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## Editorial

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In the past decade, an accelerating number of outraging reports on looted museums and archaeological sites, churches and mosques, cemeteries and dig houses, and other monuments have come from Middle Eastern countries. And now Egypt. Of course, lamenting about this appears callous in the face of the tens of thousands of plundered private homes, rape, and murder. Often our indignation forgets that systematic (and even institutionalized) looting has been reported in many ancient Near Eastern texts, including the Old Testament, or that the western countries' history is full of such periods, such as the sack of Constantinople by the Fourth Crusade, the looting of the Aztec gold, Napoleon's or the Nazi / Allied Forces "removal" of cultural objects from conquered territories. Or see the Lieber Code of 1863! The topic is highly complex and old: Many of us have found evidence of systematic contemporaneous looting in Neolithic and Chalcolithic contexts. Be it the villager making pits in Tell Jokha (Umma), or the armed fighters coming with bulldozers to Apamea, their disposition to benefit from the chaos is encouraged by the greed of the wealthy "co-looters" from all around the world, be they institutions or private collectors secretly enjoying the plunder. Neolithic collections may not yet be largely in the focus of looters and co-looters, but does this protect their integrity during a looting raid?

Hans Georg K. Gebel and Gary O. Rollefson

## Establishing a Radiocarbon Sequence for Göbekli Tepe. State of Research and New Data

Oliver Dietrich, Çiğdem Köksal-Schmidt, Jens Notroff, and Klaus Schmidt

The stratigraphy of Göbekli Tepe comprises three layers, an older Layer III, assigned to the PPNA, a younger Layer II, attributed to the early and middle PPNB, and a final Layer I, featuring mixed sediments derived from agricultural activities, though containing PPN materials and sporadic finds from the Middle Ages and the modern period (but with no architectural remains). Layer III has produced the well-known monumental architecture with megalithic T-shaped pillars arranged in circle-like enclosures around two taller central pillars; Layer II consists of smaller rectangular buildings often containing just two or even one smaller pillar, and sometimes none at all. The difficulties and possibilities linked to the application of radiocarbon dating at the site have already been highlighted (Dietrich 2011); as such, in the following we provide only a brief summary of the current state of research.

### Radiocarbon Dating at Göbekli: the State of Research

At least for the large enclosures from Layer III it can be stated that these were intentionally backfilled at the end of their use-lives. This backfilling poses severe problems for the dating of this layer using the radiocarbon method, as organic remains from the fill-sediments could be older or younger than the enclosures, with younger samples becoming deposited at lower depths, thus producing an inverse stratigraphy. Another issue is the lack of carbonized organic material available for dating; only in the last campaigns have larger quantities been discovered.

Given these inherent difficulties, in a first approach the attempt was made to date the architecture directly using pedogenic carbonates. These begin to form on limestone surfaces as soon as they are buried with sediment (Pustovoytov 2002, 2006; Pustovoytov and Taubald 2003; Pustovoytov *et al.* 2007a, 2007b). Unfortunately the pedogenic carbonate layers accumulate at a variable rate over long time periods, so a sample comprising a whole layer will yield only an average value. This problem can be avoided by sampling only the oldest calcium carbonate layer in a thin section: the result should be a date near the beginning of soil formation around the stone, *i.e.* near the time of its burial (Pustovoytov 2002). Radiocarbon data are available from both the architecture of Layers III and II (Dietrich 2011, Tab. 1). Although the observed archaeological stratigraphy is confirmed by the relative sequence of the data, absolute ages are clearly too young, with Layer III being pushed into the 9th millennium, and Layer II producing ages from the 8th or even 7th millennia calBC.

Therefore, the data fail to provide absolute chronological points of reference for architecture and strata. At most they serve as a *terminus ante quem* for the backfilling of the enclosures (Layer III) and the abandonment of the site (Layer II).

A far better source of organic remains for the direct dating of architectural structures is the wall plaster used in the enclosures. This wall plaster comprises loam, which also contains small amounts of organic material (Dietrich and Schmidt 2010). A sample (KIA-44149) taken from the wall plaster of Enclosure D (Area L9-68, Loc. 782.3) gives a date of  $9984 \pm 42$   $^{14}\text{C}$ -BP (9745-9314 calBC at the 95.4% confidence level), thus placing the circle in the PPNA.

Concerning the fill-material from the enclosures, two approaches have been pursued, the first dedicated to the dating of animal bones and a second to ages made on charcoal. The archaeological appraisal of a recently acquired series of 20 data made on bone samples (Fig. 3) is quite complicated, as they pose some methodological problems (Dietrich 2011: 19-20, Tab. 4). At least within the group of samples chosen, collagen conservation is poor, and the carbonate-rich sediments at Göbekli Tepe may be the cause for problems with the dating of apatite fractions (*cf.* Zazzo and Saliège 2011).

Carbonized plant remains have been very scarce at Göbekli, thus limiting the possibilities for dating charcoal. Nevertheless, three charcoal samples (Tab. 1) are available for Enclosure A. While two samples (Hd-20025 and Hd-20036) stem from back-fill (Kromer and Schmidt 1998) and have been dated to the late 10th / earliest 9th millennium calBC, a third charcoal sample (KIA-28407) was taken from beneath a fallen fragment of a pillar. This sample has provided a date for a possible final filling event around the mid-9th millennium calBC. It is confirmed by a measurement (IGAS-2658; Tab. 1) made on humic acids from a buried humus horizon that provides a *terminus ante quem* for Layer II in area L9-68, dating to the late 9th / early 8th millennium calBC.

In conclusion, up to now charcoal samples have suggested that the backfilling or *burial* of the larger enclosures occurred some time in the late 10th and early 9th millennium calBC, while KIA-44149 from the wall plaster of Enclosure D indicates building activities in the mid-10<sup>th</sup> millennium calBC, *i.e.* in the early PPNA. Notwithstanding these results, no clear image emerged in regard to the contemporaneity of the enclosures.

### A New Series of Data

Recent fieldwork in the main excavation area at Göbekli Tepe has focused on the excavation of deep soundings

to reach the natural bedrock in preparation for the construction of a shelter, urgently required for the protection of the exposed Neolithic architecture. Eleven deep soundings have been excavated to the bedrock. At several locations, considerable amounts of carbonized botanical material were discovered, so far unique for excavations at Göbekli (Fig. 2). A series of more than 150 samples has been produced either on site or by flotation of the relevant soil units. To test the quality of the material for radiocarbon dating, five samples from the area of the large enclosures from Layer III were submitted for AMS-radiocarbon dating (Tab. 1, Fig. 2, 3; UGAMS-10795 to 10799). In the following, these new data, together with a further age made on collagen from an animal tooth (KIA- 44701; Tab. 1, Fig. 2, 3), are presented and discussed in context with previously available absolute chronological evidence.

## Enclosure D

Two deep soundings were excavated directly adjacent to the ring wall belonging to Enclosure D, with three new ages obtained from charcoal recovered from the sounding in area L9-78 (for location of samples discussed in the text, *cf.* Fig. 1). These samples were collected close to the bedrock, which in its interior forms the floor of this enclosure. Calibrated ages cluster between 9664 to 9311 calBC at the 95.4% confidence level (UGAMS-10795, 10796, 10799; Tab. 1, Fig. 2, 3), a time-span which is in good agreement with the earlier measurement made on clay mortar from the ring wall

of Enclosure D between Pillars 41 and 42 (KIA-44149,  $9984 \pm 42$   $^{14}\text{C}$ -BP, 9745-9314 calBC at the 95.4% confidence level; Tab. 1, Fig. 2, 3). Based on these data, we now have a much clearer picture of the chronological frame within which construction activities took place in the area of Enclosure D. It is only regrettable that these four data all correspond to a period with a slight plateau in the calibration curve (Fig. 2b), thus resulting in larger probability ranges. Additional excavation work is needed to clarify the exact stratigraphical correlation of the three new charcoal dates with Enclosure D.

Finally, from the fill-material of Enclosure D there is one new  $^{14}\text{C}$ -age made on collagen from an animal tooth found north of Pillar 33 (KIA-44701,  $9800 \pm 120$   $^{14}\text{C}$ -BP, 9746-8818 calBC at the 95.4% confidence level; Tab. 1, Fig. 2, 3). Taken together with another new measurement made on charcoal extracted from the same fill (Layer III) in area L9-69 (UGAMS-10798,  $9540 \pm 30$   $^{14}\text{C}$ -BP, 9127-8763 calBC at the 95.4% confidence level; Tab. 1, Fig. 2, 3) there can still be no consensus regarding the time of abandonment and *burial* of this enclosure. Further radiocarbon measurements will be needed to clarify this process. Indeed, the animal tooth used to produce sample KIA-44701 might even stem from the use-life of the enclosure, which as we know would have included the celebration of large feasts (Dietrich *et al.* 2012). This line of thought would then allow for a considerable (several hundred years) time of use of the enclosure prior to its burial sometime in the late 10th or early 9th millennium calBC (UGAMS-10798). But at the moment, a rather short life-span of the enclosure remains a possibility, too.

Code	Date	$\delta^{13}\text{C}$ , ‰	Material	Context
UGAMS-10796	9990 $\pm$ 30	-25.6	charcoal (Pistacia atlantica, Prunus amygdalus, undetermined)	<b>Enclosure D</b> L9-78, Loc. 129.11 space adjacent to ring walls
UGAMS-10795	9970 $\pm$ 30	-24.8	charcoal (Pistacia atlantica, Prunus amygdalus, undetermined)	<b>Enclosure D</b> L9-78, Loc. 129.12 space adjacent to ring walls
UGAMS-10799	9960 $\pm$ 30	-25.7	charcoal (Pistacia atlantica, Prunus amygdalus, Prunus, Rhamnus sp., undetermined; mainly fragments of branches)	<b>Enclosure D</b> L9-78, Loc. 129.10 space adjacent to ring walls
KIA- 44149	9984 $\pm$ 42	-26.31 $\pm$ 0.57	wall plaster, organic remains	<b>Enclosure D</b> L9-68, Loc. 782.3 inner ring wall between pillars 41 and 42
KIA- 44701	9800 $\pm$ 120	-20.57 $\pm$ 0.13	collagen from cattle tooth	<b>Enclosure D</b> L9-67, Loc. 65.2, north of pillar 33
UGAMS-10798	9540 $\pm$ 30	-25.4	charcoal (Pistacia atlantica, Populus / Salix, undetermined)	<b>Layer III, north of Enclosure D</b> L9-69, Loc. 123.3
UGAMS-10797	9700 $\pm$ 30	-26.7	charcoal (Pistacia atlantica; fragments of branches)	<b>Enclosure C</b> L9-97, Loc. 64.2 space between outer ringwalls
Hd-20036	9559 $\pm$ 53	not provided	charcoal (Pistacia sp., Amygdalus sp.)	<b>Enclosure A</b> L9-75, Loc. 48.1
Hd-20025	9452 $\pm$ 73	not provided	charcoal (Pistacia sp., Amygdalus sp.)	<b>Enclosure A</b> L9-75, Loc. 44.3
KIA-28407	9250 $\pm$ 55	-24.82 $\pm$ 0.11	charcoal	<b>Enclosure A</b> under a fallen pillar fragment in L9-75, Loc. 50.
IGAS- 2658	8880 $\pm$ 60	not provided	humic acids from soil sample	<b>Terminus ante quem for Layer II</b> over the Filling of Enclosure D in L9-68

Table 1 List of radiocarbon data made on organic samples from Göbekli Tepe.

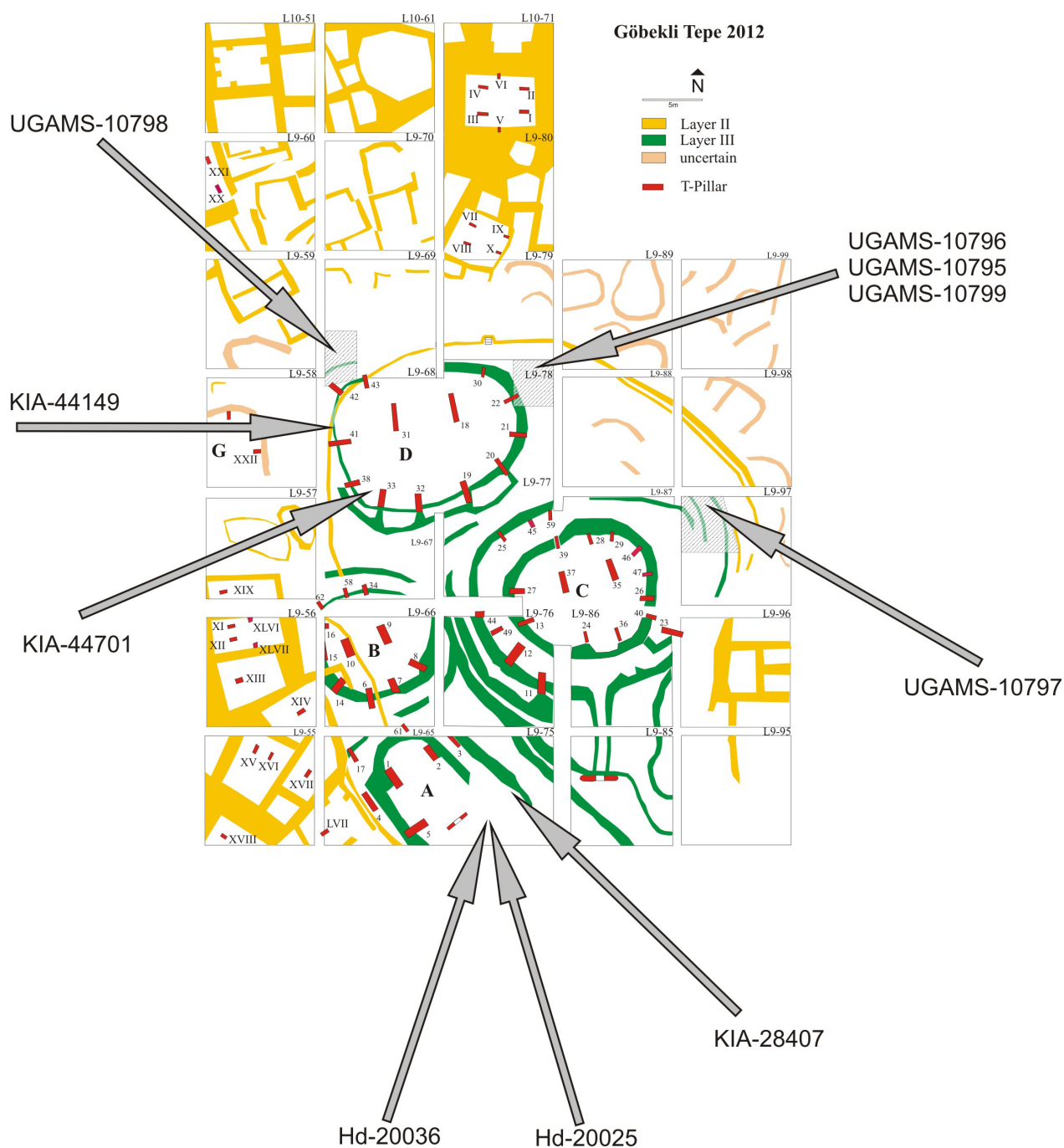


Fig. 1 The main excavation area at Göbekli Tepe with origin of 14C samples discussed in the text.

At this point reference should again be made to sample IGAS-2658 ( $8880 \pm 60$   $^{14}\text{C}$ -BP, 8241-7795 calBC at the 95.4% confidence level; Tab. 1, Fig. 2, 3) taken from a humus layer in area L9-68 (Pustovoytov 2006: 707-708, Fig. 2f). This date marks the last PPN activities in this area and provides a *terminus ante quem* for Layer II.

### Enclosure C

To present, only one date is available for Enclosure C (UGAMS-10797,  $9700 \pm 30$   $^{14}\text{C}$ -BP, 9261-9139 calBC at the 91.6% probability level; Tab. 1, Fig. 2, 3). This sample was taken from a deep sounding in area L9-97

(Loc. 64.2) between the outermost ring walls of the enclosure and close to the bedrock. This could indicate that building activities at the outer ring walls of this enclosure were underway during the backfilling of Enclosure D. However, a larger series of data and a close inspection of Enclosure C's building history will be necessary to confirm such far-reaching conclusions.

### Enclosure A

From the area of Enclosure A there are the two dates already published by Kromer and Schmidt (1998) and mentioned above (Hd-20036,  $9559 \pm 53$   $^{14}\text{C}$ -BP, 9175-8759 calBC; and Hd-20025,  $9452 \pm 73$   $^{14}\text{C}$ -BP, 9131-

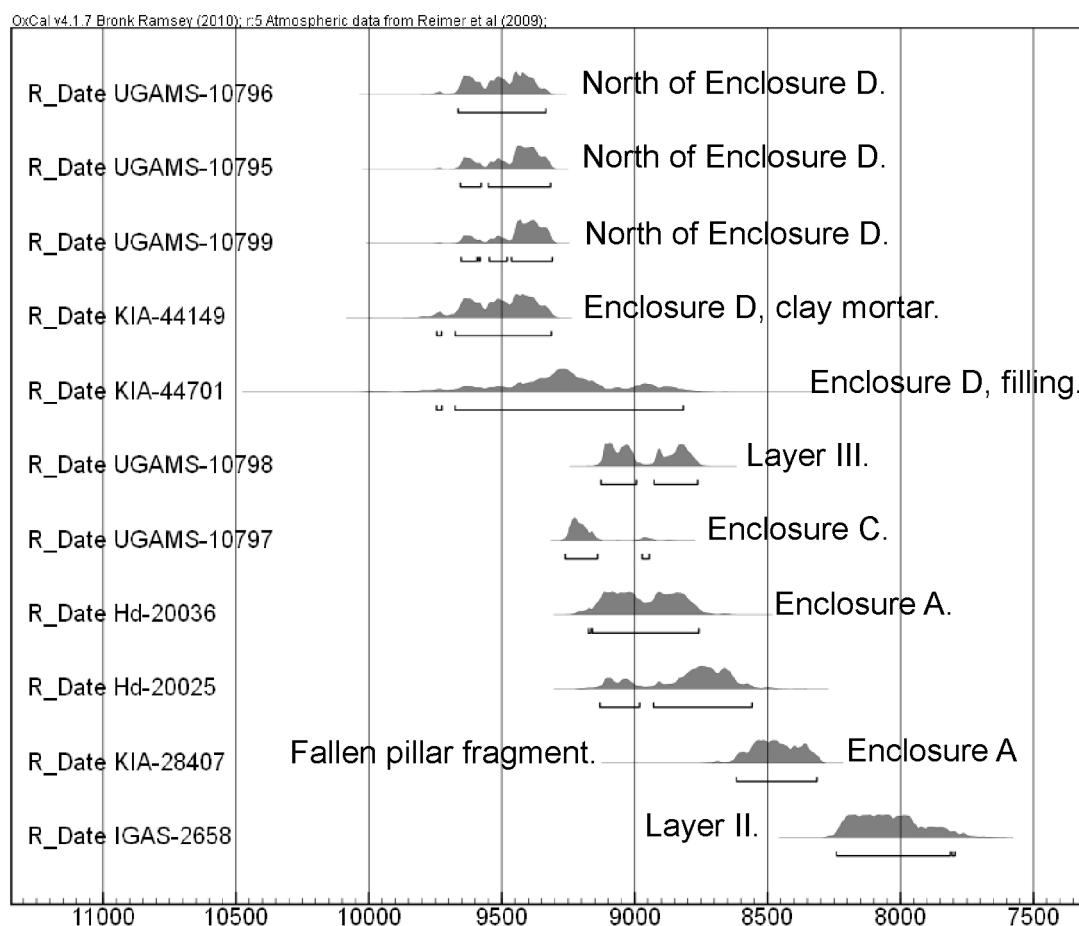
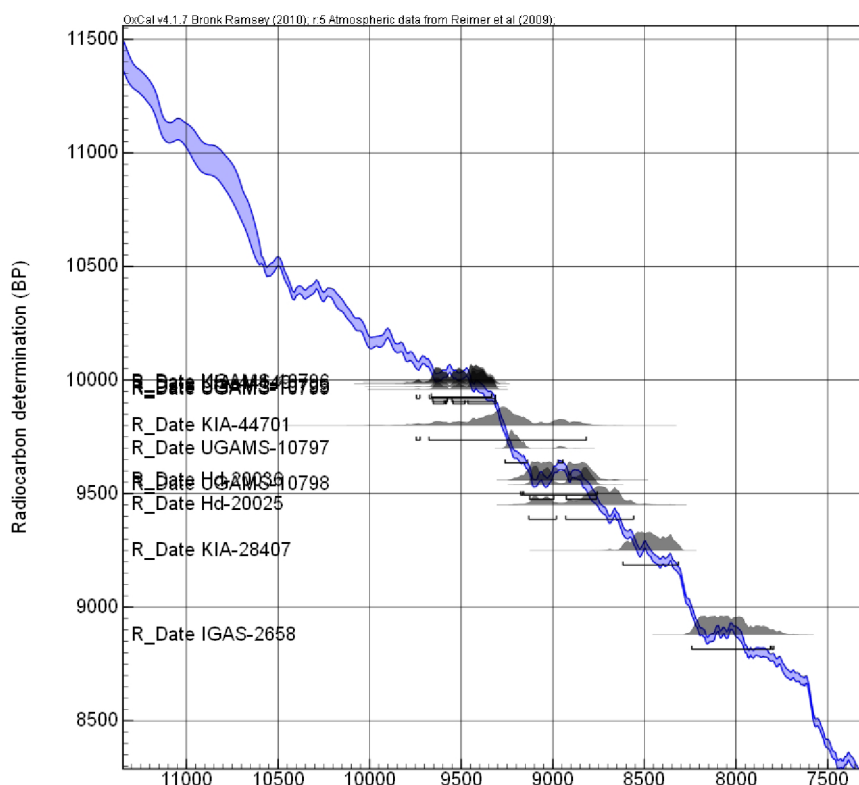
**a****b**

Fig. 2 Charts of radiocarbon data from Göbekli Tepe.



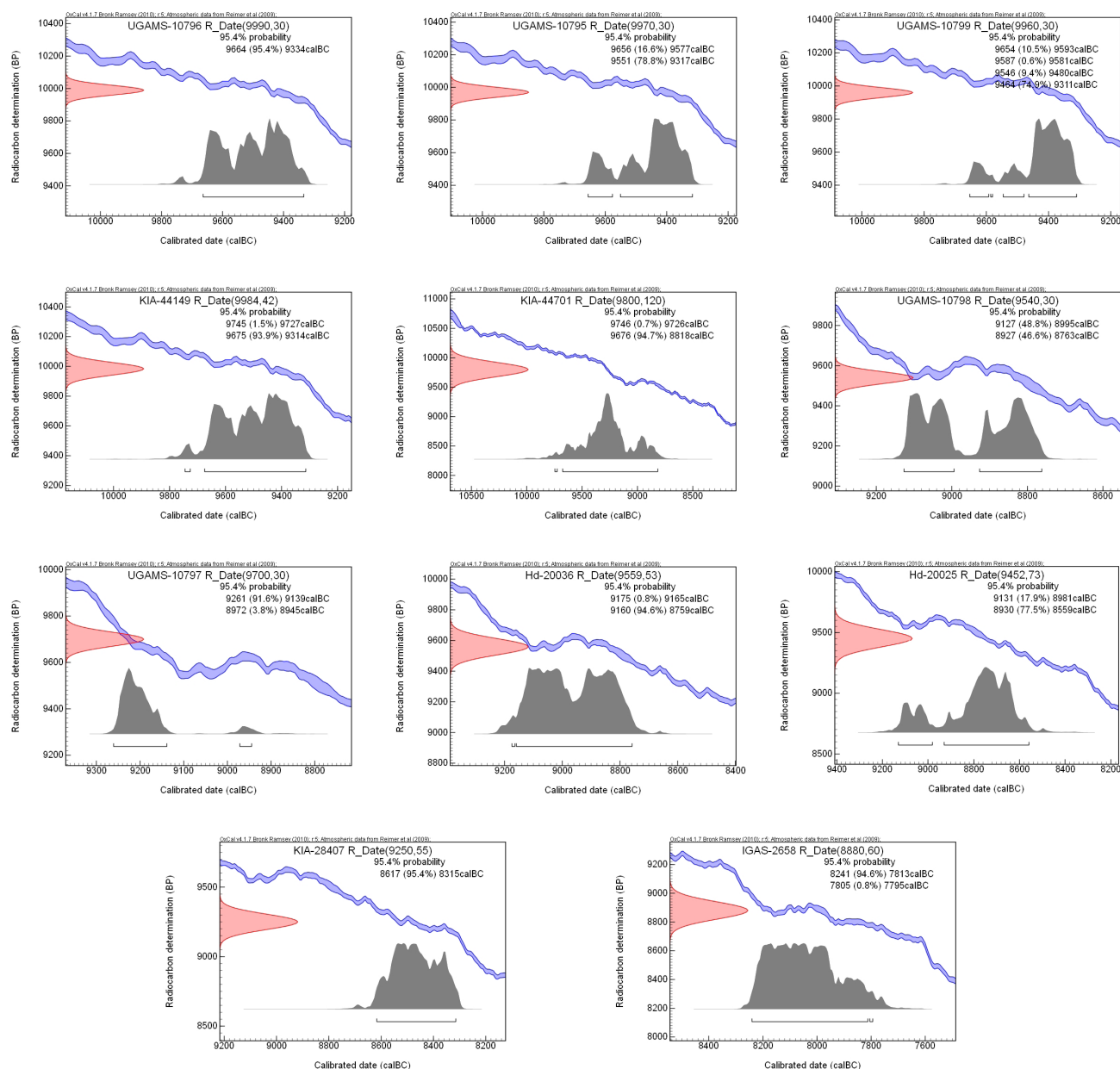


Fig. 3 The calibrated radiocarbon data from Göbekli Tepe – single plots.

8559 cal BC at the 95.4% confidence level; Tab. 1, Fig. 2, 3). As these charcoals came from the fill of the enclosure, these measurements most likely date its abandonment, though it certainly cannot be ruled out that older organic remains became mixed in with material used for the burial of the structure (Kromer and Schmidt 1998).

In combination with the new data, these dates may indicate that Enclosure A is generally later (or was in use for a longer period) than Enclosures C and D. From the perspective of its rather square-like ground-plan, Enclosure A could be an architectural missing link between the older circular structures of Layer III and the smaller rectangular complexes of Layer II. Good comparisons for its general layout can be found in the sub-quadric “*Terrazzo Building*” in Çayönü (cell plan layer) (Schirmer 1990: 382–384) or in the “*Cult Building*” at Nevalı Çori (Hauptmann 1993), which also yielded T-shaped pillars of forms similar to those at Göbekli, Layer II.

KIA-28407 ( $9250 \pm 55$   $^{14}\text{C}$ -BP; 8617–8315 calBC at the 95.4% confidence level; Tab. 1, Fig. 2, 3) is a date made on charcoal from a soil sample extracted from beneath a rather large fragment of fallen pillar (Pustovoytov 2006: 709, Fig. 3g). Although this age could mark the time of abandonment of Enclosure A, its origin makes it difficult to determine whether it dates the *burial* of the enclosure at the end of its use-life, a later intentional destruction, or a moment when Enclosure A was already filled and Layer II activities led to the deposition of the pillar fragment.

## Conclusion

As a preliminary conclusion, the still limited series of radiocarbon data seems to suggest that Layer III enclosures at Göbekli Tepe were not exactly con-

temporaneous. Earliest radiocarbon dates stem from Enclosure D, for which the relative sequence of construction (*ca.* mid-10th millennium calBC), usage, and burial (late 10th millennium calBC) are documented. The outer ring wall of Enclosure C could be younger than Enclosure D. However, more data are needed to confirm this interpretation. Finally, Enclosure A seems younger than Enclosures C and D. With only eleven radiocarbon dates, many questions remain. It is hoped that the recent discovery of larger amounts of carbonized material at Göbekli Tepe will soon provide us with further dates and a much firmer grasp on the absolute chronology of this unique site.

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*D. Schmandt-Besserat* Murals and Floor Paintings at 'Ain Ghazal

Chapter 9. STANDING STONES

*Z.A. Kafafi* Standing Stones of the Neolithic Village of 'Ain Ghazal

Chapter 10. CONCLUSION

*D. Schmandt-Besserat* Neolithic Symbolism at 'Ain Ghazal