Supplementary Materials for

Chronology for the Aegean Late Bronze Age 1700–1400 B.C.

Sturt W. Manning,* Christopher Bronk Ramsey, Walter Kutschera, Thomas Higham, Bernd Kromer, Peter Steier, Eva M. Wild

*Corresponding author. E-mail: sm456@cornell.edu

Published 28 April 2006, Science 312, 565 (2013)
DOI: 10.1126/science.1125682

This PDF file includes:

Materials and Methods
Figs. S1 to S8
Tables S1 to S3
References

Correction: Shading was removed from three lines in table S1 and an explanation added to the table footnotes.
Materials and Methods

1. Samples

We report on a radiocarbon dating program which addresses the chronology of the Aegean Late Minoan (LM) IA, IB and II phases, and the date of the archaeologically and geologically pivotal major Minoan eruption of the Santorini (Thera) volcano – which is placed in the mature or late LMIA phase (S1-S3). We obtained 100 new measurements AD2000-2004 on LMIA-II samples (sites and study region shown in Fig. S1). We also considered 23 previously published normally pre-treated (acid-base-acid procedure) and corrected (for isotopic fractionation) radiocarbon ages on very similar samples run by one of the laboratories involved in this study (Oxford) (S4, S5), a set of high-quality ages from the Copenhagen laboratory – where known age test data indicates these ages are if anything minima (S6, S7) (note: only the previous Akrotiri Volcanic Destruction Level (VDL) samples stated to come from the final horizon, Stages 2/3, are included here), three data on short-lived sample material from the Akrotiri VDL previously reported by the Heidelberg radiocarbon laboratory (S8), and 6 known age test data relevant to a Vienna versus Heidelberg dendro-date comparison (Pinus nigra tree-rings from western Turkey for AD1640-1649 employed). All these data are presented in Table S1.

Our sample selection concentrated on short-lived material sealed in good quality (“secure”) archaeological contexts (architectural features, storage jars, clear use contexts, etc.) which should offer radiocarbon ages approximately contemporary with these contexts, and then on safely assigned charcoal/wood samples with multi-decade tree-ring series where “wiggle-matching” (abbreviation WM) was possible to better place the last ring and/or likely cutting date for defined contexts (S9). Such samples are labeled “secure” in Table S1 and represent the core of the analysis program reported. However, because such material is not easy to find in many sites and periods, we also dated a range of other bone and charcoal samples. Where the stratigraphic context is regarded as reasonably secure these are labeled as “phased”. Some of these contexts were not regarded as particularly secure from the outset (i.e. there was always the possibility of residual material, or of intrusion from higher levels), and some have been identified as questionable or incorrect with further study. These situations are noted with qualifications or caveats in the right-hand column of Table S1. Such data were excluded from the study. An unexplained problem also exists with two or three assigned Late Helladic (LH) I (mainland Greek cultural phase equivalent to Late Minoan I based on archaeological linkages) samples from Tsoungiza (see notes to Table S1), and the decision was made to exclude this site and its six data from the present study (the three LHI-II data are OK, but in two cases merely set irrelevantly early terminus post quem points and so provide no added value: ref S10). One LMII datum (OxA-10762) is either significantly residual material or aberrant for unknown reasons. It too was excluded. In all, 13 data of the 124 data listed in Table S1 were excluded from the study as non-secure or problematic as just described – these data are shaded in dark grey in Table S1. For the Bayesian OxCal Sequence analyses, two further criteria were then applied to the dataset under study: (i) some data within the LMIA-II Sequence offer perfectly valid, but irrelevantly early,
termini post quos (TPQ) information – such data within the Sequence (as opposed to at its beginning for example) do not contribute any useful information and so were not included in the “secure sets” models (either Model 1 in the main text or Model 2 considered below); and (ii) where there is only a single datum from a site context or specific horizon, and so no control at all on this datum’s representativeness, then this datum was also not included in the “secure sets” models. Such TPQ or “single” datum instances are shaded in light grey in Table S1. These samples were included in the Model 1 run labeled as “with extras” and including single and irrelevant TPQ data and for which results are shown in Fig. S4 and Table S3.

Two carbonized wood samples were obtained where it was possible to divide the samples into sequential 10-year tree-ring segments for $^{14}$C dating. These were then wiggle-matched as Defined Sequences against the radiocarbon calibration curve. AE1024 from Trianda on Rhodes was a small wedge of oak preserving 30 visible rings (pith to bark). The sample was regarded by the excavator (Toula Marketou) as from an early LMIA context ($S10$). But this local context might also be considered as late Middle Bronze Age (MBA) by some other scholars ($S11$). The sample thus sets a terminus post quem (TPQ) either for late MBA or for early LMIA. Bark was present, so the outer ring sets the cutting and likely use date. Three 10-year sub-samples, rings 1-10, 11-20 and 21-30, have been measured twice each at Oxford, and once also at VERA (Fig. 1 nos. 1-3). All data offer a coherent analysis (see Fig. 1 (nos. 1-3), Fig. 2A, Figs. S2-S4). C-TU-MIL1 from Miletos in western Turkey comprises a 72-year tree-ring sequence from an oak timber that had been quartered and stripped of bark before being used to make a chair/stool ($S10$). This chair/stool was burned in a fire dated as late in the LMIA phase by the excavator (W.-D. Niemeier) and was in turn found covered by Minoan eruption Santorini (Theran) tephra. The final preserved ring, present around the entirety of the preserved circumference, appears to indicate the presence of the waney edge, i.e. the last ring before the tree was cut down (this interpretation is a best opinion based on what is visible and experience, but it is not certain given the absence of clear morphological features that in oak might indicate sapwood, such as color change, or filled tyloses in the early wood vessels ($S10$)). Since the chair is from the late LMIA level (though in principle the chair could be older than this) and was buried by Santorini tephra, the outer preserved ring of this sample sets a terminus post quem for the date of the volcanic eruption of Santorini.

2. Laboratory measurement and accuracy

Relevant laboratory details pertaining to the pretreatment and dating procedures and accuracy/precision limits at the time of the dating of the samples in this study have been described elsewhere with further references for each of the laboratories ($S3$, $S7$, $S12$-$S19$).

In more detail, at VERA charred seeds, charcoal, and wood samples were treated with the standard acid – base – acid (ABA) method used at VERA for the removal of potential contaminants (carbonates and humic acids). This method is used for the majority of biogenic materials. Its comprises a treatment with 1M HCl at 60°C for 1 hour followed by a repeated treatment with 0.1 M NaOH at 60°C until the alkaline solution gets
transparent and colorless, and a final treatment with 1M HCl at 60°C for 1 hour. Between the individual steps and at the end of the clean-up procedure the samples are washed to near neutral pH with H$_2$O$_{\text{bidest}}$. If the samples dissolved completely during the alkaline step of the pre-treatment, the humic acids were precipitated by acidification of the alkaline solution, and were used as dating material (i.e. VERA-2743 to VERA-2750 and VERA-2756 to VERA-2758 (see comment below)). In the case of the recent wood, the samples (VERA-2751 to VERA-2755) were soaked in acetone prior to the ABA procedure in order to remove any waxes and resins that are soluble in this solvent. The organic solvent is washed out from the samples by repeated rinses with H$_2$O$_{\text{bidest}}$. The pretreated sample material (seeds, humic acids and wood) was then further processed by combustion and the resulting CO$_2$ was graphitized to solid carbon. For further details see ref. S19.

At Oxford, slightly differing pretreatments apply depending on the nature of the sample material. Three approaches are relevant to the data reported in this paper (the abbreviations used below are also used in Table S1 below to identify which samples received which pretreatment):

(i) ZR = Standard A-B-A protocol: samples are treated with 1M HCl at 80°C (1 hour), a rinse with hot 0.1M NaOH and a final HCl wash, followed by a rinse with distilled water and oven drying.

(ii) RR = a milder version of the ZR treatment, 1M HCl wash at room temperature (RT), followed by rinsing with distilled water, a further acid wash in HCl at RT this time with 0.1 M acid, and a final water rinse.

(iii) AF = this is the standard Oxford bone preparation method. All AF samples are of ultrafiltered gelatin, resulting from the decalcification of the powdered bone, gelatinisation using pH 3 water at 65 degrees C in an incubator and ultrafiltration purification. Full details of this method are outlined in ref. S20.

For general standard $^{14}$C reporting practice and isotopic ($\delta^{13}$C) correction, see ref. S21.

Known age test data for the Oxford Laboratory for 1995-2001, mainly on Irish Oak, and all against the IntCal98 (S22) dataset, are available in ref. S12: overall offset of just $+7\pm3.83$ $^{14}$C years BP for measurements run in AD2000 (n=150 – this excludes 9 rejected samples, with these included the offset increases to $13.28\pm3.69$) and $+1.38\pm3.06$ years $^{14}$C years for 2001 (n=179). Subsequent data (same basis) for 2002-2004 are:

- $+11.35\pm3.72$ (n=105) for 2002, $+7.77\pm3.09$ (n=97) for 2003, and $+5.39\pm2.47$ (n=137) for 2004.

Review of dendro-dated samples run from 1971-1993 by the Copenhagen Laboratory is in ref. S7 (this covers the period relevant to the samples listed in Table S1). The comparisons show reasonable results, but might indicate some tendency towards slightly too recent ages (ref. S23 at p.129), suggesting that the Copenhagen data for the Santorinii samples might, if anything, be regarded as minima. Comparisons of Heidelberg data on identical wood in the relevant period 1700-1500 BC versus Seattle data (the major component laboratory of the $^{14}$C calibration curve at this time) show a mean offset of only $+2.3$ $^{14}$C years (S16). Recent known-age test data for the VERA laboratory are discussed in refs. S14 and S15. In a test involving 28 targets on dendrochronologically dated Scottish pine no result deviated by more than $2\sigma$ and only 7 results by more than
1σ, with average values around 1 and -8 $^{14}$C years from the IntCal98 values (S22). In the other test on upper timber line Stone Pine, which likely exhibit a very small seasonal growth variation offset at certain times, nonetheless 33 of 58 data agree with IntCal98 at 1σ and only 2 data deviate by more than 2σ (S15). The comparison of five measurements of the identical wood (same decade) between Vienna and Heidelberg shown in Fig.1, though clearly limited, would indicate only a very small average offset Vera to Heidelberg of around +4.4 $^{14}$C years.

As shown in Fig.1, we undertook our own focused comparison of measurements on identical samples between the Oxford (both old accelerator replaced in 2002 and new accelerator operation from then) and Vienna laboratories as a direct quality control investigation for the present project. Fifteen of the 17 comparisons agree within 95% confidence limits (S24), and only one pair (Fig. 1 no.15) significantly diverge indicating an aberrant measurement (see Fig. 1 and caption). Overall, comparing the Oxford (OxA) versus Vienna (VERA) data on the same samples (using the pooled ages for each individual laboratory where they re-measured the same sample – thus n=17), we find an average offset of -11.4 $^{14}$C years. The standard deviation is, however, rather larger than the stated errors on the data would imply at 68.1. This indicates that there is an unknown error component of 54.5 $^{14}$C years. Two pairs of data contribute especially to this (Fig 1 no.15 in particular, and also Fig 1 no.7), and these two data (and especially the Fig. 1 no.15 pair) are not compatible as representing the same ages. If these two pairs are excluded, then the offset becomes +8.33 years, and the standard deviation reduces to 38.45 and the unknown error component to 13.96.

In this regard it is important to note that in many of the Oxford versus Vienna comparisons reported in Fig. 1 differing chemical fractions (derived from the identical samples) have been dated in the respective laboratories. Thus, a priori, one would not necessarily expect exactly identical results. Whereas Oxford dated base insoluble material after their standard pretreatment procedure, Vienna instead in many cases dated base soluble material (humic acids) remaining after pretreatment cycles (with odd exceptions such as VERA-2757 repeat which received only HCl pretreatment). However, we note that despite this difference the good correspondence in nearly all cases (15 of 17) shows the robust nature of the results in general – and, specifically, shows the absence of any significant contamination component in nearly all the samples. The deviation of 2 out of the 17 samples (and badly only in 1 of 17) is unexplained, but these form the exceptions.

The known age test data in general for the laboratories involved in this study, and the specific inter-comparisons carried out as part of this study, demonstrate the existence of only small offsets in measurements across significant data sets. These offsets are of a level that falls within the scale of variation found in comparisons between the best (the high-precision calibration) $^{14}$C laboratories (S22, S25, S26). Thus the high accuracy of the data from our work is demonstrated. The possible likely typical unknown error component of around 14 $^{14}$C years found between Oxford and Vienna is about as good as can be expected in such an inter-comparison given the typical level of offsets found in inter-laboratory comparisons even between the high-precision laboratories (S22, S25, S26). This unknown error component may represent both slight under-reporting of real errors, or a small varying accuracy offset operating at times between the two laboratories.
3. \(^{14}\text{C}\) Calibration and Analysis

All \(^{14}\text{C}\) date analysis, interpretation, and calibration carried out in this paper employs the OxCal software package using version 3.10 dated February 2005 (S27-S29 – and subsequent versions – available from http://www.rlaha.ox.ac.uk/orau/oxcal.html). For details on this software, see the manual available also at http://www.rlaha.ox.ac.uk/oxcal/oxcal.htm. The calibration dataset employed unless stated otherwise is the (AD2005 published) internationally recommended northern hemisphere IntCal04 dataset (S25). In a test of the sensitivity of the analysis to small changes in calibration dataset and its modeling, we also considered the Bayesian models against the IntCal98 calibration dataset (S22) which was complied via differing procedures. Curve resolution in OxCal was set at 1 and cubic interpolation “on”. Round Ranges function set as “off”. All outputs are cited in the text rounded to the nearest whole integer.

For the specific dating of the Volcanic Destruction Level (VDL) at Akrotiri, Thera, and so the Minoan eruption of the Santorini (Thera) volcano, the project obtained 13 new age estimates directly on short-lived material from the VDL (samples shown as nos. 16-19 in Fig.1 from Akrotiri, Thera; nos. 16, 18 and 19 on \textit{Hordeum sp.}, no.17 ?\textit{Lens sp.}). The coherent weighted average \(^{14}\text{C}\) age is 3344.2±8.4BP (test statistic of 5.0 less than the \(\chi^2\) limit at 95% confidence level of 21.0 for 12 degrees of freedom), yielding calibrated calendar age ranges at 1σ of 1663-1650 BC (P=20.7%) and 1642-1616 BC (P=47.5%), and at 2σ of 1685-1609 BC using refs. S27 and S25.

In the main text and in Fig.2B we refer to a set of 28 data in all from our work and previously published work for samples on short-lived seed material or a 10-year growth twig from the VDL at Akrotiri on Thera (Santorini) and with current normal pretreatment procedures (acid-base-acid) and correction for isotopic (\(\delta^{13}\text{C}\)) fractionation. These data are listed in Table S1. They include three determinations reported from the Heidelberg laboratory (S8). We note in this regard that although ref. S8 at p. 184 refers in the text to just two short-lived samples, we observe that Table 2 on the same page lists also Hd-7092-6795 on “peas”, thus we include this sample also in our analysis.

The outcomes of the calibration and analyses are shown in Fig.2, Table 1, Figs S2-S5, S7, S8, Table S3.

The dating analysis relevant to the Santorini eruption reported here (for the Volcanic Destruction Level, VDL, at Akrotiri on Santorini), allied with the consistent and mutually supported narrower date range (1627-1600 BC at 2σ) reported for an olive tree likely killed by the eruption in ref. S30, combine consistently to suggest a date range for the eruption in the late 17th century BC.

The conventional archaeological assessments of the date of the LMIA phase in the 16th century BC, and of the Santorini eruption at about 1525-1500 BC (S1, S3, S11, S31-S39), are clearly incompatible with the current \(^{14}\text{C}\) data and analysis as reviewed in this paper,
and the independent new data in ref. S30. The conventional assessment requires dates which lie outside all the 2σ ranges calculated for the Santorini Volcanic Destruction Level (Table 1, Fig. 2, Figs. S2-S5; also ref. S30). To make such a later date possible, some unknown small and consistent error that has affected several different sample types and sample contexts and/or several different 14C laboratories running different methodologies or equipment would need to be identified and demonstrated. No such factor is apparent at present. It has been suggested that perhaps contamination by “dead” volcanic CO2 offers a mechanism (S11). However, as outlined in the main text, the data argue strongly against this (see also ref. S30). Nor, based on observational data available, is such an effect likely to be at the same time wide-spread, constant, and minor even if present. A case for a 1580-1530 BC date range as an alternative would require less of an adjustment to the 14C data (S40), but is still not compatible with the large body of 14C data presently available. And, even if such a mid-16th century BC date were found to be more likely given other information, it would still require significant re-thinking to the conventional chronological and cultural synthesis of the region (since a LMIA-LMII chronology with an eruption date of 1525 BC has been stated to be “on present evidence the highest possible in relation to crosslinks with the historical chronology of Egypt” (ref. S3 at p.319)).

The 14C chronology (this paper, ref. S30) thus implies a defect either in the conventional linkages to the Egyptian historical chronology in the mid-second millennium BC, or a failing in the Egyptian chronology itself. The so-called “high” Aegean chronology has suggested the former solution for the mid-second millennium BC (S41, S42). The problem appears limited to this time. Egyptian historical chronology in the mid-14th century BC (Amarna period) correlates well both with the independent Mesopotamian historical chronology and 14C evidence (S43-S45). However, alternatively, if the strength and cogency of the conventional material culture linkages for the LMIA and LMIB phases (and LHI-IIA phases) versus Egypt are held to be overwhelming (S3, S39), then the possibility of a flaw in Egyptian dates in mid-second millennium BC also becomes relevant.

4. Bayesian Analysis

The Bayesian dating models employed in this paper take all of the dating results (see Table S1) together in combination with the prior sequence information from the archaeological stratigraphy to constrain a model for the cultural chronology. Sets of archaeologically defined coherent periods (“Phases”) within the “Sequence” are defined by “Boundaries” (it is assumed data within such boundaries are taken from a uniform distribution); boundaries thus represent the transitions between the dated information – the analysis quantifies these boundaries/transitions solely on the basis of the data in the surrounding model. Where sample material is long lived we have defined it merely as a terminus post quem (TPQ), which will constrain the model to be later than these dates. We have employed terminus post quem data only for the LMIA phase at the start of the model’s sequence, where it is useful in setting the upper limits for elements of this phase. Especially important in this regard are two tree-ring samples where Defined Sequence
analysis (so-called wiggle-matching) was possible (that is there are known exact calendar relationships between the elements of the sequence) – these samples set *terminus post quem* ranges respectively for the late Middle Bronze Age or early LMIA phase, and for the specific Akrotiri VDL (see Fig. S7). In contrast, long-lived samples offering *terminus post quem* data for the LMIB or LMII phases within the sequence model cannot be usefully employed as they merely give irrelevant, early, information better defined from ages for the respective close of LMIA short-lived samples or close of LMIB short-lived samples.

The basic Bayesian OxCal model (run file) used in this study is set out in Table S2. Variations to this model to investigate various criteria are described in the notes to Table S2. Example outputs from Model 1 and Model 2 are shown in Figs. S2 and S3 (for Model 1, see also main text Fig.2). The output from a run file version including the single and irrelevant early *terminus post quem* data identified by the light grey shading in Table S1 is shown in Fig. S4 (compare the “with extras” runs reported in Table S3). The output from a version of Model 1 in which all data from Santorini are excluded, and the model is then asked to calculate the age range for the Santorini VDL based on the $^{14}$C evidence available from elsewhere in the Aegean, is shown in Fig. S5. The Bayesian OxCal analysis combines the (prior) information on the stratigraphic sequence of the sample sets with the radiocarbon dating probability functions from the data. Mathematical and implementation information is provided in refs. S27-S29 and especially in the OxCal manual at [http://www.rlaha.ox.ac.uk/oxcal/oxcal.htm](http://www.rlaha.ox.ac.uk/oxcal/oxcal.htm). A number of publications discuss the mathematical bases to the technique as applied to radiocarbon and archaeological data (S27-S29, S46-S52). To test for intrusion and outliers we used the OxCal agreement index. This is a calculation of the overlap of the simple calibrated distribution versus the distribution after Bayesian modelling. If the overlap falls below 60%, it is approximately equivalent to a combination of normal distributions failing a $\chi^2$ test at the 95% confidence level. In this case we have over a hundred radiocarbon dates, so we would expect some samples (~5%) to fail this test, but not by much. An extension of this method tests the model as a whole to see if the overall agreement is acceptable or not – again versus an approximate 95% confidence threshold indicated by an index value of ≥60%.

The stratigraphic information available in summary from oldest to most recent is:

Middle Bronze Age (MBA)/Middle Minoan (MM) → Late Minoan (LM) IA → LMIB → LMII

Within LMIA a further phasing from early LMIA, to mature LMIA to late/Akrotiri destruction Level (VDL) LMIA is available (for a review of LMIA Aegean sites, see ref. S53). Various data on wood or charcoal samples set *termini post quos* for the LMIA phase in general, or, in the case of the Miletos oak sample found covered by Minoan eruption Santorini (Thera) tephra, for the late LMIA/LMIA-VDL sub-phase in particular. Site sequences within LMIA exist from Akrotiri on Thera and Trianda on Rhodes. At Akrotiri a charcoal/wood sample (OxA-11250, Hd22037) from a LMIA context offers a *terminus post quem* for the phase, two samples of sub-decadal growth branch material provide data from mature (but pre-final VDL) LMIA (OxA-10312 to 10319, VERA-2748
to 2747), and then a series of short-lived samples from the VDL offer ages for the end of
the site in late LMIA and the approximate date of the eruption which buried the site.
Where samples comprise the same tree-rings they are combined to offer the best estimate
of radiocarbon age (as long as the data permit this – see note 1 to Table S2). Where the
data altogether comprise samples from a 3-year growth sample (65/N001/12) or a ca.8-
year growth sample (M4N003) then they are also combined to offer a best radiocarbon
age for the total sample and to offer the most appropriate comparison with the $^{14}$C
calibration curve (comprising at this time mainly 10-year sample data combined and
interpolated to offer the 5 year points of the IntCal04 calibration curve – see ref. S25).
Where short-lived (sub-decadal, and, in fact, in all but one case annual-growth plant
matter) derive from a single specific context such as the Volcanic Destruction Level at
Akrotiri on Santorini, then these data are also combined to offer the best estimate of
radiocarbon age. At Trianda a 30-year wiggle-match offers a *terminus post quem* for
either the late MBA or early LMIA, and two measurements on a sub-decadal growth oak
twig (OxA-10643, 11884) offer a late LMIA date range.

The two sets of LMIB data come from close of phase destruction horizons at the sites of
Chania (in north-west Crete) and Myrtos-Pyrgos (in south east Crete) (S4). The Myrtos-
Pyrgos data all come from the clear LMIB destruction horizon at the site which
represents the end of the LMIB phase at this site. It is reasonable to combine these
samples together to best estimate the radiocarbon age of this destruction horizon. The set
of samples from Chania may also reflect one site-wide event, but one sample, of peas
yielding OxA-2517 and 10322, seems significantly older than the others (and the set of
data from Chania fails a 95% level test for combination – it passes without these two
samples). Thus it seems inappropriate to combine all the Chania data together as they
may (or at least one sample, and two of the 8 dates here) represent more than one specific
dating horizon. The Chania set is thus treated as a Phase in the model.

It is also important to note that the final late LMIB phase across Crete as a whole may
continue for a while after the Chania and Myrtos-Pyrgos destructions and so the $^{14}$C
evidence in this project. Some regionalism may well play a part here too, with different
areas and sites on Crete moving from clear LMIB into LMII at differing rates and with
some apparent overlap evident. Final LMIB may thus continue in calendar time for a
period of time after the dates for the LMIB destructions at Chania and Myrtos-Pyrgos
shown in Table 1: as suggested previously in ref. S23 on the basis especially of recent
work at the site of Mochlos (S54).

It is important to note for the LMIB phase – in contrast to the LMIA phase where we
have $^{14}$C information directly defining its internal duration – that we therefore lack any
data relevant to the duration of LMIB up to these destructions. The LMIB (and LMII)
phase is merely evidenced by sets of short-lived samples from close of phase destructions
which will thus yield ages probably clustering around the end of the phase. Therefore, the
majority of each of these phases prior to the destruction is not represented – yet it is
evident that some period of time passed constituting the phase before the destruction
horizon. Indeed, recent archaeological work has generally been argued to indicate that the
LMIB phase was relatively long. We therefore created a Model 2, which tests the
influence that recognizing this missing time representation might have on the Bayesian
analysis by sub-dividing the relevant LMIB and LMII phases into two elements (part 1 = unrepresented time period and part 2 = the close of phase destruction evidence available). Model 2 is perhaps more realistic in some regards, but it necessarily involves interpretative steps, and thus we prefer Model 1 as the basic statement in the main text.

We therefore offer two versions of our analytical model:

(i) Model 1 (main text, Fig.2, Table 1, Fig.S2) which does not specifically address the fact we know that there was a (seemingly) significant period of time between the end of LMIA and the LMIB destructions at Chania and Myrtos-Pyrgos and merely uses the stratigraphic sequence as represented in the available dated phases. There is thus just a single boundary statement in the OxCal model between the LMIA phase and the LMIB destruction phase, reading: Boundary "Close of LMIA to LMIB Destructions".

(ii) Model 2 (Fig.S3, Table S3) which inserts a recognized and real, but unquantified by our direct data, significant time period between the end of LMIA and the horizon recorded by the individual site close of LMIB destruction evidence from Chania and Myrtos-Pyrgos. Model 2 does this by adding an extra boundary between the end of LMIA and the LMIB destruction phase. It also asks the program to calculate an Event that would describe this start of LMIB through to mature LMIB (but pre-destructions) period of time. The model thus comprises between the end of LMIA and the LMIB destruction phase the commands: Boundary "End or Final LMIA to Start LMIB"; Event "Early to Mid/Mature LMIB"; Boundary "Early/Mid LMIB to Later LMIB". The effect of this model and the assumption made will be to achieve the latest possible date for the LMIB destruction phase. We argue this model is likely more realistic as it tries to treat the time within the LMIB phase (and also LMII – see below), but it involves inclusion of non-represented real time – something which some readers will find challenging.

The LMII dataset comes from a destruction horizon late in the phase as represented in the so-called Minoan Unexplored Mansion at Knossos (MUMK) (S55). It thus dates the close of the phase at Knossos. As in the case of LMIB, we could consider trying to allow for the “missing” evidence for the duration of the LMII, between the close of LMIB destructions at Chania and Myrtos-Pyrgos, and the close of LMII destruction at Knossos. Model 1 makes no allowance, and Model 2 inserts an extra boundary for LMII as described above for LMIB.

Models 1 and 2 employ all the non-shaded data shown in Table S1.

Description, information and outputs on a range of the models are shown in Fig. 2, Table 1, Figs. S2-S5, S8, Table S3.
Fig. S1. Map of the Aegean region with the archaeological sites relevant to this study indicated.
**Fig. S2.** Data, model description, calculations and results for Model 1 (for the results, see also Figure 2). A-H show the data description and R_Combine calculations. I-J show the data with agreement indices in Fig 2. K shows the interval calculations made. L shows the correlation plot for duration of mature LMIA versus the date calculated for the Volcanic Destruction Level (VDL) at Akrotiri, Thera. The figures in percentages are the agreement indices for the samples/groups. An index score of ≥60% indicates agreement at approximately the 95% confidence level. The overall Sequence also exhibits an agreement statistic of 84.3% – comfortably greater than the 95% criterion of c.60%. One group of LMIA samples, branch 65/N001/I2, fails the agreement test.* M-N Subjectively re-ordering the data groups in the LMIA pre-VDL sequence can allow 65/N001/I2 to achieve a >60% agreement score, but this has almost no impact on the final VDL dating (e.g. 1658-1611 BC doing this versus 1660-1613 BC for the more objective sequence shown below and in Fig. 2 and used in Table 1), which can be regarded as robust to such minor intra-sequence variations. The horizontal lines under each probability distribution indicate the 2σ (95.4%) confidence calibrated age ranges.

Note: each run of the Sequence analysis part of the OxCal software offers a very slightly different outcome. The run illustrated here is merely a typical outcome.

* The 3-year growth sample (branch 65/N001/I2), and especially the final annual-growth ring (ring 3 dated by OxA-10312 and VERA-2748), exhibits a $^{14}$C age a little more recent than most of the other measurements on short-lived samples from the LMIA phase. One possible explanation is that this sample, pre-dating the VDL, may reflect short-term higher amplitude and/or frequency variation in atmospheric $^{14}$C ages not seen in the IntCal04 record for the period, which is both based on 10-year growth samples and smoothed ($S25$). Some suggestion of such possible higher amplitude and/or frequency changes in atmospheric $^{14}$C levels occurring during the mid-17th century BC is evident both in the non-smoothed IntCal98 record ($S22$), and in other $^{14}$C data on tree-rings from the period ($S16$).
Fig. S2A
Model 1

D_Sequence Miletos WM
First Round 1
Cap 67

- R_Combine RY1000-1010 (df=1 T=1.5(5%3.8))
  - OxA-12301 3439±30BP
  - OxA-12302 3386±31BP

- R_Combine RY1000-1010 (df=1 T=1.6(5%3.8))
  - OxA-12304 3404±31BP
  - OxA-12305 3459±31BP

- R_Combine RY1004-1030 (df=1 T=0.7(5%3.8))
  - OxA-12308 3361±31BP
  - OxA-12309 3397±32BP

- R_Combine RY1004-1050 (df=1 T=1.3(5%3.8))
  - OxA-12310 3345±32BP
  - OxA-12311 3397±32BP

- R_Combine RY1050-1060 (df=1 T=0.7(5%3.8))
  - OxA-12312 3388±30BP
  - OxA-12313 3352±31BP

Event Felling Miletos WM

2300BC 2200BC 2100BC 2000BC 1900BC 1800BC 1700BC 1600BC 1500BC 1400BC

Calendar date

Fig. S2B
### Model 1

<table>
<thead>
<tr>
<th>Event</th>
<th>Kommos R Combine pairs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R Combine K85A/62D9:992 av (df=1) T=1.6(5%3.8))</td>
<td>OxA-11251 3505±40BP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VERA-2636 3445±25BP</td>
<td></td>
</tr>
<tr>
<td>R Combine K85A/62D9:992 av</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R Combine K85A/66B4:22:23 av (df=1) T=0.1(5%3.8))</td>
<td>OxA-11252 3375±45BP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VERA-2637 3390±20BP</td>
<td></td>
</tr>
<tr>
<td>R Combine K85A/66B4:22:23 av</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R Combine K85A/62D8:83 av (df=1) T=22.5(5%3.8))</td>
<td>OxA-11253 3397±38BP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VERA-2638 3600±19BP</td>
<td></td>
</tr>
<tr>
<td>R Combine K85A/62D8:83 av</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M4N003 R Combine pairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>R Combine A (df=1) T=0.5(5%3.8))</td>
</tr>
<tr>
<td>VERA-2743 3413±28BP</td>
</tr>
<tr>
<td>R Combine B (df=1) T=3.0(5%3.8))</td>
</tr>
<tr>
<td>VERA-2744 3427±31BP</td>
</tr>
<tr>
<td>R Combine C (df=1) T=1.5(5%3.8))</td>
</tr>
<tr>
<td>VERA-2745 3386±38BP</td>
</tr>
<tr>
<td>R Combine D (df=1) T=5.6(5%3.8))</td>
</tr>
<tr>
<td>VERA-2746 3471±28BP</td>
</tr>
<tr>
<td>R Combine E</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calibrated date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2600CalBC</td>
</tr>
<tr>
<td>2400CalBC</td>
</tr>
<tr>
<td>2200CalBC</td>
</tr>
<tr>
<td>2000CalBC</td>
</tr>
<tr>
<td>1800CalBC</td>
</tr>
<tr>
<td>1600CalBC</td>
</tr>
<tr>
<td>1400CalBC</td>
</tr>
</tbody>
</table>

Fig. S2C
Fig. S2D
**Model 1**

<table>
<thead>
<tr>
<th>Sequence MBA-LB2, LMIA TPQ then LMIA-II short-lived</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boundary Start Sequence</strong></td>
</tr>
<tr>
<td>Phase MBA or LMIA long-lived = TPQ for LMIA</td>
</tr>
<tr>
<td>Phase Akrotiri long-lived wood earlier LMIA context</td>
</tr>
<tr>
<td>R. Combine M54/2/VII/60/de=247 (df=1 T=0.0(5% 3.8))</td>
</tr>
<tr>
<td>Ox-A-11250 3550±45BP</td>
</tr>
<tr>
<td>H122037 3552±19BP</td>
</tr>
<tr>
<td>R. Combine M54/2/VII/60/de=247</td>
</tr>
<tr>
<td>Phase Kommos early LMIA secure charcoal</td>
</tr>
<tr>
<td>R. Combine K85A/62D9:92 (df=1 T=1.6(5% 3.8))</td>
</tr>
<tr>
<td>Ox-A-11251 3505±40BP</td>
</tr>
<tr>
<td>VERA-2636 3445±25BP</td>
</tr>
<tr>
<td>R. Combine K85A/62D9:92</td>
</tr>
<tr>
<td>R. Combine K85A/66B/4:22+23 (df=1 T=0.1(5% 3.8))</td>
</tr>
<tr>
<td>Ox-A-11252 3375±45BP</td>
</tr>
<tr>
<td>VERA-2637 3390±20BP</td>
</tr>
<tr>
<td>R. Combine K85A/66B/4:22+23</td>
</tr>
<tr>
<td>Phase K85A/62D8:83</td>
</tr>
<tr>
<td>Ox-A-11253 3397±38BP</td>
</tr>
<tr>
<td>VERA-2638 3600±19BP</td>
</tr>
<tr>
<td>Phase Space 25B, Tr.66B</td>
</tr>
<tr>
<td>R. Combine R. Comb (df=2 T=3.5(5% 6.0))</td>
</tr>
<tr>
<td>Ox-A-11883 3485±33BP</td>
</tr>
<tr>
<td>Ox-A-11944 3435±25BP</td>
</tr>
<tr>
<td>Ox-A-3429 3350±70BP</td>
</tr>
<tr>
<td>R. Combine R. Comb</td>
</tr>
<tr>
<td><strong>TPQ Late MBA/Early LMIA (Trianda)</strong></td>
</tr>
<tr>
<td>Prior Felling Trianda WM</td>
</tr>
</tbody>
</table>

| Boundary Start Mature LMIA                   |
| Sequence Mature LMIA                        |
| Phase Mature LMIA                           |
| Phase Mileitos LMIA bone samples            |

**Calibrated date**

2600CalBC 2400CalBC 2200CalBC 2000CalBC 1800CalBC 1600CalBC 1400CalBC

Fig. S2E
### Model F

**Sequence** MBA-LB, LMIA TPQ than LMIA-II short-lived

**Phase** Mature LMIA

**LMIA bone samples**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Age (±1σ) BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>OxA-11954</td>
<td>3377±24BP</td>
</tr>
<tr>
<td>OxA-11951</td>
<td>3423±23BP</td>
</tr>
</tbody>
</table>

**Phase** Pre-VDL LMIA

- **R_Combine M4N003** (df=9 T=13.2(9% 16.9))
  - OxA-10315 3446±39BP
  - OxA-10316 3342±38BP
  - OxA-10317 3440±35BP
  - OxA-10318 3355±40BP
  - OxA-10319 3424±38BP
  - VERA-2743 3413±28BP
  - VERA-2744 3427±31BP
  - VERA-2745 3386±28BP
  - VERA-2746 3474±28BP
  - VERA-2747 3386±30BP
- **R_Combine Trianda short-lived late LMIA twig** (df=1 T=0.2(9% 3.8))
  - OxA-10643 3367±39BP
  - OxA-11884 3344±32BP
- **R_Combine Trianda short-lived late LMIA twig**
  - OxA-10314 3330±27BP
  - OxA-10313 3353±27BP
  - OxA-10312 3293±27BP
  - VERA-2751 3325±28BP
  - VERA-2749 3335±33BP
  - VERA-2748 3319±28BP
- **R_Combine 65/N001/12** (df=5 T=2.6(9% 11.1))
  - OxA-10314 3330±27BP
  - OxA-10313 3353±27BP
  - OxA-10312 3293±27BP
  - VERA-2751 3325±28BP
  - VERA-2749 3335±33BP
  - VERA-2748 3319±28BP
- **R_Combine 65/N001/12**
  - TPQ Miletos Thera eruption TPQ
  - Prior Felling Miletos WM
- **R_Combine Thera VDL**
  - Hcl-7092-6795 3360±60BP

**Calibrated date**

![Graph with calibrated dates](image)

Fig. S2F
### Model 1

<table>
<thead>
<tr>
<th>Sequence</th>
<th>MBA-LB2</th>
<th>LMIA TPQ than LMIA-II short-lived</th>
<th>Phase</th>
<th>Mature LMIA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MBA-LB2</td>
<td>LMIA TPQ than LMIA-II short-lived</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R_Combine VDL (df=27 T=31.5(5% 39.9))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R_Combine Hd-5058-5519 3490=80BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hd-6059-7967 3140±70BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-1552 3390±65BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-1555 3245±65BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-1548 3335±60BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-1549 3460±80BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-1550 3395±65BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-1553 3340±65BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-1554 3280±65BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-1556 3415±70BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>K-5352 3310±65BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>K-5353 3430±90BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>K-3228 3340±55BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>K-4255 3380±60BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-11817 3348±31BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-11818 3367±33BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-11820 3400±31BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-11869 3336±34BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-12170 3336±28BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-12171 3372±28BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-12175 3318±28BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OxA-12172 3321±32BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VERA-2756 3317±28BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VERA-2757 3315±31BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VERA-2758 3339±28BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VERA-2757 repeat 3390±32BP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VERA-2758 repeat 3322±33BP</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Fig. S2G
# Model 1

**Sequence:** MBA-LB2, LMIA TPO then LMIA-II short-lived

**Phase:** LMIB Destructions Crete

<table>
<thead>
<tr>
<th>Event Chania LMIB Destruction</th>
<th>OxA-3187 3230±70BP</th>
<th>OxA-3188 3200±70BP</th>
<th>OxA-3189 3270±70BP</th>
<th>OxA-3225 3160±80BP</th>
<th>OxA-10324 3270±26BP</th>
<th>OxA-10325 3228±26BP</th>
<th>OxA-10326 3227±25BP</th>
<th>OxA-10411 3150±40BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>R_Combine Myrtos-Pyrgos (df=7 T=7.6 5% 14.1)</td>
<td><img src="image1.png" alt="Graph" /></td>
<td><img src="image2.png" alt="Graph" /></td>
<td><img src="image3.png" alt="Graph" /></td>
<td><img src="image4.png" alt="Graph" /></td>
<td><img src="image5.png" alt="Graph" /></td>
<td><img src="image6.png" alt="Graph" /></td>
<td><img src="image7.png" alt="Graph" /></td>
<td><img src="image8.png" alt="Graph" /></td>
</tr>
</tbody>
</table>

**Phase:** Late Minoan II

<table>
<thead>
<tr>
<th>OxA-2006 3070±70BP</th>
<th>OxA-2097 3190±65BP</th>
<th>OxA-2098 3220±65BP</th>
<th>OxA-11882 3156±33BP</th>
<th>OxA-11943 3148±23BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>R_Combine Knossos LMII Destruction short-lived (df=4 T=2.8 5% 9.5)</td>
<td><img src="image9.png" alt="Graph" /></td>
<td><img src="image10.png" alt="Graph" /></td>
<td><img src="image11.png" alt="Graph" /></td>
<td><img src="image12.png" alt="Graph" /></td>
</tr>
</tbody>
</table>

**Boundary LMIB/LMII transition**

Correlation Correl = Thera VDL * Duration Mature LMIA

<table>
<thead>
<tr>
<th>3500 CalBC</th>
<th>3000 CalBC</th>
<th>2500 CalBC</th>
<th>2000 CalBC</th>
<th>1500 CalBC</th>
<th>1000 CalBC</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image13.png" alt="Graph" /></td>
<td><img src="image14.png" alt="Graph" /></td>
<td><img src="image15.png" alt="Graph" /></td>
<td><img src="image16.png" alt="Graph" /></td>
<td><img src="image17.png" alt="Graph" /></td>
<td><img src="image18.png" alt="Graph" /></td>
</tr>
</tbody>
</table>

**Calibrated date**

Fig. S2H
Fig. S2I

<table>
<thead>
<tr>
<th>Calendar date</th>
<th>3000 BC</th>
<th>2800 BC</th>
<th>2600 BC</th>
<th>2400 BC</th>
<th>2200 BC</th>
<th>2000 BC</th>
<th>1800 BC</th>
<th>1600 BC</th>
<th>1400 BC</th>
</tr>
</thead>
</table>

**Model 1**

- **Sequence Trianda WM**
  - Event Felling Trianda WM
- **Sequence Miletos WM**
  - Event Felling Miletos WM

Sequence MBA-LB2, LMIA TPQ then LMIA-II short-lived \( \{ A = 85.1\% (A' = 60.0\%) \} \)

**Boundary Start Sequence**

- Phase MBA or LMIA long-lived = TPQ for LMIA
  - Phase Akrotiri long-lived wood earlier LMIA context
    - \( R \_ \text{Combine M54/2/VII/600\text{d}c} = 247 \, 101.7\% \)
  - Phase Kommos early LMIA secure charcoal
    - \( R \_ \text{Combine K85A/62D9/92} = 102.9\% \)
    - \( R \_ \text{Combine K85A/66B4:22+23} = 100.8\% \)
  - Phase K85A/62D8:83
    - \( Oc4-11253 = 95.4\% \)
    - \( VERA-2638 = 92.0\% \)
  - Phase Space 25B, Tr.66B
    - \( R \_ \text{Combine R Com} = 99.5\% \)
  - TPQ Late MBA/Early LMIA (Trianda)
    - \( Prior \_ \text{Felling Trianda WM} = 100.3\% \)

**Boundary Start Mature LMIA**

- Sequence Mature LMIA
  - Phase Mature LMIA
    - Phase Miletos LMIA bone samples
      - \( Oc4-11954 = 112.2\% \)
      - \( Oc4-11951 = 94.0\% \)
  - Sequence
    - Phase Pre-VDLMIA
      - \( R \_ \text{Combine M4N003} = 88.6\% \)
      - \( R \_ \text{Combine Trianda short-lived Late LMIA twig} = 119.6\% \)
      - \( R \_ \text{Combine 65N001/12} = 46.8\% \)
      - TPQ Miletos Thera eruption TPQ
        - \( Prior \_ \text{Felling Miletos WM} = 100.1\% \)
Fig. S2J
Fig. S2K
Fig. S2L
### Model 1 Subjective Ordering

<table>
<thead>
<tr>
<th>Event</th>
<th>Ordering</th>
</tr>
</thead>
<tbody>
<tr>
<td>D_Sequence Trianda WM</td>
<td></td>
</tr>
<tr>
<td>Event Felling Trianda WM</td>
<td></td>
</tr>
<tr>
<td>D_Sequence Miletos WM</td>
<td></td>
</tr>
<tr>
<td>Event Felling Miletos WM</td>
<td></td>
</tr>
<tr>
<td>Sequence MBA-LB2, LMIA TPQ then LMIA-II short-lived</td>
<td>A=92.8%, A'=60.0%</td>
</tr>
</tbody>
</table>

#### Boundary Start Sequence

- Phase MBA or LMIA long-lived = TPQ for LMIA
  - Phase Akrotiri long-lived wood earlier LMIA context
    - R_Combine M5/2/VI.60/\(\text{dp}=247\) 100.6%
  - Phase Kommos early LMIA secure charcoal
    - R_Combine K85A/62D9:92 104.2%
    - R_Combine K85A/66B4:22\(\text{dp}=23\) 101.1%
  - Phase K85A/62D9:83
    - Oec-11253 95.3%
    - VERA-2638 86.7%
  - Phase Space 25B, Tr.66B
    - R_Combine R.Com 99.3%
  - TPQ Late MBA/Early LMIA (Trianda)
    - Prior @Felling Trianda WM 99.9%

#### Boundary Start Mature LMIA

- Sequence Mature LMIA
  - Phase Mature LMIA
    - Phase Miletos LMIA bone samples
      - Oec-11954 110.4%
      - Oec-11951 93.9%
    - Sequence
      - Phase Pre-VDL LMIA
        - R_Combine M4N003 89.1%
      - TPQ Miletos Thera eruption TPQ
        - Prior @Felling Miletos WM 95.2%
      - R_Combine Trianda short-lived late LMIA twig 132.2%

---

![Fig. S2M](image-url)
Fig. S2N
Fig. S3. A-B. The Sequence analysis portion of the Model 2 output, typical example (compare with Fig. 2 and Fig. S2).
Fig. S3B
**Fig. S4.** A-B. The Sequence analysis portion of the Model 1 including single and irrelevant TPQ data, typical example (compare with Fig. 2 and Figs. S2-S3). Data marked with a ? are shown with their individual calibrated result, but have not been included in the Sequence calculations – these data do not offer a satisfactory agreement level with the model (<60% agreement index). These samples usually offer irrelevantly early *terminus post quem* data.

### Model 1 with extras

<table>
<thead>
<tr>
<th>Event</th>
<th>Sequence analysis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Sequence Trianda WM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event Felling Trianda WM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Sequence Miletos WM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event Felling Miletos WM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sequence MIA-I/II, LMA/II TPQ then LMIA-II short-lived [A=84.4%, K=60.0%]**

#### Boundary Start Sequence

- Phase MBA or LMIA long-lived = TPQ for LMIA
  - Phase Akrotiri long-lived wood earlier LMIA context
  - Phase Other LMIA long-lived TPQ
  - Prior @Felling Trianda WM

### Boundary Start Mature LMIA

#### Sequence Mature LMIA

- Phase Miletos LMIA bone samples
  - Oca-11954 112.5%
  - Oca-11951 92.9%

#### Sequence Pre-MIL LMIA

- Phase LMIA Akrotiri pre YDL
  - Oca-119503 87.7%
  - Phase Trianda short-lived twig late LMIA

### Calendar date

<table>
<thead>
<tr>
<th>3000 BC</th>
<th>2500 BC</th>
<th>2000 BC</th>
<th>1500 BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000 BC</td>
<td>2500 BC</td>
<td>2000 BC</td>
<td>1500 BC</td>
</tr>
</tbody>
</table>
Fig. S4B
Fig. S5. A-B. The Sequence analysis portion output of Model 1 with no Santorini samples included and with the VDL date range modeled given the rest of the evidence available (see also Table 1).
Model 1 NO Santorini data included

Sequence MBA-LB2, LMIA TPQ then LMIA-II short-lived (A= 88.2%(A'c= 60.0%))

Sequence Mature LMIA
Phase Mature LMIA
Sequence
Phase Pre-VDL LMIA

TPQ Miletos Thera eruption TPQ
Prior @Felling Miletos WM 98.4%
Event Thera VDL

Boundary End or Final LMIA to LMIB Destructs

Phase LMIB Destructs Crete

Phase Chania
OctA-2517 83.0%
OctA-2518 106.7%
OctA-2646 113.2%
OctA-2647 85.5%
OctA-10320 96.9%
OctA-10321 103.4%
OctA-10322 85.2%
OctA-10323 106.9%
Event Chania LMIB Destruction
R Combine Myrtos-Pyrgos 104.1%

Boundary LMIB/LMII transition

Phase Late Mincon II
R Combine Knossos LMII Destruction short-lived 105.2%

Boundary End Sequence

3500BC  3000BC  2500BC  2000BC  1500BC  1000BC
Calendar date

Fig. S5B
Fig. S6. Calibrated calendar age probability histograms for the five known age (tree-rings dated AD1640-1649) test data run at VERA, and for the same decade tree-ring sample run at Heidelberg. The upper and lower horizontal brackets under each distribution show, respectively, the $2\sigma$ calibrated calendar age ranges. All the radiocarbon ages include the correct tree-ring age within their $1\sigma$ calibrated ranges.
Fig. S7. Dating two tree-ring samples (Defined Sequence data) versus the $^{14}$C calibration curve (“wiggle matching”). A-B. Three decade Trianda sample (each decade = weighted average of 3 consistent measurements) ending in bark lies at a period when $^{14}$C levels are varying quite significantly, and thus it offers three potential placement zones. This sample is a terminus post quem for early LMIA or the late Middle Bronze Age. The “post” element may be significant. The wiggle-match range (1815-1737 BC at 95.4% confidence) is the upper limit to the possible dating of the LMIA phase – it must be younger, perhaps by quite a lot. C-D. The 72-year, divided into 7 consecutive decades, Miletos sample (with each decade the weighted average of two Oxford measurements) ending with the (likely) waney edge (and so more or less the felling date) offers a more specific wiggle-match analysis. This sample was found covered by Santorini eruption tephra, and so is a terminus post quem for the eruption. The approximate felling date calculated from the wiggle match is 1670-1643 BC at 95.4% confidence. The hollow (outline) distributions show the calibrated ages for each weighted average on its own; the solid black distributions within these show the calculated ranges applying the Bayesian Defined Sequence model. The figures in percentages are the agreement indices for the samples/groups. An index score of ≥60% indicates agreement at approximately the 95% confidence level. The horizontal lines under each distribution indicate the 95.4% confidence calibrated calendar age range(s).
**Fig. S8.** A-B. The Sequence analysis portion output of Model 1 adding in the $^{14}$C wiggle-match data and modeled eruption event date from ref. S30 (see also Table 1).

A.

![Model 1 diagram](image)

- **D_Sequene Trianda WM**
- **Event Felling Trianda WM**
- **D_Sequene Miletos WM**
- **Event Felling Miletos WM**
- **D_Sequene Santorini Olive = Ref. S30**
- **H2-23599-24426 rings 1-13 130.4%**
  - **Cap 18.5**
- **H2-23587 rings 14-37 108.6%**
  - **Cap 23**
- **H2-23589 rings 38-59 115.6%**
  - **Cap 17.5**
- **H2-23588-24402 rings 60-72 151.4%**
  - **Cap 6**
- **Event Santorini Eruption = Ref. S30**

Sequence MBA-LR2, LMIA TPQ then LMIA-II short-lived \{A=85.6%/Ae=60.0%\}

**Boundary Start Sequence**

- **Phase MBA or LMIA long-lived = TPQ for LMIA**
  - **Phase Akrotiri long-lived wood earlier LMIA context**
    - **R_Combine M84/2/VI/60/de>247 102.0%**
  - **Phase Kommos early LMIA secure charcoal**
    - **R_Combine K85a/62D9.92 103.1%**
    - **R_Combine K85/66B4.22+23 101.2%**
    - **Phase K85a/62D8.83**
      - **Oca-11253 95.4%**
      - **Vera-2638 91.8%**
    - **Phase Space 25B, Tr.66B**
      - **R_Combine _R_Com 99.1%**
  - **TPQ Late MBA/Early LMIA (Trianda)**
    - **Prior @Felling Trianda WM 99.8%**

**Boundary Start Mature LMIA**

- **Sequence Mature LMIA**
- **Phase Mature LMIA**
- **Phase Miletos LMIA bone samples**

<table>
<thead>
<tr>
<th>3000BC</th>
<th>2800BC</th>
<th>2600BC</th>
<th>2400BC</th>
<th>2200BC</th>
<th>2000BC</th>
<th>1800BC</th>
<th>1600BC</th>
<th>1400BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calendar date</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fig. S8B.
Table S1. List of all samples and radiocarbon dates obtained for, or used in, this study. Source Laboratories: Oxford Radiocarbon Accelerator Unit – OxA (OxA samples with nos. 1548 to 3225 come from refs. S4, S5), Vienna Environmental Research Accelerator – VERA, Heidelberg Radiocarbon Laboratory – Hd (samples Hd7092-6795, 6058-5519, 6059-7967 come from ref. S8), Copenhagen Radiocarbon Laboratory – K (K samples come from ref. S6). For discussion of samples used/not used in this study in the principle Models 1 and 2 analyses (those not used are shaded grey), see above, and see notes in right hand column of Table S1 and Table S2 and notes. The samples employed in Models 1 and 2 are the non-shaded entries. Dark grey shaded entries are excluded altogether from the analysis for the reasons indicated. The light grey shaded entries are single data for samples or contexts, or are irrelevant early terminus post quem data for Late Minoan IB or Late Minoan II samples. These samples are not included in the Models 1 and 2 analyses, but are included in the Model 1 run “with extras” shown in Fig. S4 and Table S3.

<table>
<thead>
<tr>
<th>Site</th>
<th>Submitter’s reference</th>
<th>Material*</th>
<th>Species</th>
<th>OxA</th>
<th>VERA</th>
<th>Hd</th>
<th>K</th>
<th>(^{14}C)BP (±1\sigma)</th>
<th>(δ^{13}C)</th>
<th>Phase</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miletos, Turkey</td>
<td>AT 99.915</td>
<td>bone</td>
<td>sheep/goat</td>
<td>11951</td>
<td></td>
<td></td>
<td></td>
<td>3423 (±23) (-19.5)</td>
<td></td>
<td>LMIA</td>
<td>Secure</td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>AT 99.729</td>
<td>bone</td>
<td>sheep/goat</td>
<td>11952</td>
<td></td>
<td></td>
<td></td>
<td>3243 (±22) (-20.1)</td>
<td></td>
<td>Intrusive into LMIA</td>
<td>Bad</td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>AT 99.779</td>
<td>bone</td>
<td>sheep/goat</td>
<td>11953</td>
<td></td>
<td></td>
<td></td>
<td>3279 (±26) (-20)</td>
<td></td>
<td>Intrusive into LMIA</td>
<td>Bad</td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>AT 99.811</td>
<td>bone</td>
<td>sheep/goat</td>
<td>11954</td>
<td></td>
<td></td>
<td></td>
<td>3377 (±24) (-19.4)</td>
<td></td>
<td>LMIA</td>
<td>Secure</td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>M542/II/60/SE&gt;247</td>
<td>charcoal</td>
<td>Olea europaea</td>
<td>11250</td>
<td>22037</td>
<td></td>
<td></td>
<td>3550 (±45) (-23.4)</td>
<td></td>
<td>LMIA(early)</td>
<td>Secure</td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>Space 25B Tr.66B</td>
<td>charcoal</td>
<td>Chamaecyparis sp.</td>
<td>3429</td>
<td></td>
<td></td>
<td></td>
<td>3350 (±70) (-27.8)</td>
<td></td>
<td>LMIA(early)</td>
<td>Secure</td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>Space 25B Tr.66B</td>
<td>charcoal</td>
<td>Chamaecyparis sp.</td>
<td>11833</td>
<td></td>
<td></td>
<td></td>
<td>3485 (±33) (-25.9)</td>
<td></td>
<td>LMIA(early)</td>
<td>Secure</td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>Space 25B Tr.66B</td>
<td>charcoal</td>
<td>Chamaecyparis sp.</td>
<td>11944</td>
<td></td>
<td></td>
<td></td>
<td>3435 (±25) (-24.4)</td>
<td></td>
<td>LMIA(early)</td>
<td>Secure</td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>TP-KE-30</td>
<td>charcoal</td>
<td></td>
<td>10618</td>
<td></td>
<td></td>
<td></td>
<td>3270 (±45) (-22.2)</td>
<td></td>
<td>LMIA(early)</td>
<td>poor/bad‡</td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>TP-KE-30</td>
<td>charcoal</td>
<td></td>
<td>10619</td>
<td></td>
<td></td>
<td></td>
<td>3295 (±45) (-22.8)</td>
<td></td>
<td>LMIA(early)</td>
<td>poor/bad‡</td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>K85A/62D/9:92</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>11251</td>
<td></td>
<td></td>
<td></td>
<td>3505 (±40) (-23.6)</td>
<td></td>
<td>LMIA(early)</td>
<td>Secure</td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>K85A/66B/4:22+23</td>
<td>charred twig</td>
<td></td>
<td>11252</td>
<td></td>
<td></td>
<td></td>
<td>3445 (±25) (-23.4)</td>
<td></td>
<td>LMIA(early)</td>
<td>Secure</td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>K85A/62D/8:83</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>11253</td>
<td></td>
<td></td>
<td></td>
<td>3375 (±45) (-23.6)</td>
<td></td>
<td>LMIA(early)</td>
<td>Secure</td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>38/TP-KC-22</td>
<td>charcoal</td>
<td></td>
<td>10731</td>
<td></td>
<td></td>
<td></td>
<td>3450 (±45) (-24.1)</td>
<td></td>
<td>LMIA(early)</td>
<td>Secure</td>
</tr>
<tr>
<td>Trianda, Rhodes</td>
<td>Trianda 1</td>
<td>charcoal</td>
<td></td>
<td>10623</td>
<td></td>
<td></td>
<td></td>
<td>3245 (±45) (-23.5)</td>
<td></td>
<td>LMIA(early)</td>
<td>secure – but single context</td>
</tr>
<tr>
<td>Trianda, Rhodes</td>
<td>Trianda 9</td>
<td>charcoal</td>
<td>?Olea sp.</td>
<td>10642</td>
<td></td>
<td></td>
<td></td>
<td>3333 (±39) (-25.2)</td>
<td></td>
<td>LMIA(early)</td>
<td>single</td>
</tr>
<tr>
<td>Trianda, Rhodes</td>
<td>34/AE1024/A rings</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>10728</td>
<td></td>
<td></td>
<td></td>
<td>3455 (±45) (-25.3)</td>
<td></td>
<td>Late MB/</td>
<td>Secure</td>
</tr>
<tr>
<td>Location</td>
<td>Site ID</td>
<td>Rings</td>
<td>Material</td>
<td>Species</td>
<td>Ring Dates</td>
<td>Age (calBP)</td>
<td>Error</td>
<td>Phase</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>--------</td>
<td>-------</td>
<td>----------</td>
<td>---------</td>
<td>------------</td>
<td>-------------</td>
<td>-------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trianda, Rhodes</td>
<td>34/AE1024/B</td>
<td>21-30 (bark)</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>10729</td>
<td>3410 45</td>
<td>-25.9</td>
<td>LMIA(early) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>36/AE1024/C</td>
<td>11-20</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>10730</td>
<td>3490 45</td>
<td>-25.5</td>
<td>LMIA(early) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>34/AE1024/A</td>
<td>30-10</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>11945</td>
<td>3473 24</td>
<td>-24.9</td>
<td>LMIA(early) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trianda, Rhodes</td>
<td>34/AE1024/B</td>
<td>21-30 (bark)</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>11946</td>
<td>3474 24</td>
<td>-26.1</td>
<td>Late MB/LMIA(early) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>36/AE1024/C</td>
<td>11-20</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>11948</td>
<td>3526 25</td>
<td>-25.2</td>
<td>Late MB/LMIA(early) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>Trianda 4</td>
<td>F/65/N001/I2</td>
<td>bark</td>
<td>charcoal</td>
<td>10640</td>
<td>3338 40</td>
<td>-25.4</td>
<td>LMIA phased - single</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>G/65/N001/I2</td>
<td>2</td>
<td>ring</td>
<td>charcoal</td>
<td>10312</td>
<td>3293 27</td>
<td>-24</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H/65/N001/I2</td>
<td>3</td>
<td>ring</td>
<td>charcoal</td>
<td>10313</td>
<td>3353 27</td>
<td>-24.1</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A/M4N003</td>
<td>rings 6-8</td>
<td>bark</td>
<td>charcoal</td>
<td>10314</td>
<td>3330 27</td>
<td>-24.5</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B/M4N003</td>
<td>rings 3-5</td>
<td>bark</td>
<td>charcoal</td>
<td>10315</td>
<td>3446 39</td>
<td>-24</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C/M4N003</td>
<td>rings 7-8</td>
<td>bark</td>
<td>charcoal</td>
<td>10316</td>
<td>3413 28</td>
<td>-24.3</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D/M4N003</td>
<td>rings 5-6</td>
<td>bark</td>
<td>charcoal</td>
<td>10317</td>
<td>3342 38</td>
<td>-24.4</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E/M4N003</td>
<td>rings 3-4</td>
<td>bark</td>
<td>charcoal</td>
<td>10318</td>
<td>3427 31</td>
<td>-20.4</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>TP-KE-31</td>
<td></td>
<td>charcoal</td>
<td></td>
<td>10620</td>
<td>3269 38</td>
<td>-22.4</td>
<td>LMIA(late) Phased - single</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>40/TP-KC-20</td>
<td></td>
<td>charcoal</td>
<td></td>
<td>10761</td>
<td>3440 38</td>
<td>-24.3</td>
<td>LMIA(late) Phased - TPQ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>39/TP-KC-21</td>
<td>1:C-TU-MIL-1/RY1000-1010</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12301</td>
<td>3439 30</td>
<td>-25.4</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1:C-TU-MIL-</td>
<td></td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12302</td>
<td>3386 31</td>
<td>-26</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site</td>
<td>Unit</td>
<td>Layer</td>
<td>Object</td>
<td>Species</td>
<td>Code</td>
<td>CMN</td>
<td>Age</td>
<td>Phase</td>
<td>Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------</td>
<td>-------</td>
<td>--------</td>
<td>--------------------</td>
<td>------</td>
<td>-----</td>
<td>-----</td>
<td>-------</td>
<td>-------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1000-1010</td>
<td>2/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12303</td>
<td>3467</td>
<td>31</td>
<td>-25.5</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1010-1020</td>
<td>3/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12304</td>
<td>3404</td>
<td>31</td>
<td>-25.5</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1020-1030</td>
<td>3/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12305</td>
<td>3459</td>
<td>31</td>
<td>-25.7</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1020-1030</td>
<td>4/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12306</td>
<td>3416</td>
<td>31</td>
<td>-25.7</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1030-1040</td>
<td>4/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12307</td>
<td>3425</td>
<td>31</td>
<td>-25.6</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1040-1050</td>
<td>5/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12308</td>
<td>3361</td>
<td>31</td>
<td>-26</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1040-1050</td>
<td>6/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12309</td>
<td>3397</td>
<td>31</td>
<td>-26</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1050-1060</td>
<td>6/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12310</td>
<td>3345</td>
<td>32</td>
<td>-26.3</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1050-1060</td>
<td>7/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12311</td>
<td>3397</td>
<td>32</td>
<td>-26.3</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1060-1070</td>
<td>7/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12312</td>
<td>3388</td>
<td>30</td>
<td>-26.3</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1060-1070</td>
<td>2/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12313</td>
<td>3352</td>
<td>31</td>
<td>-26.1</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>1/RY1060-1070</td>
<td>1/C-TU-MIL</td>
<td>charcoal</td>
<td>Quercus sp.</td>
<td>12407</td>
<td>3385</td>
<td>34</td>
<td>-25.8</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trianda, Rhodes</td>
<td>Trianda 8</td>
<td></td>
<td>charcoal</td>
<td></td>
<td>10641</td>
<td>3498</td>
<td>39</td>
<td>-24.4</td>
<td>LMIA(late) phased single, TPQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trianda, Rhodes</td>
<td>Trianda 13</td>
<td></td>
<td>charred twig</td>
<td>Quercus sp.</td>
<td>10643</td>
<td>3367</td>
<td>39</td>
<td>-26.3</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trianda, Rhodes</td>
<td>Trianda 13</td>
<td></td>
<td>charred twig</td>
<td>Quercus sp.</td>
<td>11884</td>
<td>3344</td>
<td>32</td>
<td>-26</td>
<td>LMIA(late) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tsoungiza, Nemea</td>
<td>Tsoungiza 4</td>
<td></td>
<td>charcoal</td>
<td></td>
<td>11312</td>
<td>3215</td>
<td>38</td>
<td>-24.2</td>
<td>LMIA(late), (LMIA(late)) phased*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tsoungiza, Nemea</td>
<td>Tsoungiza 5</td>
<td></td>
<td>charcoal</td>
<td></td>
<td>11313</td>
<td>3261</td>
<td>39</td>
<td>-24.1</td>
<td>LMIA(late), (LMIA(late)) phased*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tsoungiza, Nemea</td>
<td>Tsoungiza 6</td>
<td></td>
<td>charcoal</td>
<td>Allium sp.</td>
<td>11314</td>
<td>3202</td>
<td>38</td>
<td>-22.7</td>
<td>LMIA(late), (LMIA(late)) phased*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>M2/76 N003</td>
<td></td>
<td>charred seed</td>
<td>? Lathyrus sp.</td>
<td>11817</td>
<td>3348</td>
<td>31</td>
<td>-22.9</td>
<td>LMIA(VDL) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>M7/68A N004</td>
<td></td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>11818</td>
<td>3367</td>
<td>33</td>
<td>-25.8</td>
<td>LMIA(VDL) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>M10/23A N012</td>
<td></td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>11820</td>
<td>3400</td>
<td>31</td>
<td>-25.2</td>
<td>LMIA(VDL) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>M31/43 N047</td>
<td></td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>11869</td>
<td>3336</td>
<td>34</td>
<td>-22.8</td>
<td>LMIA(VDL) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>M2/76 N003</td>
<td></td>
<td>charred seed</td>
<td>? Lathyrus sp.</td>
<td>12170</td>
<td>3336</td>
<td>28</td>
<td>-22.9</td>
<td>LMIA(VDL) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>M7/68A N004</td>
<td></td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>12171</td>
<td>3315</td>
<td>31</td>
<td>-24.1</td>
<td>LMIA(VDL) Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>M31/43 N047</td>
<td></td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>12172</td>
<td>3390</td>
<td>32</td>
<td>-21.5</td>
<td>LMIA(VDL) Secure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: CMN = Code, Age, and Morphological Significance; Secure = Phase of Secure Analysis; Phased = Phased Analysis; (LMIA(late))% = (LMIA(late)) Percentage; Phased* = Phased Analysis (late); TPQ = Total Phases; VDL = Very Dark Layer.
<table>
<thead>
<tr>
<th>Site/Location</th>
<th>Code</th>
<th>Artifact Type/Plant</th>
<th>Species</th>
<th>Date Code</th>
<th>Date</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Datum</th>
<th>Marker</th>
<th>Status</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akrotiri, Thera</td>
<td>M10/23A N012</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>12175</td>
<td>2756</td>
<td>3317</td>
<td>28</td>
<td>-21.6</td>
<td>LMIA(VDL)</td>
<td>Secure</td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>1</td>
<td>charred seed</td>
<td>Lathyrus sp.</td>
<td>1548</td>
<td>3318</td>
<td>28</td>
<td>-24.7</td>
<td>LMIA(VDL)</td>
<td>Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>1</td>
<td>charred seed</td>
<td>Lathyrus sp.</td>
<td>1549</td>
<td>3335</td>
<td>60</td>
<td>-23</td>
<td>LMIA(VDL)</td>
<td>Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>2</td>
<td>charred seed</td>
<td>Lathyrus sp.</td>
<td>1550</td>
<td>3395</td>
<td>65</td>
<td>-23</td>
<td>LMIA(VDL)</td>
<td>Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>4</td>
<td>charred seed</td>
<td>Lathyrus sp.</td>
<td>1552</td>
<td>3390</td>
<td>65</td>
<td>-23</td>
<td>LMIA(VDL)</td>
<td>Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>8</td>
<td>charred seed</td>
<td>Lathyrus sp.</td>
<td>1553</td>
<td>3340</td>
<td>65</td>
<td>-23</td>
<td>LMIA(VDL)</td>
<td>Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>8</td>
<td>charred seed</td>
<td>Lathyrus sp.</td>
<td>1554</td>
<td>3226</td>
<td>65</td>
<td>-23</td>
<td>LMIA(VDL)</td>
<td>Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>9</td>
<td>charred seed</td>
<td>Lathyrus sp.</td>
<td>1555</td>
<td>3245</td>
<td>65</td>
<td>-23</td>
<td>LMIA(VDL)</td>
<td>Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>11</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>1556</td>
<td>3415</td>
<td>70</td>
<td>-23</td>
<td>LMIA(VDL)</td>
<td>Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>041079-1, 220976</td>
<td>pulses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>011079-1, 021069</td>
<td>pulses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>20579-3</td>
<td>pulses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akrotiri, Thera</td>
<td>250780</td>
<td>charred twig</td>
<td>Tamarix sp.</td>
<td>4255</td>
<td>3380</td>
<td>60</td>
<td>-23.8</td>
<td>LMIA(VDL)</td>
<td>Secure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tsoungiza, Nemea</td>
<td>Tsoungiza 2</td>
<td>charred seed</td>
<td>Vitis vinifera</td>
<td>11309</td>
<td>7967</td>
<td>3140</td>
<td>70</td>
<td></td>
<td>LMIA(VDL)</td>
<td>Secure – see correction below</td>
<td></td>
</tr>
<tr>
<td>Tsoungiza, Nemea</td>
<td>Tsoungiza 3</td>
<td>charcoal</td>
<td>? Quercus sp.</td>
<td>11310</td>
<td>5619</td>
<td>3490</td>
<td>80</td>
<td></td>
<td>LMIA(VDL)</td>
<td>Secure – see correction below</td>
<td></td>
</tr>
<tr>
<td>Tsoungiza, Nemea</td>
<td>Tsoungiza 3</td>
<td>charcoal</td>
<td>? Quercus sp.</td>
<td>11311</td>
<td>6058-6059</td>
<td>3503</td>
<td>38</td>
<td>-24.5</td>
<td>LMIA(VDL)</td>
<td>phased*</td>
<td></td>
</tr>
<tr>
<td>Chania, Crete</td>
<td>15/TR10,Rm E</td>
<td>charred seed</td>
<td>Pisum sativum</td>
<td>2517</td>
<td>7092-6795</td>
<td>3308</td>
<td>39</td>
<td>-23.4</td>
<td>LMIA(VDL)</td>
<td>phased*</td>
<td></td>
</tr>
<tr>
<td>Chania, Crete</td>
<td>13/TR17,1984,Rm C</td>
<td>charred seed</td>
<td>Vicia faba</td>
<td>2518</td>
<td>6058-6059</td>
<td>3340</td>
<td>39</td>
<td>-24.9</td>
<td>LMIA(VDL)</td>
<td>phased*</td>
<td></td>
</tr>
<tr>
<td>Chania, Crete</td>
<td>14/TR17,1984,Rm C</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>2646</td>
<td></td>
<td>3315</td>
<td>70</td>
<td>-23.9</td>
<td>LMIA(VDL)</td>
<td>phased*</td>
<td></td>
</tr>
<tr>
<td>Chania, Crete</td>
<td>16/TR24,1989,L6,Ba1</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>2647</td>
<td></td>
<td>3315</td>
<td>70</td>
<td>-23.9</td>
<td>LMIA(VDL)</td>
<td>phased*</td>
<td></td>
</tr>
<tr>
<td>Chania, Crete</td>
<td>13/TR17,1984,Rm C</td>
<td>charred seed</td>
<td>Vicia faba</td>
<td>10320</td>
<td></td>
<td>3208</td>
<td>26</td>
<td>-22.8</td>
<td>LMIA(VDL)</td>
<td>phased*</td>
<td></td>
</tr>
<tr>
<td>Chania, Crete</td>
<td>14/TR17,1984,Rm C</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>10321</td>
<td></td>
<td>3268</td>
<td>27</td>
<td>-22.1</td>
<td>LMIA(VDL)</td>
<td>phased*</td>
<td></td>
</tr>
<tr>
<td>Chania, Crete</td>
<td>15/TR10,Rm E</td>
<td>charred seed</td>
<td>Pisum sativum</td>
<td>10322</td>
<td></td>
<td>3338</td>
<td>26</td>
<td>-23.9</td>
<td>LMIA(VDL)</td>
<td>phased*</td>
<td></td>
</tr>
<tr>
<td>Chania, Crete</td>
<td>16/TR24,1989,L6,Ba1</td>
<td>charred seed</td>
<td>Pisum sativum</td>
<td>10323</td>
<td></td>
<td>3253</td>
<td>25</td>
<td>-23.3</td>
<td>LMIA(VDL)</td>
<td>phased*</td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>TP-KE-29</td>
<td>charcoal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>17/K5,2,1</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>3187</td>
<td></td>
<td>3230</td>
<td>70</td>
<td>-22.2</td>
<td>LMIB</td>
<td>Secure</td>
<td>single</td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>18/K5,2,4</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>3188</td>
<td></td>
<td>3200</td>
<td>70</td>
<td>-26.5</td>
<td>LMIB</td>
<td>Secure</td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>19/K5/K6,2,1</td>
<td>charred seed</td>
<td>Vicia ervilia</td>
<td>3189</td>
<td></td>
<td>3270</td>
<td>70</td>
<td>-26</td>
<td>LMIB</td>
<td>Secure</td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>20/K5/L6,2,2</td>
<td>charred seed</td>
<td>Vicia ervilia</td>
<td>3225</td>
<td></td>
<td>3160</td>
<td>80</td>
<td>-23.6</td>
<td>LMIB</td>
<td>Secure</td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>17/K5,2,1</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>10324</td>
<td></td>
<td>3270</td>
<td>26</td>
<td>-22.4</td>
<td>LMIB</td>
<td>Secure</td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>19/K5/K6,2,1</td>
<td>charred seed</td>
<td>Vicia ervilia</td>
<td>10325</td>
<td></td>
<td>3228</td>
<td>26</td>
<td>-23.4</td>
<td>LMIB</td>
<td>Secure</td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>20/K5/L6,2,2</td>
<td>charred seed</td>
<td>Vicia ervilia</td>
<td>10326</td>
<td></td>
<td>3227</td>
<td>26</td>
<td>-22.4</td>
<td>LMIB</td>
<td>Secure</td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>18/K5,2,4</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>10411</td>
<td></td>
<td>3150</td>
<td>40</td>
<td>-26.5</td>
<td>LMIB</td>
<td>Secure</td>
<td></td>
</tr>
<tr>
<td>Miletos, Turkey</td>
<td>AT 99.787</td>
<td>bone</td>
<td>sheep/goat</td>
<td>11955</td>
<td></td>
<td>3233</td>
<td>23</td>
<td>-17.8</td>
<td>LMIB/II</td>
<td>phased</td>
<td></td>
</tr>
<tr>
<td>Site</td>
<td>Layer</td>
<td>Material</td>
<td>Species</td>
<td>Specific Date</td>
<td>Before 2020</td>
<td>After 2020</td>
<td>Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>-------</td>
<td>------------</td>
<td>--------------</td>
<td>---------------</td>
<td>------------</td>
<td>-----------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knossos, Crete</td>
<td>MUMK</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>2096</td>
<td>3070</td>
<td>70</td>
<td>-23.3</td>
<td>LMII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knossos, Crete</td>
<td>MUMK</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>2097</td>
<td>3190</td>
<td>65</td>
<td>-23.6</td>
<td>LMII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knossos, Crete</td>
<td>MUMK</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>2098</td>
<td>3220</td>
<td>65</td>
<td>-22.9</td>
<td>LMII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knossos, Crete</td>
<td>MUMK</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>11882</td>
<td>3156</td>
<td>33</td>
<td>-22.7</td>
<td>LMII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knossos, Crete</td>
<td>MUMK</td>
<td>charred seed</td>
<td>Hordeum sp.</td>
<td>11943</td>
<td>3148</td>
<td>23</td>
<td>-23</td>
<td>LMII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>TP-KE-28</td>
<td>charcoal</td>
<td></td>
<td>10793</td>
<td>3382</td>
<td>37</td>
<td>-23.7</td>
<td>LMII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>43/TP-KC-17</td>
<td>charcoal</td>
<td></td>
<td>10732</td>
<td>3095</td>
<td>45</td>
<td>-22.2</td>
<td>LMII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>42/TP-KC-18</td>
<td>charcoal</td>
<td></td>
<td>10762</td>
<td>7440</td>
<td>50</td>
<td>-23.4</td>
<td>LMII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kommos, Crete</td>
<td>41/TP-KC-19</td>
<td>charcoal</td>
<td></td>
<td>10770</td>
<td>3040</td>
<td>190</td>
<td>-26.9</td>
<td>LMII</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Known Age test</td>
<td>Çatacik, Turkey</td>
<td>tree rings</td>
<td>Pinus nigra</td>
<td>19597</td>
<td>246</td>
<td>13</td>
<td>-23.64</td>
<td>AD1640-49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2751</td>
<td>227</td>
<td>31</td>
<td>-22.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2752</td>
<td>271</td>
<td>37</td>
<td>-21.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2753</td>
<td>252</td>
<td>31</td>
<td>-22.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2754</td>
<td>259</td>
<td>31</td>
<td>-22.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2755</td>
<td>243</td>
<td>28</td>
<td>-23.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* In terms of the Oxford Laboratory varying sample pretreatment strategies (RR, ZR or AF) depending on sample nature as summarized above, all the bone samples (OxA-11951, 11952, 11953, 11954, 11955) were AF pretreated, samples OxA-3429, 10793 and 11833 (from Kommos), OxA-11869 (from Akrotiri) and OxA-2096, 2097, 2098, 11882, 11943 (from Knossos) were RR pretreated, and all other Oxford samples were ZR pretreated.

† Two bone samples from Miletos were received and originally dated on the basis of being from Late Minoan IA contexts. Subsequently the excavator of the site, W.-D. Niemeier, informed us that these two samples derive from what was later recognized as an intrusive (probably Mycenaean) pit cut into the LMIA stratum (S10). These two dates may therefore be dismissed as relevant to LMIA and are excluded from analysis.
‡ These two samples were taken from Building T in the space under Gallery P5 hearth. While this context is regarded as LMIA early, the Kommos excavation team’s archaeological analysis of the context has concluded that it was also “possibly contaminated by LMIIIA2 fill” (Jeremy B. Rutter, pers. comm.). Hence these two radiocarbon samples and dates must be regarded as suspect as they could relate to post-LMIA disturbance/material. They are thus not employed in this analysis.

§ These VERA samples are the weighted averages of two measurements for VERA-2636 and 2637, and of three measurements for VERA-2638.

|| See ref. S10.

¶ This sample received only HCl pretreatment. For other variations in VERA sample pretreatment, see discussion in section 2. above.

% Three of the samples from the southern Greek mainland site of Tsoungiza are an unexplained problem as they do not agree with the other data: OxA-11312 at 3215±38BP, 11313 at 3261±39BP, 11314 at 3202±38BP, and especially OxA-11312 and 11314. These two samples, regarded as Late Helladic I (approximately contemporary with LMIA), offer ages rather too late to conform with the other secure samples of this age range and indeed are mainly too late even for the (lower) conventional archaeological chronology. Calibrated age ranges are, respectively, 1513-1441 BC and 1499-1434 BC at 1σ. OxA-11312 and 11313 come from contexts also previously dated using other charcoal fragments by the Arizona radiocarbon lab with respective ages of 3322 ± 54 BP (AA-10816) and 3317 ± 55 BP (AA-10818). These ages are both rather older than the OxA measurements, in the first case by quite a large margin. This might suggest either (i) some problem (or contexts not in fact clear), or (ii) that the material from these contexts is mixed in age and some might be intrusive. We note in contrast, that the three samples regarded as subsequent, and of Late Helladic I-II context, seem fine. OxA-11309 on grape seeds, and so a short-lived sample, yields a calibrated range of 1625-1526 BC at 1σ, while OxA-11310 and 11311 on long-lived wood fragments yield rather older ages but these are acceptable given the sample material and clear possibility of also being residual (and so they offer largely irrelevant terminus post quem data for their phase: see ref S10). The quality controls on the overall OxA dataset presented here, and generally for the laboratory, suggest there was nothing unusual which affected the measurements of OxA-11312 to 11314. We can note that the samples were not freshly acquired, but had been in storage for a number of years and so some form of contamination cannot be ruled out. However, a more economical explanation would seem to be unrecognized intrusive or mixed material at the site. None of the Tsoungiza data are employed in the analyses in this paper.

Table S1 Correction. Correction added April 2013. The 3 Heidelberg dates (Hd-7092-6795, 6058-5519, 6059-7967) were incorrectly shaded grey in the original SOM. These data were included in the 28-date set of short-lived samples from the Akrotiri VDL (see Figures S2F and S2G and Table S2). The weighted average for the Akrotiri VDL as employed in this paper with these data is 3345 ± 8 BP (T = 31.5 < 39.9 for df27 at the 5% level); the weighted average without these data is almost the same at 3346 ± 8 BP (T = 19.7 < 36.4 for df24 at the 5% level) (ref.18). The inclusion/exclusion of these 3 dates is thus not a substantive issue for this analysis using a weighted average value for the Akrotiri short-lived samples VDL set. We thank especially Malcolm Wiener for drawing this issue to our attention.
Table S2. Bayesian OxCal Model (Model 1) employed in the analysis shown in Figure 2. The extra code added in Model 2 is indicated in the notes below. Notes are indicated by the magenta numbers (1-9). The magenta numbers in parentheses in Table S2 are not part of the run file code.

Plot "Model 1"
{
  D_Sequence "Trianda WM"
  {
    First;
    R_Combine
    {
      R_Date "OxA-10730" 3490 45;
      R_Date "OxA-11948" 3526 25;
      R_Date "VERA-2742" 3476 28;
    }; Gap 10;
    R_Combine
    {
      R_Date "OxA-10729" 3410 45;
      R_Date "OxA-11946" 3474 24;
      R_Date "VERA-2741" 3485 28;
    }; Gap 5;
    Event "Felling Trianda WM"; (1)
  }
  Page;
  D_Sequence "Miletos WM"
  {
    First;
    R_Combine
    {
      R_Date "OxA-10730" 3490 45;
      R_Date "OxA-11948" 3526 25;
      R_Date "VERA-2742" 3476 28;
    }; Gap 10;
    R_Combine
    {
      R_Date "OxA-10729" 3410 45;
      R_Date "OxA-11946" 3474 24;
      R_Date "VERA-2741" 3485 28;
    }; Gap 10;
    R_Combine "RY1010-1020"
    {
    R_Date "OxA-10728" 3455 45;
    R_Date "OxA-11945" 3473 24;
    R_Date "VERA-2740" 3481 32;
    };
    R_Combine "RY1020-1030"
    {
      R_Date "OxA-12303" 3467 31;
      R_Date "OxA-12407" 3385 34;
    }; Gap 10;
    R_Combine "RY1030-1040"
    {
      R_Date "OxA-12304" 3404 31;
      R_Date "OxA-12305" 3459 31;
    }; Gap 10;
  }
  R_Combine "RY1000-1010"
  {
    R_Date "OxA-12306" 3416 31;
    R_Date "OxA-12307" 3425 31;
    };
    R_Combine "RY1040-1050"
    {
  };
  Page;
R_Date "OxA-12308" 3361 31;
R_Date "OxA-12309" 3397 32;
}; Gap 10;
R_Combine "RY1050-1060"
{
R_Date "OxA-12310" 3345 32;
R_Date "OxA-12311" 3397 32;
}; Gap 10;
R_Combine "RY1060-1070"
{
R_Date "OxA-12312" 3388 30;
R_Date "OxA-12313" 3352 31;
}; Gap 7;
Event "Felling Miletos WM"; (2)
};
Page;
Label "Kommos R_Combine pairs";
R_Combine "K85A/66B/4:22+23 av"
{
R_Date "OxA-10315" 3446 39;
R_Date "VERA-2743" 3413 28;
};
R_Combine "B"
{
R_Date "OxA-10316" 3342 38;
R_Date "VERA-2744" 3427 31;
};
R_Combine "C"
{
R_Date "OxA-10317" 3440 35;
R_Date "VERA-2745" 3386 28;
};
R_Combine "D"
{
R_Date "OxA-10318" 3355 40;
R_Date "VERA-2746" 3471 28;
};
R_Combine "E"
{
Label "M4N003 R_Combine pairs";
R_Combine "A"
{
R_Date "OxA-10319" 3424 38;
R_Date "VERA-2747" 3386 30;
};
Label "65/N001/I2 R_Combine pairs";
R_Combine "F"
{
R_Date "OxA-10314" 3330 27;
R_Date "VERA-2751" 3325 28;
};
R_Combine "G"
R_Date "OxA-10313" 3353 27; R_Date "VERA-2749" 3335 33; R_Combine "H" {

R_Date "OxA-10312" 3293 27; R_Date "VERA-2748" 3319 28;
}; (3)

Page;

Sequence "MBA-LB2, LMIA TPQ then LMIA-II short-lived" (4)
{

Boundary "Start Sequence";
Phase "MBA or LMIA long-lived = TPQ for LMIA"
{

Phase "Akrotiri long-lived wood earlier LMIA context"
{
R_Combine "M54/2/VII/60/de>247"
{
R_Date "OxA-11250" 3550 45;
R_Date "Hd22037" 3552 19;
};
}; (5)

Phase "Space 25B, Tr.66B"
{
R_Combine
{
R_Date "OxA-11883" 3485 33;
R_Date "OxA-11944" 3435 25;
R_Date "OxA-11944" 3435 25;
R_Date "OxA-3429" 3350 70;
};

Phase "Kommos early LMIA secure charcoal"
{
R_Combine "K85A/62D/9:92"
{
R_Date "OxA-11251" 3505 40;
R_Date "VERA-2636" 3445 25;
};

R_Date "OxA-11252" 3375 45;
R_Date "VERA-2637" 3390 20;
};

Phase "K85A/62D/8:83"
{
R_Date "OxA-11253" 3397 38;
R_Date "VERA-2638" 3600 19;
};

Phase "K85A/66B/4:22+23"
{
R_Date "OxA-11883" 3485 33;
R_Date "OxA-11944" 3435 25;
R_Date "OxA-3429" 3350 70;
};

TPQ "Late MBA/Early LMIA (Trianda)"
{

Prior "@Felling Trianda WM"; (6)
};

Boundary "Start Mature LMIA";
Sequence "Mature LMIA"
{

Phase "Mature LMIA"
{

Phase "Miletos LMIA bone samples"
{
R_Date "OxA-11954" 3377 24;
R_Date "OxA-11951" 3423 23;
};
}

Sequence
Phase "Pre-VDL LMIA" 
{ 
R_Date "OxA-10314" 3330 27; 
R_Date "OxA-10313" 3353 27; 
R_Date "OxA-10312" 3293 27; 
R_Date "Vera-2751" 3325 28; 
R_Date "Vera-2749" 3335 33; 
R_Date "Vera-2748" 3319 28; 
R_Date "Vera-2747" 3386 28; 
R_Date "Hd-7092-6795" 3360 60; 
R_Date "Hd-5058-5519" 3490 80; 
R_Date "Hd-6059-7967" 3140 70; 
R_Date "OxA-1552" 3390 65; 
R_Date "OxA-1555" 3245 65; 
R_Date "OxA-1548" 3335 60; 
R_Date "OxA-1549" 3460 80; 
R_Date "OxA-1550" 3395 65; 
R_Date "OxA-1553" 3340 65; 
R_Date "OxA-1554" 3280 65; 
R_Date "OxA-1556" 3415 70; 
R_Date "K-5352" 3310 65; 
R_Date "K-5353" 3430 90; 
R_Date "K-3228" 3340 55; 
R_Date "K-4255" 3380 60; 
R_Date "OxA-10314" 3330 27; 
R_Date "OxA-10643" 3367 39; 
R_Date "VERA-2743" 3413 31; 
R_Date "VERA-2744" 3427 31; 
R_Date "VERA-2745" 3386 28; 
R_Date "VERA-2746" 3471 28; 
R_Date "VERA-2747" 3386 30; 
R_Date "VERA-11817" 3348 31; 
R_Date "Hd-7092-6795" 3360 60; 
R_Date "Hd-5058-5519" 3490 80; 
R_Date "Hd-6059-7967" 3140 70; 
R_Date "OxA-1552" 3390 65; 
R_Date "OxA-1555" 3245 65; 
R_Date "OxA-1548" 3335 60; 
R_Date "OxA-1549" 3460 80; 
R_Date "OxA-1550" 3395 65; 

TPQ "Miletos Thera eruption TPQ" 
R_Date "OxA-10643" 3367 39; 
R_Date "VERA-2743" 3413 28; 
R_Date "VERA-2744" 3427 31; 
R_Date "VERA-2745" 3386 28; 
R_Date "VERA-2746" 3471 28; 
R_Date "VERA-2747" 3386 30; 
R_Date "VERA-11817" 3348 31; 
R_Date "Hd-7092-6795" 3360 60; 
R_Date "Hd-5058-5519" 3490 80; 
R_Date "Hd-6059-7967" 3140 70; 
R_Date "OxA-1552" 3390 65; 
R_Date "OxA-1555" 3245 65; 
R_Date "OxA-1548" 3335 60; 
R_Date "OxA-1549" 3460 80; 
R_Date "OxA-1550" 3395 65; 
R_Date "VERA-2756" 3317 28; 
R_Date "VERA-2757" 3315 31; 
R_Date "VERA-2758" 3339 28; 
R_Date "VERA-2758 repeat" 3390 32; 
R_Date "VERA-2758 repeat" 3322 33; 

R_Date "VERA-2756" 3317 28; 
R_Date "VERA-2757" 3315 31; 
R_Date "VERA-2758" 3339 28; 
R_Date "VERA-2758 repeat" 3390 32; 
R_Date "VERA-2758 repeat" 3322 33; 

R_Date "VERA-2756" 3317 28; 
R_Date "VERA-2757" 3315 31; 
R_Date "VERA-2758" 3339 28; 
R_Date "VERA-2758 repeat" 3390 32; 
R_Date "VERA-2758 repeat" 3322 33; 

R_Date "VERA-2756" 3317 28; 
R_Date "VERA-2757" 3315 31; 
R_Date "VERA-2758" 3339 28; 
R_Date "VERA-2758 repeat" 3390 32; 
R_Date "VERA-2758 repeat" 3322 33; 

R_Date "VERA-2756" 3317 28; 
R_Date "VERA-2757" 3315 31; 
R_Date "VERA-2758" 3339 28; 
R_Date "VERA-2758 repeat" 3390 32; 
R_Date "VERA-2758 repeat" 3322 33; 

R_Date "VERA-2756" 3317 28; 
R_Date "VERA-2757" 3315 31; 
R_Date "VERA-2758" 3339 28; 
R_Date "VERA-2758 repeat" 3390 32; 
R_Date "VERA-2758 repeat" 3322 33; 

R_Date "VERA-2756" 3317 28; 
R_Date "VERA-2757" 3315 31; 
R_Date "VERA-2758" 3339 28; 
R_Date "VERA-2758 repeat" 3390 32; 
R_Date "VERA-2758 repeat" 3322 33;
Interval "Duration Mature LMIA";

};

};

Boundary "End or Final LMIA to LMIB Destructions"; (8)

Phase "LMIB Destructions Crete"

{

Phase "Chania"

{

R_Date "OxA-2517" 3380 80;

R_Date "OxA-2518" 3340 80;

R_Date "OxA-2646" 3315 70;

R_Date "OxA-2647" 3150 70;

R_Date "OxA-10320" 3208 26;

R_Date "OxA-10321" 3268 27;

R_Date "OxA-10322" 3338 26;

R_Date "OxA-10323" 3253 25;

R_Combine "Myrtos-Pyrgos"

{

R_Date "OxA-3187" 3230 70;

R_Date "OxA-3188" 3200 70;

R_Date "OxA-3189" 3270 70;

R_Date "OxA-3225" 3160 80;

R_Date "OxA-10324" 3270 26;

R_Date "OxA-10325" 3228 26;

R_Date "OxA-10326" 3227 25;

R_Date "OxA-10411" 3150 40;

R_Date "OxA-2096" 3070 70;

R_Date "OxA-2097" 3190 65;

R_Date "OxA-2098" 3220 65;

R_Date "OxA-11882" 3156 33;

R_Date "OxA-11943" 3148 23;

};

};

Phase "Late Minoan II"

{

R_Combine "Knossos LMII Destruction short-lived"

{

R_Date "OxA-2096" 3070 70;

R_Date "OxA-2097" 3190 65;

R_Date "OxA-2098" 3220 65;

R_Date "OxA-11882" 3156 33;

R_Date "OxA-11943" 3148 23;

};

};

Boundary "LMIB/LMII transition"; (9)

R_Date "OxA-10320" 3208 26;

R_Date "OxA-10321" 3268 27;

R_Date "OxA-10322" 3338 26;

R_Date "OxA-10323" 3253 25;

Boundary "LMIB/LMII transition"; (9)

Interval "Final LMIA to LMIB Destructions";

};

Boundary "End Sequence";

Correlation "Correl" "Thera VDL" "Duration Mature LMIA";

};

};
Notes to Table S2

1. The OxA and VERA data on the identical 10-year tree-ring sections of AE1024 are combined (weighted average) to yield the best estimate. As evident in Fig. 1, the respective sets of three data for each decade are consistent with the assumption that they plausibly represent the same event.

2. The pairs of OxA data on the same decade samples are combined. The final gap represents the 7 years from the centre of the last dated decade sample to the waney edge. (Note: the sample and outer ring age sets a terminus post quem for the subsequent Santorini eruption. If the observation of likely waney edge is incorrect, and if there were therefore some additional, now missing, sapwood rings before the tree was actually cut down, then this would push the preferred Akrotiri VDL date range a little lower. For example, allowance for 10 missing sapwood rings would produce an Akrotiri VDL date range with Model 1 at 2σ confidence of 1653-1611 BC (versus the Table 1 range of 1660-1612 BC) and a 1σ range of 1638-1617 BC (versus the Table 1 ranges of 1656-1651 BC (P=0.113) and 1639-1616 BC (P=0.569)).

3. The pairs of OxA and VERA data for fractions of the same tree-rings (three separate charcoal samples from Kommos divided to the same rings for each measurement, and two branch samples from Akrotiri divided to same ring or rings) are combined to test the compatibility of measurements by the two laboratories (see also Figure 1). One of the three Kommos pairs, R_Combine “K85A/62D/8:83”, does not successfully combine and clearly comprises significantly different ages. VERA-2638 is much older than its OxA pair. There is no obvious reason for the discrepancy (the VERA age reported is the weighted average of 3 separate measurements). This sample is acting as a terminus post quem for the LMIA phase, thus the existence of an older age does not matter as other data better describe a later terminus post quem. However, it is clearly inappropriate to combine these two data as they do not offer a satisfactory average, and thus the two K85A/62D/8:83 data are left uncombined as a Phase in the Sequence analysis in the model. The one other pair that are problematic are those in R_Combine D – but here by not very much. And, looking at the 10 data in total on sample M4N003, comprising the apparent rings 3-8 years of an 8-year growth sample, all 10 data together can combine satisfactorily to offer the best age for this timber, thus the variation in the R_Combine D pair does not appear significant overall. This particular sample was on rings 5-6 of the sample, and, apart from assigning the matter to laboratory variation, it is of course possible that one fraction offered more of one of the rings so as to create a small difference in the samples. It is noticeable that the other pair including ring 5 within the sample (here a 3-year sample comprising rings 3-5), R_Combine B, is the next most divergent (while making the 95% confidence level test), so perhaps there is an issue surrounding ring 5 (e.g. perhaps it was not entirely accurately recognized and dissected). All 10 data, combined, are employed below in the Sequence analysis to best estimate the age of this 6-years of growth sample against the calibration curve. We note that this sample comprised olive (a branch). Discriminating growth rings in olive is often impossible or problematic, but in this relatively small branch we believe annual growth rings were successfully detected and separated – but some error undoubtedly attaches to this view. Such an error may also help explain any minor discrepancies between pairs, and the spread in ages overall for the sample. For the other pairs all data combine within the 95% confidence level.

4. The Sequence model to analyze the stratigraphically ordered information starts here. Data which represent either irrelevant (much) earlier terminus post quem (TPQ) points for their find
context, or which are the single datum from their context or horizon at their site, are shown but not used in calculating the Sequence analysis. These data are noted with a ? following their entry and a !REF statement.

5. See note 1 above. The divergent pair of K85A/62D/8:83 data are not combined but left separately as a Phase. Both act as *terminus post quem* data, with the VERA date effectively irrelevant as much older.

6. The prior calculated Trianda felling date (bark) is now inserted into the model as a late MBA or early LMIA *terminus post quem*.

7. The prior calculated Miletos estimated felling date is now inserted into the model as a *terminus post quem* for the Akrotiri Mature LMIA and VDL phases.

8. This coding represents Model 1. Model 2 inserts at this point: Boundary "End or Final LMIA to Start LMIB"; Boundary "Early/Mid LMIB to Later LMIB";

9. This coding represents Model 1. Model 2 inserts at this point: Boundary "Late LMIB to Start LMII"; Boundary "Early/Mid LMII to Later LMII".
Table S3. Typical Bayesian analysis outcomes from the models and analyses summarized in Figs. S3 and S4 and as discussed above. Compare with Table 1. The 2σ, 95.4%, confidence calibrated calendar date ranges BC calculated by the analyses shown in Figs. S3 and S4 are listed for a number of the key transitions or events/phases within the LMIA to LMII archaeological sequence. Data are rounded to the nearest whole year. Typical data given (each computer run of the model varies very slightly, with variation usually ≤ 2 years).

<table>
<thead>
<tr>
<th></th>
<th>Transition to Mature LMIA</th>
<th>Felling Date Miletos oak chair/stool</th>
<th>Akrotiri Volcanic Destruction Level (VDL)</th>
<th>Transition end LMIA to LMIB</th>
<th>Horizon allocated to Early through Mid/ Mature LMIB</th>
<th>Chania LMIB Dated Horizon</th>
<th>Myrtos-Pyrgos Close of LMIB Destruction</th>
<th>Horizon allocated to Early through Mid/ Mature LMII</th>
<th>Knossos LMII Destruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 2 with IntCal04 (20)</td>
<td>1736-1670</td>
<td>1672-1645</td>
<td>1661-1614</td>
<td>1660-1587</td>
<td>1632-1524</td>
<td>1595-1461</td>
<td>1525-1486 (83.5%)</td>
<td>1492-1412 (11.9%)</td>
<td>1453-1398</td>
</tr>
<tr>
<td>Model 1 with extras and IntCal04 (20)</td>
<td>1736-1671</td>
<td>1671-1644</td>
<td>1659-1612</td>
<td>1659-1575</td>
<td>Not in model</td>
<td>1625-1437</td>
<td>1522-1455</td>
<td>Not in model</td>
<td>1445-1395</td>
</tr>
</tbody>
</table>
Supporting References


