RADIOCARBON DATING OF THE TEMPLE OF MONKEY – THE NEXT STEP TOWARDS COMPREHENSIVE ABSOLUTE CHRONOLOGY OF PACHACAMAC, PERU

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Fig.1. Geographical situation of Pachcamac

Pachacamac, one of the largest and most important archaeological sites in Peru, is located 30km south of Lima and about half km from the Pacific Ocean (Fig.1). It was an urban centre permanently inhabited from probably the first centuries AD until the Spanish Conquest in 1535 AD. A special development of the site fell on Ychsma Period (or Late Intermediate Period, 900 - 1470 AD), when Pachacamac was the religious centre and the seat of rulers. During this period a number of pyramids with ramps were constructed.

Extensive research of Pachacamac has been carried out since 1999 as part of the Ychsma Project by the team led by Peter Eeckhout. The project has been designed to answer question about function, development and influence of Pachacamac during the Late Prehispanic Periods. In 2003 the absolute chronology of Pyramid III at Pachacamac was constructed and discussed (Michczyński, Eeckhout, Pazdur, 2003). The study was based on the radiocarbon dating of the main structure of the Complex of Pyramid III – Pyramid IIIA and IIIB (Figs. 2 and 3). Comparison of the results for Pyramid II and Pyramid III confirms the hypothesis of successive occupation and abandonment of the buildings.

The results presented here are the next step towards comprehensive chronology of Pachacamac. The new study focused on a building Pyramid III-C located about 70m form the Pyramid IIIB, at the lower part of the Complex of Pyramid III (Fig.4). During the excavations it was found, that there is no direct access of transit between part C and the rest of the monumental complex. It showed, that Pyramid III-C had no structural relationship to the rest of the Complex. Moreover numerous traces of offerings and ritual activities were found, what suggested that the structure was used in a different way than the rest of Pyramid III. The traces of offerings implied ceremonial nature of the structure, which may be classed as a temple. Because a mummified monkey burial had been discovered there, the building was called "Temple of Monkey".

Fig.2. View of Pyramid IIIA and IIIB at Pachacamac

Sample	Lab nr	14C date BP	Sample material	Depth b.s.	Context	Other info
PAC 35-c-3	Gds-304	695 ± 40	wood	0.5m	mud floor within the Temple of the Monkey	Foundation of the first platform of the Temple of the Monkey
PAC 42-a-2-poste 1	Gds-298	610 ± 50	wood	0.5m	sand fill within a posthole within theTemple of the Monkey	Idol pedestal associated with floor 1 and layer 2B within the second platform of Temple of the Monkey
PAC 42-c-3 /4 /5 poste 2	Gds-291	640 ± 40	wood	1.2m	sand fill with organic material within a posthole within the second platform of the Temple of the Monkey	Wood post associated with floor 1 of the Temple of the Monkey
PAC 42-h-hoyo 3	Gds-297	645 ± 55	wood	1m	sand fill within a post hole within the second platform of the Temple of the Monkey	Roof-supporting post associated with floor 1 within the second platform of the Temple of the Monkey
PAC 49-k-4	Gds-296	630 ± 45	plant remains	1m	heterogeneous constructive fill mad of earth, adobes and other materials	foundation of room 49 within the Temple of the Monkey
PAC /E20-3-b7	Gds-306	400 ± 40	plant remains	0.50m	exterior petate of a mummy burial within the Temple of the Monkey	secondary burial of E-20 mummy – foundation of Temple of the Monkey
PAC /E20-3-b44	Gds-307	430 ± 45	plant remains	0.50m	interior petate layer of a mummy bundle	first original burial of the mummy found within the Temple of the Monkey
PAC 50-a-1	Gds-295	320 ± 45	plant remains	1m	collapsed adobe wall within the entrance to room 49 in the Temple of the Monkey	cane remains which correspond to the roof of the door – occupation of the Temple of the Monkey
PAC 34-t-4	Gds-289	265 ± 45	plant remains	1m	geological sand within the Temple of the Monkey	terminus post quem for the construction of the Temple of the Monkey

Table 1. Detailed information about samples from the Temple of Monkey
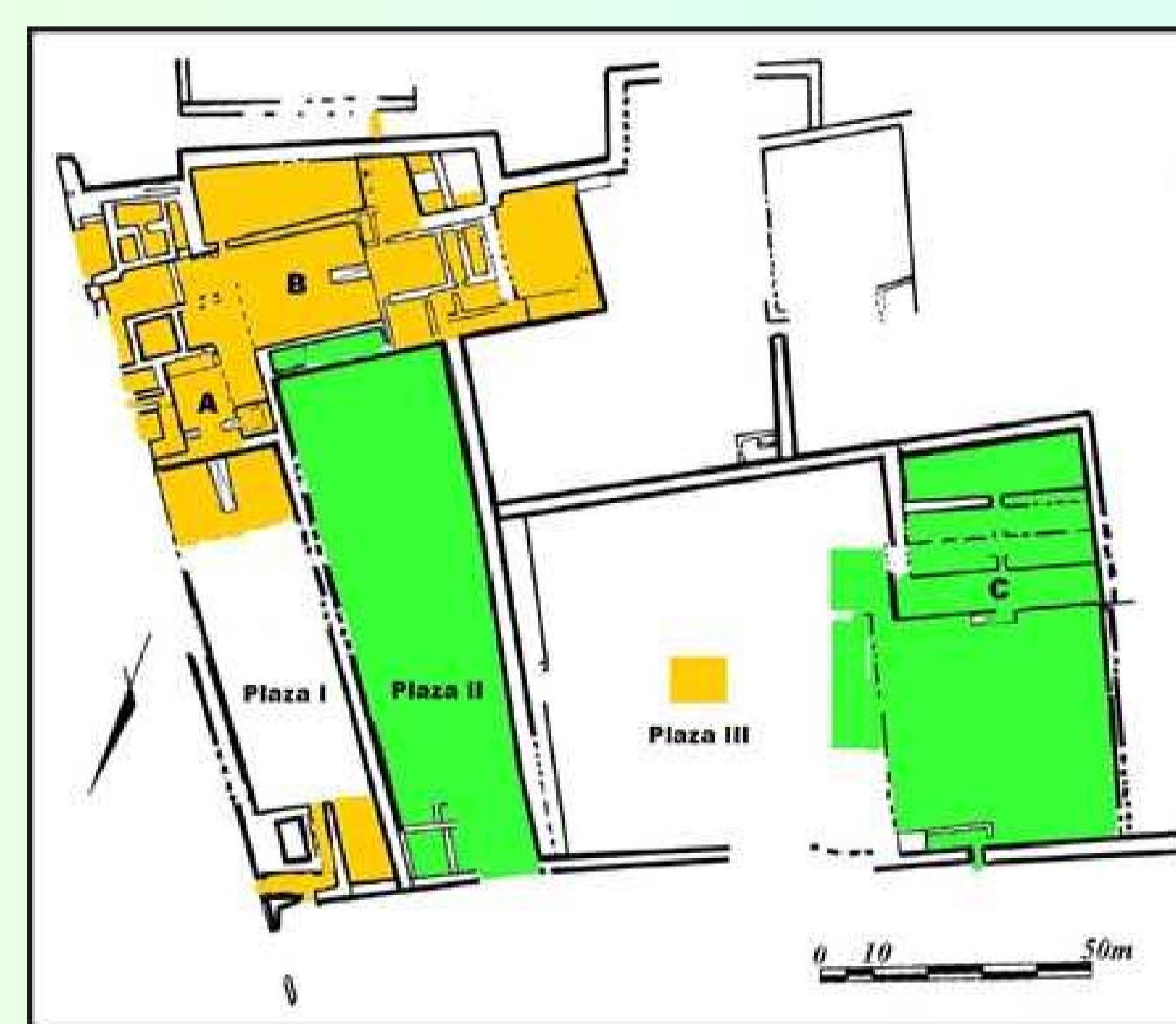

Fig.3. Plan of Pyramid III complex: A–Pyramid IIIA, B–Pyramid IIIB, C-Pyramid III-C (the Temple of Monkey)
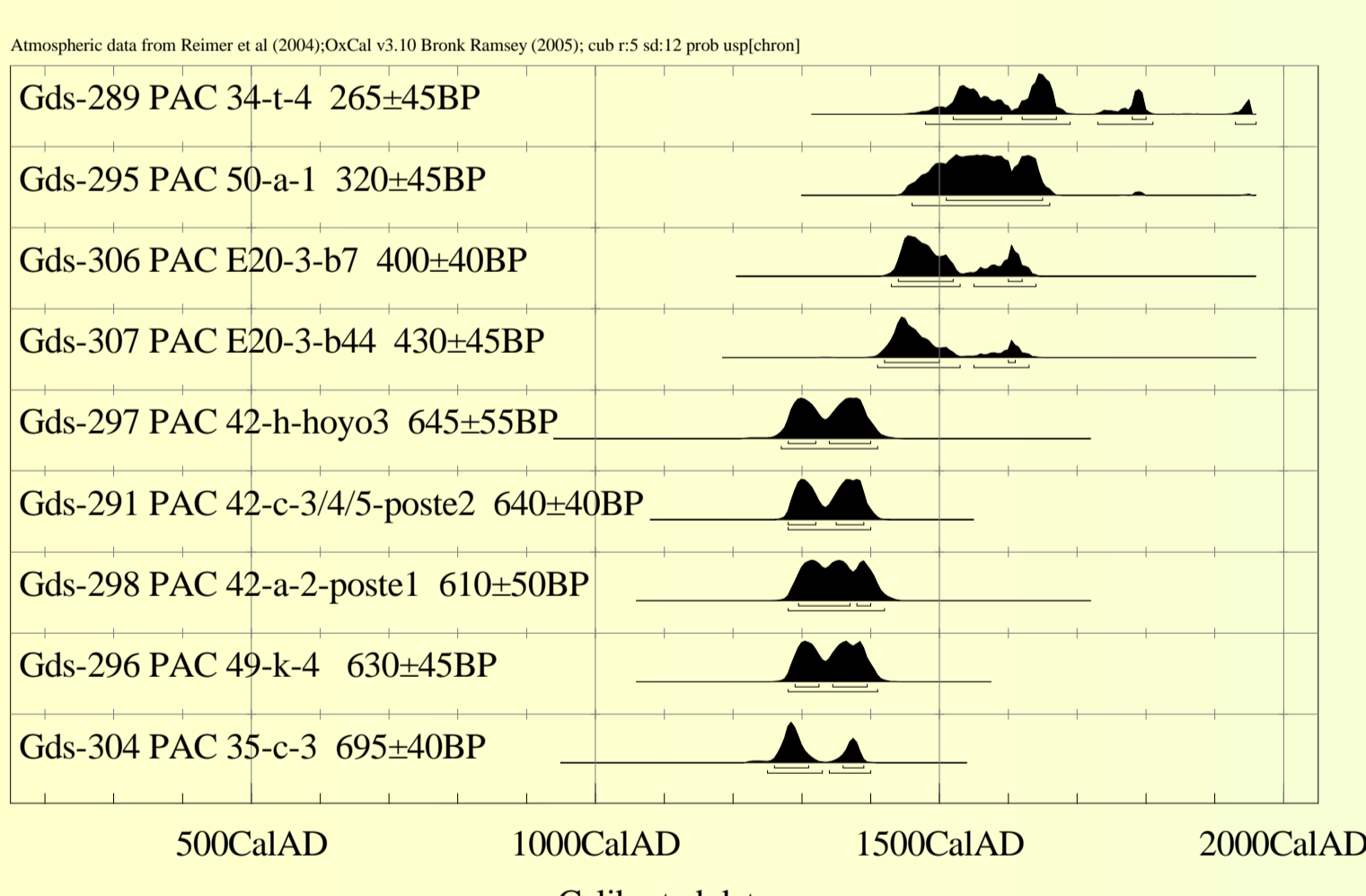

Fig.4. View of the Temple of Monkey

Fig. 5. The results of calibration of individual dates for samples from the Temple of Monkey

Samples included in the analysis (see Table 1) were taken form constructional elements of the Temple of Monkey and from the bundle of the E20 mummy of about 35 years old woman. It could be shown that it was a secondary burial, i.e. the bundle was buried at the moment of death and then taken out from his original tomb to be placed in the Temple where we found it. All samples were dated in the Gliwice Radiocarbon Laboratory using the liquid scintillation technique. The dates were calibrated using OxCal v3.10 calibration program and IntCal04 calibration curve (Reimer et al., 2004). We decided not to use SHCal04 calibration curve (McCormac, et al., 2004), because our site is located close to the Intertropical Convergence Zone, while this curve is constructed basing on data from latitudes 55-30°S. The results of calibration are shown in Figure 5.

In order to estimate more precisely the calendar dates of studied objects and events we used the OxCal calibration program to combine radiocarbon dates and other chronological information. We constructed chronological model, which allows for the following historical and archaeological prior data:
1. All calibrated dates should be older than the date of forced abandonment of the site during the Spanish Conquest, which is known to be AD 1535 through historical sources.
2. Two group of dates may be marked out from the set of all dates – the first group - connected with foundation and the first period of occupation of the Temple (Gds-304, Gds-296, Gds-298, Gds-291, Gds-297) and the second group – connected with the E20 Mummy (Gds-307, Gds-306). Two dates (Gds-295, Gds-289) can be assigned to none of these groups. There is not prior relation between the first and the second group as well as between the groups and the unassigned dates.
3. The dates belonging to the first group may be divided into two subgroups, which corresponds to two succeeding phases of the chronology of the Temple – the foundation of the Temple (Gds-304, Gds-296) and the first period of the Temple occupation (Gds-298, Gds-291, Gds-297). We added to our model boundaries of whole group and used them to find estimates of the beginning of the construction of the Temple and the ending of the first period of occupation.
4. The date of sample taken from the internal part of the mummy bundle (Gds-307, the first burial) should be older than the date of sample taken from external part (Gds-306, the second burial).

The structure of the model and the posterior probability distributions of calibrated dates are presented in Fig.6. The overall agreement index of the model as well as the agreement indices for every date have values above the threshold (see values in Fig.6), what proves that there is good concordance between the radiocarbon dates and the prior data of our model.

Comparison of the results of radiocarbon dating for the foundation and the first period of occupation of the Temple of the Monkey (see Fig.6) and the results for Pyramid IIIA and IIIB (Fig.7) clearly shows that the Temple of Monkey is older than Pyramid IIIA and IIIB. The age of its construction is similar to the age of occupation of Pyramid II, but it is also possible that the Temple is even older than the Pyramid II. Moreover the results obtained for mummy E20 suggest that the Temple was used also during occupation of Pyramid IIIA. The probability distribution of calibrated age of sample PAC 50-a-1 (Gds-295) is flat and wide (see Fig.5) as the calibration curve is rather flat for time period 1450-1600 AD, but according to the model described above (see Fig.6) it is possible, that the real sample age falls in the second half of 15th century or in the beginning of 16th century. This comment relates also to the probability distribution of the result obtained for sample PAC34-t-4 (Gds-289). The dates Gds-307 and Gds 306 concern mummy E20 and they are almost identical (see Fig.5), however archaeological evidence show, that the first date should be older because it dates a sample from inside of the mummy bundle (the first burial), while the second date concerns the external wrapping and gives information about the second burial. This prior information included in our model allow to estimate more precisely the age of the first and second burial of the mummy and the time span between burials. The posterior probability distributions of calibrated dates of the first and the second burial and the probability distribution of the possible time span between burials are presented in Figure 8. The results show that the first burial took place in the period 1425 – 1465 AD (with probability equal to 68.2%), while the second burial – in the period 1450 –1515 AD (with probability equal to 68.2%). The time span between burials has a value smaller than 50 years with probability equal to 68.2%

The results show that the Temple of Monkey was built before the Pyramid IIIA and IIIB and it was occupied probably longer than neighboring Pyramids II and III. It confirms hypothesis, that this structure was separated and used for other purposes than the rest of the Complex of Pyramid III.

Fig.6. The structure of assumed model of the chronology and the results of calibration (posterior distributions, agreement indices) obtained including the prior archaeological and historical data
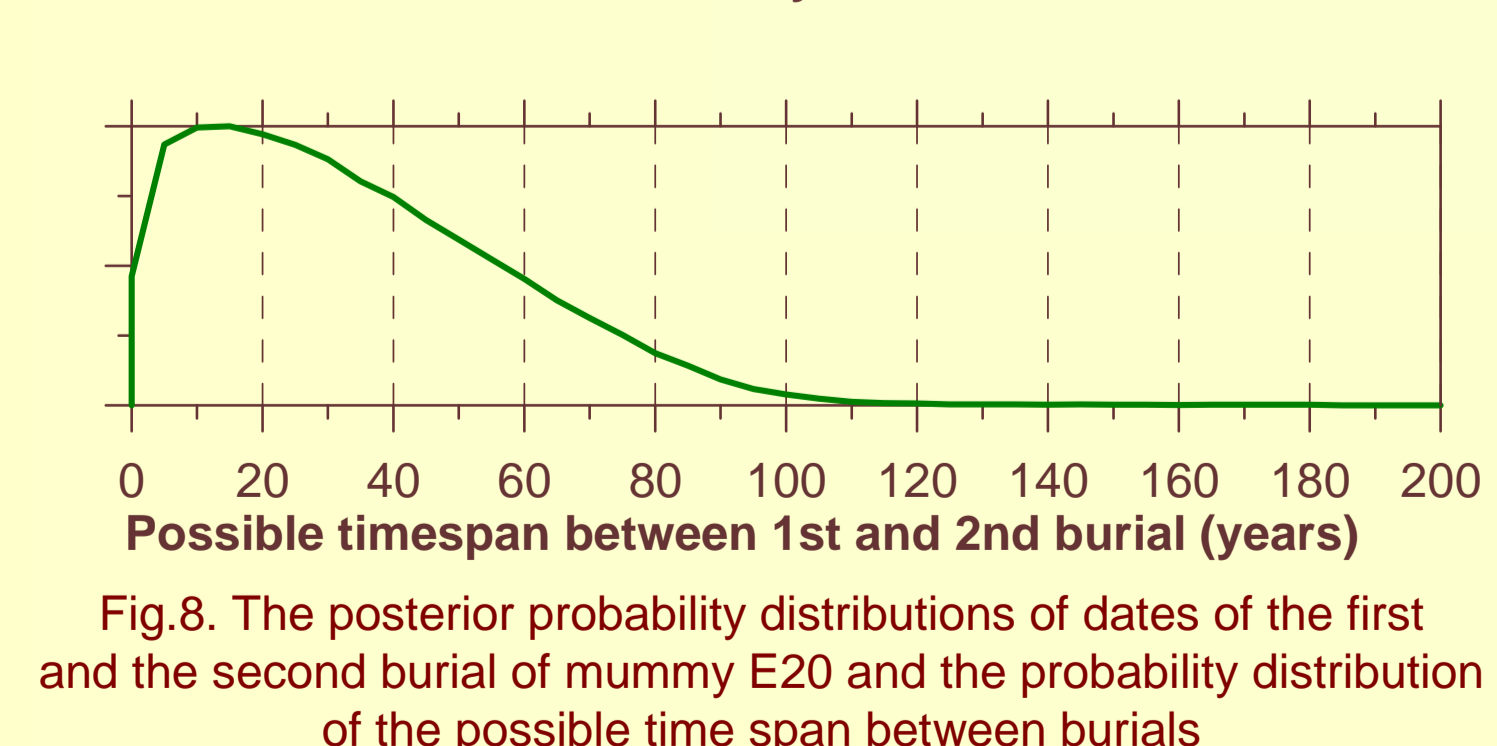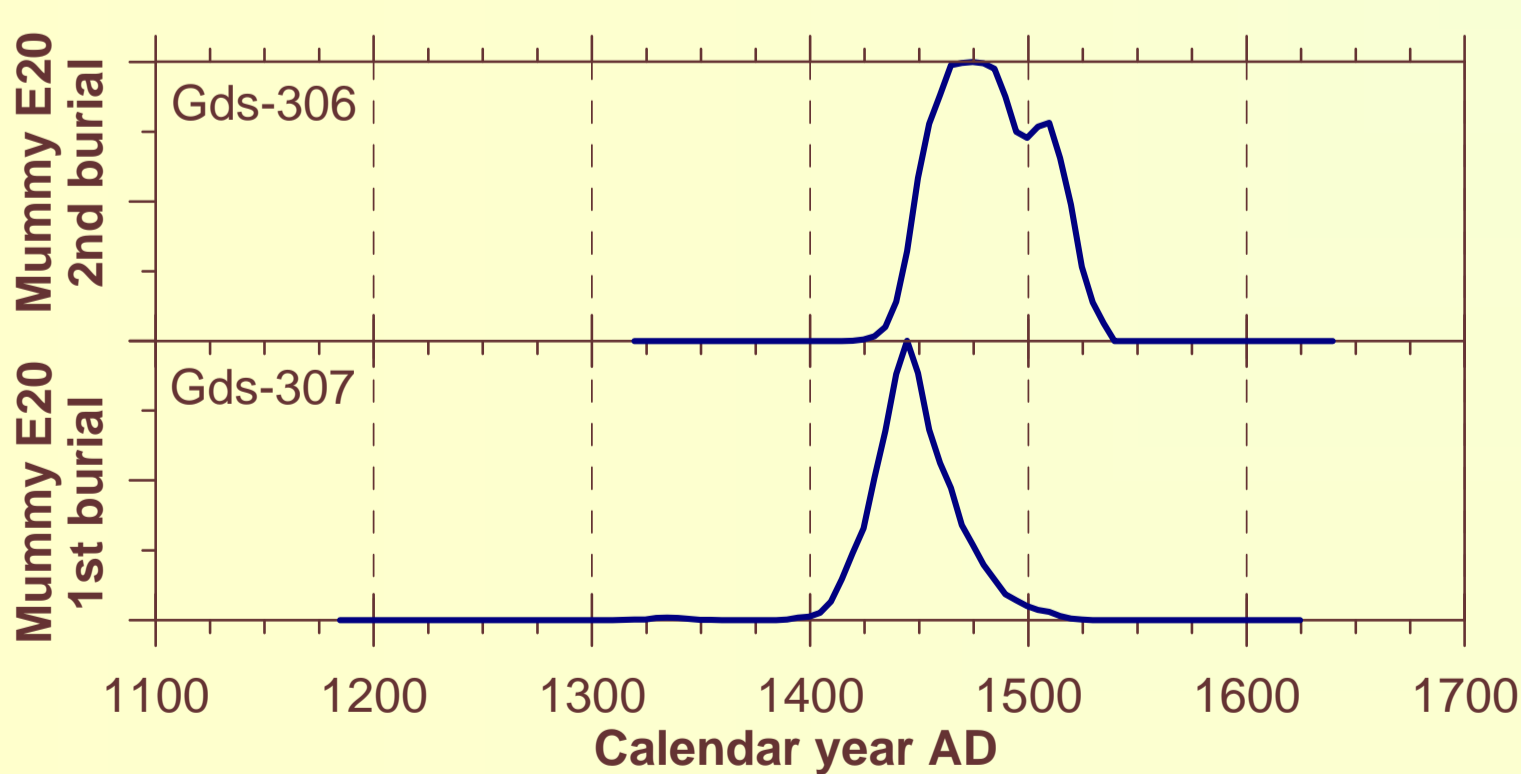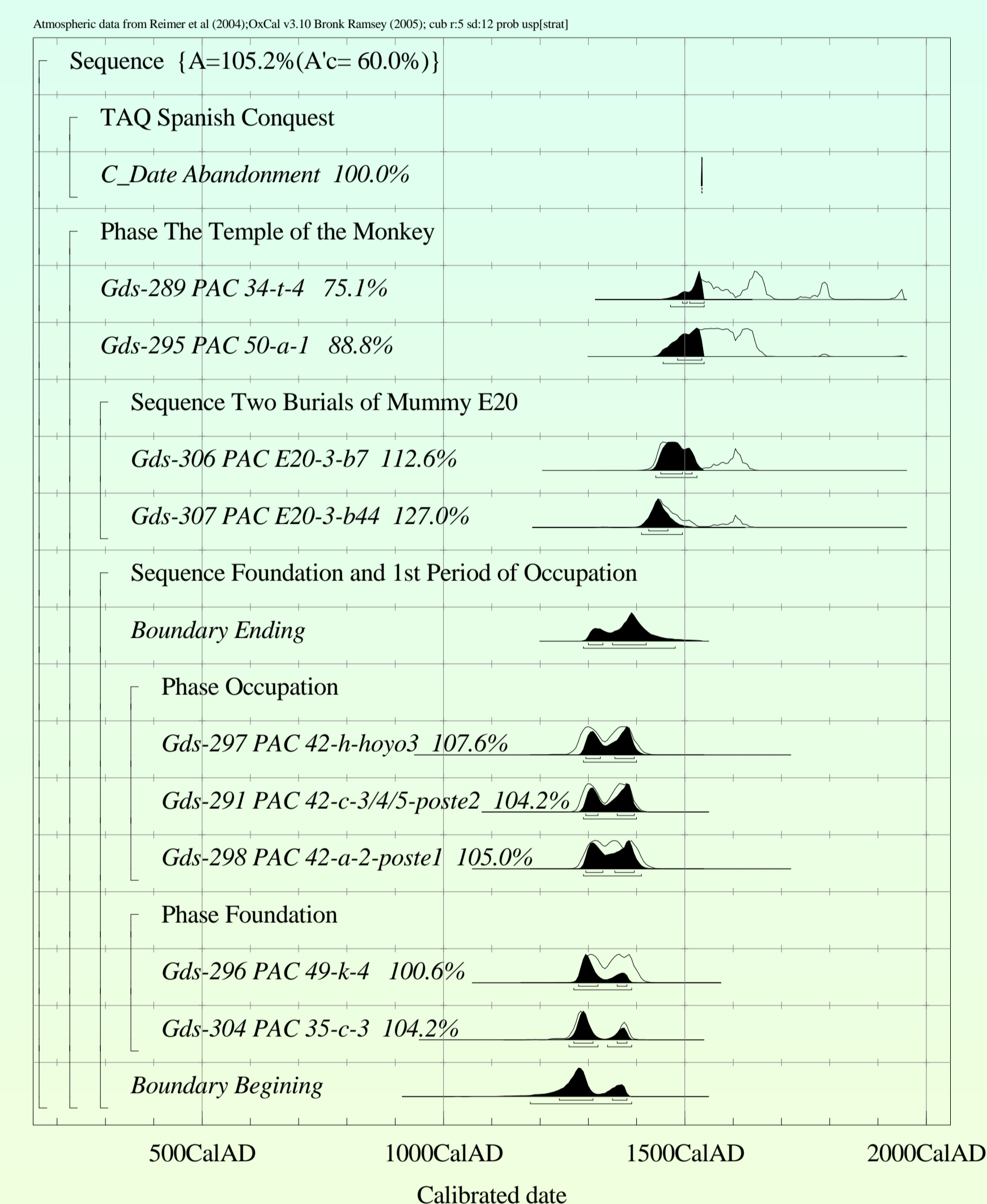

Fig.8. The posterior probability distributions of dates of the first and the second burial of mummy E20 and the probability distribution of the possible time span between burials
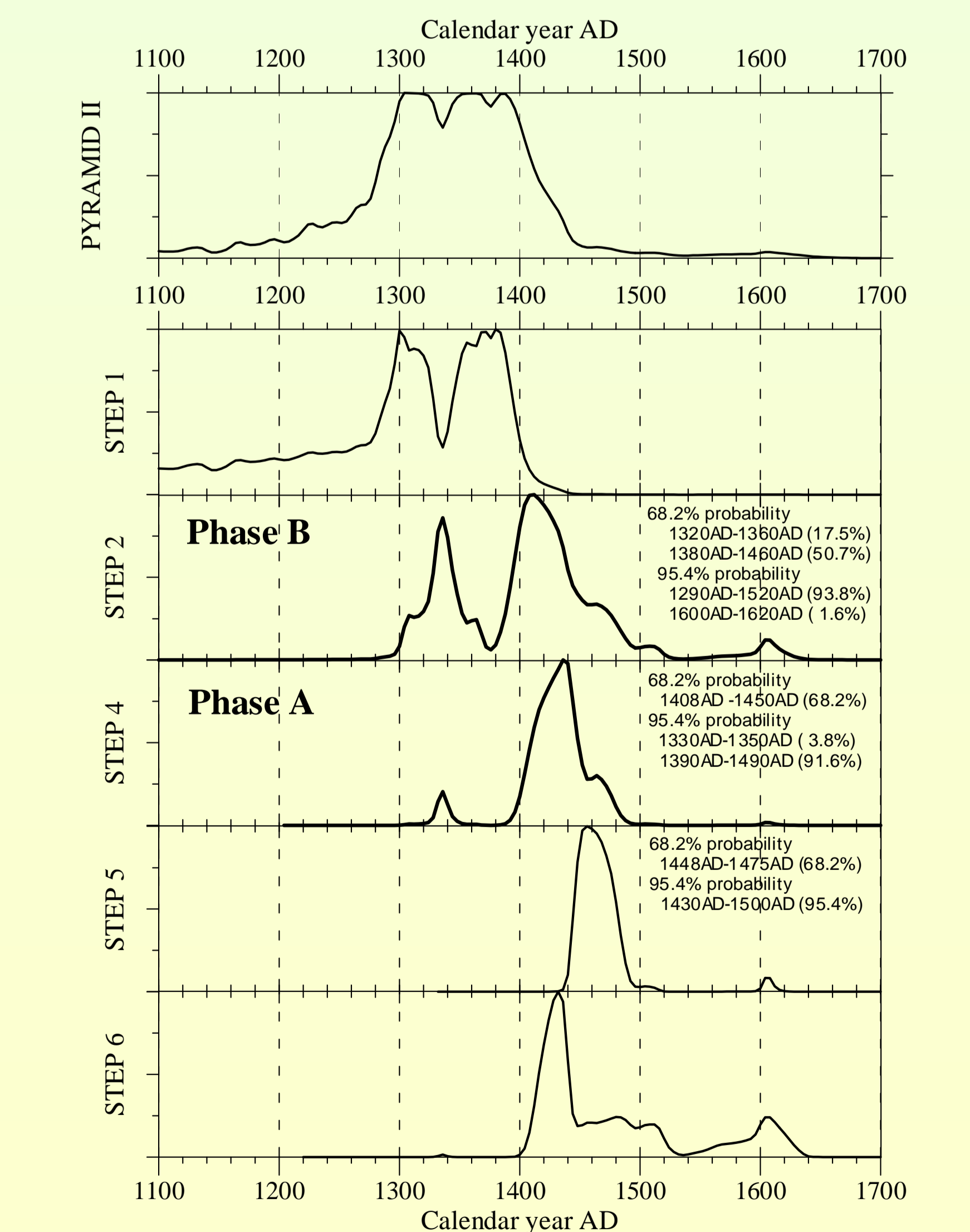

Fig.7. The absolute radiocarbon chronology of Pyramid III and probability distribution of calendar age of three dates for Pyramid II. STEP 1 – refuse deposit, STEP 2 – construction and occupation of Pyramid IIIA, STEP 4 - construction and occupation of Pyramid IIIB, STEP 5 – abandonment of Pyramid IIIA, STEP 6 – intrusive reoccupation (Michczyński, Eeckhout, Pazdur, 2003)

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Photos, map of geographical situation of Pachacamac and plan of Pyramid III Complex come from www site of Ychsma Project: http://www.ulb.ac.be/philo/ychsma/

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