

CALENDAR AGES OF THE TIME HORIZONS PRESENTED ON THE ISOPOLLEN MAPS

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The isopollen maps have been constructed for 500-year time intervals chosen as even dates from 14,000 yr BP to the present-day (Nalepka & Walanus, this volume). These horizons are expressed in the scale of conventional radiocarbon age. For the horizons an equal range of ± 100 years has been accepted, so the assigned time horizons include 200 years (0 ± 100 yr BP, 500 ± 100 yr BP, 1000 ± 100 yr BP, etc.). The range of ± 100 does not mean a measurement error. For example, the range of the time horizon 3000 ± 100 years means that those spectra have been used to draw the map whose calculated dates were included in the time interval from 2900 to 3100 yr BP. In other words, all the pollen spectra dated within the limits of ± 100 are included in the range of this time horizon.

Dating of spectra from the particular profiles may contain some errors. These dates result from the interpolation (less frequently from extrapolation) of radiocarbon and other dates, thus a few kinds of error are superimposed on each other (Nalepka & Walanus 2003a, b). The errors (uncertainties) in dating of spectra are different for particular sites, being the greatest for profiles without radiocarbon dates. The character of these errors does not allow them to be described by normal distribution, unlike the case for conventional radiocarbon dates (Walanus & Goslar 2004). Moreover, it is almost impossible to give a quantitative estimation of accuracy of dating. This results from applying the broad range of information from natural sciences such as biostratigraphy and lithology of sediments (Hoek 1997a, b) in assigning ages of the palynological zones. To include this type of qualitative knowledge in an estimation of the error in a final result, it would be necessary to present subjective probabilities of possible deviations from a situation accepted for a particular dating, and this would not provide much greater precision.

The time scale is the radiocarbon conventional age. Most of the dates are given in the conventional scale (Nalepka & Walanus, this volume). To calibrate ages of horizon boundaries used to construct isopollen maps, the

commonly available programme OxCal v3.8 (Copyright Bronk Ramsey 2001) established in the Radiocarbon Laboratory of Oxford University has been applied. Figure 21 presents a calibration curve.

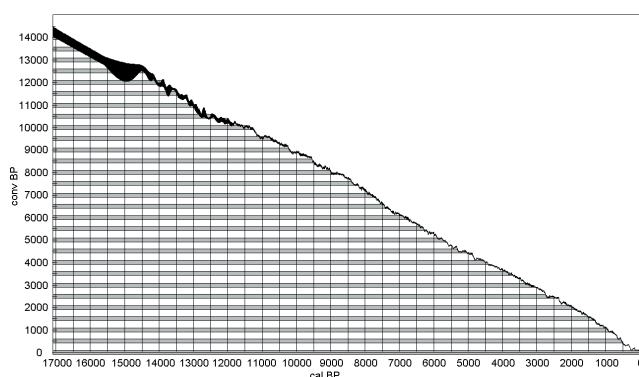


Fig. 21. Time horizons referring to the calibration curve. Calibration of particular time horizons is presented in Figs 22 and 23. The calibration curve is provided by the OxCal v3.8 programme

A basic result of calibration of time horizon boundaries is a set of diagrams (Figs 22 and 23) comprising appropriate fragments of a calibration curve, in which the limits of horizons are drawn as horizontal lines.

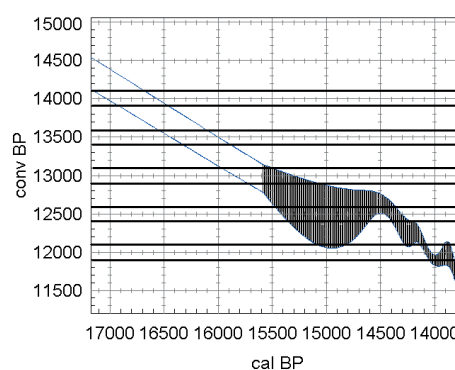


Fig. 22. Calibration of time horizons from 14,000 to 12,000 yr BP used for drawing the isopollen maps

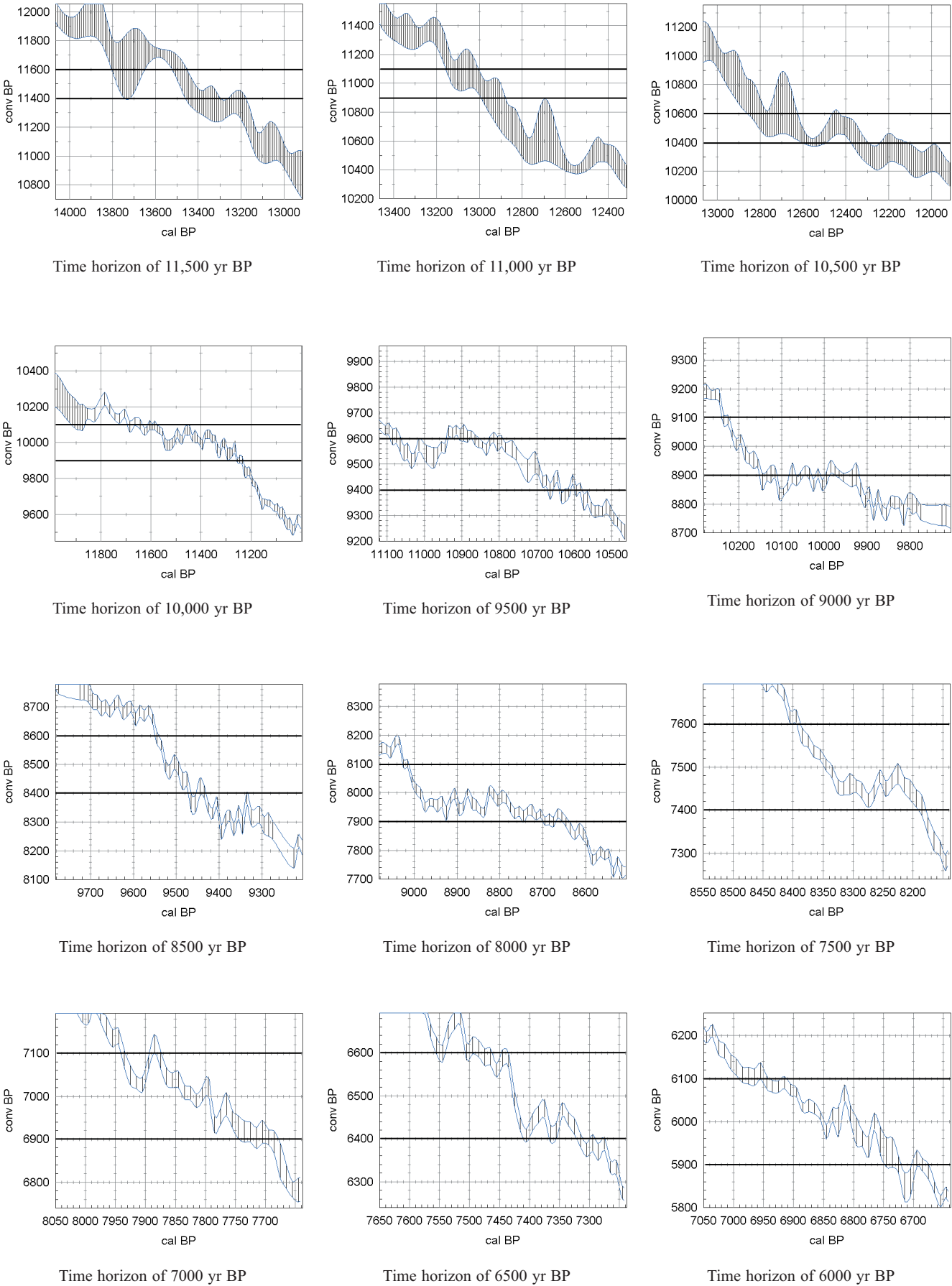


Fig. 23. Calibration of time horizons from 11,500 to 100 yr BP used for drawing the isopollen maps

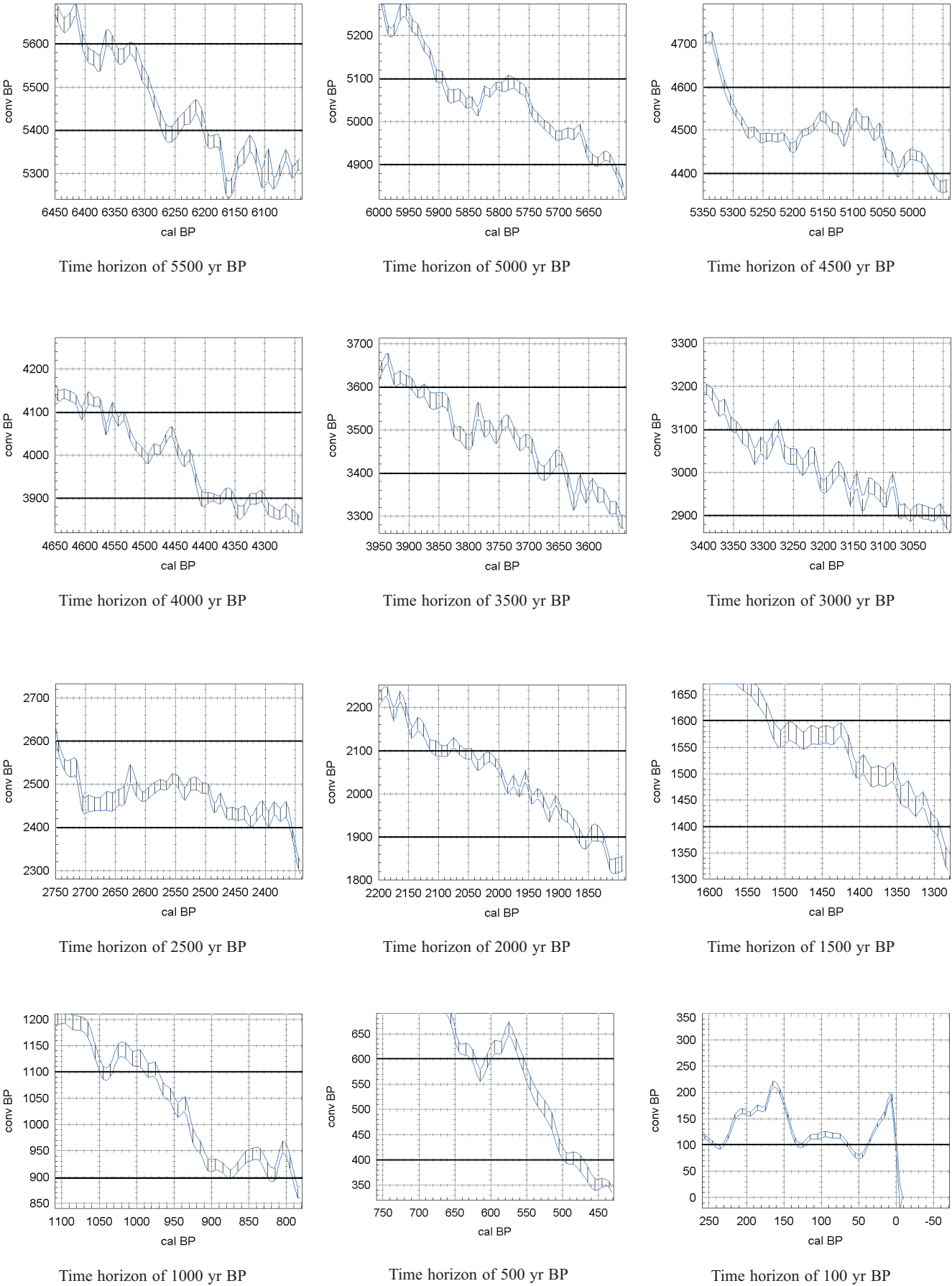


Fig. 23. Cont.

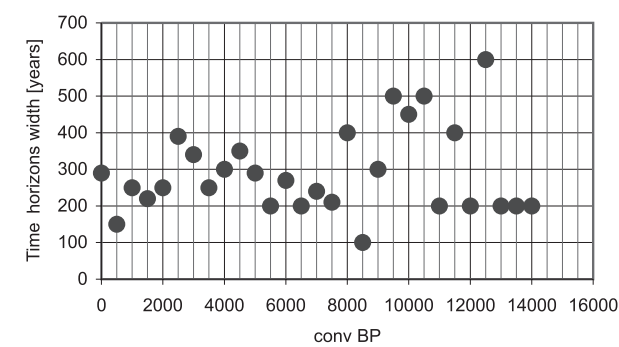


Fig. 24. The width of time horizons after calibration (in a scale of conventional radiocarbon years the width of all the horizons equals 200 years)

Calibrated (=calendar) dates are given along the horizontal axis. Diagrams allow some leeway because of the shape and limited accuracy of a calibration curve. The widths of the time horizons after calibration are presented in Figure 24.

Proposals of the authors of this chapter concerning expression of the ages of boundaries of time horizons in calendar scale are presented in Table 1. However, it should be emphasized that due to the lack of the unequivocal nature and certainty of the radiocarbon calibration curve it is not possible to precisely determine the calendar age of the boundaries of time horizons.

Interpretations given in Table 1 are based on two assumptions:

1. calendar age of a boundary should not differ much from the most probable age (or from the median),
2. the width of a horizon expressed in calendar years should not differ much from the width resulting from the mean inclination of the calibration curve close to the horizon, which is usually 200 years.

Table 1. Calendar age of limits of time horizons (interpretation according to Figs 22 and 23)

Conventional age yr BP			Calibrated age yr BP	
centre of horizon	upper limit	lower limit	upper limit	lower limit
0	–100	100	–50	240
500	400	600	480	630
1000	900	1100	790	1040
1500	1400	1600	1300	1520
2000	1900	2100	1850	2100
2500	2400	2600	2360	2750
3000	2900	3100	3000	3340
3500	3400	3600	3640	3890
4000	3900	4100	4300	4600
4500	4400	4600	4970	5320
5000	4900	5100	5610	5900
5500	5400	5600	6200	6400
6000	5900	6100	6680	6950
6500	6400	6600	7300	7500
7000	6900	7100	7700	7940
7500	7400	7600	8180	8390
8000	7900	8100	8650	9050
8500	8400	8600	9450	9550
9000	8900	9100	9950	10,250
9500	9400	9600	10,600	11,100
10,000	9900	10,100	11,250	11,700
10,500	10,400	10,600	12,300	12,800
11,000	10,900	11,100	12,900	13,100
11,500	11,400	11,600	13,300	13,700
12,000	11,900	12,100	13,900	14,100
12,500	12,400	12,600	14,500	15,100
13,000	12,900	13,100	15,400	15,600
13,500	13,400	13,600	16,100	16,300
14,000	13,900	14,100	16,700	16,900