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Termination of the African Humid Period: 6-8 ka in the Kebara Marshes of NW Israel

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Termination of the African Humid Period: 6-8 ka in the Kebara Marshes of NW Israel

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

in

Earth Sciences

by

Kendall Mahony

Committee in charge:

Professor Richard D. Norris, Chair
Professor Sarah M. Aarons
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2023

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

University of California San Diego

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ABSTRACT OF THE THESIS

Termination of the African Humid Period: 6-8 ka in the Kebara Marshes of NW Israel

by

Kendall Mahony

Master of Science in Earth Sciences

University of California San Diego, 2023

Professor Richard D. Norris, Chair

The unusually warm and wet climatic conditions associated with the African Humid Period (AHP) from 6,000 to 11,000 years ago are well recorded across the Mediterranean. The termination of the AHP is widely considered to be "abrupt", transitioning into modern, seasonally dry climatic conditions over the course of 500-800 years. This was not a smooth transition, but was punctuated by short-term, extreme climatic fluctuations of both wetter and drier conditions that are not well defined. These short-term variations in climate can drastically alter vegetation patterns, water availability, and overall habitability of lands. We have conducted

a multi-proxy analysis of a sediment core from the Kebara Marshes of Israel, reconstructing the paleoenvironmental conditions of the mid- to late Holocene. By identifying the depositional environments of the five repeating, distinct facies in our core, we were able to infer the relative wetness of the climatic conditions during those times. We recorded the overall drying trend associated with the termination AHP as well as decadal-resolution variability throughout. Our study finds that aridity begins to substantially increase ~7.0 ka until modern, seasonally dry conditions first appear ~6.3 ka. Within each dominant climatic regime, dramatic multidecadal climatic fluctuations occur about once per century. During the mid-Holocene, the cultural shift from nomadic hunter-gatherers to the first settled societies occurs across the Levant. Defining these rapid climatic variations can ultimately provide insight into major cultural shifts and identify any environmental drivers potentially responsible.

1. Introduction

The African Humid Period (AHP) was a time of unusually warm and wet conditions from 11-5 ka centered around Northern Africa (Kutzbach, 1981). Changes in Earth's orbit and axial tilt caused solar insolation in the northern hemisphere to increase, pushing the African monsoonal system northward (Berger and Loutre, 1991). Increases in precipitation and temperature in the northern latitudes transformed the Saharan desert into grasslands dotted with lakes, aptly termed the "Green Sahara" (Jolly *et al.*, 1998; Lezine and Casanova, 1989; Skonieczny *et al*., 2015). Paintings and engravings in Fig. 1 dated to the AHP show hunters chasing grassland animals in Northern Africa (presently a desert) such as hippos, giraffes, and the ancestors of domestic cattle (deMenocal & Tierney, 2012). Around 10 ka, the Levant witnessed the transition from nomadic to settled, agricultural societies, partially attributed to the overall warming over the Holocene (McGee and deMenocal, 2017).

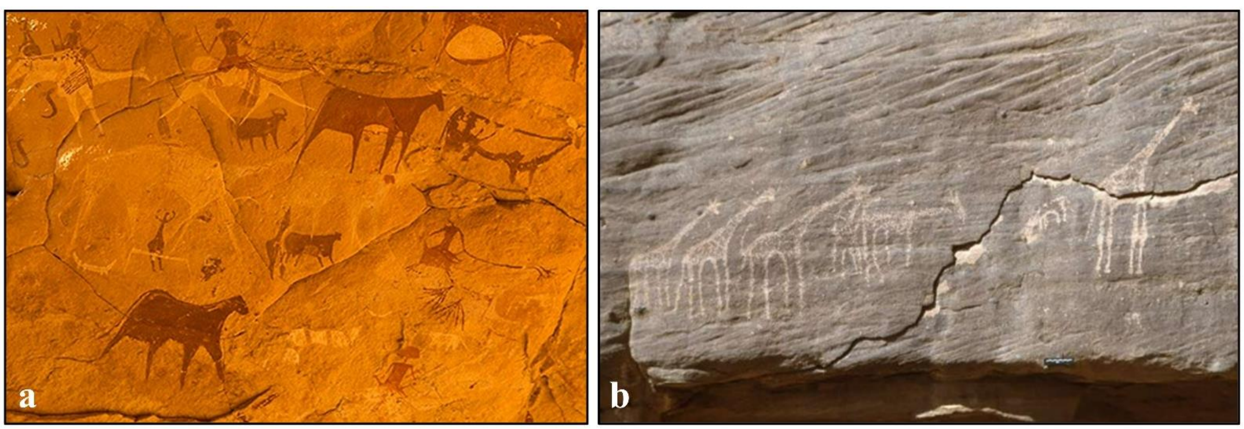

Fig. 1: Paintings and engravings from North Africa dated to the African Humid Period. (a) Swimmer's Cave located in southern Egypt depicting elephants, camels, and ancestors of cattle. (b) Tassili n'Ajjer located in southeastern Algeria depicting giraffes.

The African Humid Period gave way to the modern Mediterranean climate system about 5-6 thousand years ago, but the rapidity and manner of this climate transition is a subject of debate. The termination of the AHP is modeled as being fairly "abrupt", between 500 and 800 years (Harrison and Digerfeldt, 1993; Tierney and deMenocal, 2013). This shift from wetter to drier conditions was not smooth, but instead punctuated by short-term climatic fluctuations throughout (Bar-Matthews and Ayalon, 2011; Zielhofer *et al*., 2017). Particularly of note are the century to multi-decadal rapid climate change events noted by Bar-Matthews and Ayalon (2011), some associated with societal shifts and collapses. The early to mid-Holocene documents the significant cultural shift from nomadic hunter-gatherers to the first settled societies within the Levant. This was not a linear transition, but a time of incessant adaptation to the rapidly changing environment around these early settlers. Resolving these climatic fluctuations accompanying cultural shifts may help to clarify the environmental drivers that could have influenced the organization and technological advancement of food production systems, social and economic decision making, and the overall spatial distribution of people living through this transition.

My project is focused on sediment core KBMN3 from the Kebara Marshes of northwest Israel (Fig. 2), located within the Fertile Crescent of the Levant. The coring program, supported by the Koret Foundation, was a collaboration between the Scripps Center for Marine Archaeology, Utah State University, and Haifa University, in a project to understand the environmental context of coastal societies in the Levant. As part of this broader study, we targeted coastal wetlands in the Kebara marshes. Wetlands sediments provide increased preservation of organic material sensitive to environmental change thanks to their high depositional rates and hypoxic sediments. We created a decadal-resolution paleoclimatic archive spanning the mid- to late Holocene, documenting the termination of the African Humid Period and variability within.

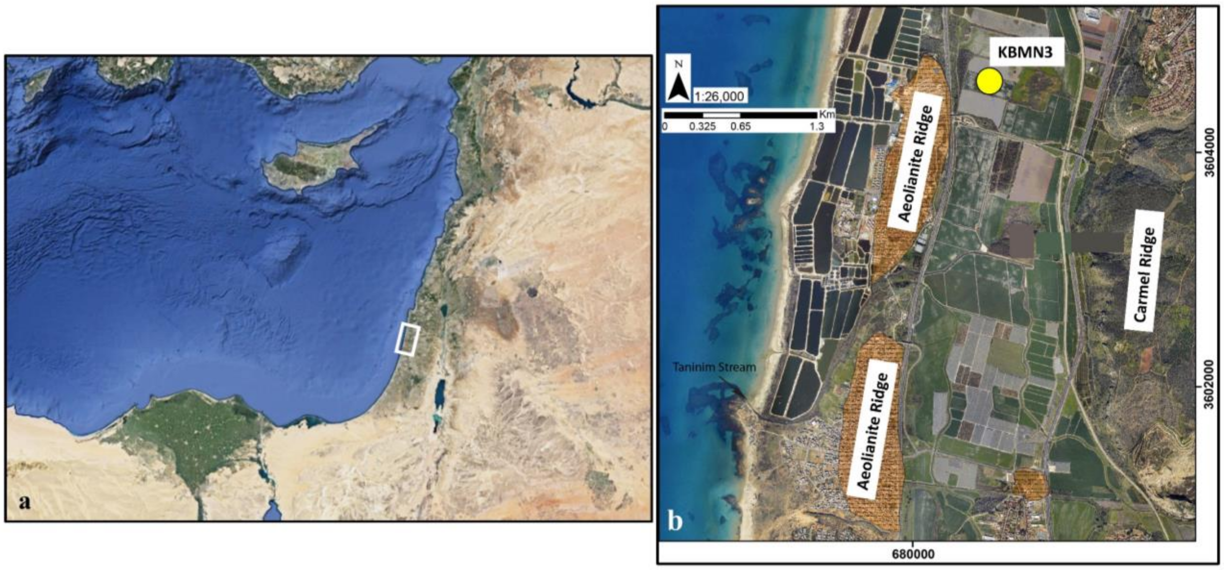

Fig. 2: Coring location. (a) Eastern Mediterranean with white box denoting the project location within NW Israel. (b) Expansion of project location with yellow dot denoting location of KBMN3 core along with adjacent relevant features.

2. Methods

We collected paleoenvironmental data from core KBMN3 in agricultural fields in NW Israel. KBMN refers to “Kebara Marsh North” since the site is in former marshes 1.34 km (0.84 miles) west of the Carmel Mountain front and the Kebara Cave–a Paleolithic archaeological site. The marsh developed between the Carmel Mountains and stabilized aeolianite ridges adjacent to the modern coast. The marsh lands were largely converted into agricultural fields with the formation of the modern state of Israel in 1948. The core site is located in UTM 36N (680613; 3604663) (Fig. 2b).

2.1 Coring Project

Multiple holes at the KBMN3 core site were recovered using a Geoprobe Systems hydraulic liner extruder. We collected four sediment cores. The first of these, Core KBMN3, was taken in 10 sections of 1.5-meter length (sections A-J), for a total penetration of 15 meters. Cores were collected in clear plastic liners that were 1.5 m long and 3.5 cm wide. Additional cores were taken as close as possible to the original coring location (about 1 m) for the purposes of dating using optically stimulated luminescence (OSL) techniques. The OSL core liners had been spray-painted black before core collection; these sections were wrapped in aluminum foil upon recovery and further wrapped in plastic cling wrap to keep the foil in place during subsequent handling. KBMN3L is the adjacent OSL core to KBMN3 and contains a nearly identical record, with slight differences in recovery of some sections. Combined, our cores have an average sediment recovery of 76%.

2.2 KBMN3 Core Analysis

KBMN3 was split vertically and preserved as archive and working halves in a refrigerated repository at the SIO Geological Collections. Using an Avaatech X-ray Fluorescence (XRF) Core Scanner, the core was analyzed at 1-cm resolution with an excitation voltage of 10 and 35 kV with a 2-cm diameter beam (Table A6). We also collected magnetic susceptibility records using a Bartington MS3 high resolution sensor. Based on distinct changes in lithology and the XRF record, we selected 54 samples and sent them to the University of Utah Luminescence Lab (USULL) for particle size and isotopic analysis (Fig. 5; Table A1).

2.3 Dating

2.3.1 Optically Stimulated Luminescence (OSL)

Samples along KBMN3L were selected for OSL dating based on major changes in lithology, TOC, particle size, and XRF analysis, presumed to represent distinct changes in environmental conditions. A total of 16 samples were collected under dim red lighting so as to not disrupt the OSL signal. USULL performed routine OSL dating on the quartz sand grains using single-aliquot regenerative-dose (SAR) procedure (Galbraith and Roberts, 2012; Murray and Wintle, 2000). The central age model from Galbraith and Roberts (2012) was used to calculate equivalent dose rates. Table 1 reports the dates and relevant information.

2.3.2 Radiocarbon

Washed samples from KBMN3 were picked for seeds and compressed plant material for ^{14}C dating. The Keck Carbon Cycle Accelerator Mass Spectrometer Facility at the University of California Irvine determined the dates of 19 samples, following the convention of Stuiver and Polach (1977). The dates and other relevant information on these samples are reported in the appendix (Table A2). The ^{14}C dates are not used in this study due to uncertainty in the reservoir correction to use with this core, particularly for plant material that grew in marsh environments.

2.4 Proxy Analysis

2.4.1 - Sample Preparation

Each section of KBMN3 was sampled roughly every 10 centimeters totaling 120 samples. KBMN3L was sampled in 32 places to fill in stratigraphic or age gaps in KBMN3. Each sample was dried in a 50°C oven, weighed, washed over a 63 µm sieve, dried, and weighed once more. Data for sample location, depth reported in m relative to mean sea level (m rmsl), dry weight, and % >63µm are reported in the appendix (Table A4).

2.4.2 - Proxy Counting

Using a binocular microscope, eight environmental proxies were counted at different size fractions for each sample: ostracods, snail opercula, mollusc fragments, seeds, charcoal, and pyrite were counted at a fraction larger than 250 µm, carbonate grains from 150-250 µm, and quartz grains from 63-150 µm (Fig. 3, Table A4). Samples that contained more than ~300 grains of specific proxies or large amounts of sediment were repeatedly halved in a sample splitter until grain numbers were less than 300-400 grains. Total counts were reported normalized to 10 g in Table A3.

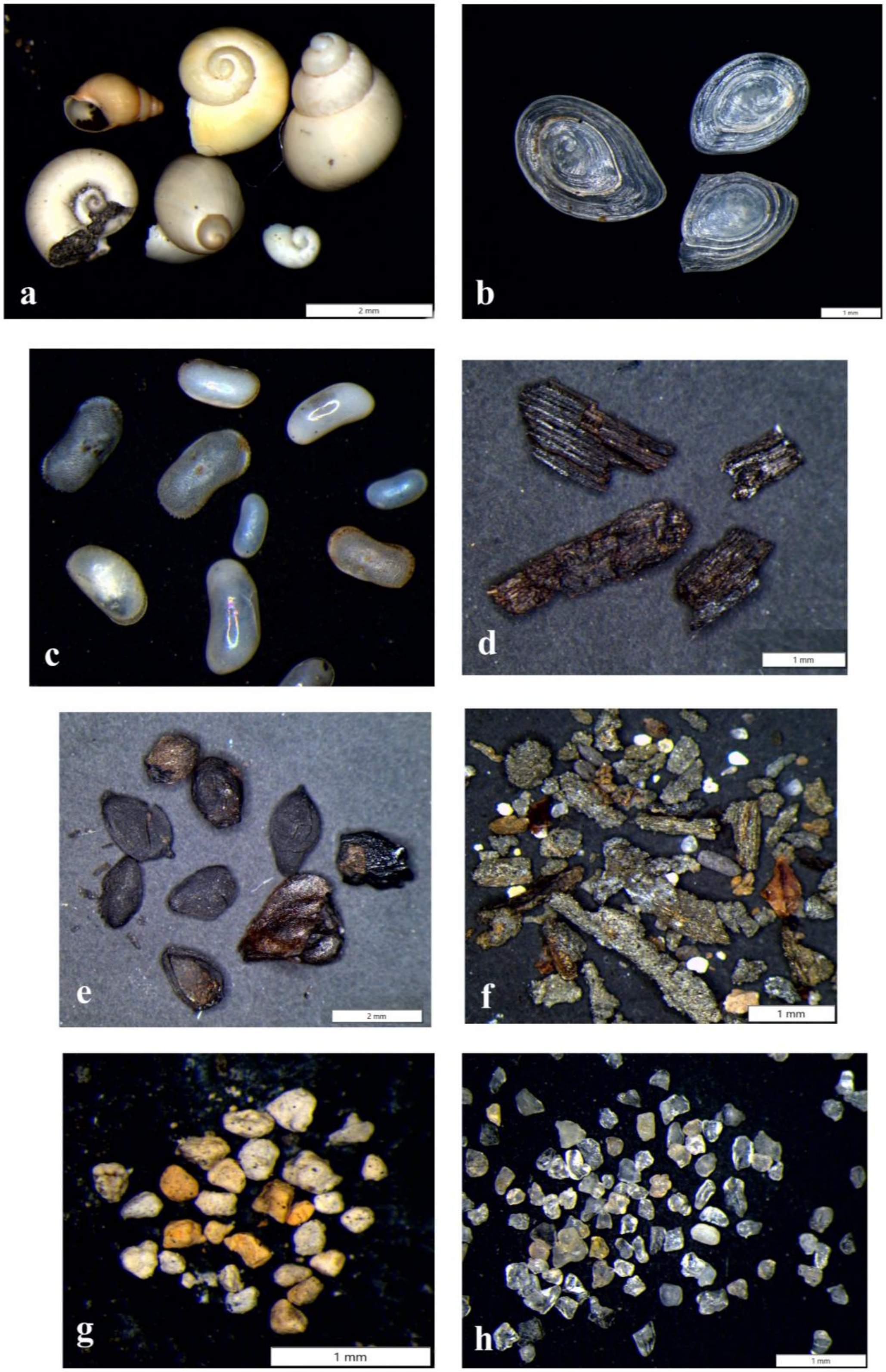

Fig. 3: Proxy pictures. (a) Mollusc shells (b) Snail opercula (c) Ostracods (d) Charcoal (e) Seeds (f) Pyritized wood (g) Carbonate sand (h) Quartz sand

2.4.3 Weight Correction

Due to a mistake in processing, 53 samples from sections A-E were not dried before they were initially weighed. To correct this, samples were taken as close as possible to the original samples, weighed wet, dried in the oven, and weighed dry (Table A5; Fig. A1). A strong linear correlation ($R^2 = 0.95$) between the initial wet and dry weights allows the us to calculate the probable dry weight of samples for which we have only a measured wet weight:

$$D = 0.6843w + 0.1008$$

Where D = dry weight correction and W = initial wet weight

We applied this correction to the incorrectly attained wet weights in the 40 samples used in this study.

3. Results

3.1 OSL Results

Table 1: Optically stimulated luminescence (OSL) ages

Sample Number	True Depth (m)	Num. of aliquots[1]	Dose rate (Gy/kyr)	±	Equivalent Dose (Gy)	± 2σ	OSL age (ka)[2]	± 1σ
KBMN3C_4	0.86	15 (25)	1.08	0.05	2.00	0.57	1.85	0.31
KBMN3C_5	0.24	19 (23)	1.67	0.07	6.97	0.36	4.16	0.36
KBMN3D_7	-0.90	17 (35)	1.25	0.05	5.12	0.75	4.10	0.45
KBMN3E_8	-2.20	19 (20)	1.45	0.06	9.15	0.77	6.31	0.59
KBMN3E_10	-2.89	15 (19)	1.36	0.06	8.81	0.55	6.50	0.58
KBMN3F_11	-3.55	13 (25)	0.81	0.04	5.33	0.61	6.56	0.66
KBMN3F_12	-3.94	14 (26)	0.87	0.04	5.54	0.88	6.39	0.73
KBMN3G_15	-4.97	13 (23)	0.89	0.04	5.88	1.08	6.64	0.82
KBMN3G_16	-5.31	23 (28)	1.30	0.06	8.98	1.10	6.91	0.71
KBMN3G_18	-6.13	15 (19)	1.24	0.05	8.61	0.56	6.96	0.62
KBMN3H_19	-6.47	12 (44)	0.87	0.04	5.72	0.99	6.56	0.78
KBMN3H_20	-7.07	15 (21)	1.14	0.05	8.24	0.90	7.24	0.72
KBMN3H_21	-7.45	13 (14)	1.14	0.05	8.37	0.66	7.36	0.68
KBMN3I_22	-8.51	12 (14)	1.19	0.05	8.64	0.76	7.26	0.68
KBMN3I_23	-8.96	16 (22)	0.90	0.04	6.60	0.53	7.33	0.68

Table 1: Optically stimulated luminescence (OSL) ages, Continued

Sample Number	True Depth (m)	Num. of aliquots[1]	Dose rate (Gy/kyr)	±	Equivalent Dose (Gy)	± 2σ	OSL age (ka)[2]	± 1σ
KBMN3J_24	-10.24	12 (20)	0.85	0.04	8.19	0.45	9.59	0.85

[1] Number of aliquots used in age calculation (number of aliquots analyzed)
[2] OSL ages in thousands of years before 2021 (ka)

Ages obtained from OSL analysis (Table 1) are plotted against depth in Fig. 4. The data show four groupings of dates separated by gaps that we interpret as three unconformities (located at 0.89, -1.84, and -9.44 m rmsl). The exact locations of the unconformities were chosen based on distinct changes in lithology and XRF data in the relevant section between dated samples. The unconformity located at -1.84 m occurs within a coring gap correlative between all of our KBMN3 boreholes, suggesting that coring problems are associated with this lithologic change. We have divided the core into 4 units based upon these unconformities.

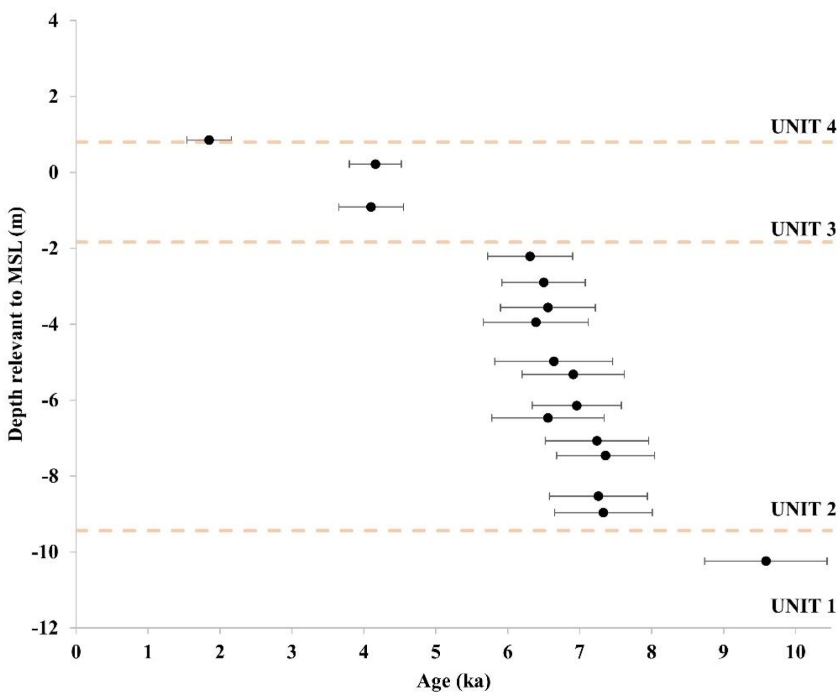

Fig. 4: Age-depth plot. OSL dates from USULL are plotted against depth. Chosen locations for unconformities are represented with orange dashed lines.

3.2 Lithostratigraphy

We recognize four units in the sedimentological sequence of Kebara marsh, separated by three age unconformities defined in the OSL results. Each unit is described in terms of repeating wetland (W) and terrestrial (T) facies defined by sedimentology, proxy counts, XRF results, and TOC.

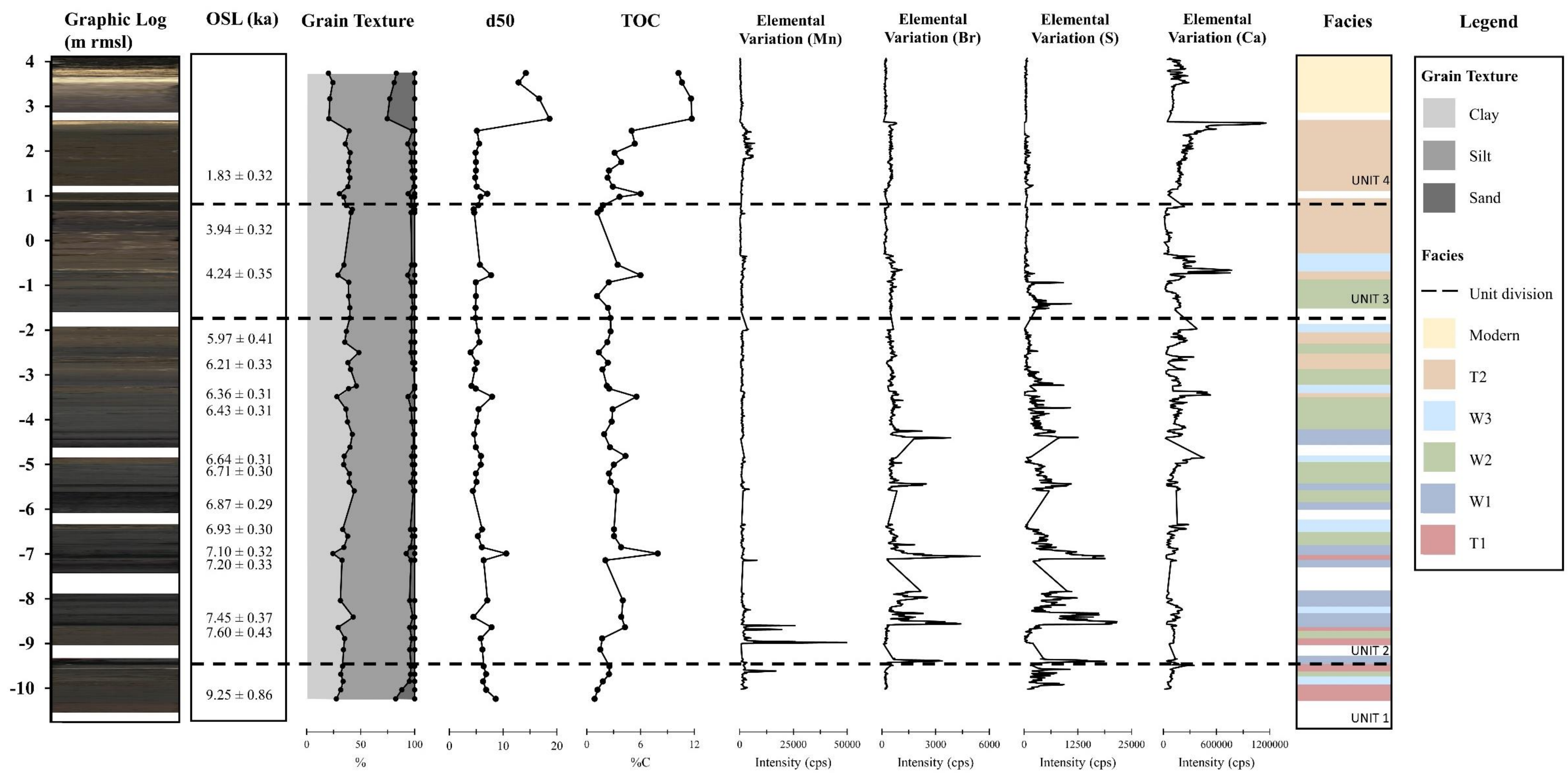

Fig. 5: Core KBMN3 with graphic log, optically stimulated luminescence (OSL) ages, grain texture, d50, total organic carbon (TOC), relevant elemental variations, and facies locations with unit divisions. OSL ages are the modeled ages (see section 4.1). The graphic log is a compilation of photos of KBMN3 relevant to depth. The white areas in the graphic log and facies column denote gaps in the core during retrieval.

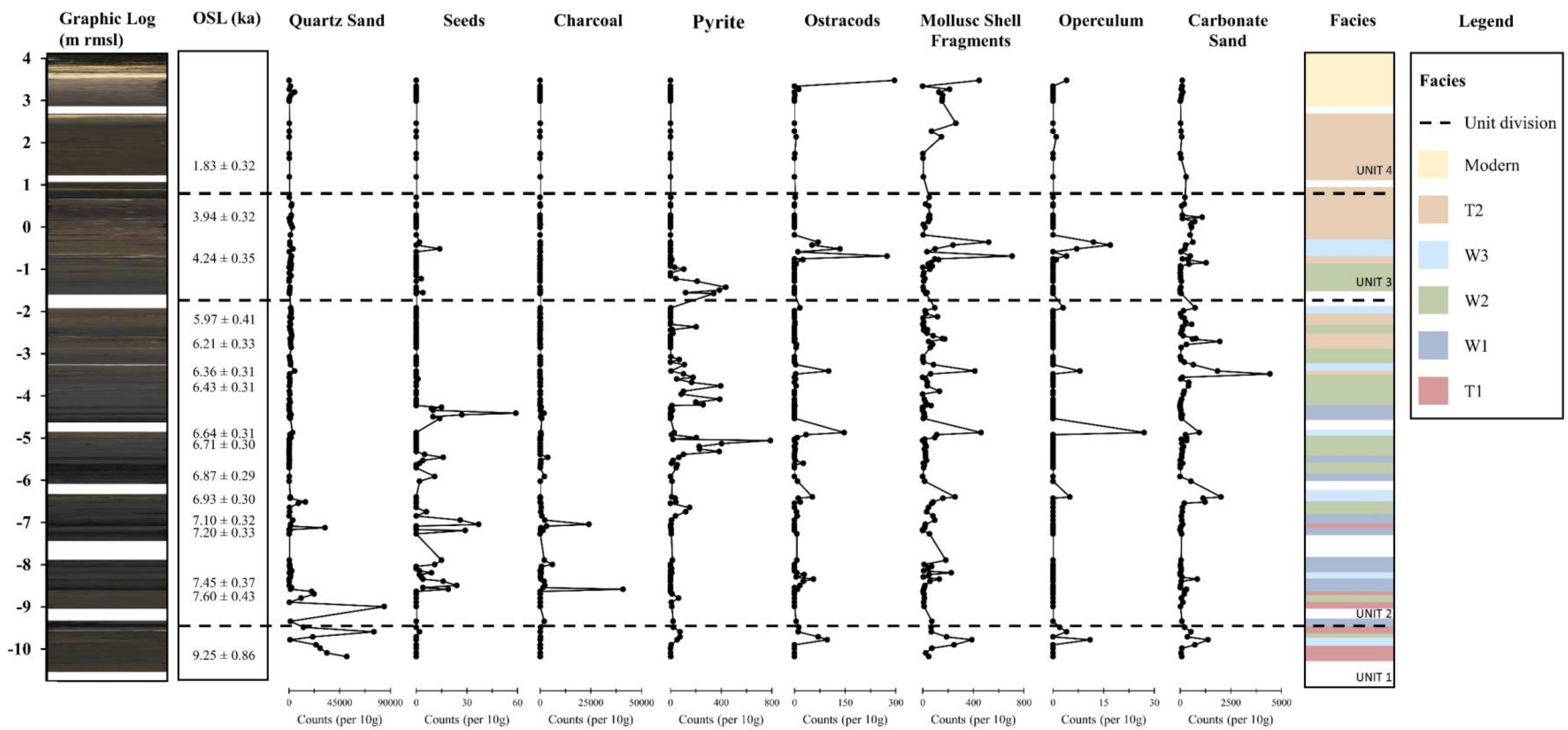

Fig. 6: Core KBMN3 with graphic log, optically stimulated luminescence (OSL) ages, relevant proxy counts, and facies locations with unit divisions. OSL ages are the modeled ages (see section 4.1). The graphic log is a compilation of photos of KBMN3 relevant to depth. The white areas in the graphic log and facies column denote gaps in the core during retrieval.

3.2.1 Facies Descriptions

Facies T1 occurs between -10.19 and -7.09 m rmsl core depth and is composed of reddish-brown, sandy-clay hamra paleosols. This stratigraphic unit is defined by 10-25% quartz sand and spikes in manganese XRF counts (Mn). Values of d50 (5-8) are high compared to most of the rest of the core, while total organic carbon (TOC), is the lowest in the core, ranging from 0.89-2.53%. There are five episodes of T1 deposition between the base of the core and -7.09 m rmsl, decreasing in thickness upsection.

Wetland Facies W1 is composed of black, charred, organic-rich peat deposits containing high counts of seeds and charcoal alongside correlating peaks in XRF counts of sulfur (S) and bromine (Br). Facies W1 has 1.95 to 7.94 weight % TOC - the highest in the core. Charcoal abundance decreases dramatically above -7 m rmsl compared to seeds, which are abundant throughout all W1 episodes. This facies occurs eight times between -9.44 and -4.23 m rmsl.

Facies W2 contains gray, silty-clay wetland deposits with high amounts of pyrite. The lowest d50 values within the core are found within W2 episodes. High counts of S in the absence of Br are correlated with the pyrite counts. This facies occurs in nine episodes between -9.76 and -0.92 m rmsl.

Brown, silty-clay wetland deposits compose Facies W3. Between -9.94 and -0.18 m rmsl, the facies occurs seven times. Mollusc fragments, ostracods, opercula, carbonate sand, and high calcium (Ca) counts are all typical of W3 Facies. TOC are relatively lower, while d50 values are relatively higher, on average than in other facies.

Finally, the Facies T2 consists of brown, clayey-silt containing large, visible carbonate nodules. There are high amounts of carbonate sand and low amounts of calcareous microfossils, compared to W3. TOC and d50 values are high. There are four episodes of this facies between –

2.9 and 2.66 m rmsl.

Above 2.66 m rmsl, the core is characterized by modern agricultural soils; these include a thick layer of pale yellow to tan lime overlain by dark brown loam. We did not analyze the agricultural soils in this study.

3.2.2 Stratigraphy

Unit 1 (-10.26 to -9.44 m rmsl): The lowermost unit contains predominantly the hamra paleosols of T1. There is a brief appearance of wetland deposition W3 (-9.94 to -9.76 m rmsl) followed immediately by Facies W2 (-9.76 to -9.66 m rmsl). TOC content is the lowest in the core, ranging from 0.89-2.53%. This unit contains significantly more sand than the overlying two units, along with higher d50.

Unit 2 (-9.44 to -1.91 m rmsl) lies unconformably on Unit 1. Evidence for an unconformity includes a sharp lithofacies contrast between Facies T1 and W1 and a jump in depositional age determined by OSL. Unit 2 begins with the first depositional phase of peat in W1, which dominates the lower half of this unit. TOC values align with this transition, increasing throughout the bottom half of Unit 2 with major peaks during Facies W1 episodes. The lower part of Unit 2 contains the final 3 appearances of Facies T1 between -3.55 and -2.05 m rmsl, ending at -7.09 m rmsl. With the transition from terrestrial to wetland facies, the silt and clay fraction increases as the d50 decreases across the unit. The last deposition of the W1 facies ends at -4.23 m rmsl. Depositional episodes of Facies W2 increase in number and thickness above -7 m rmsl as episodes of Facies W1 decrease. As the occurrence of Facies W2 begin occurring more frequently, charcoal and TOC values decrease. Counts of Br diverge from the S record above -7 m rmsl, coinciding with the transition from Facies W1 to Facies W2. There are 5 episodes of Facies W3 deposition throughout Unit 2, appearing about every 1.5 m and correlating with peaks in d50 and low Si.

Unit 3 (-1.58 to 0.76 m rmsl) sits unconformably on Unit 2. The youngest W2 deposit has low d50. Above that, Facies T2 episodes contain high amounts of carbonate sand, d50, and TOC. A last episode of W3 appears before transitioning into Facies T2.

Unit 4 (1.02-4.16 m rmsl) is composed mostly of T2. The top of this unit consists of modern sediments attributed to the transition of this area of wetlands into agricultural fields. At the top of our core, brown-black soil sits atop a yellowish-white agricultural fill (3.14-4.16 m rmsl) that contains the highest values of TOC and grain size in the whole cored record.

4. Discussion

4.1 Age-Depth Model

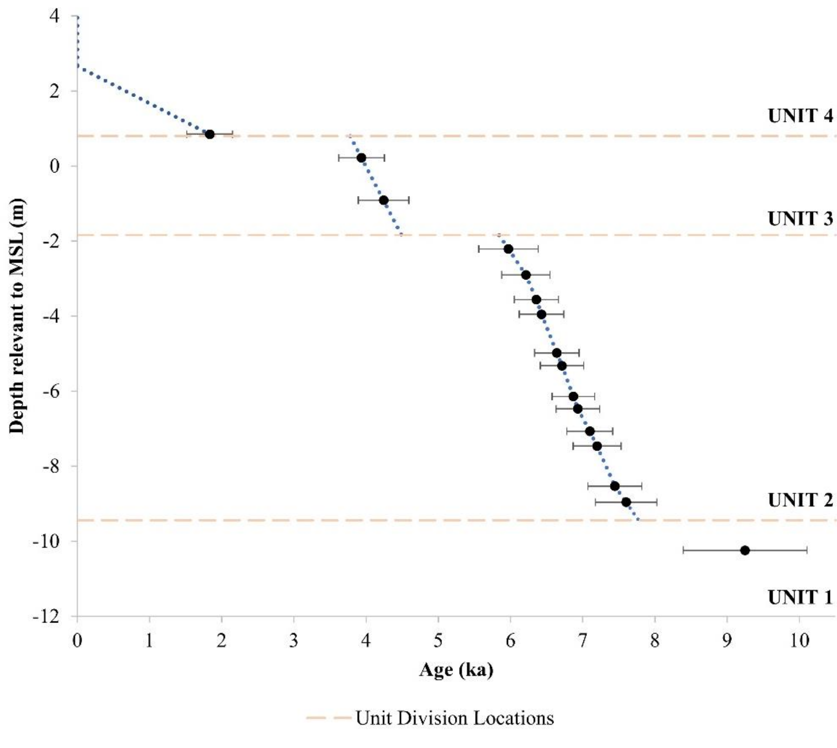

Fig. 7: Age-depth model. Plotted are the adjusted ages and uncertainties from the Bayesian model. The linear interpolations between dates derived from the model are represented with blue dotted lines. Chosen locations for unconformities are represented with orange dashed lines.

To combat the large uncertainties from OSL dating as well as apparent reversals in the age results (Fig. 4), Dr. Gilad Shtienberg (personal communication, 2022) used OxCal to apply a Bayesian model to the data (Fig. 7, appendix). This approach considers the uncertainty bounds and central ages between adjacent points, resulting in adjusted ages-depth points (Table 2). The new age-depth model using this Bayesian approach resolves the apparent reversals in the raw data between 3.94 ka and 7.60 ka. This model is applied to convert our record from depth to time. Unit 2 contains the longest, continuous deposition in our core and therefore will be the focus of this study. Our average sampling resolution in Unit 2 is 17 years between points, with the highest resolution being 3.5 years and lowest 150 years within a core gap due to coring issues.

Table 2: Bayesian model correction of OSL dates

		Original		**Bayesian Model**	
Sample Number	**True Depth (m rmsl)**	**OSL Age (ka)**	**Uncertainty (ka)**	**OSL Age (ka)**	**Uncertainty (ka)**
KBMN3C_4	0.85	1.85	0.31	1.83	0.32
KBMN3C_5	0.22	4.16	0.36	3.94	0.32
KBMN3D_7	-0.91	4.10	0.45	4.24	0.35
KBMN3E_8	-2.21	6.31	0.59	5.97	0.41
KBMN3E_10	-2.90	6.50	0.58	6.21	0.33
KBMN3F_11	-3.56	6.56	0.66	6.36	0.31
KBMN3F_12	-3.95	6.39	0.73	6.43	0.31
KBMN3G_15	-4.98	6.64	0.82	6.64	0.31
KBMN3G_16	-5.32	6.91	0.71	6.71	0.30
KBMN3G_18	-6.14	6.96	0.62	6.87	0.29
KBMN3H_19	-6.47	6.56	0.78	6.93	0.30
KBMN3H_20	-7.07	7.24	0.72	7.10	0.32
KBMN3H_21	-7.46	7.36	0.68	7.20	0.33
KBMN3I_22	-8.53	7.26	0.68	7.45	0.37
KBMN3I_23	-8.96	7.33	0.68	7.60	0.43
KBMN3J_24	-10.24	9.59	0.85	9.25	0.86

Adjusted OSL ages using a Bayesian model, in thousands of years before 2021 (ka)

4.2 Depositional Environments

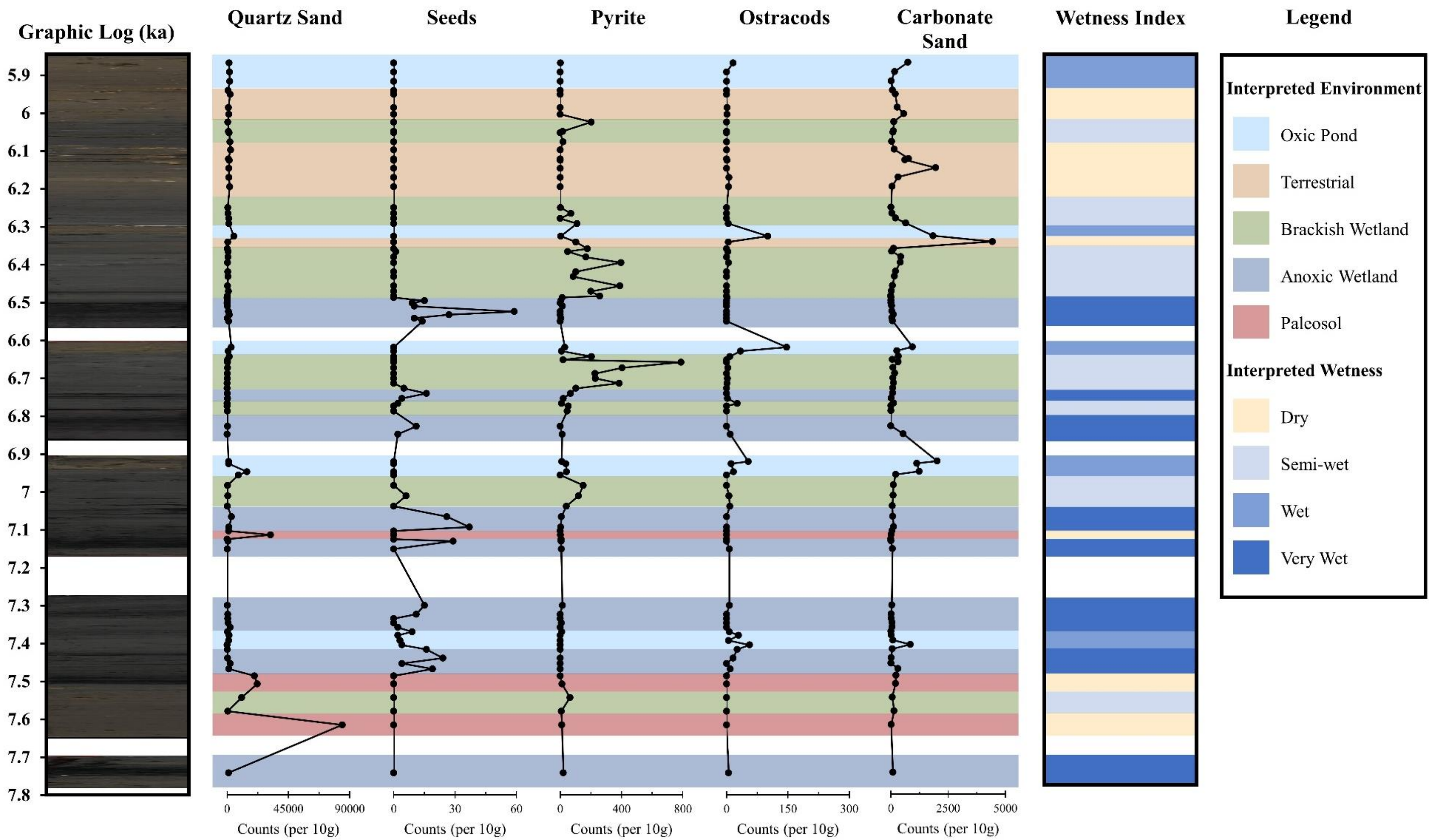

Fig. 8: Core KBMN3 from 5.80-7.80 ka with graphic log, relevant counts, and interpreted wetness index. One count from each type of facies/depositional environment was included: quartz sand (T1, paleosol), seeds (W1, anoxic wetland), pyrite (W2, brackish wetland), ostracods (W3, oxic pond), carbonate sand (T2, terrestrial). Wetness index represents how wet an environment is relative to another: dry (paleosol, terrestrial), semi-wet (brackish wetland), wet (oxic ponds), very wet (anoxic wetland).

Facies T1 is composed of *hamra* paleosols that we interpret as quartz sand originating from the Nile Delta (Box *et al.*, 2010; Gvirtzman and Wieder, 2001). This facies represents climatically stable, terrestrial conditions because of the slow sedimentation rates (0.1 m/1000 years) required to form *hamra* paleosols (Porat *et al.*, 2003). The distinctive red coloring is due to leaching of aeolian Saharan dust high in iron through the slow-forming soils (Gvirtzman and Wieder, 2001). The high values of Mn are due to the presence of Mn-Fe nodules commonly found within *hamra* soils, linked to periodic water-logging (Tsatskin *et al.*, 2009). The wetness index in Fig. 8 refers to how wet a particular facies is relative to the others, representative of changes in the hydrological system of the area. Facies T1 is classified as "dry" in comparison to the wetland units.

The first of the wetland facies W1 is composed of organic-rich peat deposits containing seeds and charcoal. High levels of TOC and Br suggest abundant organic matter, while high S is attributed to anoxic conditions (Kalugin *et al.*, 2007, 2013; Thomson *et al.*, 2006). Seeds found within these episodes are presumed to be the same as those identified within a previous study in the same wetlands. Sivan *et al.* (2016) identified the botanical remains as the class *Phragmitetea*, salt-tolerant plants commonly found in and around shallow, periodically submerged swamps (Mauchamp and Mesleard, 2001). We interpret this environment as an anoxic wetland ranking "very wet" on the wetness index. This is recognized as the wettest facies due to the standing water necessary for formation of year-round wetlands as well as submersion of vegetation within anoxic waters to form peat deposits.

Facies W2 contains dark gray, silty-clays with high amounts of pyrite and S, all evidence of reducing, sub-oxic conditions (Cohen-Seffer *et al.*, 2005; Reineck and Singh, 1973; Sluijs *et al.*, 2008). Pyritization occurs primarily in areas with marine influence as a source of sulfate and low oxygen availability. We suggest Facies W2 formed in brackish wetlands due to a decrease in freshwater input (rainfall and spring output), and a corresponding increase in saltwater intrusion that would supply sulfate needed for pyrite production. The W2 facies is classified under "semi-wet" on the wetness index due to the inferred decrease in freshwater runoff that enabled saltwater intrusion from the nearby ocean.

The last wetland facies, W3, is composed of gray-brown silty clays with large amounts of calcareous microfossils (ostracods, mollusc shells, and snail opercula) and correlating high Ca. Calcareous microfossils are known to be accurate proxies for environmental conditions such as salinity and climatic variability (Frenzel and Boomer, 2005). Sivan *et al.* (2016) identified the assemblages of ostracods and gastropods in the Kebara wetlands around this time as living in freshwater to oligohaline environments. There are high amounts of carbonate sand within these layers, likely due to increased precipitation and thus erosion of the marine carbonates that make up the adjacent Carmel Ridge. Facies W3 is interpreted as the depositional system associated with shallow, oxic ponds classified as "wet" conditions. Although classified as ponds, the episodes of this facies are short-lived compared to the anoxic wetlands of W1 and probably confined to springs and areas adjacent to freshwater streams, so we are classifying them as less wet than the facies W1 and W2.

The upper terrestrial deposits of the core constitute Facies T2. Containing peaks of carbonate sand, this environment also experienced erosion off the Carmel Ridge. Abundant within these facies are also soil concretions that formed around the roots of plants, typically in seasonally arid soils. The lack of floral and faunal evidence points towards the end of year-round wetlands and a return to modern, seasonally dry conditions (Flako-Zaritsky *et al.*, 2011). This resurgence of terrestrial conditions is ranked as "dry".

4.3 Climatic Interpretation

4.3.1 Early Holocene

The early Holocene climates across the Mediterranean exhibited a trend of increasing temperature and precipitation following the Last Glacial Maximum. Around 18 ka, sea levels in the Mediterranean Sea rose dramatically from -125 m rmsl during a glacial lowstand to about -7 m rmsl by 7 ka (Lambeck and Bard, 2000; Rohling *et al.*, 2014; Sivan and Porat, 2004). Sediment derived from the Nile was carried eastward by longshore drift and deposited along the Israeli coast as sea level rose and the coastline transgressed (Box *et. al*, 2010; Emery and Bentor, 1960). We dated the *hamra* paleosol deposition in the eastern trough to 9.25 ± 0.86 ka, likely related to increased depositional rates along the coastline. This is in agreement with *hamra* presence in the western trough around 9.2 ka (Sivan *et al.*, 2011).

The African Humid Period (AHP) produced extremely warm and wet conditions in the Eastern Mediterranean from 6.5-9.5 ka, as recorded by many climatic records across the Mediterranean (compiled by Robinson *et al.*, 2006). Our core record has a sedimentological unconformity between the paleosols and the younger wetland unit, creating a sedimentological and environmental gap from 7.77 ± 0.43 to 9.25 ± 0.86 ka. Major climatic shifts can drastically affect the hydrology of an area, changing river distributary channels, discharge, sediment delivery, and more. On the Carmel coast, the Taninim stream is the only coastal stream that flows year-round (Shtienberg *et al.*, 2022; Sivan *et al.*, 2011). The Yarkon-Taninim aquifer, which feeds the Taninim stream, is largely controlled by direct precipitation, creating sensitivity of the entire wetland system towards variations in annual rainfall (Cohen-Seffer *et al.*, 2005; Sivan *et al.*, 2011). We attribute the unconformity to high river discharge during the peak of the AHP (Cohen-Seffer *et al.*, 2005) at a time when the stream gradient was high due to lowered sea level relative to today. We speculate that large volumes of water pumping through the Taninim stream decreased sediment deposition and increased erosion, removing and/or preventing the deposition of the 7.8-9.2 ka record in the Kebara marshes.

Wetland deposition began at 7.77 ± 0.43 ka, laying down a continuous, decadal-resolution environmental record for the next ~2,000 years. Sedimentation rates increase rapidly compared to the *Hamra* paleosols, from 0.1 m/1000 yrs to 4.2 m/1000 yrs. We infer that the high sedimentation rates in the new wetlands are due to higher precipitation during the AHP that deposited continental clays into the eastern trough (Cohen-Seffer *et al.*, 2015).

4.3.2 ~7.0-7.8 ka

Very wet, anoxic wetlands dominate the first ~800 years of wetland deposition, from 7.77 ± 0.43 to 7.04 ± 0.32 ka. Each occurrence of these extremely wet conditions lasts about 60 years. The climate is not uniformly wet, but contains short interruptions of drier conditions lasting 35 years on average. There are 8 rapid climatic transitions within the first 710 years of wetland growth, averaging about one reversal each century. Episodes of year-round flooding in Facies W1 give way to drier conditions, manifesting as terrestrial deposition (paleosols), oxic ponds, and brackish wetlands, showing intense climatic variability in both magnitude and duration. Overall, the period from ~7.0-7.8 ka represents wetter climates associated with peak AHP conditions.

4.3.3 ~6.3-7.0 ka

The first major brackish wetland episode occurs starting at 7.04 ± 0.32 ka. The development of pyrite-bearing wetland soils also marks the end of the last major anoxic wetland episode. The inferred reduction in rainfall produced high salinity within the brackish wetlands and suggests overall drying of the Kebara trough. We infer that the increased aridity of the system at 7 ka marks the beginning of the termination of the AHP in the Levant. Brackish wetland episodes last for 90 years on average while short-term reversals back to wetter conditions average 40 years. There are eight transitions between depositional environments in 730 years, extremely similar to the interval between 7.0-7.8 ka. The last of the anoxic wetland facies was deposited about 6.48 ± 0.31 ka, signaling the end of extremely wet conditions associated with the peak of the AHP.

4.3.4 ~5.8-6.3 ka

Terrestrial facies T2 begin accumulating about 6.33 ± 0.32 ka, representative of the return to seasonally dry conditions associated within the modern Mediterranean climate system. We suggest that 6.3 ka marks the first development of the modern, seasonally dry Mediterranean climate system and the termination of the African Humid Period within our record. We record two long episodes of terrestrial deposition between 5.91 ± 0.41 and 6.21 ± 0.33 ka, both 110 years long. There are relatively short interruptions of drier brackish and oxic wetlands between them, averaging 60 years. These interruptions also occur roughly once per century. Our record ends with a short period of oxic ponds centered around 5.9 ka, representing a brief return to wetter conditions.

Unfortunately, there is another unconformity occurring between our modeled dates of 4.42 ± 0.35 and 5.87 ± 0.41 ka, so we cannot resolve the paleoenvironmental record over this 1.45 ka interval. However, we note that Facies T2, representing seasonally-arid soils, occurs through most of the younger parts of the KBMN3 core up to the conversion of the marsh into an agricultural system. There is also the occurrence of Facies W2 and W3, representing brackish wetlands and ponds, respectively, in the time interval 4.02 ± 0.32 to 4.42 ± 0.35 ka, and implying that the near permanent disappearance of wetland facies does not occur until about 4.4 ka. The

Kebara Marshes continue to have ponds in them up to the present day, particularly in areas adjacent to the Taninim stream and springs in the Kebara Trough (Schumacher, 1887; Schiller, 1979; Sivan *et al.*, 2016)

4.4 Regional Comparisons

This study of the Kebara marshes over the mid- to late Holocene agrees with paleoclimatic archives around the Levant on the timing of the African Humid Period. The overall trend of wetter to drier conditions from 9.5 ka to 6.0 ka is seen in our wetland system, as well as speleothems from Soreq, Peqiin, and Jeita caves (Bar-Matthews *et al.*, 1997, 1999, 2003; Bar-Matthews and Ayalon, 2011; Cheng *et al.*, 2015; Verheyden *et al.*, 2008), deep-sea sediment cores (Almogi-Labin *et al.*, 2009; Box *et al.*, 2010; Rossignol-Strick *et al.*, 1982, 1995; Schmiedl *et al.*, 2010), Dead Sea lake level reconstructions (Bookman *et al.*, 2006; Enzel *et al.*, 2003; Frumkin *et al.*, 2001; Migowski *et al.*, 2006), and pollen analysis (Langgut and Weinstein-Evron, 2011; Litt *et al.*, 2012). The wet conditions of the AHP were not uniform, but routinely interrupted by pulses of comparatively dry environments. Millennial-scale variations during the AHP are oscillatory, deriving from variations in solar insolation. Not well understood are the responses and feedbacks to this forcing (Bar-Matthews and Ayalon, 2011; Roberts *et al.*, 2008; Zielhofer *et al.*, 2017). My work recorded the millennial-scale dryness pulse at 6.0 ka that was also recognized by Zielhofer et al., (2017) and the bi-millenial dry event at 7.1 ka seen by Cheng *et al*. (2015). These authors have documented dry-wet cycles earlier in the AHP than is seen on the Kebara record, limited as it is to the AHP younger than 7.8 ka.

Due to the high depositional rates of the Kebara wetlands, our core succeeded in recording many short-term fluctuations during the end of the AHP. The Soreq Cave speleothem dataset recorded five wet fluctuations within the timeline of our dataset, only some of which agree with ours. Bar-Matthews and Ayalon (2011) recorded three wet periods within an overall drier system: 6.16-6.23 ka, 6.51-6.61 ka, and 6.74-6.76 ka. We only record two of these episodes, with wet conditions occurring from 6.48 ± 0.31 to 6.55 ± 0.31 ka and from 6.72 ± 0.30 to 6.77 ± 0.30 ka. Within an overall wetter system, the Soreq Cave record also recorded two dry periods: 6.24-6.31 ka and 6.66-6.71 ka. Our record only agrees with the latter; semi-arid conditions are recorded from 6.64 ± 0.31 to 6.72 ± 0.30 ka. The speleothem record is defined by oxygen and carbon isotopic data. While this system is sensitive to changes in temperature and precipitation, they are still an indirect measurement of the wetness of an area. The variability recorded in the 2011 study is also not well resolved. We believe our Kebara record, with its multi-proxy approach, is more likely than the speleothem record to record the subtleties of climate variability.

The actual drivers of these decadal and multi-decadal variations in Mediterranean climate are not well understood. Most studies attribute them to local and regional responses to the larger climatic shifts in temperature and humidity driven by solar variations. Cheng *et al.* (2015) attributes centennial periodicity to connections between solar irradiance, atmospheric response, drift ice volume, and ocean-land surface gradients. Also shown is the variability within the Mediterranean, driven largely by differences in precipitation-evaporation balance of each region (Cheng *et al.*, 2015). Roberts *et. al* (2008) make note of the change in cyclogenesis during the Holocene, caused by shifts in the North Atlantic storm track and resulting in higher precipitation during the winter. Brayshaw *et al.* (2011) include variations within monsoonal and westerly tracks and intensity. It seems that the specific drivers of short-term fluctuations within the Eastern Mediterranean remain unresolved, but the general consensus points towards regional variability of the ocean-atmosphere-land system driven overall by solar variations.

4.5 Anthropological Implications

Rapid climate change events within overall long-term trends are attributed to strong, nonlinear feedbacks such as vegetation and land/sea temperature responses directly affecting regional climates (deMenocal *et al.*, 2000; Mayewski *et al.*, 2004; Tierney *et al.*, 2017). These decade-long variations in temperature and precipitation can disrupt ecosystem dynamics through changes in flooding patterns, erosion of landscapes, and ultimately plant and animal distribution. All of these factors directly affect human settlement patterns and cultural evolution.

Many rapid climate change events are associated with societal collapses. For example, the well-recorded 5.2 ka dry event resulted in the collapse of the Uruk period society in Mesopotamia, directly related to the decrease in rainfall drastically reducing cereal agriculture in the region (Staubwasser and Weiss, 2006). In the Levant, a dry pulse around 8.2 ka is associated with the end of the Pre-Pottery Neolithic period in the Levant, also due to increasing aridity and resulting in the abandonment of farming towns (Mithen, 2003; Weninger *et al.*, 2006).

The warmer and wetter conditions of the Early Holocene coincide with the onset of Neolithic farming communities along the Fertile Crescent (Roberts *et al.*, 2008). Increases in precipitation from the Last Glacial Maximum allowed for domestication of crops around 10 ka, particularly cereals in the Levant, as well as livestock such as pigs, goats, cattle, and sheep (Bar-Yosef, 2011). Population began increasing due to the stability of resources, leading to an expansion of permanent settlements until ~9.5 ka. These larger, relatively immobile communities relied heavily on food production rather than collection, making them particularly vulnerable to environmental variations (Rosen and Rosen, 2017). The combination of an overall decrease in aridity coming off the peak of the African Humid Period with fluctuations between wet and dry conditions until 6.5-7 ka resulted in relatively fragile Levantine communities (Palmisano *et al.*, 2019). Seasonal variations in distribution and amounts of annual precipitation change vegetation and wild animal populations relatively quickly. A variety of responses within the Levant communities are seen, from advancements in irrigation techniques and environmental management to population decreases and dispersal (Palmisano *et al.*, 2019). Reconstructing the environmental variations during this time can help explain what exactly drove these cultural responses. As the African Humid Period came to an end, climatic conditions stabilized in the modern Mediterranean climate system, allowing civilizations to increase in number and expand throughout the local areas beginning around 7 ka (Levy, 1992, 1998; Palmisano *et al.*, 2019; Zohary *et al.*, 2012).

These short-term climatic fluctuations can affect where, how, and for how long civilizations can exist. Changes in annual precipitation for a few decades can have drastic effects on the distribution of vegetation, wildlife, and water availability in the area. Civilizations either adapt with agricultural advancements and socio-economic shifts or collapse altogether. The cultural transitions towards more sedentary lifestyles around 7 ka is in agreement with my record, documenting the appearance of brackish wetlands associated with a decrease in local freshwater supplies. I recorded another major transition around 6.3 ka towards more seasonally dry conditions, but currently there are no specific cultural responses dated to that time. This second transition may have had a less dramatic transformation of the landscape and resources within and thus had a lesser effect on surrounding communities. Future studies expanding spatially and temporally on the environmental history of coastal Israel may hold the answers. This climate record supplements other local and regional climatological and archaeological archives to better understand the movements, advancements, and overall evolution of the Levantine communities during the mid- to late Holocene.

5. Conclusions

This multi-proxy paleoenvironmental archive from the Kebara marshes of Israel provides a decadal-resolution record of the termination of the African Humid Period. Overall wet conditions associated with high rainfall of the AHP are implied by the dominance of anoxic wetlands from ~7.0-7.8 ka. Brackish wetlands became common from ~6.3-7.0 ka, indicating a transition from wetter to drier conditions with more coastal saltwater intrusion into formerly freshwater wetlands. Modern, seasonally dry conditions first appear around 6.3 ka, likely signaling the termination of the AHP. This climatic transition was not uniform, with short, decade-long reversals occurring at least once per century. Overall, the period when brackish water wetlands were present in the Kebara Trough lasted about 800 years, implying a relatively drawn-out transition between the AHP proper, and its full replacement by the modern Mediterranean climate pattern of seasonal aridity. These reversals likely had effects on the landscape and vegetation distribution of the Levant, having potentially large impacts on human cultural evolution. Our record enhances the existing paleoclimatic archives across the Eastern Mediterranean, providing a higher resolution dataset describing the variability of the termination of the African Humid Period and its effects across the Levant during the late Holocene.

APPENDIX

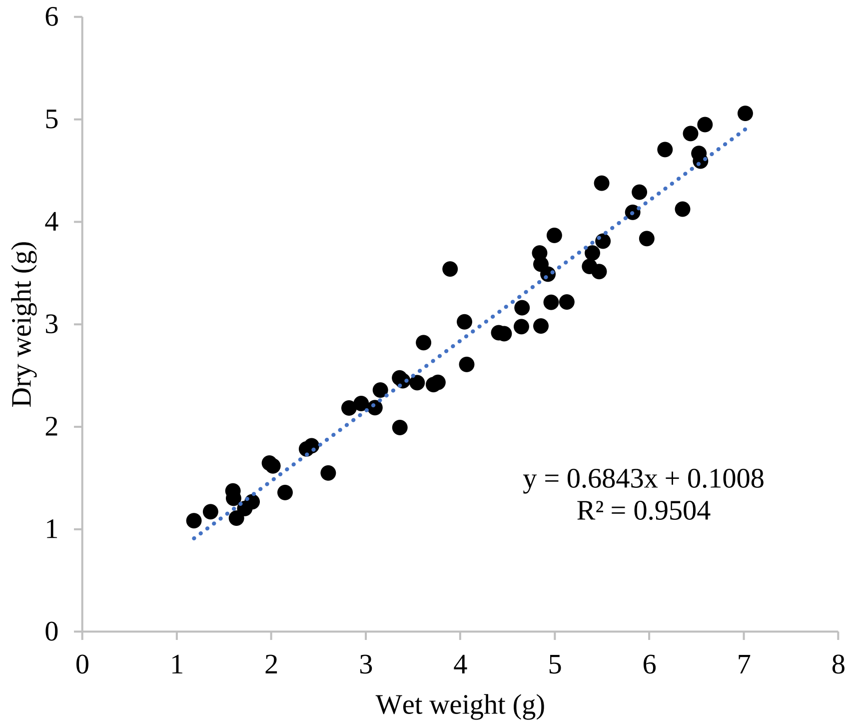

Fig. A1: Weight correction graph. Plotted are each samples' wet weight (weight right after sampling), and dry weight (weight after drying). The line of best fit is a linear model with a high coefficient of determination (R^2), allowing us to correct the weights of samples not weighed dry.

Table A1: Isotopic and particle size analysis results

Sample name	True depth (m)	%C	d (0.5)	% Clay	% Silt	% Sand	d 15N/14N	d 13C/12C	%N	C/N
KBMN3_A_1	3.74	10.24	14.26	20.28	62.73	17.00	6.51	-13.11	0.13	78.14
KBMN3_A_2	3.53	10.62	12.87	24.24	56.84	18.93	5.30	-7.37	0.10	106.20
KBMN3_A_3	3.17	11.63	16.71	21.44	55.52	23.04	1.40	-7.17	0.03	352.27
KBMN3_A_4	2.72	11.72	18.62	20.60	54.08	25.32	1.82	-8.11	0.05	260.38
KBMN3_B_5	2.45	5.01	5.16	39.17	58.76	2.07	2.11	-9.38	0.03	161.65
KBMN3_B_6	2.16	5.37	5.58	35.92	57.71	6.37	1.91	-8.86	0.03	173.19
KBMN3_B_7	1.96	3.12	4.88	40.23	56.69	3.09	1.49	-11.87	0.02	141.77
KBMN3_B_8	1.75	3.86	4.96	39.32	57.40	3.28	-0.29	-9.75	0.02	192.80
KBMN3_B_9	1.56	2.49	4.95	38.74	59.01	2.25	-0.01	-10.99	0.02	146.47
KBMN3_B_10	1.40	2.35	4.82	40.05	58.21	1.74	2.25	-12.61	0.02	102.22

Table A1: Isotopic and particle size analysis results, Continued

Sample name	True depth (m)	%C	d (0.5)	% Clay	% Silt	% Sand	d 15N/14N	d 13C/12C	%N	C/N
KBMN3_B_11	1.20	2.92	5.09	38.28	61.15	0.57	-0.62	-10.16	0.02	121.63
KBMN3_C_12	1.04	6.02	7.07	30.34	63.68	5.98	3.56	-8.33	0.05	133.69
KBMN3_C_13	0.97	3.66	5.81	34.50	62.30	3.21	1.61	-8.92	0.02	152.38
KBMN3_C_14	0.78	1.83	5.38	36.67	59.99	3.34	-0.44	-12.44	0.02	91.70
KBMN3_C_15	0.69	1.59	4.55	42.21	56.82	0.97	0.31	-16.79	0.02	66.38
KBMN3_C_16	0.62	1.21	4.64	41.00	55.62	3.38	1.08	-18.82	0.03	41.76
KBMN3_D_17	-0.55	3.46	5.72	34.51	62.79	2.71	1.05	-7.77	0.04	98.74
KBMN3_D_18	-0.78	6.00	7.78	28.87	64.84	6.29	2.80	-8.58	0.04	146.22
KBMN3_D_19	-0.94	2.46	4.94	38.99	57.62	3.39	1.12	-13.06	0.04	61.55
KBMN3_D_20	-1.25	1.17	4.97	38.82	58.47	2.71	0.13	-26.37	0.03	34.53
KBMN3_D_21	-1.51	2.38	4.88	40.02	58.24	1.74	2.71	-16.92	0.05	49.60
KBMN3_D_22	-1.74	2.66	4.90	39.99	56.75	3.26	4.45	-16.43	0.09	28.26
KBMN3_E_23	-2.04	2.67	5.27	36.67	60.55	2.78	2.55	-11.45	0.05	53.30
KBMN3_E_24	-2.28	2.29	5.61	35.34	61.35	3.31	1.18	-11.59	0.05	44.84
KBMN3_E_25	-2.51	1.36	3.95	48.30	48.34	3.36	1.03	-22.51	0.03	41.30
KBMN3_E_26	-2.74	2.37	5.09	38.23	59.90	1.88	0.90	-11.94	0.03	94.88
KBMN3_E_27	-2.89	1.77	4.74	40.64	58.95	0.41	-0.22	-15.58	0.02	104.29
KBMN3_E_28	-3.26	2.25	4.15	46.00	53.93	0.07	2.90	-15.95	0.05	43.25
KBMN3_E_29	-3.32	2.51	4.94	38.84	60.98	0.18	3.79	-16.16	0.06	44.82
KBMN3_F_30	-3.50	5.56	7.95	28.09	65.78	6.13	3.66	-18.50	0.05	115.90
KBMN3_F_31	-3.78	2.90	5.47	36.34	60.54	3.11	3.06	-17.55	0.05	59.24
KBMN3_F_32	-4.06	2.78	5.17	37.84	59.61	2.55	3.51	-16.93	0.05	59.09
KBMN3_F_33	-4.34	1.95	4.64	42.26	56.83	0.91	3.72	-30.95	0.06	35.47
KBMN3_F_34	-4.63	2.59	4.93	40.09	58.54	1.36	5.14	-22.52	0.10	27.24
KBMN3_F_35	-4.83	4.34	5.89	34.88	62.36	2.77	3.97	-19.68	0.16	26.95
KBMN3_G_36	-5.02	3.03	5.87	34.21	63.64	2.15	3.30	-10.02	0.08	38.35
KBMN3_G_37	-5.22	2.49	4.95	39.65	59.22	1.13	4.29	-16.27	0.08	29.67
KBMN3_G_38	-5.41	2.66	5.08	39.34	57.24	3.41	5.03	-20.22	0.12	22.13
KBMN3_G_39	-5.61	3.33	4.39	44.03	54.90	1.08	5.86	-17.76	0.13	26.21
KBMN3_H_40	-6.47	3.05	6.09	33.43	62.64	3.94	4.60	-17.95	0.12	25.88
KBMN3_H_41	-6.62	3.05	5.31	38.04	59.87	2.08	3.64	-13.79	0.09	33.52

Table A1: Isotopic and particle size analysis results, Continued

Sample name	True depth (m)	%C	d (0.5)	% Clay	% Silt	% Sand	d 15N/14N	d 13C/12C	%N	C/N
KBMN3_H_43	-7.01	7.94	10.59	24.33	67.86	7.81	3.04	-25.33	0.25	31.63
KBMN3_H_44	-7.16	2.09	6.38	32.75	63.92	3.32	3.68	-16.17	0.08	25.18
KBMN3_I_45	-8.06	4.03	7.08	31.18	64.18	4.64	3.78	-25.93	0.17	24.44
KBMN3_I_46	-8.43	3.87	4.51	43.16	55.09	1.75	4.69	-19.69	0.12	32.23
KBMN3_I_47	-8.66	4.26	7.85	29.30	66.19	4.51	3.87	-21.37	0.15	28.97
KBMN3_I_48	-8.91	1.73	5.87	35.13	62.14	2.72	2.68	-17.47	0.08	22.18
KBMN3_I_49	-9.16	1.53	6.16	34.14	61.34	4.52	1.99	-18.17	0.07	20.72
KBMN3_J_50	-9.53	2.53	6.38	33.15	63.63	3.22	3.65	-16.66	0.09	27.82
KBMN3_J_51	-9.71	2.50	6.86	31.61	64.49	3.90	1.04	-15.93	0.07	36.29
KBMN3_J_52	-9.87	1.80	6.29	33.70	61.32	4.98	2.02	-17.25	0.08	23.63
KBMN3_J_53	-10.06	1.20	6.85	31.60	56.48	11.91	1.36	-19.13	0.06	19.10
KBMN3_J_54	-10.26	0.89	8.63	27.50	54.96	17.54	0.16	-22.47	0.05	17.15

Table A2: Radiocarbon ages

UCIAMS #	Sample name	Depth below surface (m)	True Depth (m)	Description	d13C (‰)	±	Fraction Modern	±	D14C (‰)	±	14C age (BP)	±
239638	KBMN 3L-B 83-85	2.34	1.82	plant mat'l 0.040mgC		0.1	1.0192	0.0032	19.2	3.2	Modern	
239633	KBMN 3D 40-42	4.91	-0.75	plant mat'l 0.042 mgC		0.1	0.7265	0.0031	-273.5	3.1	2565	35
239634	KBMN 3D (A) 60-62	5.11	-0.95	plant mat'l 0.17mgC		0.1	0.7445	0.0012	-255.5	1.2	2370	15
239635	KBMN 3D 107-109	5.58	-1.42	plant mat'l 0.16mgC		0.1	0.5275	0.0011	-472.5	1.1	5140	20
239636	KBMN 3E 51-53	6.52	-2.36	plant mat'l 0.17mgC		0.1	0.5267	0.0011	-473.3	1.1	5150	20
239637	KBMN 3E (A) 122-124	7.23	-3.07	charcoal	-23.1	0.1	0.5698	0.0009	-430.2	0.9	4520	15
239622	KBMN3g_75-77	9.76	-5.6	seed+char	-26.4	0.1	0.4303	0.0008	-569.7	0.8	6775	20
239623	KBMN3h_20-22	10.71	-6.55	plant mat'l 0.21mgC	-29.4	0.1	0.4714	0.001	-528.6	1	6040	20
239624	KBMN3h_30-32	41.5	-37.34	plant mat'l	-20	0.1	0.4762	0.0009	-523.8	0.9	5960	15

Table A2: Radiocarbon ages, Continued

UCIAMS #	Sample name	Depth below surface (m)	True Depth (m)	Description	d13C (‰)	±	Fraction Modern	±	D14C (‰)	±	14C age (BP)	±
239625	KBMN3h_60-62	11.11	-6.95	seeds+char	-27.1	0.1	0.4224	0.0008	-577.6	0.8	6925	20
239626	KBMN3h_70-72	11.21	-7.05	seeds+char	-27.6	0.1	0.4118	0.0008	-588.2	0.8	7130	20
239627	KBMN3h_78-80	11.29	-7.13	charcoal	-24.2	0.1	0.3997	0.0009	-600.3	0.9	7365	20
239628	KBMN3i_15-17	12.16	-8	seeds+char	-27.9	0.1	0.4484	0.0008	-551.6	0.8	6445	15
239629	KBMN3i_45-47	12.46	-8.3	seeds+char 0.20mgC	-27.5	0.1	0.4332	0.0011	-566.8	1.1	6720	20
239630	KBMN3i_65-67	12.66	-8.5	seeds+char	-26.7	0.1	0.4207	0.0009	-579.3	0.9	6955	20
239631	KBMN3i_74-76	12.75	-8.59	seeds+char	-24	0.1	0.4129	0.0008	-587.1	0.8	7105	20
239632	KBMN3j_25-27	13.76	-9.6	seeds+char 0.23mgC	-24.1	0.1	0.4126	0.0009	-587.4	0.9	7110	20

Table A3: Normalized proxy counts

Column ID	True Depth (m rmsl)	Age (ka)	Quartz Sand	Seeds	Charcoal	Pyrite	Mollusc Shell Fragments	Ostracods	Operculum	Carbonate Sand
A-L	3.49		154	0	0	0	447	296	4	103
A-L	3.35		1232	0	0	0	0	0	0	96
A-L	3.28		181	0	0	0	213	13	0	59
A-L	3.21		4968	0	0	0	128	0	0	133
A-L	3.14		1706	0	0	0	157	1	0	72
A-L	3.07		428	0	0	0	156	0	0	51
A-L	3.00		61	0	0	0	152	0	0	4
B-L	2.47		235	0	2	0	263	0	0	24
B-L	2.28		198	0	0	0	70	0	0	43
B-L	2.15		130	0	0	0	149	5	1	84
B-L	1.75		186	0	1	0	2	1	0	4
B-L	1.64		216	0	0	0	3	0	0	49
B-L	1.20	3.67	178	0	7	0	6	0	0	294
C-L	0.72	3.80	251	0	0	2	51	2	0	240
C-L	0.55	3.85	2505	0	0	0	22	0	0	205

Table A3: Normalized proxy counts, Continued

Column ID	True Depth (m rmsl)	Age (ka)	Quartz Sand	Seeds	Charcoal	Pyrite	Mollusc Shell Fragments	Ostracods	Operculum	Carbonate Sand
C-L	0.51	3.86	2037	0	1	1	49	0	0	81
C-L	0.29	3.92	2003	0	0	0	54	0	0	117
C-L	0.24	3.93	1572	0	0	0	48	0	0	1085
C-L	0.21	3.94	271	0	0	0	57	0	0	112
C-L	0.14	3.96	687	0	0	0	45	0	0	724
C-L	0.07	3.98	1821	0	2	0	6	0	0	529
C-L	0.00	4.00	2976	0	0	0	18	0	0	563
C-L	-0.18	4.05	1263	0	0	0	4	0	0	487
D	-0.35	4.09	688	2	22	0	521	70	12	630
D	-0.42	4.11	973	0	17	0	240	52	17	275
D	-0.51	4.13	3461	14	0	0	99	135	7	235
D	-0.58	4.15	304	0	1	0	34	10	0	45
D	-0.68	4.18	2144	0	0	0	706	274	4	499
D	-0.75	4.20	1563	0	0	0	96	0	0	114
D	-0.77	4.20	1343	0	1	11	125	25	1	393
D	-0.84	4.22	761	0	0	0	66	0	0	1282
D	-0.87	4.23	1958	0	0	0	44	5	0	437
D	-0.92	4.25	1861	0	0	0	75	0	0	14
D	-0.95	4.25	106	0	0	32	2	0	0	38
D	-0.99	4.26	1495	0	0	105	57	0	0	16
D	-1.08	4.29	197	0	0	0	9	0	0	9
D	-1.15	4.31	1864	0	0	0	4	0	0	15
D	-1.22	4.33	249	3	0	43	17	0	0	27
D	-1.28	4.34	121	0	0	211	8	0	0	59
D	-1.42	4.38	830	0	0	436	4	0	0	38
D	-1.49	4.40	603	0	6	387	8	0	0	3
D	-1.55	4.42	403	4	4	119	34	0	0	7
D	-1.57	4.42	485	0	0	341	25	0	0	55
E	-1.91	5.87	1511	0	3	2	96	16	3	742
E	-1.98	5.89	1816	0	0	0	20	0	0	170
E	-2.05	5.92	1904	0	13	0	25	0	0	19
E	-2.12	5.94	709	0	0	0	117	0	0	67
E	-2.15	5.95	2237	0	5	0	3	0	0	192
E	-2.25	5.99	956	0	11	1	9	1	0	279

Table A3: Normalized proxy counts, Continued

Column ID	True Depth (m rmsl)	Age (ka)	Quartz Sand	Seeds	Charcoal	Pyrite	Mollusc Shell Fragments	Ostracods	Operculum	Carbonate Sand
E	-2.30	6.00	1409	0	17	0	2	1	0	568
E	-2.36	6.03	560	0	50	203	10	0	0	124
E	-2.43	6.05	1065	0	38	16	38	0	0	110
E	-2.44	6.05	1526	0	5	0	9	0	0	86
E	-2.51	6.08	2085	0	0	19	34	0	0	34
E	-2.57	6.10	2559	0	0	0	83	0	0	149
E	-2.64	6.12	982	0	0	0	157	0	0	773
E	-2.65	6.13	1697	0	1	0	174	1	0	613
E	-2.71	6.15	1351	0	0	0	47	0	0	1951
E	-2.78	6.17	1368	0	6	0	79	6	0	316
E	-2.85	6.20	1948	0	14	0	60	5	0	51
E	-3.07	6.25	485	0	8	2	3	0	0	6
E	-3.14	6.27	742	0	53	70	1	0	0	45
E	-3.20	6.28	1323	0	7	0	7	0	0	202
E	-3.26	6.29	1403	0	18	109	86	4	0	648
F	-3.41	6.33	4967	0	0	4	413	101	8	1846
F	-3.48	6.34	610	0	0	102	62	4	0	4435
F	-3.56	6.36	298	0	0	178	0	0	0	114
F	-3.60	6.37	830	1	93	49	24	3	0	33
F	-3.68	6.38	700	0	26	167	37	0	0	428
F	-3.76	6.40	379	0	9	397	36	5	0	411
F	-3.89	6.42	478	0	85	103	133	0	0	200
F	-3.96	6.43	727	0	29	86	0	0	0	157
F	-4.08	6.46	365	0	10	390	13	0	0	74
F	-4.15	6.47	1074	0	60	200	22	0	0	24
F	-4.21	6.48	157	0	0	258	36	0	0	0
F	-4.23	6.49	111	0	64	13	67	1	0	3
F	-4.27	6.50	253	15	498	5	0	0	0	3
F	-4.30	6.50	123	9	210	1	1	0	0	9
F	-4.34	6.51	242	10	101	15	0	0	0	32
F	-4.41	6.53	1091	59	1926	0	12	0	0	47
F	-4.45	6.53	1700	27	480	0	11	0	0	109
F-L	-4.50	6.54	184	10	353	5	16	0	0	47
F-L	-4.54	6.55	1137	14	763	0	5	0	0	67

Table A3: Normalized proxy counts, Continued

Column ID	True Depth (m rmsl)	Age (ka)	Quartz Sand	Seeds	Charcoal	Pyrite	Mollusc Shell Fragments	Ostracods	Operculum	Carbonate Sand
G	-4.87	6.62	3113	0	275	30	461	147	27	943
G	-4.92	6.63	800	0	394	9	111	34	0	263
G	-4.99	6.64	1674	0	16	204	96	8	0	324
G	-5.03	6.65	315	0	88	19	15	0	0	65
G	-5.06	6.66	320	0	23	789	0	0	0	320
G	-5.13	6.67	450	0	20	404	18	3	0	86
G	-5.20	6.69	253	0	21	227	29	0	0	165
G	-5.26	6.70	163	0	14	230	14	2	0	94
G	-5.32	6.71	50	0	1	385	21	1	0	117
G	-5.39	6.73	103	5	53	103	23	0	0	83
G	-5.46	6.74	217	16	3699	67	22	0	0	77
G	-5.53	6.75	392	4	292	20	30	2	0	12
G	-5.60	6.77	47	2	334	9	5	26	0	121
G-L	-5.64	6.77	59	0	150	53	14	0	0	4
G-L	-5.71	6.79	163	0	48	46	9	0	0	9
G-L	-5.92	6.83	323	11	2095	0	0	0	0	0
G-L	-6.03	6.85	125	2	4	13	15	9	0	535
H	-6.40	6.92	1094	0	36	10	255	53	5	2019
H	-6.43	6.93	1106	0	24	37	160	11	0	1132
H	-6.52	6.95	14617	0	83	42	83	17	0	1233
H	-6.55	6.96	8289	0	285	0	72	0	0	209
H	-6.65	6.98	382	0	470	151	45	0	0	112
H	-6.75	7.01	506	6	285	120	31	6	0	103
H	-6.85	7.04	172	0	812	40	81	8	0	64
H	-6.95	7.07	3291	26	2310	8	95	0	0	79
H	-7.05	7.09	1394	37	24080	4	21	0	0	123
H	-7.09	7.10	1159	0	3133	0	18	0	0	52
H	-7.13	7.11	31872	0	378	2	16	0	0	18
H-L	-7.18	7.13	26	0	200	6	0	0	0	0
H-L	-7.20	7.13	730	29	1361	6	0	0	0	6
H-L	-7.28	7.15	169	0	0	7	54	7	0	69
I	-7.90	7.30	249	15	2006	15	183	7	0	44
I	-8.00	7.32	588	11	5979	0	11	0	0	17
I	-8.05	7.34	566	0	651	0	71	0	0	18

Table A3: Normalized proxy counts, Continued

Column ID	True Depth (m rmsl)	Age (ka)	Quartz Sand	Seeds	Charcoal	Pyrite	Mollusc Shell Fragments	Ostracods	Operculum	Carbonate Sand
I	-8.10	7.35	827	0	464	8	43	0	0	54
I	-8.15	7.36	2292	2	37	0	9	0	0	49
I	-8.20	7.37	381	9	546	11	226	7	0	9
I	-8.24	7.38	1455	2	212	0	50	29	0	12
I	-8.30	7.39	1236	3	100	0	5	5	0	88
I	-8.35	7.41	18	4	437	0	131	56	0	846
I	-8.40	7.42	238	16	1882	0	59	26	0	59
I	-8.50	7.44	304	24	2261	0	19	16	0	16
I	-8.55	7.45	2219	4	1346	0	13	0	0	9
I	-8.59	7.47	1305	19	40878	0	9	9	0	308
I	-8.64	7.49	20143	0	3	0	3	0	0	222
I	-8.70	7.51	22197	0	12	12	10	0	0	202
I	-8.80	7.54	10646	0	24	64	14	0	0	59
I	-8.90	7.58	480	0	1	7	8	0	0	142
I	-9.00	7.62	84489	0	12	11	12	0	0	17
J	-9.35	7.74	1190	0	2013	21	73	5	0	89
J	-9.49		12778	0	214	22	67	13	2	219
J	-9.60		75379	2	64	75	68	11	4	532
J	-9.72		21200	0	116	75	188	70	0	356
J	-9.79		891	0	44	53	388	97	11	1373
J	-9.91		24025	0	15	5	248	0	0	733
J	-9.99		27737	0	18	0	72	0	0	90
J	-10.10		33648	0	6	1	24	0	0	42
J	-10.19		51390	0	1	2	48	0	0	80

In the column ID, any section denoted with an 'L' was taken from the corresponding OSL core. Counts are normalized to 10 g.

Table A4: Sample processing data and raw counts

Core Section	True Depth (m)	Dry Weight (g)	Dry Coarse Fraction (>63 µm)	%>63 µm	Quartz Sand	Seeds	Charcoal	Pyrite	Mollusc Fragments	Ostracods	Oper-culum	Carbon-ate Sand
A-L	3.49	7.546	0.213	2.8%	116	0	0	0	337	223	3	78
A-L	3.35	10.844	0.879	8.1%	1336	0	0	0	0	0	0	104

Table A4: Sample processing data and raw counts, Continued

Core Section	True Depth (m)	Dry Weight (g)	Dry Coarse Fraction (>63 μm)	%>63 μm	Quartz Sand	Seeds	Charcoal	Pyrite	Mollusc Fragments	Ostracods	Oper-culum	Carbon-ate Sand
A-L	3.28	7.936	0.609	7.7%	144	0	0	0	169	10	0	47
A-L	3.21	7.827	0.349	4.5%	3888	0	0	0	100	0	0	104
A-L	3.14	9.845	0.417	4.2%	1680	0	0	0	155	1	0	71
A-L	3.07	8.579	0.476	5.5%	367	0	0	0	134	0	0	44
A-L	3.00	7.902	0.662	8.4%	48	0	0	0	120	0	0	3
B-L	2.47	12.295	0.334	2.7%	289	0	2	0	323	0	0	29
B-L	2.28	17.742	2.295	12.9%	352	0	0	0	125	0	0	76
B-L	2.15	14.786	2.090	14.1%	192	0	0	0	221	8	1	124
B-L	1.75	17.633	2.223	12.6%	328	0	1	0	3	1	0	7
B-L	1.64	11.275	0.543	4.8%	244	0	0	0	3	0	0	55
B-L	1.20	18.652	3.064	16.4%	332	0	13	0	12	0	0	548
C-L	0.72	4.547	1.961	43.1%	114	0	0	1	23	1	0	109
C-L	0.55	15.299	2.884	18.8%	3832	0	0	0	34	0	0	313
C-L	0.51	13.547	2.146	15.8%	2760	0	2	1	67	0	0	110
C-L	0.29	11.221	1.227	10.9%	2248	0	0	0	61	0	0	131
C-L	0.24	11.960	2.031	17.0%	1880	0	0	0	58	0	0	1298
C-L	0.21	6.136	0.639	10.4%	166	0	0	0	35	0	0	69
C-L	0.14	4.713	0.680	14.4%	324	0	0	0	21	0	0	341
C-L	0.07	5.404	0.866	16.0%	984	0	1	0	3	0	0	286
C-L	0.00	4.973	0.589	11.8%	1480	0	0	0	9	0	0	280
C-L	-0.18	5.418	0.670	12.4%	684	0	0	0	2	0	0	264
D	-0.35	4.128	0.305	7.4%	284	1	9	0	215	29	5	260
D	-0.42	1.747	0.117	6.7%	170	0	3	0	42	9	3	48
D	-0.51	1.407	0.026	1.8%	487	2	0	0	14	19	1	33
D	-0.58	15.708	0.059	0.4%	477	0	1	0	53	15	0	70
D	-0.68	2.407	0.189	7.8%	516	0	0	0	170	66	1	120
D	-0.75	1.663	0.056	3.3%	260	0	0	0	16	0	0	19
D	-0.77	16.497	2.207	13.4%	2216	0	1	18	206	42	1	648
D	-0.84	3.050	0.996	32.6%	232	0	0	0	20	0	0	391
D	-0.87	18.221	2.366	13.0%	3568	0	0	0	81	9	0	796
D	-0.92	2.133	0.252	11.8%	397	0	0	0	16	0	0	3
D	-0.95	17.058	2.326	13.6%	180	0	0	54	4	0	0	64
D	-0.99	1.237	0.030	2.4%	185	0	0	13	7	0	0	2

Table A4: Sample processing data and raw counts, Continued

Core Section	True Depth (m)	Dry Weight (g)	Dry Coarse Fraction (>63 µm)	%>63 µm	Quartz Sand	Seeds	Charcoal	Pyrite	Mollusc Fragments	Ostracods	Oper-culum	Carbon-ate Sand
D	-1.08	2.127	0.037	1.7%	42	0	0	0	2	0	0	2
D	-1.15	2.752	0.026	0.9%	513	0	0	0	1	0	0	4
D	-1.22	3.013	0.035	1.1%	75	1	0	13	5	0	0	8
D	-1.28	2.561	0.057	2.2%	31	0	0	54	2	0	0	15
D	-1.42	2.361	0.104	4.4%	196	0	0	103	1	0	0	9
D	-1.49	3.617	0.066	1.8%	218	0	2	140	3	0	0	1
D	-1.55	18.454	0.415	2.2%	744	7	7	220	63	0	0	12
D	-1.57	3.607	0.080	2.2%	175	0	0	123	9	0	0	20
E	-1.91	5.745	0.317	5.5%	868	0	2	1	55	9	2	426
E	-1.98	2.467	0.052	2.1%	448	0	0	0	5	0	0	42
E	-2.05	1.576	0.022	1.4%	300	0	2	0	4	0	0	3
E	-2.12	1.791	0.017	1.0%	127	0	0	0	21	0	0	12
E	-2.15	14.410	0.775	5.4%	3224	0	7	0	5	0	0	276
E	-2.25	15.190	0.821	5.4%	1452	0	17	2	13	1	0	424
E	-2.30	16.408	0.937	5.7%	2312	0	28	0	4	2	0	932
E	-2.36	2.017	0.038	1.9%	113	0	10	41	2	0	0	25
E	-2.43	1.821	0.054	3.0%	194	0	7	3	7	0	0	20
E	-2.44	16.955	0.495	2.9%	2588	0	9	0	15	0	0	146
E	-2.51	15.963	0.211	1.3%	3328	0	0	30	54	0	0	54
E	-2.57	1.212	0.015	1.2%	310	0	0	0	10	0	0	18
E	-2.64	0.957	0.094	9.8%	94	0	0	0	15	0	0	74
E	-2.65	18.481	1.478	8.0%	3136	0	1	0	322	1	0	1132
E	-2.71	1.917	0.407	21.2%	259	0	0	0	9	0	0	374
E	-2.78	3.539	0.035	1.0%	484	0	2	0	28	2	0	112
E	-2.85	2.151	0.012	0.6%	419	0	3	0	13	1	0	11
E	-3.07	18.050	0.244	1.4%	876	0	15	3	5	0	0	10
E	-3.14	14.601	0.412	2.8%	1084	0	78	102	1	0	0	65
E	-3.20	3.023	0.114	3.8%	400	0	2	0	2	0	0	61
E	-3.26	15.628	0.750	4.8%	2192	0	28	170	135	6	0	1012
F	-3.41	2.665	0.215	8.1%	1324	0	0	1	110	27	2	492
F	-3.48	2.264	0.138	6.1%	138	0	0	23	14	1	0	1004
F	-3.56	1.575	0.065	4.1%	47	0	0	28	0	0	0	18
F	-3.60	9.893	0.281	2.8%	821	1	92	48	24	3	0	33

Table A4: Sample processing data and raw counts, Continued

Core Section	True Depth (m)	Dry Weight (g)	Dry Coarse Fraction (>63 μm)	%>63 μm	Quartz Sand	Seeds	Charcoal	Pyrite	Mollusc Fragments	Ostracods	Oper-culum	Carbon-ate Sand
F	-3.68	1.916	0.307	16.0%	134	0	5	32	7	0	0	82
F	-3.76	2.216	0.331	14.9%	84	0	2	88	8	1	0	91
F	-3.89	1.653	0.329	19.9%	79	0	14	17	22	0	0	33
F	-3.96	3.822	0.085	2.2%	278	0	11	33	0	0	0	60
F	-4.08	3.125	0.312	10.0%	114	0	3	122	4	0	0	23
F	-4.15	4.506	0.191	4.2%	484	0	27	90	10	0	0	11
F	-4.21	4.144	0.086	2.1%	65	0	0	107	15	0	0	0
F	-4.23	13.349	0.273	2.0%	148	0	85	17	89	1	0	4
F	-4.27	3.959	0.150	3.8%	100	6	197	2	0	0	0	1
F	-4.30	14.368	0.816	5.7%	177	13	302	1	2	0	0	13
F	-4.34	4.042	0.106	2.6%	98	4	41	6	0	0	0	13
F	-4.41	2.549	0.580	22.7%	278	15	491	0	3	0	0	12
F	-4.45	6.588	2.110	32.0%	1120	18	316	0	7	0	0	72
F-L	-4.50	3.857	1.533	39.7%	71	4	136	2	6	0	0	18
F-L	-4.54	4.170	2.022	48.5%	474	6	318	0	2	0	0	28
G	-4.87	3.341	0.631	18.9%	1040	0	92	10	154	49	9	315
G	-4.92	3.500	0.317	9.1%	280	0	138	3	39	12	0	92
G	-4.99	2.502	0.107	4.3%	419	0	4	51	24	2	0	81
G	-5.03	2.605	0.994	38.2%	82	0	23	5	4	0	0	17
G	-5.06	1.279	0.060	4.7%	41	0	3	101	0	0	0	41
G	-5.13	3.932	0.421	10.7%	177	0	8	159	7	1	0	34
G	-5.20	3.748	0.352	9.4%	95	0	8	85	11	0	0	62
G	-5.26	4.910	0.079	1.6%	80	0	7	113	7	1	0	46
G	-5.32	6.777	0.177	2.6%	34	0	1	261	14	1	0	79
G	-5.39	3.991	0.061	1.5%	41	2	21	41	9	0	0	33
G	-5.46	3.136	0.478	15.2%	68	5	1160	21	7	0	0	24
G	-5.53	4.973	0.101	2.0%	195	2	145	10	15	1	0	6
G	-5.60	5.718	0.102	1.8%	27	1	191	5	3	15	0	69
G-L	-5.64	5.072	1.390	27.4%	30	0	76	27	7	0	0	2
G-L	-5.71	4.606	1.404	30.5%	75	0	22	21	4	0	0	4
G-L	-5.92	3.714	2.646	71.2%	120	4	778	0	0	0	0	0
G-L	-6.03	5.455	0.873	16.0%	68	1	2	7	8	5	0	292
H	-6.40	4.161	0.481	11.6%	455	0	15	4	106	22	2	840

Table A4: Sample processing data and raw counts, Continued

Core Section	True Depth (m)	Dry Weight (g)	Dry Coarse Fraction (>63 µm)	%>63 µm	Quartz Sand	Seeds	Charcoal	Pyrite	Mollusc Fragments	Ostracods	Oper-culum	Carbon-ate Sand
H	-6.43	4.630	0.560	12.1%	512	0	11	17	74	5	0	524
H	-6.52	1.200	0.140	11.7%	1754	0	10	5	10	2	0	148
H	-6.55	2.635	0.341	12.9%	2184	0	75	0	19	0	0	55
H	-6.65	3.766	0.168	4.5%	144	0	177	57	17	0	0	42
H	-6.75	5.160	0.125	2.4%	261	3	147	62	16	3	0	53
H	-6.85	5.938	0.362	6.1%	102	0	482	24	48	5	0	38
H	-6.95	3.792	0.221	5.8%	1248	10	876	3	36	0	0	30
H	-7.05	2.439	0.956	39.2%	340	9	5872	1	5	0	0	30
H	-7.09	2.710	0.620	22.9%	314	0	849	0	5	0	0	14
H	-7.13	5.582	0.171	3.1%	17792	0	211	1	9	0	0	10
H-L	-7.18	6.462	1.838	28.4%	17	0	129	4	0	0	0	0
H-L	-7.20	3.425	2.419	70.6%	250	10	466	2	0	0	0	2
H-L	-7.28	4.613	1.014	22.0%	78	0	0	3	25	3	0	32
I	-7.90	1.366	0.128	9.4%	34	2	274	2	25	1	0	6
I	-8.00	1.753	0.368	21.0%	103	2	1048	0	2	0	0	3
I	-8.05	4.350	0.485	11.1%	246	0	283	0	31	0	0	8
I	-8.10	2.586	0.094	3.7%	214	0	120	2	11	0	0	14
I	-8.15	5.340	0.488	9.1%	1224	1	20	0	5	0	0	26
I	-8.20	5.568	0.152	2.7%	212	5	304	6	126	4	0	5
I	-8.24	4.200	0.147	3.5%	611	1	89	0	21	12	0	5
I	-8.30	3.998	0.033	0.8%	494	1	40	0	2	2	0	35
I	-8.35	5.510	0.488	8.9%	10	2	241	0	72	31	0	466
I	-8.40	3.868	0.223	5.8%	92	6	728	0	23	10	0	23
I	-8.50	3.680	0.321	8.7%	112	9	832	0	7	6	0	6
I	-8.55	2.280	0.726	31.9%	506	1	307	0	3	0	0	2
I	-8.59	2.145	1.225	57.1%	280	4	8768	0	2	2	0	66
I	-8.64	6.160	0.236	3.8%	12408	0	2	0	2	0	0	137
I	-8.70	5.889	0.186	3.2%	13072	0	7	7	6	0	0	119
I	-8.80	5.741	0.220	3.8%	6112	0	14	37	8	0	0	34
I	-8.90	7.206	0.281	3.9%	346	0	1	5	6	0	0	102
I	-9.00	7.257	0.439	6.0%	61312	0	9	8	9	0	0	12
J	-9.35	3.816	0.229	6.0%	454	0	768	8	28	2	0	34
J	-9.49	4.621	0.156	3.4%	5904	0	99	10	31	6	1	101

Table A4: Sample processing data and raw counts, Continued

Core Section	True Depth (m)	Dry Weight (g)	Dry Coarse Fraction (>63 µm)	%>63 µm	Quartz Sand	Seeds	Charcoal	Pyrite	Mollusc Fragments	Ostracods	Oper-culum	Carbon-ate Sand
J	-9.60	8.134	0.477	5.9%	61312	2	52	61	55	9	3	433
J	-9.72	4.830	0.184	3.8%	10240	0	56	36	91	34	0	172
J	-9.79	8.797	0.804	9.1%	784	0	39	47	341	85	10	1208
J	-9.91	10.802	3.139	29.1%	25952	0	16	5	268	0	0	792
J	-9.99	14.260	3.039	21.3%	39552	0	26	0	103	0	0	128
J	-10.10	15.255	3.691	24.2%	51328	0	9	2	36	0	0	64
J	-10.19	16.090	4.853	30.2%	82688	0	1	4	78	0	0	128

Table A5: Weight Correction

Original sample				Sample used for correction			
Core section	**True Depth (m)**	**Wet weight (g)**	**Corrected dry weight (g)**	**Core section**	**True Depth (m)**	**Wet weight (g)**	**Dry weight (g)**
A-L	3.49	10.88	7.55	A-L (A)	3.495	5.8974	4.2894
A-L	3.35	15.7	10.84	A-L (A)	3.355	3.1561	2.3595
A-L	3.28	11.45	7.94	A-L (A)	3.285	6.4386	4.8625
A-L	3.21	11.29	7.83	A-L (A)	3.215	4.0462	3.0252
A-L	3.14	14.24	9.85	A-L (A)	3.145	2.3751	1.782
A-L	3.07	12.39	8.58	A-L (A)	3.075	4.8569	3.5854
A-L	3	11.4	7.90	A-L (A)	3.005	2.4284	1.8156
B-L (A)	2.47	17.82	12.30	B-L (A)	2.495	3.6142	2.8218
B-L (A)	2.35	29.37	20.20	B-L (A)	2.375	6.5936	4.9485
B-L (A)	2.28	25.78	17.74	B-L (A)	2.265	5.4988	4.3775
B-L (A)	2.15	21.46	14.79	B-L (A)	2.135	6.1679	4.7057
B-L (A)	1.75	25.62	17.63	B-L (A)	1.735	6.5276	4.6681
B-L (A)	1.64	16.33	11.28	B-L (A)	1.625	7.0186	5.0583
B-L (A)	1.2	27.11	18.65	B-L (A)	1.215	4.9976	3.8686
C-L (A)	0.55	22.21	15.30	C-L (A)	0.575	6.5432	4.5931
C-L	0.51	19.65	13.55	C-L (A)	0.485	5.8274	4.0914
C-L (A)	0.29	16.25	11.22	C-L (A)	0.275	5.4017	3.6962
C-L (A)	0.24	17.33	11.96	C-L (A)	0.235	3.5446	2.4301
C-L	0.21	8.82	6.14	C-L (A)	0.195	4.6568	3.1626

Table A5: Weight Correction, Continued

Original sample				Sample used for correction			
Core section	**True Depth (m)**	**Wet weight (g)**	**Corrected dry weight (g)**	**Core section**	**True Depth (m)**	**Wet weight (g)**	**Dry weight (g)**
C-L	0.14	6.74	4.71	C-L (A)	0.135	1.7213	1.2005
C-L	0.07	7.75	5.40	C-L (A)	0.075	4.9315	3.4892
C-L	0	7.12	4.97	C-L (A)	-0.005	2.02	1.6163
C-L	-0.18	7.77	5.42	C-L (A)	-0.175	3.0986	2.187
D	-0.58	22.807	15.71	D	-0.595	3.8947	3.5385
D (A)	-0.77	23.96	16.50	D (A)	-0.785	4.6496	2.9783
D (A)	-0.87	26.48	18.22	D (A)	-0.885	6.3547	4.124
D (A)	-0.95	24.78	17.06	D (A)	-0.965	3.7191	2.4105
D (A)	-1.15	19.74	13.61	D (A)	-1.135	5.1315	3.2183
D	-1.35	3.5773	2.55	D	-1.335	1.6026	1.3009
D (A)	-1.35	21.84	15.05	D (A)	-1.335	4.4083	2.9174
D (A)	-1.42	22.19	15.29	D (A)	-1.435	4.9653	3.2158
D(A)	-1.49	20.09	13.85	D (A)	-1.475	5.3711	3.5649
D (A)	-1.55	26.82	18.45	D (A)	-1.535	4.4674	2.908
E (A)	-2.05	25.67	17.67	E (A)	-2.065	4.841	3.6973
E	-2.15	20.91	14.41	E	-2.135	1.1822	1.0836
E (A)	-2.37	32.79	22.54	E (A)	-2.385	5.5134	3.8131
E (A)	-2.44	24.63	16.96	E (A)	-2.455	4.0709	2.6079
E	-2.51	23.18	15.96	E	-2.535	1.3581	1.1694
E (A)	-2.58	23.32	16.06	E (A)	-2.565	3.7664	2.4346
E (A)	-2.65	26.86	18.48	E (A)	-2.635	5.9771	3.8361
E	-2.72	23.7	16.32	E	-2.715	1.9809	1.6442
E	-2.79	15.29	10.56	E	-2.775	2.8244	2.1821
E	-2.86	16.36	11.30	E	-2.855	2.9546	2.2279
E	-2.93	2.7623	1.99	E	-2.935	1.7982	1.2683
E (A)	-2.93	23.57	16.23	E (A)	-2.945	5.4721	3.5154
E (A)	-3.07	26.23	18.05	E (A)	-3.055	4.8544	2.9837
E	-3.13	3.4885	2.49	E	-3.125	3.3582	2.4778
E	-3.14	21.19	14.60	E	-3.135	3.3938	2.4493
E (A)	-3.21	30.02	20.64	E (A)	-3.225	1.6348	1.1087
F	-3.6	14.31	9.89	F	-3.605	1.5955	1.3733
F	-4.23	19.36	13.35	F	-4.235	2.1489	1.357
F	-4.3	20.85	14.37	F	-4.295	3.3619	1.9911

Table A5: Weight Correction, Continued

Original sample				Sample used for correction			
Core section	**True Depth (m)**	**Wet weight (g)**	**Corrected dry weight (g)**	**Core section**	**True Depth (m)**	**Wet weight (g)**	**Dry weight (g)**
F	-4.45	9.48	6.59	F	-4.455	2.604	1.5484

In the column ID, any section denoted with an 'L' was taken from the corresponding OSL core and 'A' was taken from the archived half of the respective core.

Table A6: X-ray fluorescence data

Section	True Depth (m)	Al	Si	Cl	S	K	Ca	Ti	Mn	Fe	Cu	Zn	Br	Rb	Sr	Zr	Nb
A	4.07	179	4020	12368	751	108	70314	699	246	7004	114	3872	234	629	10604	3872	734
A	4.06	124	4101	26194	648	115	93261	793	130	7749	151	4480	216	614	10384	4480	522
A	4.05	86	1800	8301	600	99	46291	462	211	4422	173	4498	221	646	7968	4498	636
A	4.04	178	5285	11919	579	121	116559	1104	435	9458	184	3845	256	588	10757	3845	752
A	4.03	322	8545	6758	508	132	165523	1214	101	12855	152	4165	198	591	7900	4165	440
A	4.02	491	10315	5862	393	140	191107	1383	214	14344	169	4368	259	648	7296	4368	798
A	4.01	290	7007	10833	811	125	128951	1183	254	12333	132	4227	164	522	6818	4227	525
A	4.00	132	5108	5927	724	119	106500	895	371	9885	176	4871	228	623	5942	4871	584
A	3.99	319	6535	5180	617	126	136166	848	391	10506	184	4773	224	592	5996	4773	838
A	3.98	352	7135	5637	484	127	150221	1146	432	10974	147	4941	169	510	5365	4941	591
A	3.97	388	8584	4375	432	133	182684	1203	240	12504	84	4524	179	485	4910	4524	774
A	3.96	303	8082	7749	521	134	179476	1164	479	12368	151	4331	163	475	4729	4331	639
A	3.95	391	7962	6099	460	130	173246	1083	359	11529	275	3992	197	499	4596	3992	462
A	3.94	440	7885	3793	537	129	161191	1237	380	12584	264	4241	181	486	4406	4241	492
A	3.93	438	9120	8696	518	135	196483	1166	509	12638	212	4611	157	493	4519	4611	642
A	3.92	179	6470	3397	431	129	176837	1047	269	9473	244	4710	202	543	4425	4710	623
A	3.91	74	2331	4714	384	112	123636	429	283	4063	152	4761	193	579	4760	4761	664
A	3.90	81	3074	3966	539	121	166544	435	214	5008	132	3619	214	461	4338	3619	746
A	3.89	166	4814	4397	480	132	223536	594	232	6568	118	3441	159	488	3635	3441	499
A	3.88	297	4393	5001	125	132	215657	818	173	6906	144	3579	198	474	3928	3579	582
A	3.87	193	4753	5024	229	131	195882	671	268	7832	151	4707	200	540	5210	4707	624
A	3.86	83	2922	5022	318	127	217011	697	417	4910	168	5713	230	712	5620	5713	772
A	3.85	58	3828	4585	505	125	190403	672	237	6543	166	5918	269	723	5852	5918	772
A	3.84	126	3534	6895	252	132	249604	588	430	5728	132	4901	242	624	7582	4901	623

A	3.83	57	2525	6792	371	127	239167	652	390	3813	141	3819	195	571	4112	3819	566
A	3.82	63	2249	4848	247	119	183345	551	360	3466	173	5739	242	716	5162	5739	972
A	3.81	56	1241	3856	567	106	103329	315	347	2494	130	6147	237	855	5433	6147	791
A	3.80	36	712	4977	646	94	50846	437	225	1563	130	5761	167	754	5227	5761	863
A	3.79	85	788	4377	565	95	46630	318	287	1595	158	5780	246	690	5133	5780	823
A	3.78	102	692	5111	563	98	68264	212	75	1578	174	5687	229	829	5248	5687	799
A	3.77	18	768	3729	624	101	81373	268	390	1458	132	5925	252	745	4978	5925	782
A	3.76	46	2130	4619	446	118	188702	548	287	3252	165	6032	199	858	5228	6032	687
A	3.75	74	2316	4071	213	124	212950	509	512	3232	166	5635	189	743	4886	5635	749
A	3.74	41	1619	3638	380	121	189461	378	374	2593	153	6037	249	809	4753	6037	802
A	3.73	70	2237	3454	397	115	162443	734	371	3645	165	5983	239	798	4901	5983	747
A	3.72	17	1060	6053	529	102	81869	506	282	1820	134	5766	232	747	4848	5766	796
A	3.71	41	986	5255	781	103	82908	513	300	1917	141	5778	203	733	4718	5778	736
A	3.70	71	2238	4650	237	116	164440	583	451	3771	147	5563	239	691	4406	5563	806
A	3.69	60	2723	3081	381	128	226908	507	279	4313	178	5710	215	653	4676	5710	680
A	3.68	98	3069	3412	129	136	274819	660	585	4463	132	6035	225	746	4598	6035	830
A	3.67	93	1712	4020	242	116	176793	416	287	2726	125	5702	203	698	4598	5702	819
A	3.66	47	847	4308	354	107	112201	337	357	1833	170	6093	207	763	4503	6093	883
A	3.65	90	1297	3128	230	112	154097	426	278	2053	185	6096	208	716	4960	6096	739
A	3.64	31	1541	4163	115	122	195487	305	304	2519	140	6287	175	850	4517	6287	1009
A	3.63	36	1519	5441	477	118	153323	226	554	3389	173	6422	243	743	4661	6422	932
A	3.62	27	714	3849	577	107	100593	296	243	1301	149	6377	286	754	4474	6377	876
A	3.61	12	728	3505	491	102	88878	429	353	1532	167	6085	189	765	4567	6085	802
A	3.60	95	1898	4207	410	122	177130	586	243	3335	244	6208	213	713	5144	6208	925
A	3.59	12	1218	2821	226	118	180917	744	322	2277	175	6292	211	646	4733	6292	998
A	3.58	47	1589	3516	435	120	210842	313	567	2464	118	6009	170	811	4226	6009	808
A	3.57	-2	1330	3270	375	126	244353	389	428	1846	161	6496	199	699	4332	6496	810
A	3.56	24	1748	3660	320	123	212910	277	580	2434	167	5645	183	699	4173	5645	594
A	3.55	-20	1179	4584	473	124	218964	230	471	1800	182	5287	191	765	4285	5287	703
A	3.54	20	1905	3865	369	128	257421	372	616	2870	162	4924	184	671	3816	4924	674
A	3.53	305	4593	3568	299	144	285213	704	824	5709	143	6105	197	740	3953	6105	855
A	3.52	170	4050	4105	434	132	229390	761	506	5507	157	5958	198	631	4068	5958	578
A	3.51	196	4780	6090	609	131	207986	672	551	6491	156	5299	162	625	3962	5299	594
A	3.50	203	4129	4051	409	125	181533	835	585	5954	146	5018	136	605	4600	5018	740

A	3.49	361	5190	4686	353	126	169736	980	482	7348	152	5871	189	755	4133	5871	922
A	3.48	1304	16676	5623	570	145	136565	3704	580	29165	147	5289	193	635	3988	5289	647
A	3.47	1361	16934	5357	561	143	119732	3865	270	28891	110	4907	174	535	4168	4907	647
A	3.46	1202	15873	5805	569	142	123099	3742	565	27462	128	6511	194	787	4003	6511	829
A	3.45	919	14260	5681	321	142	131726	3238	411	25877	134	5943	219	666	3732	5943	824
A	3.44	1047	13300	5788	430	131	93482	3379	175	25148	127	5639	127	715	4007	5639	766
A	3.43	1127	15206	5400	499	140	120994	3467	332	28055	112	6064	178	727	3550	6064	852
A	3.42	1486	18007	5321	419	142	116033	4065	534	30332	163	5389	175	710	3143	5389	648
A	3.41	1620	18859	5149	459	146	119626	4146	520	31964	142	5419	148	653	3295	5419	659
A	3.40	1333	17857	5073	484	142	120315	3897	341	32356	135	4413	139	507	4021	4413	584
A	3.39	1472	18627	5768	582	141	108321	4019	252	35426	173	5895	134	711	4623	5895	612
A	3.38	1533	19476	4954	586	145	116016	4648	510	35496	158	5273	180	722	3122	5273	739
A	3.37	1658	19412	5678	364	145	119797	4467	613	38053	144	4184	137	477	2769	4184	709
A	3.36	1372	18567	4775	327	145	116588	4012	466	40803	119	5312	202	695	3274	5312	781
A	3.35	1186	14210	4857	362	133	96887	3347	755	30986	181	5559	221	681	3249	5559	461
A	3.34	974	13685	5457	558	132	97162	3254	466	32123	158	5468	194	752	3420	5468	684
A	3.33	1259	16877	5496	350	139	104505	3949	357	35684	167	5507	182	640	3298	5507	751
A	3.32	1185	15791	5396	493	135	94315	3276	463	34105	135	5424	193	649	3231	5424	721
A	3.31	1118	15438	5679	548	135	98714	3733	786	30400	151	5355	203	685	3350	5355	915
A	3.30	1209	16727	4796	324	137	102238	3518	480	38816	200	5425	153	631	3522	5425	800
A	3.29	1187	16374	5190	638	138	100678	3713	505	34654	173	5877	187	713	3660	5877	747
A	3.28	1102	16712	5913	419	139	103161	4104	498	32294	176	5587	227	750	3492	5587	1023
A	3.27	1334	16851	5139	489	137	104206	3596	523	31123	132	6052	209	778	4089	6052	801
A	3.26	1228	17058	4590	468	141	107708	3733	533	31105	120	5490	217	729	4243	5490	545
A	3.25	1250	16667	5879	462	139	101683	3958	799	32527	160	6423	220	777	4486	6423	974
A	3.24	1122	16884	4259	361	140	104589	4192	653	29430	143	6712	230	841	4337	6712	841
A	3.23	1153	17133	5229	324	139	99821	4104	882	32089	135	6438	277	788	4129	6438	661
A	3.22	1482	18394	4689	635	140	100877	4419	527	32954	180	6530	230	937	4158	6530	1114
A	3.21	1431	19058	4105	329	141	100179	4416	746	31513	155	6652	142	858	4022	6652	1007
A	3.20	1392	18897	6935	540	140	102293	3831	708	32786	121	5808	219	812	4294	5808	762
A	3.19	1413	19130	5238	506	142	106642	4189	721	36198	171	6618	217	889	4230	6618	959
A	3.18	1456	20187	5131	371	144	106962	4249	916	36568	128	6869	204	954	4108	6869	723
A	3.17	1748	22551	5318	428	146	103363	5148	807	38144	195	7434	172	920	4223	7434	1372
A	3.16	1541	21488	5344	374	145	100941	5147	935	45941	143	6774	211	977	4371	6774	1090

A	3.15	1732	22424	5631	388	148	104035	5079	521	45970	162	6633	210	929	4014	6633	772
A	3.14	1764	23557	5850	144	151	116914	5195	756	39688	142	6354	188	883	4579	6354	880
A	3.13	1870	24052	5668	428	151	114659	5438	499	40508	186	6415	244	869	3945	6415	739
A	3.12	1825	24013	5885	383	151	112922	5298	633	38617	135	6209	181	790	5010	6209	743
A	3.11	2010	24246	5945	486	150	107828	5275	816	40584	187	6633	253	878	3884	6633	960
A	3.10	1958	24589	5761	405	152	109104	5253	1230	39477	157	6253	173	811	3930	6253	821
A	3.09	1817	24309	5908	223	150	109038	5241	1030	39265	181	6067	198	890	3825	6067	811
A	3.08	1906	25058	5940	439	153	111621	5314	923	41341	174	6109	195	913	4197	6109	986
A	3.07	2029	25114	5962	487	152	116780	5423	1704	38600	185	5931	226	818	5006	5931	917
A	3.06	1858	24772	6284	415	152	109735	5549	1064	40172	182	5084	218	671	3563	5084	666
A	3.05	1774	25026	5249	449	153	113679	5762	976	39885	170	5393	223	827	3616	5393	891
A	3.04	1967	24614	5648	463	152	108197	5486	890	40680	167	5707	235	867	4068	5707	774
A	3.03	1731	24270	5811	242	149	106181	5355	790	44271	128	5481	181	873	3927	5481	891
A	3.02	2094	24967	6230	323	150	106768	5152	1066	44435	171	5624	176	792	3768	5624	937
A	3.01	1910	24063	5857	387	151	108022	4961	1553	44058	141	5640	221	782	3888	5640	727
A	3.00	1925	24357	4991	256	152	105205	5517	1028	43404	141	5044	302	846	4235	5044	741
A	2.99	1841	25005	5774	557	150	104559	5768	883	47495	178	5318	200	718	3588	5318	837
A	2.98	1822	24025	5701	289	152	114656	5251	767	42493	145	5850	214	871	4147	5850	864
A	2.97	1819	23726	5740	447	152	107448	5543	1026	42662	162	5654	183	815	4243	5654	890
A	2.96	1921	24078	6530	300	151	101384	5749	983	44209	209	5097	252	866	4130	5097	867
A	2.95	1814	24751	5213	287	150	102322	5630	533	42551	158	5853	142	869	4146	5853	1031
A	2.94	1889	24913	5802	432	150	99782	5777	729	45979	170	5977	228	938	4186	5977	1040
A	2.93	1835	25069	5179	283	151	102039	5578	938	42913	191	6003	243	989	4048	6003	783
A	2.92	2249	25422	6161	398	152	102755	5808	907	41958	180	5056	232	707	3788	5056	853
A	2.91	1937	25251	6216	317	152	97814	5796	787	43470	127	5796	213	779	4072	5796	979
A	2.90	1574	19857	4648	600	141	83054	5124	791	35093	209	6161	188	894	3787	6161	1009
A	2.89	1418	18178	5265	432	140	70972	4713	653	38390	179	5861	187	825	4101	5861	1210
A	2.88	1594	20162	5878	525	140	75655	5084	594	38601	164	5477	201	803	3985	5477	818
A	2.87	1788	21903	5102	577	143	82834	5237	531	39500	140	5719	180	924	4040	5719	736
A	2.86	1899	23657	5544	551	146	87139	5835	637	43256	158	5701	194	856	4343	5701	782
A	2.85	1870	23271	5345	580	146	83843	5593	526	41627	164	6384	244	838	4166	6384	855
A	2.84	2016	23833	5576	431	148	90317	5630	716	41393	116	5996	165	913	4212	5996	1128
A	2.83	1575	20399	5791	341	143	81016	5081	654	38716	127	6464	233	1052	4324	6464	1224
A	2.82	1396	19233	5494	554	143	83290	5146	641	41050	192	6159	203	787	3884	6159	867

B	2.65	67	859	3990	462	-2389	43882	286	150	723	73	80	99	895	4338	6940	1257
B	2.64	75	5910	2776	0	-1476	702034	758	526	6823	67	158	598	911	4303	6213	842
B	2.63	0	6647	-2780	0	-1887	1126964	740	562	7639	64	145	762	862	4379	5919	768
B	2.62	-41	9007	-2292	0	-1584	1158574	865	1010	10343	127	166	813	832	4110	5494	904
B	2.61	921	21783	2504	0	-494	1017234	2750	1063	28212	128	240	818	895	4066	6094	1175
B	2.60	892	19429	-300	0	-1368	1092270	1732	1096	19883	153	231	716	941	4062	5516	833
B	2.59	1784	28431	1884	0	427	973726	3064	1552	28342	163	226	705	907	4184	5778	962
B	2.58	3986	52427	4022	0	5138	655940	9612	1266	80791	218	550	487	815	4650	6126	916
B	2.57	4639	59830	4529	0	7243	528064	13138	939	100229	194	667	419	914	5390	6074	966
B	2.56	5813	70996	5884	0	9303	515340	14267	1286	128251	265	811	449	877	4947	6245	908
B	2.55	5693	72868	4477	0	8945	484315	14637	1379	132387	238	700	388	875	5484	5857	855
B	2.54	6429	80487	6133	0	10555	505552	14812	1479	141550	166	803	477	627	7428	5312	594
B	2.53	6043	80106	5521	0	10886	482837	15712	2102	136874	256	770	462	891	7239	5580	634
B	2.52	6512	81985	5712	0	10873	501505	15159	2044	166252	255	782	492	713	6697	4998	722
B	2.51	6316	83505	5096	0	10481	507821	15873	1813	169347	293	802	490	775	4095	5195	736
B	2.50	5950	80443	5474	0	10312	513873	15671	2143	153122	244	793	509	583	4956	3693	588
B	2.49	4785	64402	5165	0	7895	594985	12235	2861	106609	247	672	522	810	4091	5860	933
B	2.48	5610	78236	5846	0	10523	520449	15594	2722	132755	224	731	617	818	4192	6397	1021
B	2.47	6202	85964	6400	0	11033	464272	17128	2701	184056	308	815	585	644	5761	4603	799
B	2.46	6709	91657	4762	0	12186	451298	18212	3483	154878	307	897	538	919	4333	6175	1059
B	2.45	7253	92669	7682	0	12998	449403	18307	2774	147019	317	941	573	645	3442	4849	680
B	2.44	5000	73198	10674	0	10126	369754	16313	2955	143880	284	813	435	1901	18424	15810	1256
B	2.43	6176	86556	6814	48	12238	424464	17177	5180	133942	277	770	518	2044	18601	16519	1522
B	2.42	5129	73462	23861	0	10006	373798	15641	5229	119061	200	744	424	1790	17900	15858	1528
B	2.41	6464	81675	7036	0	11646	348056	18050	2703	131510	348	906	493	1864	17170	15779	1476
B	2.40	6788	86649	7170	0	12854	363758	18355	2346	155359	252	841	534	1948	16825	16146	1895
B	2.39	6053	83683	7059	0	12453	382492	18320	2271	139353	256	782	480	1915	17612	15707	1633
B	2.38	6424	82133	7366	316	12415	375150	17451	3324	142216	259	807	492	1846	16958	15655	1492
B	2.37	4383	62516	6522	116	9724	291401	14753	2375	130826	273	743	505	1802	13446	12794	1360
B	2.36	3554	49706	5826	230	7719	252408	14117	1858	121410	233	633	390	1518	12227	11694	1309
B	2.35	2282	37889	7458	452	6432	225587	12839	1456	124476	255	664	432	1740	12018	11788	1170
B	2.34	3428	47837	8827	771	8338	261134	16180	1818	161501	204	820	485	1837	13333	14363	1778
B	2.33	2908	44883	7858	1034	9562	285767	17997	2456	149961	230	798	586	2043	14968	15832	1560
B	2.32	3442	52297	6956	1134	9586	305523	18574	2759	159736	248	855	498	1896	15321	15429	1676

B	2.31	5188	67890	6625	772	10695	315971	18120	3232	151612	184	722	543	1723	14379	14648	1503
B	2.30	5238	70301	7093	391	10883	309999	17108	2949	164923	196	746	456	1670	12953	13116	1624
B	2.29	5737	72933	7292	502	10929	299725	18021	2092	154036	274	722	451	1817	13201	14474	1407
B	2.28	6171	75178	7213	415	12093	310921	18602	2816	139450	290	771	476	1821	14202	14911	1582
B	2.27	5877	74249	6481	305	11328	334721	17827	4582	144231	279	720	484	1800	13850	14079	1390
B	2.26	6354	78286	6879	342	11821	314434	18891	2421	158145	269	799	533	1857	13416	15364	1534
B	2.25	6128	76296	17383	329	11387	306902	19652	2207	174970	191	718	489	1834	13363	14892	1685
B	2.24	5927	76089	13830	387	11232	299338	19460	2244	163357	245	823	472	1884	13343	14927	1505
B	2.23	6566	81307	8041	435	12171	312052	20651	2290	159142	293	806	484	2019	13566	15800	1749
B	2.22	6175	79285	7927	177	11978	288589	20577	1908	168054	245	823	495	1902	12887	15629	1970
B	2.21	6243	79193	9998	441	12295	293171	21303	2403	166504	237	796	522	2009	12991	15930	1538
B	2.20	6306	79907	7947	909	12078	292750	20865	2357	163668	265	752	399	2028	12602	15894	1784
B	2.19	7075	86173	6942	493	12978	298418	21557	2405	173065	281	845	476	2061	13046	17249	1889
B	2.18	7606	92058	7641	548	13575	310553	23582	2726	189999	287	854	544	1985	13455	17858	1868
B	2.17	6568	79834	6184	-63	11067	329921	20712	6965	202427	285	738	483	1985	13083	17608	1626
B	2.16	6828	86451	9705	349	12957	313761	23066	3893	203176	314	840	574	2094	13983	18226	1819
B	2.15	7008	84651	7115	159	12548	283191	22825	2721	198154	268	842	513	2178	12538	17409	1888
B	2.14	7148	84195	7537	430	12899	273654	22578	2418	183873	243	880	538	2177	12868	17350	1706
B	2.13	6337	77176	6792	335	11818	271789	22398	3314	185654	277	868	427	2064	13353	17272	1658
B	2.12	4571	57889	7006	843	8065	220108	17553	3757	143260	300	786	457	1973	13090	15960	1562
B	2.11	7047	85118	7877	5	11931	327311	25109	5156	190263	288	898	593	2508	14431	19574	1867
B	2.10	6951	88318	9013	0	12800	302534	24552	2883	190191	349	845	598	2375	13231	19077	1801
B	2.09	6990	82515	8019	92	12512	275777	22927	2611	185620	259	847	536	2013	11950	17270	1648
B	2.08	7130	81773	8740	714	11611	263257	22575	2684	167114	293	897	428	2024	12238	17056	1801
B	2.07	5874	72917	7673	51	10875	252697	21515	2838	165433	236	874	470	2038	12018	17262	1945
B	2.06	6272	74074	7312	0	10449	316975	21482	5320	176844	279	807	473	1994	13674	16364	1747
B	2.05	7240	87378	9004	0	12454	334849	25331	5862	222745	359	903	609	2339	13976	21302	1947
B	2.04	5879	67373	7463	593	9929	260267	19881	5151	161699	301	781	459	1846	11714	16105	1564
B	2.03	4375	56246	13123	527	7970	228416	18102	4498	140560	305	748	394	1756	9996	14475	1798
B	2.02	4565	56662	9567	728	8379	215139	18844	3600	144307	345	751	446	1895	10459	15512	1235
B	2.01	5778	66527	8523	1105	10663	239226	24925	4543	161147	219	847	474	2130	15988	18987	2123
B	2.00	6030	76417	9169	720	12758	274430	25205	4766	176128	321	898	516	2438	13318	20414	2226
B	1.99	4948	64245	11276	285	9902	232592	22469	3524	156060	279	908	496	2399	11900	18353	1553
B	1.98	5236	62984	8885	443	9611	210562	21055	2966	157823	218	718	463	1833	9882	16132	1668

B	1.97	3698	48277	7354	658	7012	207658	17519	3774	143766	187	693	430	1759	10582	14523	1686
B	1.96	3556	45456	6553	1486	6395	212018	16198	3881	121718	220	735	426	1974	13202	16347	1749
B	1.95	6791	84079	11156	272	13012	267279	25369	3149	186636	231	862	462	2585	12827	20043	2327
B	1.94	6660	81276	10067	140	12742	265468	24124	2994	178531	311	771	486	2146	11562	18324	1755
B	1.93	6309	74646	9021	190	11601	249072	23049	3550	162519	183	770	432	1855	10618	16513	1890
B	1.92	6202	77941	10238	340	11749	243266	23453	3943	189420	317	840	455	2032	10263	17202	2202
B	1.91	7167	83941	9617	603	12846	241773	24923	3883	186721	309	887	485	2091	10659	18001	1869
B	1.90	5705	69760	36168	968	12027	246784	23890	6147	202241	277	800	496	2096	11153	17639	1686
B	1.89	5338	65871	11173	1231	12691	244154	24878	6214	212161	332	816	521	2235	11547	18952	1983
B	1.88	4965	61243	12276	1145	11881	230441	23528	5138	195784	234	841	456	2083	11540	18201	1803
B	1.87	5013	64082	16856	974	11879	243050	24738	5382	206524	312	874	477	2321	12296	19639	2056
B	1.86	4120	51640	25029	318	9308	226681	21750	6129	168375	300	905	445	2370	12088	17935	1624
B	1.85	5458	66836	11280	440	12382	248381	27582	4374	216811	317	1008	549	2712	12887	21301	2391
B	1.84	5305	64870	13645	540	12130	266088	26260	5232	206110	364	956	553	2495	12626	19464	2110
B	1.83	6693	79166	10698	420	14205	241819	28258	2484	209370	395	999	584	2491	12499	20537	2185
B	1.82	7616	85824	10735	291	14683	209785	27873	1670	179272	278	956	428	2614	11675	19807	1948
B	1.81	7688	83231	15211	322	12432	233070	24110	1906	164898	251	907	563	2150	11317	17178	1716
B	1.80	5818	66098	8707	527	9084	253838	18810	2612	150380	290	725	429	1941	10669	14149	1659
B	1.79	6159	71855	9311	352	10779	214447	22036	1774	175281	261	752	484	2005	9815	15437	1781
B	1.78	6122	71884	8894	562	11295	194359	22916	1742	193507	300	679	436	1946	9710	15215	1887
B	1.77	4723	58201	6279	227	8428	196125	21062	1942	163374	264	736	390	1807	9409	13860	1351
B	1.76	1980	26909	4722	110	2120	171240	10019	1853	82734	204	598	329	1303	8488	10206	1125
B	1.75	4025	50803	6331	122	7280	199028	18063	1706	148937	226	685	370	1782	8815	13059	1362
B	1.74	2982	39702	8354	279	5936	171804	16168	1643	135963	180	665	321	1501	8089	10892	1369
B	1.73	2935	38257	10015	506	6266	152391	17952	1626	145344	248	714	382	1639	8424	13162	1636
B	1.72	4538	54803	13109	201	10309	199330	24535	2010	219286	383	864	457	2185	11184	17837	1917
B	1.71	3940	50768	13550	612	10921	207159	25748	1655	234917	251	918	483	2486	12156	19483	2051
B	1.70	4211	53025	12886	640	11678	186003	26974	1819	267819	281	937	453	2602	11647	19526	2135
B	1.69	3559	47273	18796	1303	11906	154229	27807	2074	277327	218	918	581	2555	10611	20443	2237
B	1.68	5345	63525	15378	1085	13694	165519	30022	1343	268886	269	924	551	2618	10975	20167	2055
B	1.67	5328	64927	15293	1238	14462	182513	29081	1564	245122	277	984	488	2611	12748	20500	1944
B	1.66	5899	71718	13497	1013	14866	187601	28144	1454	261010	263	916	497	2602	11293	19963	1652
B	1.65	7020	81492	12931	710	15231	175446	28932	1406	237519	451	1021	553	2707	11327	20404	2439
B	1.64	7309	82081	12173	771	14624	191453	28048	1388	219555	305	955	516	2581	11236	18939	2004

B	1.63	5173	65786	14570	1311	13349	188612	25800	1263	199790	286	896	485	2435	11479	18532	1934
B	1.62	4624	59303	13743	761	12391	193457	25065	1328	181845	314	892	530	2436	11248	17285	1806
B	1.61	4048	54714	14089	1036	12385	162898	24338	1120	190825	318	847	492	2233	10665	16842	1378
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B	1.55	5738	71597	15365	892	14493	187286	27684	946	213595	329	1000	477	2761	11731	19454	2054
B	1.54	6178	72173	14054	972	14698	161184	28567	1585	217931	317	984	576	2734	11458	19835	2038
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B	1.51	8388	94347	11436	705	15891	191751	28347	1287	222119	229	963	546	2533	13423	18688	1990
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B	1.49	8992	96600	10592	635	15465	199799	28337	1398	227106	388	1017	565	2525	12475	19219	1897
B	1.48	8682	98069	11139	478	14978	214693	27882	1366	214659	304	920	518	2680	14038	18261	2146
B	1.47	9054	95194	10191	761	14348	224203	28078	1117	212477	259	1003	584	2709	15627	17596	1867
B	1.46	9154	97320	11875	421	15129	195947	28656	1159	230139	325	1071	566	2425	12061	18712	2194
B	1.45	8855	97392	11107	445	15916	179195	29344	1061	225543	401	1057	507	2727	11782	19382	2332
B	1.44	9143	97263	14842	481	16002	192387	29143	1247	230780	346	1033	475	2588	12539	18161	2056
B	1.43	9387	98555	12876	512	16272	185562	30161	1139	240467	364	1066	604	2785	11417	19322	2189
B	1.42	9290	98602	11343	268	16072	185225	29219	1413	242812	388	1111	484	2644	12291	18386	1833
B	1.41	8572	91580	11166	611	14011	199845	27534	1269	268693	232	918	454	2380	11416	16461	2087
B	1.40	8851	91331	11081	482	13807	185193	28701	1422	297064	304	1068	470	2600	10843	17218	1792
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B	1.37	8428	90549	11403	289	13709	189420	28433	1575	286382	252	986	498	2406	10946	16907	1836
B	1.36	8834	90340	11049	690	13614	181573	27890	1361	249287	293	992	512	2519	11474	16324	1982
B	1.35	8864	90680	11835	852	13800	181229	28093	1420	234373	304	1089	530	2520	12655	15862	1825
B	1.34	7114	75387	10662	677	11345	164369	25349	886	190321	355	1008	471	2253	11703	15021	1785
B	1.33	5179	58278	8228	705	8313	190719	19598	1174	169806	314	909	451	1726	10307	11383	1293
B	1.32	5934	62015	8204	245	9078	161978	21305	981	200410	206	815	436	1872	9344	11992	1618
B	1.31	4112	47876	7044	242	5722	140068	17951	968	170145	229	814	395	1752	8872	10698	1532
B	1.30	5067	57690	9300	475	7578	161290	21190	1164	213905	289	894	431	1925	9696	12525	1627

B	1.29	4313	55215	7575	460	7183	165645	21897	909	189441	323	837	400	1899	10759	13001	1696
B	1.28	4322	51648	6595	466	6703	164806	21851	963	177512	298	903	347	2009	10640	13563	1755
B	1.27	5647	63261	9754	459	8003	192677	21623	708	170742	300	728	393	1925	10635	13368	1640
B	1.26	5888	66259	8511	733	8609	172371	21622	953	179986	286	863	332	2101	10287	13253	1651
B	1.25	5687	65473	9576	836	8382	200902	19568	740	167072	278	791	362	1888	11059	12188	1624
B	1.24	7380	77991	8962	1001	10927	183554	24252	1088	194076	281	906	444	2172	10987	14923	1910
B	1.23	7588	84468	9234	2081	11616	195327	24694	817	198405	209	857	460	2160	12153	15879	1795
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C	1.15	762	11263	10170	315	559	161436	2572	718	20419	158	285	265	453	10645	3934	573
C	1.14	1449	18562	5136	366	1869	98837	4761	919	34088	162	342	165	605	5639	4641	564
C	1.13	1451	17935	5878	430	2179	87494	4884	690	34526	131	380	191	687	5235	4871	857
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C	1.10	1377	15540	5069	546	1612	65002	4656	601	30785	153	317	221	634	4075	4601	998
C	1.09	881	12323	4970	346	1351	52293	4504	569	32149	159	313	131	579	3029	3915	729
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C	1.06	1417	15548	5626	503	1554	75571	4777	601	39340	151	319	196	563	6814	4480	681
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C	1.04	1419	17443	5372	524	1790	77148	5146	928	41099	108	338	215	545	4748	5099	607
C	1.03	1905	20812	5758	623	2419	66075	6223	1324	55029	218	400	177	598	3686	5495	847
C	1.02	1972	21050	5056	455	2674	57942	6710	893	53271	131	371	202	711	3997	5667	717
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C	0.76	286	4467	4637	292	-238	238682	1176	711	9977	101	215	380	154	25639	2040	293
C	0.75	492	8500	5082	463	16	214539	1408	467	12788	121	213	387	279	22402	2318	598
C	0.74	544	7398	5021	261	215	115260	2022	415	21430	102	255	315	440	14921	3573	363
C	0.73	795	11127	4889	749	460	164452	2390	517	23039	141	224	317	524	15627	3628	446
C	0.72	1448	17509	6488	702	1735	42690	6595	310	51768	135	350	137	894	4094	6344	767
C	0.71	1755	17250	5666	793	1937	39969	6061	367	48906	124	339	208	820	4497	6240	872
C	0.70	1289	15153	5551	637	1424	35774	6046	459	51872	175	321	191	770	3694	6069	718
C	0.69	1923	20663	6223	803	2090	44342	6947	471	53237	155	344	155	834	3658	5719	1031
C	0.68	1692	19051	5848	607	2663	42932	7447	509	55779	131	388	235	808	3957	6127	1258
C	0.67	1251	15189	5274	568	1070	38068	4907	778	41039	161	329	166	786	3998	5484	848

C	0.66	1495	14516	5419	575	1305	27528	5529	1273	54962	157	391	189	862	3344	6082	1017
C	0.65	1066	12601	5927	790	1642	25138	6295	1104	53584	151	376	162	979	3490	5841	899
C	0.64	1279	14770	6241	744	2224	27289	6450	540	50582	144	357	153	869	3443	5804	691
C	0.63	1336	14946	5751	670	2154	23873	6519	762	49205	218	423	195	914	3345	6128	857
C	0.62	1366	16555	5727	710	2324	23348	6131	374	46698	141	365	153	874	3172	5185	703
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C	0.59	1853	21438	6397	588	2842	40080	8330	1078	64710	199	449	191	984	3869	6399	1283
C	0.58	1592	18615	6699	479	1995	67320	6529	671	59487	152	381	180	772	5211	5338	633
C	0.57	1451	15233	6350	741	1767	49744	5804	684	57228	147	367	210	799	4137	5123	791
C	0.56	1362	16683	6219	611	2100	37640	6426	547	64268	159	402	195	892	3125	5618	923
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C	0.53	1465	16871	6348	913	2803	14558	7732	533	69006	162	441	246	994	3003	5684	933
C	0.52	1298	15577	5685	862	2983	9990	7373	445	75173	193	492	246	932	2654	5420	838
C	0.51	989	10803	5807	533	1337	9867	6282	258	58352	175	422	211	995	2870	5609	707
C	0.50	1497	16119	5978	670	1955	19627	6523	332	67370	184	454	230	860	3797	5095	946
C	0.49	697	9442	6403	609	1070	16336	4653	278	52037	181	406	262	1024	3275	5349	778
C	0.48	1159	13916	5441	620	1877	13846	6206	210	57894	144	376	234	1029	3364	4964	930
C	0.47	1703	20039	5858	711	3218	17321	7534	190	59998	154	425	174	907	2655	4968	749
C	0.46	722	8837	6961	552	1013	13758	4223	190	39032	125	372	168	564	2173	3833	691
C	0.29	2417	25989	8101	399	3898	22400	9146	345	70812	227	441	259	1063	3811	6436	867
C	0.28	2380	26213	7185	598	4503	25139	9094	649	79958	155	535	232	1046	3502	6182	937
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C	0.26	2370	25000	7028	690	3913	22924	8496	495	73819	195	484	273	971	3562	5981	873
C	0.25	2358	24731	6758	536	3700	22979	8333	481	74755	159	456	247	1008	3648	6261	920
C	0.24	2058	22300	6454	681	3229	28005	8080	288	66944	128	464	322	987	3744	5803	960
C	0.23	2222	23001	6601	719	3455	33769	7678	291	66194	170	431	270	998	3775	6019	678
C	0.22	2123	23154	7042	744	3251	43182	7345	326	58789	183	426	287	855	4357	5902	896
C	0.21	2183	22714	6513	1047	3199	38769	7432	372	57846	159	411	269	927	3868	5614	855
C	0.20	2229	22920	6721	747	3267	44704	7159	440	56892	136	372	258	799	4197	5488	1053
C	0.19	2115	22367	7708	783	3321	33313	7597	508	58240	198	435	242	940	3663	6275	1086
C	0.18	2010	24305	6887	661	3329	46811	7512	614	55116	164	421	206	808	4611	5792	949
C	0.17	1468	16639	5979	450	1454	97505	4678	546	44183	142	291	194	536	5573	3880	763

C	0.16	1854	20942	6909	566	2901	64210	6684	363	55936	183	399	193	888	4343	6089	746
C	0.15	1092	13607	5785	574	1629	58990	4736	425	42037	128	306	223	677	4052	5292	916
C	0.14	456	6899	4519	603	253	32678	3221	345	24612	110	257	162	405	2245	2929	510
C	0.13	1207	14301	6341	676	1583	41323	5119	312	40303	133	322	143	605	3115	4140	787
C	0.12	1460	17160	5558	431	2120	49503	6120	270	50741	156	380	195	585	3580	4589	626
C	0.11	1242	13236	5775	801	1198	64380	4307	504	52131	158	350	183	459	4153	4009	631
C	0.10	1389	16623	6653	454	1651	70598	5459	486	59854	159	323	204	677	4634	5202	830
C	0.09	1831	20643	6332	452	2449	61900	6720	516	57752	182	363	251	795	4323	5548	735
C	0.08	1864	22244	6628	392	2794	57698	7203	159	52775	127	400	269	793	4155	5562	607
C	0.07	2064	23365	6961	509	3344	61972	7405	530	56785	134	372	254	826	4499	5983	727
C	0.06	1831	20516	6951	343	2321	88784	6251	403	50351	165	315	226	726	5093	5646	782
C	0.05	2310	23902	6438	391	3036	60641	7438	544	59990	123	378	245	897	4740	6133	760
C	0.04	2138	23545	6731	532	2991	58941	7768	327	58630	143	390	232	907	4270	6487	754
C	0.03	2410	26086	7160	472	3318	57720	7634	643	59504	129	373	211	988	4485	6279	981
C	0.02	2264	23640	6769	460	3143	70717	6786	534	59420	156	357	176	839	4530	6182	851
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C	-0.02	2314	24076	7148	469	2845	68585	7113	312	59862	167	373	198	816	4734	6266	955
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C	-0.16	1283	15718	7685	582	1729	59155	6168	624	59319	298	485	173	824	4070	5660	821
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C	-0.18	1759	19464	9355	672	2627	52340	7325	424	57962	231	413	158	827	3980	5969	579
C	-0.19	1952	20911	7254	471	2584	54298	6803	399	58970	159	387	201	826	4141	5885	873
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C	-0.22	1650	17743	6809	713	2144	56480	6541	583	41396	157	281	157	751	5359	4761	650
C	-0.23	1527	16433	6054	574	1944	45237	5683	255	42331	143	355	183	671	3199	4830	673
C	-0.24	1471	16022	8053	390	1821	42823	5910	148	43819	165	284	148	639	3233	4779	912
C	-0.25	1909	21199	6780	811	2602	59817	6825	526	54138	116	358	168	825	4369	6030	845
C	-0.26	1705	19610	5630	921	2237	62763	6434	545	48954	204	404	227	811	4083	5800	863
C	-0.27	2016	22238	7339	696	3246	55132	7355	228	55517	124	352	158	788	4016	5746	737
C	-0.28	1726	18985	6464	485	2414	50739	6578	437	58569	258	391	176	752	3635	5118	936

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C	-0.30	44	1378	3062	489	-541	5813	1040	96	6582	128	159	120	181	804	1209	473
D	-0.35	1184	17288	9137	0	-1563	192345	4650	627	42462	149	369	625	638	17228	5036	722
D	-0.36	6753	84658	9821	21	12336	352028	21379	3286	189563	278	923	623	2221	16744	16930	2115
D	-0.37	4608	59702	8044	349	8244	270987	16972	2704	134741	197	684	465	1678	12439	12795	1358
D	-0.38	2803	35439	5742	319	3850	188100	12194	2510	97442	192	524	380	1184	8772	9033	890
D	-0.39	1461	21268	3555	197	921	112692	8516	1413	68836	130	390	238	834	5680	6263	763
D	-0.40	2313	30157	4116	211	2970	139122	10913	1941	83211	156	418	269	958	6268	7489	908
D	-0.41	5419	60133	7776	203	8635	228735	18648	2798	147791	208	728	440	1639	10695	12941	1238
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D	-0.43	5198	59697	7490	580	7413	267235	15034	2141	120481	268	641	532	1357	17455	12190	1204
D	-0.44	4067	49512	6088	494	5553	253165	12673	1482	95530	185	468	478	1212	19076	10182	917
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D	-0.48	8998	99301	8888	0	14021	360301	25950	2270	180207	407	956	694	2378	21587	18636	1886
D	-0.49	9129	100645	8218	48	14250	344087	26727	2248	197482	341	1016	733	2542	21629	18972	1847
D	-0.50	8995	98018	8675	0	14754	275225	28133	1994	222109	368	1024	614	2513	16940	18880	1996
D	-0.51	7881	88828	9036	375	14123	233989	26458	1688	228787	404	999	415	2498	13040	18283	1723
D	-0.52	9240	98901	9238	577	16339	231884	28772	1502	231602	342	1008	491	2557	13701	19969	1996
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D	-0.54	10085	103470	11443	506	16243	223834	29814	1801	239170	318	1037	514	2686	13065	20028	2306
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D	-0.56	9692	100497	8559	344	14405	238538	29730	1383	246130	410	1167	560	2841	16196	17569	2159
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D	-0.58	8802	94277	9161	314	13102	315714	26211	1603	219335	369	1120	570	2661	18194	17811	1777
D	-0.59	9872	100558	10326	489	14883	224648	29963	1293	236318	323	1086	518	2698	16399	17568	2000
D	-0.60	9384	100759	8938	53	14698	234047	27853	1338	228610	380	1123	548	2548	14156	17390	2030
D	-0.61	9479	101513	8968	0	15995	232572	28590	1298	220556	348	1105	539	2837	13590	18487	2424
D	-0.62	9396	99533	8884	145	16035	234286	28518	1592	230753	369	1078	567	2641	13676	19352	2097
D	-0.63	7888	91036	7990	0	13111	392272	21655	2508	193204	291	923	644	2297	19396	16315	1410
D	-0.64	7182	90285	8065	0	11551	519383	17329	2351	138166	266	854	840	1966	33099	14767	1813
D	-0.65	6632	84961	8154	0	10009	600115	15200	2132	127467	238	757	822	1591	36732	13950	1415
D	-0.66	5564	73330	6936	0	7339	723639	11423	1892	98689	212	592	1128	1286	55334	11005	1007

D	-0.67	3651	52793	5974	0	4163	771916	7741	1402	68990	179	420	1013	1010	66902	8094	757
D	-0.68	4062	52764	6550	178	4384	682830	9259	1334	81901	149	451	944	1093	62869	8736	831
D	-0.69	4806	57465	6343	257	5506	547009	13080	1333	115868	292	688	857	1502	52897	10385	839
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D	-0.71	7394	81561	9700	1029	11700	276585	23416	1278	218397	395	1123	609	2860	24275	16128	1664
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F	-4.03	10465	109744	11458	1935	16195	133977	32779	676	185993	340	1235	418	2656	13016	25771	2093
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F	-4.06	9734	99856	11171	3097	16154	130562	31950	1028	206511	330	1272	563	3067	12148	19165	2286
F	-4.07	9960	100554	10471	2290	16181	127340	33467	958	209566	362	1279	517	3276	13060	18404	2509
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F	-4.10	10514	102816	10502	1576	16490	115477	34272	1104	218297	404	1423	570	3336	12655	18896	2276
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F	-4.43	3244	37352	8089	8049	5335	24623	16691	1120	122218	241	810	2999	1961	8393	10248	1681
F	-4.44	3116	37431	92752	7715	4521	34852	13467	521	96242	168	1457	1789	1365	5431	6985	1288
G	-4.85	6573	78849	27603	1582	10675	433039	18142	2152	141144	223	850	844	1662	33292	14093	1303
G	-4.86	6781	82401	13256	590	11245	460913	19079	2365	148429	266	772	775	1905	36497	13878	1194
G	-4.87	7281	86306	9384	713	12138	434403	21012	1533	169089	276	817	788	1983	31823	14049	1433
G	-4.88	8193	90660	9984	946	13501	316070	24604	1860	195734	309	944	542	2272	19896	17300	1965
G	-4.89	8255	91191	10729	884	14014	311990	25283	1681	203053	306	911	628	2158	21732	15886	1394
G	-4.90	8717	90284	9409	906	13033	294779	24597	1610	197708	285	934	654	2435	19525	16176	2089
G	-4.91	9010	95453	9071	924	13203	254010	26642	1440	207201	334	982	519	2570	16240	17382	1850
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G	-4.94	9606	101014	9997	1604	14579	269217	27495	1592	211259	350	1011	611	2556	20575	18769	2048
G	-4.95	8775	93500	9878	355	15003	266913	27735	2604	210941	287	903	522	2848	14271	19903	1951

G	-4.96	8354	89385	10692	230	14414	270807	26195	2537	218036	361	789	513	2260	13553	17707	1955
G	-4.97	7714	85549	10521	609	14212	267389	25536	1973	191075	299	962	672	2293	21097	16692	1582
G	-4.98	8105	85762	10629	1630	13961	259624	24497	1526	173720	391	940	1102	2620	20820	16210	1931
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G	-5.02	9304	97866	10345	3268	17800	157766	32000	1288	196860	396	1282	591	2950	13113	18635	2388
G	-5.03	10091	101574	11168	4137	18061	165823	32737	1536	214025	364	1295	664	2987	14065	18517	2100
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G	-5.12	5314	58808	10152	3970	9975	112733	22347	991	148566	294	844	446	1797	9002	11130	1541
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G	-5.14	6580	70147	7907	2784	12979	122166	25324	1030	156940	299	980	495	2332	10132	12784	1721
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G	-5.16	7372	75841	9118	2877	13263	132366	26476	1101	171880	340	1009	433	2536	11447	14671	2200
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G	-5.18	7284	75175	8615	4117	13564	107759	26035	883	177306	323	1114	526	2452	9964	13421	1964
G	-5.19	7267	78723	7980	4464	14387	103551	27116	1099	185392	336	1089	543	2536	10048	14046	1730
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G	-5.55	8515	83064	9436	2794	15705	179583	27491	1832	185370	364	1267	407	2956	13138	15102	1900
G	-5.56	8126	80390	8064	1976	15782	188076	25322	2783	174785	319	1065	465	2802	13206	15483	1989
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H	-6.36	5203	64190	15475	835	9955	284852	19793	2619	157044	311	771	592	1806	17575	14671	1617

H	-6.37	5442	65290	8320	438	10448	247041	21579	2515	170163	295	774	517	2020	13596	15611	1781
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H	-6.39	2208	27310	5863	746	3047	94322	11221	468	78711	213	585	323	1310	10713	7709	1054
H	-6.40	1300	17698	4014	493	1252	64868	8906	483	64084	147	478	229	891	6940	5702	1019
H	-6.41	1403	19047	4022	242	926	77532	9952	525	75761	189	443	239	998	6796	5818	883
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H	-6.46	7278	80079	31078	987	12962	258470	23415	2031	183559	302	809	555	2416	19304	16691	1696
H	-6.47	8882	91570	10054	3275	15556	173365	29647	1286	208155	382	1097	632	2894	18029	17418	2197
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H	-6.52	3729	43668	6126	2580	7423	78473	19078	794	133057	257	883	465	1702	8353	9541	1525
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H	-6.56	3481	41374	6165	4035	7261	45871	20165	1010	118213	246	903	499	1943	8166	11006	1415
H	-6.57	3560	39392	10645	2493	6980	48088	18348	928	119129	236	882	532	1890	7604	10035	1588
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H	-6.59	8561	83523	11682	4701	14952	107317	29326	1186	189231	432	1265	653	2845	12299	15091	1955
H	-6.60	8589	89379	10496	4778	15414	127332	31311	1492	190298	442	1415	746	3104	12572	16218	2294
H	-6.61	9078	92614	9483	5577	16058	106675	33693	1124	212111	454	1365	826	3164	12436	17142	2575
H	-6.62	9257	93691	9380	5369	16689	95851	34650	1245	217798	393	1448	870	3395	12515	16647	2177
H	-6.63	8667	83672	9219	5475	14907	87589	32024	1333	204282	411	1441	878	3205	11761	15452	2221
H	-6.64	7354	76312	9056	4511	14291	77924	29316	1306	191601	385	1222	820	2749	10421	14414	2102
H	-6.65	6844	68046	8239	3641	12569	85327	26815	1038	175029	303	1127	616	2628	10240	13672	2059
H	-6.66	6353	68106	8715	4325	11675	116172	27096	1207	170824	288	1258	712	2770	10222	13823	2090
H	-6.67	6179	67389	8993	3595	12468	87394	25493	1384	178635	302	1209	680	2547	9562	12684	1943
H	-6.68	6725	68337	8380	4534	12140	79754	25999	1878	188597	316	1104	772	2467	10470	13379	1970
H	-6.69	7076	72286	9176	5163	14123	66501	26613	1649	197612	326	1110	598	2467	10504	13582	1759
H	-6.70	7646	76519	8898	5492	14774	58005	28546	1706	203266	351	1162	688	2795	9891	14343	2145

H	-6.71	4561	47348	7430	3468	8442	47631	19527	815	141227	267	935	597	2078	7957	11129	1741
H	-6.72	6910	68966	8822	4177	12857	57264	25382	1575	180114	308	1088	610	2428	9082	13375	2113
H	-6.73	8081	82938	10826	5174	15082	85167	29243	1580	211134	334	1286	765	2921	10924	15311	1882
H	-6.74	5349	58118	7739	3273	10623	60581	24025	1040	169025	242	1030	567	2261	9547	11912	1724
H	-6.75	3662	40074	5784	2837	7360	50261	18868	707	131864	303	821	518	1790	7323	9562	1484
H	-6.76	2775	34944	5429	2370	5785	40914	16863	737	121620	294	750	436	1563	6628	9066	1261
H	-6.77	2769	31474	5030	1812	4285	52346	14772	522	103865	187	701	377	1470	6065	8002	1272
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H	-6.79	3538	41220	6206	3465	6359	77212	18457	1026	126300	249	799	563	1666	8317	9530	1575
H	-6.80	3799	42726	6640	5792	6312	63822	18834	1135	134410	245	742	996	1683	8020	10478	1716
H	-6.81	3363	40757	7091	6436	6580	39361	17637	1013	135036	268	739	1828	1672	7538	9650	1431
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H	-6.84	3619	41943	6132	3525	7099	62431	18693	900	139989	227	849	723	1988	8923	10655	1413
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H	-6.86	5443	58783	7125	4869	10352	78732	24340	1129	162178	289	1015	886	2518	10156	13120	2106
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H	-6.89	6887	74954	7369	4027	14492	118069	26734	2221	185070	412	1188	597	2753	13472	14975	1877
H	-6.90	7709	81371	8099	2860	14118	161910	26971	2210	177074	417	1167	503	2821	13556	15851	1878
H	-6.91	8255	91464	7289	4742	14773	150259	29752	1977	195376	394	1210	734	2857	14739	18018	2103
H	-6.92	8775	92952	7464	3670	15513	164662	29618	1689	207153	411	1316	778	2898	14644	17764	2071
H	-6.93	8673	93388	8013	6446	15620	150391	30586	1940	222979	320	1200	753	3163	15362	17133	2111
H	-6.94	8611	89477	7287	7026	15805	128702	30676	1573	214202	372	1269	927	2926	14408	17443	2478
H	-6.95	7488	78573	9304	9690	14316	102448	29619	1565	217052	326	1239	1184	3003	13333	16530	1991
H	-6.96	7314	75428	8547	10104	14023	108695	27988	1749	203726	363	1105	1237	2916	13268	18999	2180
H	-6.97	7227	76520	8108	12194	14102	124300	27894	1575	214071	320	1165	1087	2766	13615	17104	2216
H	-6.98	6241	68748	8365	11439	11542	131901	24335	1506	186511	309	1182	1142	2526	14176	17665	2047
H	-6.99	6924	75136	9006	10332	12469	133125	26648	1457	191447	354	1069	1125	2510	14205	18224	2011
H	-7.00	6119	67948	10475	9721	11448	118824	24333	1429	178118	329	1051	1380	2376	14602	16443	1651
H	-7.01	6374	67680	7329	11112	11069	122910	24729	1556	180071	325	1093	1455	2595	14383	17918	2231
H	-7.02	5997	66530	6699	10549	11752	96034	24393	1336	190135	313	1067	2342	2597	11921	14963	2214
H	-7.03	6211	64750	6883	10915	11948	64406	25697	1851	194468	295	1141	1769	2791	11846	15700	2254
H	-7.04	5080	53299	7505	13634	9602	36767	23652	1496	202897	397	1156	2766	2674	11680	13496	2098

H	-7.05	4684	49769	6356	13444	9591	33933	22548	1266	192362	409	1327	2252	2684	10871	13657	2085
H	-7.06	3897	40995	8768	18493	6919	33598	19110	969	171834	361	1005	4173	2102	10276	10230	2136
H	-7.07	2139	24746	8766	16937	3932	33207	13768	1192	122238	194	797	5485	1944	10840	9249	2028
H	-7.08	2863	31832	7958	16494	5179	32470	16305	1036	145336	198	907	3962	2027	10426	10887	1978
H	-7.09	2583	31329	8225	15943	4736	33899	16460	1061	144381	332	814	3643	2176	10777	12395	1948
H	-7.10	2554	30033	7991	16504	5235	35229	17273	870	156713	269	764	3339	2127	11543	11170	2039
H	-7.11	3125	36163	6823	16247	6891	32376	20328	873	172628	328	903	2253	2162	10383	14757	2256
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H	-7.13	5029	61603	6529	6105	11857	58989	27687	1416	166705	316	858	290	2293	9190	23326	1732
H	-7.14	5296	65805	7293	3465	11621	83473	25181	1741	162270	286	791	288	2160	9317	21625	1835
H	-7.15	5687	70643	7097	3854	12329	110554	26694	2679	171599	338	873	304	2292	10556	22663	1935
H	-7.16	7744	89983	8272	3467	14847	141527	30649	8110	193136	273	943	366	2237	11615	27563	1756
H	-7.17	7541	90857	7551	3646	15831	145899	31491	2224	197888	216	1082	345	2602	12411	27228	2402
H	-7.18	4266	50445	12231	2072	8570	85450	20482	1486	140951	291	971	368	2189	9405	19286	1711
I	-7.85	5612	60432	11847	10001	11978	47987	23903	901	187033	341	1085	2177	2489	10461	13641	1948
I	-7.86	6049	63527	10700	11041	12303	45853	25384	930	204557	298	1073	1965	2801	10881	13428	2040
I	-7.87	5955	62778	9805	5962	13199	52805	26941	937	202318	335	1181	1311	2919	10296	14003	2147
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I	-7.90	6174	67093	8507	5145	13989	60998	29014	1389	211761	318	1229	1089	3049	11294	15937	2077
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I	-7.96	5500	63519	7812	4953	13255	39637	29866	1253	212511	351	1206	1179	3240	12116	23392	2288
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I	-7.98	5244	57195	7692	7313	11903	36399	27989	838	210161	445	1356	2226	3197	11771	17450	2398
I	-7.99	4601	50645	9046	9272	11281	34181	25470	938	205776	299	1147	2541	2960	10899	14895	2201
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I	-8.01	5898	62324	7781	10922	12733	39441	25409	1146	208704	313	1120	1807	2695	9926	12412	1567
I	-8.02	5221	57680	7998	9074	10432	71445	22563	953	183288	259	977	1984	2412	11208	13403	1860
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I	-8.05	7646	84266	9180	4911	15201	100595	32467	924	216860	399	1381	1210	3160	13773	19506	2191
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I	-8.19	7073	69920	9664	3736	13707	164154	25689	1703	197146	317	1291	745	2831	14053	15315	2092
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I	-8.23	8223	81029	9455	2855	15835	195023	28008	2104	196517	321	1229	442	3230	14046	16458	2126
I	-8.24	8349	82808	9171	2485	15371	200970	26867	2276	189568	362	1225	465	3073	14024	15808	2395
I	-8.25	7656	81638	8756	4255	15025	210803	25630	3218	190986	253	1134	543	2740	14306	15578	2191
I	-8.26	8428	83514	8612	4396	15246	206178	26951	3324	196352	326	1182	467	2882	13993	16126	2085
I	-8.27	8046	84032	9150	3414	14153	215037	27578	4937	185670	329	1221	413	3012	14456	17028	2018
I	-8.28	8380	92380	8403	1851	15636	191282	29670	2188	190714	389	1234	453	3264	14897	18892	2333
I	-8.29	8572	86590	9420	4920	15101	165068	28834	2160	205478	434	1271	645	3203	15024	17229	2041
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I	-8.31	8410	91652	8310	3038	14403	172792	28297	2773	189986	414	1373	569	3125	14518	17162	2522
I	-8.32	8695	95302	8059	5973	13570	165410	28596	1818	204476	364	1187	702	2746	15225	16868	2315
I	-8.33	7598	85905	7577	6002	12071	170886	27066	2136	198042	432	1301	1357	2669	18357	14543	1908
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I	-8.39	7673	80343	7868	12088	14057	114166	28251	1628	226108	358	1172	1259	2826	12382	14875	2000
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I	-8.46	7941	100158	7454	8218	15363	159774	29767	1549	174751	330	1087	946	2819	14558	30569	1985
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I	-8.52	6462	68870	6907	17377	11356	109247	24545	1844	209892	330	1057	2430	2793	14811	15292	1786
I	-8.53	5253	56875	8418	21205	9308	44417	22686	2056	217189	370	1147	3089	2758	11668	13050	2038
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I	-8.57	1844	21602	8825	18978	2186	36476	10626	1230	92935	260	696	4091	1189	10337	5776	1584
I	-8.58	3989	42227	9984	20421	6594	39268	18336	975	165295	336	994	4407	2031	10555	9485	1918
I	-8.59	4999	54740	14395	17627	8929	38861	21640	817	183476	256	1024	3306	2134	10965	11520	1797
I	-8.60	7955	92753	7659	4672	16060	92244	30814	1594	191213	228	1041	784	2513	11097	23543	2083
I	-8.61	9197	102306	8270	3371	16681	134507	31630	3160	196840	365	980	303	2562	12061	27552	2005
I	-8.62	8917	100820	8825	3503	16060	150257	33869	25690	237855	314	825	366	2420	11964	28985	2017
I	-8.63	8986	102677	7267	2680	16520	145287	32748	6333	209667	264	954	386	2706	12361	28820	1930
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I	-8.66	9807	101057	8987	2409	18510	102555	35416	1965	215495	407	904	302	2809	11038	26638	2345
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I	-8.68	9628	105498	8205	4016	19231	106939	38160	2987	219583	326	984	251	2910	11256	28041	2395
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I	-8.72	10134	104678	8109	1666	19403	111898	34898	3341	243427	311	923	311	2920	10920	24228	1967

I	-8.73	10223	105893	7364	1196	18679	115720	36337	2438	243537	307	936	258	2843	11316	27856	2299
I	-8.74	9916	106745	8686	1414	18385	114031	36148	1988	240126	308	935	421	2669	11237	33573	2476
I	-8.75	10247	108306	8200	637	19903	117442	36299	1672	258650	271	942	223	3023	11556	26956	2232
I	-8.76	9932	111379	7996	383	19646	124955	35931	1686	239629	270	1042	215	2874	12021	30082	2444
I	-8.77	9989	109963	8451	1575	19302	122591	36196	1815	245880	359	988	247	2935	11503	32544	2364
I	-8.78	10153	109269	8086	1820	18355	127925	34157	1531	240199	299	983	266	2644	11515	28010	2264
I	-8.79	9934	109207	7513	1340	18961	122240	34708	1830	240914	348	976	231	2719	11696	28515	1934
I	-8.80	9922	108006	7665	1343	18376	122160	33535	1846	247609	342	956	297	2739	11418	29079	2190
I	-8.81	10134	110360	7650	1119	18826	127153	34047	2504	240285	333	1044	233	2670	11687	29407	2666
I	-8.82	10251	111979	7930	1018	18523	122449	35561	2162	249125	244	934	274	2744	11900	28162	2180
I	-8.83	10591	111942	7108	805	18827	118641	35999	2112	246664	306	951	228	3087	11856	31536	2095
I	-8.84	10712	110703	9022	858	18743	112007	35506	1794	251237	318	1012	222	2789	11378	32396	2099
I	-8.85	10796	112601	8187	1049	19549	113190	36074	1956	240515	311	919	297	2872	11718	33427	2489
I	-8.86	10886	114769	9171	174	20153	117409	36042	1934	250106	285	988	270	2902	11558	32077	2001
I	-8.87	10725	114352	8515	205	20386	124148	36803	1867	246840	383	917	274	2859	11460	27530	2199
I	-8.88	10307	112037	8365	794	18876	126763	35640	2494	263209	247	1040	246	2908	11346	26054	2152
I	-8.89	10656	114224	7532	243	18988	120537	34142	4341	234239	324	934	220	2700	11402	30649	1929
I	-8.90	10364	112397	8877	598	17946	126777	33675	5151	226620	332	942	169	2852	11367	34004	2214
I	-8.91	11618	115981	10184	139	18888	119420	35410	2693	236719	266	960	325	2965	11975	32739	2430
I	-8.92	11180	115861	8516	78	18907	117292	36069	2180	238959	265	829	252	2910	11386	35434	2384
I	-8.93	11066	111531	7833	311	18749	116478	35193	2276	239410	317	983	185	2851	11260	31365	1848
I	-8.94	10527	111314	8283	363	18231	113953	33383	2373	226976	265	933	230	2741	10821	32027	2133
I	-8.95	10140	112253	8243	636	18010	113485	33735	3530	232110	293	831	269	2673	11076	30625	2081
I	-8.96	10656	115151	9364	714	19039	116332	34411	3378	245509	329	1040	239	2884	11933	26305	2077
I	-8.97	11020	116832	9322	205	19118	108753	35622	8545	244986	291	873	235	2925	11465	28950	2154
I	-8.98	10117	111470	10722	381	17585	117433	32739	25925	224153	310	804	166	2560	10713	29775	1985
I	-8.99	10792	113481	9441	538	18486	113684	33966	6518	226455	311	966	166	2733	10952	31973	2128
I	-9.00	9917	105037	9123	577	17542	118051	32577	49725	223989	313	822	166	2478	9838	28597	1776
I	-9.01	9807	103819	7756	1448	17639	112847	33055	23851	233886	278	844	190	2654	9859	27683	2201
I	-9.02	8728	90226	7082	2103	16203	86503	33000	1581	220359	267	892	262	2554	9813	26968	1558
I	-9.03	1946	25974	249133	2140	1779	65022	8945	714	65323	111	1689	96	713	3393	8581	1064
J	-9.35	7305	77697	8256	4421	14255	133225	27700	1024	190365	356	1144	607	2808	12828	15763	2006
J	-9.36	7778	82269	7670	4676	14477	127485	28426	1335	202242	269	1219	716	2901	13257	16954	2266
J	-9.37	8253	87191	9210	3839	14300	154639	28843	1526	230831	308	1129	630	2964	15080	17505	1946

J	-9.38	7261	79050	9325	5745	13957	121814	27124	1639	225967	335	1098	691	2670	11907	16937	1670
J	-9.39	6791	73489	7142	11817	12633	122639	25558	1401	186571	300	1010	1241	2442	12775	16595	1897
J	-9.40	5076	58299	7480	14205	9886	66609	21853	1255	188195	353	1109	2955	2439	11420	12630	1938
J	-9.41	3146	37681	8240	15047	5805	39552	17276	972	144403	310	873	3377	1971	10339	10405	1556
J	-9.42	3053	34116	8489	18621	4893	42425	15492	801	140107	275	838	2908	1819	9312	9338	1487
J	-9.43	4970	57112	7638	13972	9213	72907	22442	918	177167	301	875	2244	2283	11395	14713	1816
J	-9.44	7185	83122	9289	6755	14117	108777	28407	2546	186578	290	917	697	2450	11852	23069	1619
J	-9.45	7326	85160	7714	5077	13703	135069	29612	3399	176146	249	921	307	2219	12184	26017	1814
J	-9.46	6769	77085	7315	3879	12923	125511	27081	1958	171835	273	878	271	2257	11352	21547	1709
J	-9.47	7714	83358	7907	2450	13391	172894	26158	2452	176405	273	882	415	2101	15085	22776	1575
J	-9.48	7355	78760	7613	3481	14667	115202	29999	2640	200567	269	913	307	2659	12487	20513	1894
J	-9.49	6178	67504	7908	2165	12226	111313	26574	2556	188228	295	850	326	2527	11874	21147	2222
J	-9.50	4531	54391	6028	2447	8708	99872	22401	1638	152864	270	809	310	2164	9461	19329	1610
J	-9.51	6215	69772	7931	1479	9254	346606	16861	1736	126332	185	689	619	1534	26934	11434	892
J	-9.52	7693	83571	7152	2006	12671	250017	22559	1865	161219	207	819	496	1846	22230	16272	1706
J	-9.58	7967	90835	8093	3310	15304	110355	30674	2671	197211	251	864	303	2329	10249	24375	1958
J	-9.59	8137	91493	7138	4912	16184	100797	33132	2438	209512	207	829	252	2429	10437	27442	1897
J	-9.60	8252	94654	5800	10685	17371	77470	45526	2060	215863	217	781	280	2546	12793	28195	2185
J	-9.61	8429	94081	6622	5610	17106	88497	39983	1752	212841	209	880	232	2550	12569	26529	2268
J	-9.62	8713	95409	6976	4683	16404	101365	36703	4084	204605	285	768	203	2309	11152	24794	1788
J	-9.63	7940	91127	4967	3040	15313	119359	33589	12155	191861	298	704	200	2008	11050	22996	1987
J	-9.64	8171	90482	7364	1888	14259	121873	28891	16886	187699	255	733	186	1962	11496	19663	1723
J	-9.65	7728	88004	8427	3384	13889	104174	31592	10347	199027	255	780	181	2176	10897	22344	1783
J	-9.66	8326	89972	7572	3524	15446	96162	35276	2214	211910	252	772	138	2259	10952	23844	1773
J	-9.67	8480	94044	7911	3665	15340	106264	33049	3418	193359	227	681	170	2253	11476	24464	1811
J	-9.68	9261	100542	7565	7579	17303	118217	43362	3326	219276	268	883	263	2523	12550	25327	1989
J	-9.69	9633	109576	7768	1793	17739	115003	34635	2918	214937	356	840	228	2428	11895	26203	1583
J	-9.70	10199	111908	7207	6946	18030	88614	43277	1519	216012	305	935	320	2484	11603	26561	2435
J	-9.71	10412	113658	7829	2083	18697	84951	37681	1535	216835	333	1047	242	2627	11258	26620	2201
J	-9.72	9637	111434	6283	3807	18881	87781	40501	1198	220244	274	812	192	2413	12108	26299	2255
J	-9.73	9142	104307	6716	3706	16961	84416	35682	1244	200948	304	806	220	2522	10312	25526	1935
J	-9.74	8942	105801	6602	6070	17319	90642	40465	1473	209749	291	799	235	2249	10671	25391	1996
J	-9.75	9931	111919	6677	4944	18117	95091	40986	1441	229497	284	885	208	2677	11713	27853	2154
J	-9.76	10651	120805	8239	1496	20156	73795	39083	1271	241617	328	831	173	2722	11038	29529	2366

J	-9.77	9336	106562	7714	3421	17489	79184	37538	1444	226942	272	805	159	2684	10631	27343	2022
J	-9.78	10887	118183	8600	1549	18977	86538	37194	1083	228601	318	915	236	2684	10430	27250	2543
J	-9.79	10159	110938	14334	4782	18288	92179	38788	1904	221702	355	910	143	2659	11113	25758	1863
J	-9.80	10019	112828	9246	3341	18444	90835	36503	2700	224286	246	892	227	2600	10267	24967	2248
J	-9.81	9704	110573	6512	3560	18107	101495	37114	2494	229035	278	908	173	2542	11079	25314	1950
J	-9.82	9620	110689	7227	4069	17837	100294	38603	1729	231782	236	934	244	2573	11295	25693	2200
J	-9.83	10104	113812	6924	3008	17946	88278	37890	3242	221175	224	819	178	2487	10498	25807	2150
J	-9.84	9171	104756	6516	2086	16652	84722	33937	1811	208400	280	776	171	2384	9904	23479	1630
J	-9.85	9313	102357	6431	4134	16126	84985	36723	1136	209067	251	803	230	2308	9445	23546	1737
J	-9.86	10103	110281	7658	2196	17413	84130	35673	1640	204742	222	746	237	2498	10099	27812	1861
J	-9.87	10608	116834	7024	1782	18749	81982	38272	1542	219340	251	923	240	2853	10299	28416	2040
J	-9.88	10426	116122	5668	2790	18844	56266	38328	1750	220613	177	702	208	2638	9592	26357	1991
J	-9.89	10542	113367	6880	1160	17858	46308	35170	2182	221462	275	842	191	2601	8745	24517	1964
J	-9.90	10323	108005	6216	2725	15907	54455	33818	1718	201645	196	708	214	2304	9206	22662	1953
J	-9.91	10913	115229	5860	3293	17102	50333	36307	1724	219656	239	745	252	2488	8848	24280	1508
J	-9.92	10364	115374	6150	8204	16470	52157	42396	1539	217824	204	755	188	2502	9925	24815	1999
J	-9.93	11330	117724	7084	4628	16640	61101	40570	1265	225678	250	796	228	2719	9883	26472	2136
J	-9.94	10112	108460	6604	9301	15750	49226	43683	681	215557	252	795	244	2523	9682	24608	1645
J	-9.95	10532	113452	7386	8781	15501	60200	42782	1484	209943	228	705	258	2346	9469	25617	1838
J	-9.96	11140	120962	5588	4008	15458	59840	38553	1539	223721	275	716	306	2454	9125	25577	1951
J	-9.97	11330	120285	6523	3461	15770	63545	36477	1503	222928	232	830	245	2457	9155	27433	2340
J	-9.98	11675	121819	6349	3488	15874	71601	38630	1752	224540	260	766	249	2498	9819	25535	1992
J	-9.99	11490	124436	7979	3221	16097	86642	38383	1917	231842	240	771	316	2570	9332	28451	1896
J	-10.00	10947	123244	7575	1862	15576	70773	35405	1936	221783	269	719	256	2273	8766	26904	1677
J	-10.01	11690	123066	7227	2045	15723	84981	34411	3572	217394	256	770	257	2438	8729	25799	1855
J	-10.02	11036	119208	7514	1842	15593	80375	33324	2814	208205	243	762	182	2298	8778	25080	1691
J	-10.03	10013	109563	7442	2300	14400	70697	34450	2781	203309	217	707	258	2203	8751	25258	1726
J	-10.04	1708	21869	5123	814	672	17680	8479	684	55546	135	326	173	697	3074	7895	657

Code for Bayesian Model:

Code used in OxCal 4.4

```
Options()
 {
 BCAD=false;
 };
 Plot()
 {
  Outlier_Model("SSimple",N(0,2),0,"s");
  P_Sequence("depth",100,9,U(-2,2))
  {
   timescale="OSL";
   Boundary();
   Date("KBMN3j_24",N(2021-9590,425))
   {
    z=-10.24;
   };
   Date("KBMN3i_23",N(2021-7330,340))
   {
    z=-8.96;
   };
   Date("KBMN3i_22",N(2021-7260,340))
   {
    z=-8.53;
   };
   Date("KBMN3h_21",N(2021-7360,340))
   {
    z=-7.46;
   };
   Date("KBMN3h_20",N(2021-7240,360))
   {
    z=-7.07;
   };
  Date("KBMN3h_19",N(2021-6560,390))
   {
    z=-6.47;
   };
   Date("KBMN3g_18",N(2021-6960,310))
   {
    z=-6.14;
   };
   Date("KBMN3g_16",N(2021-6910,355))
   {
    z=-5.32;
   };
   Date("KBMN3g_15",N(2021-6640,410))
   {
    z=-4.98;
   };
   Date("KBMN3f_12",N(2021-6390,365))
   {
    z=-3.95;
   };
   Date("KBMN3f_11",N(2021-6560,330))
   {
```

```
 z=-3.56;
 };
 Date("KBMN3e_10",N(2021-6500,290))
 {
 z=-2.9;
 };
 Date("KBMN3e_8",N(2021-6310,295))
 {
 z=-2.21;
 };
 Date("KBMN3d_7",N(2021-4100,225))
 {
 z=-0.91;
 };
 Date("KBMN3c_5",N(2021-4160,180))
 {
 z=0.22;
 };
 Date("KBMN3c_4",N(2021-1850,155))
 {
 z=0.85;
 };
 Boundary();
};
};
```

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