	42280	173722	9092	1004	54258	190	10316
D	0.63	2017	69876	55270	136587	5465	984	35155	158	7569
D	0.62	616	52392	18205	46340	2060	521	10420	122	4320
D	0.61	629	52386	11180	33701	1721	650	10295	79	4564
D	0.60	1471	79515	19095	60214	3116	702	19750	159	5362
D	0.59	1834	92061	44564	106161	3472	538	20754	111	6367
D	0.58	1282	94838	39209	82762	2459	520	15725	130	5859
D	0.57	1712	99563	29514	79053	3201	422	20820	159	6755
D	0.56	1888	105178	33697	88526	3327	219	21729	160	7214
D	0.55	1785	106385	29308	73719	3237	722	19084	66	6502
D	0.54	1704	127629	20102	53197	2608	773	13245	174	6431
D	0.53	2013	134002	15239	52477	2642	1010	15018	208	7632
D	0.52	1661	116156	10570	43702	2180	263	14176	122	6393
D	0.51	1943	92357	4572	29776	3308	582	20378	119	7397
D	0.50	1641	104267	4769	27620	3209	582	15809	135	6175
D	0.49	1726	113480	4188	27988	3209	610	16287	119	6980
D	0.48	1418	84555	2482	23440	2353	834	11283	88	5006
D	0.47	1230	83790	1571	16710	2266	1000	11109	115	5219
D	0.46	772	80299	1524	15198	1562	447	8548	87	4189
D	0.45	1030	90053	1602	21681	1850	439	9610	80	4326
D	0.44	1346	103151	1176	15693	1965	890	9107	122	4832
D	0.43	1128	91880	1450	17991	1729	578	9463	140	4372
D	0.42	1281	95316	1556	22564	1967	1053	9399	89	4574
D	0.41	1229	95565	1545	20947	1812	1271	9340	151	4059
D	0.40	1192	93982	1695	18149	1796	747	8635	88	4237
D	0.39	1193	98387	1715	25111	1564	755	8740	110	4909

D	0.38	1653	112680	2013	19307	2291	546	11299	126	5828
D	0.37	1479	102817	1630	27205	1861	1114	10653	111	4626
D	0.36	2093	98883	3024	38045	3379	786	20316	96	6203
D	0.35	2620	117551	5170	51919	4592	657	27401	159	8008
D	0.34	2463	118170	9181	47004	3489	561	21603	110	6861
D	0.33	2297	122691	8534	45453	3460	858	23244	146	6478
D	0.32	2013	115865	6473	37987	3771	556	21649	118	7082
D	0.31	3074	107697	16482	68169	5921	958	38101	173	7984
D	0.30	1825	130903	4758	31608	3636	536	16925	114	7527
D	0.29	1703	120294	5579	35950	2935	1180	15844	172	7485
D	0.28	2405	120544	3761	52237	4516	527	28616	92	7818
D	0.27	2522	121672	12858	56029	4605	759	27330	128	7718
D	0.26	2193	138215	8285	46168	2539	566	17565	104	7464
D	0.25	1506	122164	6218	31174	2086	585	12590	170	6004
D	0.24	1057	77718	3166	21770	2167	650	8070	88	4533
D	0.23	1745	132726	5533	26086	2363	600	11503	107	6333
D	0.22	1963	139027	8343	42679	2804	531	13317	139	5500
D	0.21	1374	115336	5818	34351	2286	884	11005	120	5649
D	0.20	1628	116048	4472	23414	2008	493	12303	107	6201
D	0.19	1474	122146	10448	40793	2840	798	13536	165	6023
D	0.18	1634	131272	9511	45616	2502	483	15358	120	6930
D	0.17	1771	123639	4068	33815	2786	500	13371	122	6268
D	0.16	1563	110553	3456	22164	2018	806	11452	119	6080
D	0.15	1562	120018	6428	33932	2714	507	12291	92	5674
D	0.14	1814	123625	5049	29651	2544	655	13545	111	5844
D	0.13	1835	135853	4270	25523	2286	561	13664	63	6599
D	0.12	1864	125873	11091	43951	2550	1238	13492	128	7170
D	0.11	1732	122882	12777	40988	2109	465	13425	136	6385
D	0.10	1630	115689	3066	22408	2362	939	12715	83	5439
D	0.09	1440	96402	2443	17818	2320	922	12330	140	5830
D	0.08	1237	92833	3095	25647	2063	405	11944	101	4671
D	0.07	1696	107799	6060	27998	2633	511	11587	65	6685
D	0.06	1173	87403	2602	16545	1902	313	9711	125	4818
D	0.05	1486	103702	4191	38493	2221	614	11037	94	4960

D	0.04	1294	91178	6960	29569	2001	563	12355	129	5445
D	0.03	1810	99751	4930	45181	3562	791	16486	108	7395
D	0.02	1886	96985	3758	63862	3703	550	19159	178	7449
D	0.01	1929	102852	4033	53104	3512	764	19812	172	5421
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D	-0.02	1255	64405	5179	67288	2867	413	18177	143	5545
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D	-0.05	584	50030	6593	18553	1281	473	6732	67	3394
D	-0.06	627	39321	1492	31034	2243	196	11077	94	3014
D	-0.07	479	35549	1500	38738	1969	275	11645	96	2819
D	-0.08	595	38705	985	12000	2055	414	10206	113	3808
D	-0.09	1185	61241	1239	28401	3122	590	15490	116	5615
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D	-0.11	947	46056	957	156697	2085	239	12276	112	2652
D	-0.12	51	12927	692	13562	798	134	3548	82	1244
D	-0.13	1	9609	520	12243	804	292	3570	40	1344
D	-0.14	-13	11656	618	8790	899	166	3555	60	1006
D	-0.15	269	19887	697	3273	1187	322	5491	102	2426
D	-0.16	713	49609	1139	4991	1945	316	10166	76	4657
D	-0.17	1082	73063	1173	6018	2195	807	8949	82	5152
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D	-0.22	2272	117182	1675	16274	3266	869	15353	78	5641
D	-0.23	882	68754	1168	6849	1633	308	7827	92	5184
D	-0.24	338	42273	974	3434	1472	547	4694	120	3941
D	-0.25	1180	78747	1169	6986	2947	459	11890	97	6536
D	-0.26	2076	113318	1115	7676	3176	928	12844	119	7455
D	-0.27	4155	105165	727	53024	11812	875	68221	135	14447
D	-0.28	6588	98036	971	73961	22873	1328	152647	338	20844
D	-0.29	7130	95010	1659	67105	25114	1744	177592	292	22156

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D	-0.31	6270	76131	1004	54403	27156	1849	210962	287	20927
D	-0.32	5783	73641	1470	45295	24617	1579	196108	319	19742
D	-0.33	4428	59306	1058	48555	22736	1462	160730	238	18249
D	-0.34	4040	61711	925	52964	19051	800	134483	249	17421
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D	-0.36	2425	39377	663	47435	16126	1109	110612	197	15621
D	-0.37	3642	47840	736	50394	21858	1690	149048	273	16842
D	-0.38	4175	53041	1173	56767	22728	1160	152859	241	17453
D	-0.39	4398	61441	936	54368	20560	1071	160915	272	14800
D	-0.40	6848	82229	1232	77172	25553	1683	206366	385	17337
D	-0.41	6970	84182	1104	60480	25651	1094	195678	339	17834
D	-0.42	6656	74851	1193	69232	25811	1493	225221	324	18150
D	-0.43	5500	63849	1015	52803	24414	1348	222966	283	17065
D	-0.44	4822	55395	906	52703	22023	1172	155195	317	16831
D	-0.45	6341	67940	916	68119	25643	1646	194319	313	17168
D	-0.46	3842	51497	777	238926	11487	3997	83481	223	12363
D	-0.47	2201	45355	542	159932	7246	2972	42523	156	12402
D	-0.48	4797	77051	1160	54434	16437	1569	78005	176	20676
D	-0.49	3808	101648	1714	8877	10532	269	47745	181	18151
D	-0.50	1991	95567	1538	6180	2935	606	14723	162	5672
D	-0.51	1968	95071	1025	5970	3781	514	14237	95	5126
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D	-0.56	2343	127200	335	5545	3470	436	15010	92	8252
D	-0.57	4990	100746	892	34100	12408	736	61796	144	17651
D	-0.58	2328	114172	778	9368	3651	878	17739	145	10121
D	-0.59	2299	130803	1214	16605	3497	819	14986	120	12396
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G	-4.22	1923	88569	22640	61915	4502	551	27455	164	8531
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I	-7.35	2769	61307	1921	63424	9965	1128	55688	153	10121
I	-7.36	2991	61955	2191	56624	11207	603	58598	148	11966

I	-7.37	2284	62383	1640	104717	6878	668	37007	115	7358
I	-7.38	3625	74938	2184	47928	12203	1333	63994	116	9529
I	-7.39	3291	80412	2050	38313	10469	756	49626	125	9673
I	-7.40	2797	83014	2163	28080	7690	1011	38959	189	10436
I	-7.41	3456	71858	2374	58225	11825	754	60193	123	10803
I	-7.42	3432	63808	2419	50046	13349	868	63977	162	15071
I	-7.43	3029	74426	2405	34796	10141	988	51367	181	11250
I	-7.44	4118	69678	2567	53556	14884	1591	83067	198	13299
I	-7.45	4330	71089	2654	50831	13984	548	82993	227	11803
I	-7.46	4073	82866	2654	42051	12008	991	68343	148	11347
I	-7.47	4869	71772	2572	54041	15906	1228	92893	199	14882
I	-7.48	4483	70921	1814	60084	17049	1142	106384	215	13811
I	-7.49	4690	72478	2302	55960	15687	1210	96378	199	11094
I	-7.50	4046	65276	2831	48576	13603	1079	80748	231	10971
I	-7.51	3387	66143	3165	42179	10886	454	60751	199	10180
I	-7.52	3259	93430	2297	20877	7613	858	36213	136	10601
I	-7.53	2873	84104	2275	21752	9498	468	45052	88	11680
I	-7.54	2167	103827	2031	11552	5727	796	25329	182	8874
I	-7.55	4184	70991	4061	46122	13864	1218	84499	328	9837
I	-7.56	4637	72447	3855	55032	16624	1210	108544	450	11152
I	-7.57	5142	57875	3590	59056	17722	600	133598	407	12146
I	-7.58	5060	61331	3778	63417	17988	586	120895	294	11802
I	-7.59	5493	65240	4138	61647	17795	672	121735	306	11416
I	-7.60	6194	66993	3851	74973	19955	1159	158848	434	13180
I	-7.61	6063	63207	3692	76142	20515	940	163049	343	12981
I	-7.62	5620	58917	4712	73202	22651	1036	193186	494	14318
I	-7.63	4873	52648	6225	66940	22993	1196	198779	600	13844
I	-7.64	5320	56845	5964	68113	21808	857	177610	455	16685
I	-7.65	5347	61859	5928	79531	22217	2031	176399	501	21355
I	-7.66	3636	73191	4890	66763	15429	1930	88185	217	23187
I	-7.67	3812	82739	3794	34307	15947	888	67701	147	26690
I	-7.68	3059	90124	2739	23691	11464	538	42913	168	27380
I	-7.69	1834	119390	2744	11550	4669	631	15032	90	25022
I	-7.70	1215	116572	12776	18951	3099	596	12051	142	13262

I	-7.71	1407	114459	13181	21568	2787	664	13412	138	12330
I	-7.72	1337	124020	6145	10365	2890	676	14351	182	11606
I	-7.73	1254	115321	7844	17265	2472	677	11056	127	10888
I	-7.74	1066	117151	9540	19005	2289	613	11021	141	8549
I	-7.73	749	110117	32762	46685	1345	629	6882	113	5661
I	-7.74	484	104550	46464	65424	1009	742	5514	60	3937
J	-8.36	652	22313	1245	30101	4450	538	29602	153	5471
J	-8.37	691	20676	1174	32068	4768	728	29938	224	5458
J	-8.38	283	11312	373	21043	3142	254	18047	112	2920
J	-8.39	635	19224	873	31448	4361	417	25089	141	4625
J	-8.40	662	21952	1215	30149	4362	492	26589	112	5085
J	-8.41	580	17432	1464	23909	3268	604	21779	158	5753
J	-8.42	512	19038	1386	33120	3855	532	26903	201	6329
J	-8.43	1121	32322	1899	41447	5853	669	38468	223	8036
J	-8.44	3756	50311	1833	94137	16972	1423	114933	329	13969
J	-8.45	4474	56282	2074	106761	20239	1318	140567	272	15591
J	-8.46	4312	59590	2112	114996	19387	1497	133623	363	16105
J	-8.47	4052	53506	2569	100916	15318	1596	105912	332	13425
J	-8.48	3951	52475	2794	100960	15121	1068	97593	254	11734
J	-8.49	2780	39977	2962	85373	12378	1100	80392	276	11351
J	-8.50	2401	39400	2883	80917	11613	777	70954	216	10389
J	-8.51	2328	37935	3015	80836	11490	819	72046	286	10841
J	-8.52	2527	39756	3058	82181	11931	631	72080	283	10241
J	-8.53	2400	40361	2812	87323	13188	1257	77631	231	10184
J	-8.54	2366	35531	2817	79290	12077	1081	82892	258	11203
J	-8.55	2926	41319	2625	84519	13152	1060	83575	243	10411
J	-8.56	3022	46508	2783	94429	14308	1280	87351	240	11557
J	-8.57	2889	44759	3464	92450	13178	1210	84040	269	10813
J	-8.58	2770	42801	3358	78536	12298	959	76050	253	9657
J	-8.59	2821	45097	3340	91594	13111	1084	79303	234	11136
J	-8.60	2694	47251	3674	74706	11828	1049	68163	266	10180
J	-8.61	2572	41711	2895	87942	13732	946	92707	265	14380
J	-8.62	3493	47106	2819	111629	18859	1985	136591	365	13173
J	-8.63	4826	63456	2655	119575	21379	2072	149527	325	15051

J	-8.64	3474	48983	2662	104875	16924	1408	118582	336	13461
J	-8.65	3278	46576	3147	101098	16163	1624	108380	193	13184
J	-8.66	3042	44553	3556	91685	13685	1462	90013	281	11628
J	-8.67	2959	46667	3228	74432	11717	916	69662	240	12073
J	-8.68	2452	36693	3773	71786	12130	1488	75144	251	13114
J	-8.69	2265	37097	3682	74947	12151	1377	75721	210	10293
J	-8.70	2558	38243	3684	103957	17107	688	116225	265	11228
J	-8.71	2954	40462	3652	96634	15376	1079	110456	287	12556
J	-8.72	2583	41467	3913	68368	11256	626	67405	230	9304
J	-8.73	1849	37015	3692	54601	8853	748	53770	179	9939
J	-8.74	1809	36777	3991	50805	8961	1054	50909	147	9609
J	-8.75	2079	35792	3616	52199	8779	791	55129	205	9949
J	-8.76	1297	33640	3360	41281	7258	679	42513	175	8897
J	-8.77	1722	35701	3523	52045	8584	774	50740	181	9363
J	-8.78	1696	33542	3261	48714	8524	1315	48621	170	8440
J	-8.79	2262	36621	3140	62799	12484	1025	71297	193	12482
J	-8.80	3539	51065	2316	80227	16219	1440	97626	187	12770
J	-8.81	4394	58031	2822	89522	18018	1589	104044	233	13474
J	-8.82	3184	51935	3272	75374	13543	1425	71353	160	9894
J	-8.83	2446	40585	2891	74967	9822	1213	59132	131	9439
J	-8.84	2303	42707	3220	67464	10894	943	61047	218	10751
J	-8.85	2581	44763	3225	71496	11692	1455	64055	223	9174
J	-8.86	1991	40998	3369	49154	8905	1332	49483	139	7968
J	-8.87	2034	40649	3413	50174	10499	833	54754	186	9398
J	-8.88	1237	36605	3574	37072	7791	1208	41721	177	7795
J	-8.89	2913	47744	2461	57337	13499	496	77923	285	9628
J	-8.90	6381	72557	2244	72230	23654	1240	167237	380	18797
J	-8.91	5245	62288	2424	68960	24171	1251	178261	309	17235
J	-8.92	6953	76780	1963	80217	25983	1959	196882	364	17419
J	-8.93	5074	61376	2876	67135	21945	1713	150501	369	17607
J	-8.94	4317	55140	2849	57902	19258	1419	126519	255	15999
J	-8.95	3393	52850	3026	46166	15492	1011	94849	217	13237
J	-8.96	4696	61390	2825	54816	18287	1303	114697	241	12715
J	-8.97	2881	56102	2149	32810	10574	606	63465	181	11713

J	-8.98	4673	55274	2181	56362	21053	1140	159802	353	14127
J	-8.99	4688	55185	2589	64254	22349	1458	164987	254	14143
J	-9.00	4061	53917	2369	56245	20206	1242	162682	387	12679
J	-9.01	4553	49814	3110	56071	24183	2620	204168	401	13910
J	-9.02	5379	56760	3061	58374	23804	2467	183101	364	14289
J	-9.03	6262	62121	2972	65033	23946	2364	177639	362	15939
J	-9.04	5563	59389	3548	65844	22302	1312	157690	390	14138
J	-9.05	5505	57896	3630	63729	22197	1781	161605	428	14960
J	-9.06	4858	54138	3802	57507	21387	10254	164274	442	14830
J	-9.07	5117	60055	3654	59299	23115	1345	176808	440	15291
J	-9.08	4178	65980	4441	50176	18054	920	104422	261	14267
J	-9.09	2490	54300	5705	36326	13335	549	68685	220	14979
J	-9.10	1087	45302	5038	15976	6232	695	32408	204	14871
J	-9.11	636	48222	4292	8357	2956	620	16000	209	12024
J	-9.12	1025	46570	5838	15588	5706	747	29824	181	13366
J	-9.13	627	40547	5167	9918	3384	448	18227	97	12173
J	-9.14	511	37663	5028	10310	2651	801	18107	143	6973
J	-9.15	1313	54009	6431	21050	5612	414	36291	183	9663
J	-9.16	978	52908	5544	20461	4634	789	35173	198	10275
J	-9.17	556	50301	4758	12600	2968	315	22547	207	6272
J	-9.18	313	48731	4008	9678	2018	486	15935	206	4661
J	-9.19	340	66067	3010	5330	1396	826	9173	209	4511
J	-9.20	564	68966	3458	6010	1747	322	10736	106	4077
J	-9.21	766	64493	3982	5451	1557	925	10022	131	3791
J	-9.22	735	71298	3907	4554	1444	1267	6402	138	4876
J	-9.23	626	78113	2837	3292	1220	838	6352	148	5551
J	-9.24	723	78777	3438	5122	1545	665	6777	178	4184
J	-9.25	1430	64609	3278	19566	7828	978	35190	193	14156
J	-9.26	4301	61144	5495	60040	25875	1397	134156	322	31192
J	-9.27	3232	43401	3415	39583	22079	1032	113519	233	22972
J	-9.28	4089	57223	4267	44165	29600	1035	134430	211	22988
J	-9.29	3213	60982	2971	33038	22277	2648	95114	193	17551
J	-9.30	3127	81125	1494	19490	10300	1638	47946	130	10704
J	-9.31	3197	63627	1822	28498	21907	4623	118694	221	20025

J	-9.32	4568	60204	618	30638	25349	3671	174902	180	24140
J	-9.33	4366	58550	949	32474	29134	1919	198297	233	25184
J	-9.34	5612	69413	1216	40975	31579	1727	226803	244	25256
J	-9.35	6466	76447	815	36953	29286	6957	210936	264	26566
J	-9.36	5780	70910	1015	35203	25505	4296	178967	269	26018
J	-9.37	5949	76867	645	45201	31021	3509	205027	283	30425
J	-9.38	6144	76224	682	41988	29764	12348	193341	264	30306
J	-9.39	5289	65696	1119	19364	23504	2919	151405	207	19619
J	-9.40	1727	28336	385	10056	13628	1378	83234	168	10306
J	-9.41	1235	23212	407	11403	8939	1201	56833	98	9343
J	-9.42	1037	21962	281	79599	7494	588	44457	100	7909
J	-9.43	534	10063	338	222487	2157	400	18634	91	2354
J	-9.44	167	7186	182	50482	2164	2620	14141	119	2356
J	-9.46	97	6104	293	13594	3016	1153	14668	56	2495
J	-9.51	-14	857	258	58042	3276	1288	9205	528	1918

REFERENCES

Banning, E. B. (1998). The neolithic period: Triumphs of architecture, agriculture, and art. *Near Eastern Archaeology*, *61*(4), 188–237. https://doi.org/10.2307/3210656

Box, M. R., Krom, M. D., Cliff, R. A., Bar-Matthews, M., Almogi-Labin, A., Ayalon, A., & Paterne, M. (2011). Response of the Nile and its catchment to millennial-scale climatic change since the LGM from SR Isotopes and major elements of east Mediterranean sediments. *Quaternary Science Reviews*, *30*(3–4), 431–442. https://doi.org/10.1016/j.quascirev.2010.12.005

Burrough, S. L., & Thomas, D. S. G. (2013). Central Southern Africa at the time of the African humid period: A new analysis of Holocene palaeoenvironmental and Palaeoclimate Data. *Quaternary Science Reviews*, *80*, 29–46. https://doi.org/10.1016/j.quascirev.2013.08.001

Claussen, M., Dallmeyer, A., & Bader, J. (2017). Theory and modeling of the African humid period and the green sahara. *Oxford Research Encyclopedia of Climate Science*. https://doi.org/10.1093/acrefore/9780190228620.013.532

Cotterell, B., & Kamminga, J. (1987). The Formation of Flakes. *American Antiquity*, *52*(4), 675-708. doi:10.2307/281378

de Menocal, P. B. (2015). End of the African humid period. *Nature Geoscience*, *8*(2), 86–87. https://doi.org/10.1038/ngeo2355

Dellwig, O., Böttcher, M. E., Lipinski, M., & Brumsack, H.-J. (2002). Trace metals in holocene coastal peats and their relation to Pyrite Formation (NW Germany). *Chemical Geology*, *182*(2–4), 423–442. https://doi.org/10.1016/s0009-2541(01)00335-7

Faust, A., & Ashkenazy, Y. (2007). Excess in precipitation as a cause for settlement decline along the israeli coastal plain during the third millennium BC. *Quaternary Research*, *68*(1), 37–44. https://doi.org/10.1016/j.yqres.2007.02.003

Faust, A., & Ashkenazy, Y. (2009). Settlement fluctuations and environmental changes in Israel's coastal plain during the Early Bronze Age. *Levant*, *41*(1), 19–39. https://doi.org/10.1179/175638009x448230

Galbraith, R. F., & Roberts, R. G. (2012). Statistical aspects of equivalent dose and error calculation and display in OSL Dating: An overview and some recommendations. *Quaternary Geochronology*, *11*, 1–27. https://doi.org/10.1016/j.quageo.2012.04.020

Goring-Morris, A. N., & Belfer-Cohen, A. (2011). Neolithization processes in the levant. *Current Anthropology*, *52*(S4). https://doi.org/10.1086/658860

Greenberg, R. (2017). No collapse: transmutations of Early Bronze Age urbanism in the southern Levant. *The late third millennium in the ancient near east*, 31-58.

Guérin, G., Mercier, N., & Adamiec, G. (2011). Dose-rate conversion factors: update. *Ancient Tl*, *29*(1), 5-8.

Hajdas, I. (2008). Radiocarbon dating and its applications in quaternary studies. *E&Amp; G Quaternary Science Journal*, *57*(1/2), 2–24. https://doi.org/10.3285/eg.57.1-2.1

Höflmayer, F., Dee, M., Genz, H., & Riehl, S. (2014). Radiocarbon Evidence for the Early Bronze Age Levant: The Site of Tell Fadous-Kfarabida (Lebanon) and the End of the Early Bronze III Period. *Radiocarbon*, *56*(2), 529-542. doi:10.2458/56.16932

Hughes, P. D., Gibbard, P. L., & Ehlers, J. (2013). Timing of glaciation during the last glacial cycle: Evaluating the concept of a global 'last glacial maximum' (LGM). *Earth-Science Reviews*, *125*, 171–198. https://doi.org/10.1016/j.earscirev.2013.07.003

Lézine, A.-M., & Casanova, J. (1989). Pollen and hydrological evidence for the interpretation of past climates in tropical West Africa during the Holocene. *Quaternary Science Reviews*, *8*(1), 45–55. https://doi.org/10.1016/0277-3791(89)90020-6

Löwemark, L., Chen, H.-F., Yang, T.-N., Kylander, M., Yu, E.-F., Hsu, Y.-W., Lee, T.-Q., Song, S.-R., & Jarvis, S. (2011). Normalizing XRF-scanner data: A cautionary note on the interpretation of high-resolution records from organic-rich lakes. *Journal of Asian Earth Sciences*, *40*(6), 1250–1256. https://doi.org/10.1016/j.jseaes.2010.06.002

Mahoney, K. (2022) Termination of the African Humid Period: 6-8 ka in the Kebara Marshes of NW Israel (Unpublished master's thesis). University of California, San Diego, La Jolla, California.

McGee, D., deMenocal, P. B., Winckler, G., Stuut, J. B. W., & Bradtmiller, L. I. (2013). The magnitude, timing and abruptness of changes in North African dust deposition over the last 20,000 yr. *Earth and Planetary Science Letters*, *371–372*, 163–176. https://doi.org/10.1016/j.epsl.2013.03.054

Murray, A. S., & Wintle, A. G. (2000). Luminescence dating of quartz using an improved single-aliquot regenerative-dose protocol. *Radiation Measurements*, *32*(1), 57–73. https://doi.org/10.1016/s1350-4487(99)00253-x

Murray, A. S., & Wintle, A. G. (2003). The single aliquot regenerative dose protocol: Potential for improvements in reliability. *Radiation Measurements*, *37*(4–5), 377–381. https://doi.org/10.1016/s1350-4487(03)00053-2

Palmisano, A., Woodbridge, J., Roberts, C. N., Bevan, A., Fyfe, R., Shennan, S., Cheddadi, R., Greenberg, R., Kaniewski, D., Langgut, D., Leroy, S. A., Litt, T., & Miebach, A. (2019). Holocene landscape dynamics and long-term population trends in the levant. *The Holocene*, *29*(5), 708–727. https://doi.org/10.1177/0959683619826642

Prescott, J. R., & Hutton, J. T. (1994). Cosmic Ray contributions to dose rates for luminescence and ESR dating: Large depths and long-term time variations. *Radiation Measurements*, *23*(2–3), 497–500. https://doi.org/10.1016/1350-4487(94)90086-8

Renssen, H., Brovkin, V., Fichefet, T., & Goosse, H. (2006). Simulation of the holocene climate evolution in Northern Africa: The termination of the African humid period. *Quaternary International*, *150*(1), 95–102. https://doi.org/10.1016/j.quaint.2005.01.001

Rittenour, T. M., Goble, R. J., & Blum, M. D. (2005). Development of an OSL chronology for late pleistocene channel belts in the Lower Mississippi Valley, USA. *Quaternary Science Reviews*, *24*(23–24), 2539–2554. https://doi.org/10.1016/j.quascirev.2005.03.011

Rollefson, G. O., Simmons, A. H., & Kafafi, Z. (1992). Neolithic Cultures at 'Ain Ghazal, Jordan. *Journal of Field Archaeology*, *19*(4), 443–470. https://doi.org/10.2307/530427

Rothwell, R. G., & Croudace, I. w. (2015). Twenty Years of XRF Core Scanning Marine sediments: What do geochemical proxies tell us? *Micro-XRF Studies of Sediment Cores*, 25–102. https://doi.org/10.1007/978-94-017-9849-5_2

Shanahan, T. M., McKay, N. P., Hughen, K. A., Overpeck, J. T., Otto-Bliesner, B., Heil, C. W., King, J., Scholz, C. A., & Peck, J. (2015). The time-transgressive termination of the African humid period. *Nature Geoscience*, *8*(2), 140–144. https://doi.org/10.1038/ngeo2329

Sivan, D., Greenbaum, N., Cohen-Seffer, R., Sisma-Ventura, G., & Almogi-Labin, A. (2011). The origin and disappearance of the late Pleistocene–early Holocene short-lived coastal wetlands along the Carmel coast, Israel. *Quaternary Research*, *76*(1), 83-92. doi:10.1016/j.yqres.2011.04.006

Sivan, D., & Porat, N. (2004). Evidence from luminescence for late pleistocene formation of calcareous aeolianite (Kurkar) and Paleosol (Hamra) in the Carmel Coast, Israel. *Palaeogeography, Palaeoclimatology, Palaeoecology*, *211*(1–2), 95–106. https://doi.org/10.1016/j.palaeo.2004.04.008

Skonieczny, C., Paillou, P., Bory, A., Bayon, G., Biscara, L., Crosta, X., Eynaud, F., Malaizé, B., Revel, M., Aleman, N., Barusseau, J.-P., Vernet, R., Lopez, S., & Grousset, F. (2015). African humid periods triggered the reactivation of a large river system in Western Sahara. *Nature Communications*, *6*(1). https://doi.org/10.1038/ncomms9751

Tierney, J. E., & deMenocal, P. B. (2013). Abrupt shifts in Horn of Africa hydroclimate since the last glacial maximum. *Science*, *342*(6160), 843–846. https://doi.org/10.1126/science.1240411

Tierney, J. E., Poulsen, C. J., Montañez, I. P., Bhattacharya, T., Feng, R., Ford, H. L., Hönisch, B., Inglis, G. N., Petersen, S. V., Sagoo, N., Tabor, C. R., Thirumalai, K., Zhu, J., Burls, N. J., Foster, G. L., Goddéris, Y., Huber, B. T., Ivany, L. C., Kirtland Turner, S., Lunt, D. J., McElwain, J. C., Mills, B. J. W., Otto-Bliesner, B. L., Ridgwell, A., Zhang, Y. G. (2020). Past climates inform our future. *Science*, *370*(6517). https://doi.org/10.1126/science.aay3701

Twiss, K. C. (2007). The neolithic of the southern levant. *Evolutionary Anthropology: Issues, News, and Reviews*, *16*(1), 24–35. https://doi.org/10.1002/evan.20113

Twiss, K. C. (2008). Transformations in an early agricultural society: Feasting in the southern Levantine Pre-Pottery Neolithic. *Journal of Anthropological Archaeology*, *27*(4), 418–442. https://doi.org/10.1016/j.jaa.2008.06.002

Vincenzo, D. S., & Massimo, C. (2015). The 5.5–4.5 kyr climatic transition as recorded by the sedimentation pattern of coastal deposits of the Apulia region, southern Italy. *The Holocene*, *25*(8), 1313–1329. https://doi.org/10.1177/0959683615584207

Wintle, A. G., & Murray, A. S. (2006). A review of quartz optically stimulated luminescence characteristics and their relevance in single-aliquot regeneration dating protocols. *Radiation Measurements*, *41*(4), 369–391. https://doi.org/10.1016/j.radmeas.2005.11.001