DETERMINATION OF THE AXIS OF THE MEDIEVAL CHURCH IN VELEMÉR

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Introduction

On 22 September 2000, three independent methods: astronomical, magnetic, and GPS-aided ones were obtained for determination of the orientation of the *Velemér* (Hungary) medieval church (see the paper by Kovács, page 51).

The Astronomical Method

The differences between the azimuth of the Sun and the azimuth of the main (east–west) outer walls of the church were measured by a theodolite several times, and the mean azimuth of the walls was derived from the computed azimuth of the Sun for the given date and time.

The results are given in the following table:

Measurement no.	time (MET)	Azimuth of the north wall	south wall
1	$10^h15^m35^s$	$71^\circ\!.455$	—
2	$10^h22^m35^s$	$71^\circ\!.18$	—
3	$10^h33^m00^s$	$71^\circ\!.07$	—
4	$10^h47^m50^s$	$71^\circ\!.10$	—
5	$10^h57^m45^s$	$71^\circ\!.058$	—
6	$11^h04^m00^s$	—	$71^\circ\!.761$
7	$11^h12^m30^s$	—	$71^\circ\!.744$
8	$11^h21^m07^s$	—	$71^\circ\!.629$
9	$11^h35^m10^s$	—	$71^\circ\!.551$
	mean:	$71^\circ\!.173 \pm 0^\circ\!.165$	$71^\circ\!.671 \pm 0^\circ\!.099$
mean azimuth of the axis		$71^\circ\!.4 \pm 0^\circ\!.15$	

The Magnetic Method

With the aid of a Bezard compass, the azimuthal angle between the magnetic north and the direction of the church walls was measured, and the mean result was corrected by the known value of magnetic deviation. The results are the following:

azimuth of the east–west main walls: $70^\circ\!.3$,
azimuth of the north–south front wall: $338^\circ\!.9$ ($\rightarrow$ azimuth of the main walls: $68^\circ\!.9$).

From these data, the mean magnetic azimuth corrected to the magnetic deviation (2° east): $71^\circ\!.6 \pm 0^\circ\!.99$.

The GPS Method

The GPS coordinates for two points in the extended line of the front wall (supposed to be perpendicular to the main walls) were determined, and the azimuth of this line was computed. From track measurements along the extended axis of the front (north–south) wall, the azimuth of the main (east–west) walls was computed. The mean value is $69^\circ \pm 2^\circ$ (the instrument had a readout rounded for degrees). The bigger errors are due to the limited length of the baseline, because there is a forest around the church.

Summary

The results mentioned above:

$$\begin{array}{lll} 71^\circ\!.4 & \pm\, 0^\circ\!.15 & \text{(astr.)} \\ 71^\circ\!.6 & \pm\, 0^\circ\!.99 & \text{(magn.)} \\ 69^\circ & \pm\, 2^\circ & \text{(GPS)} \end{array}$$

exclude the idea of the exact east–west orienation (90°) of the main axis of the church. It is near the average of the azimuth of the rising sun for the date of Easter ($74^\circ\!.4 \pm 4^\circ$) between 1370 and 1375 (the supposed period of the building of the church).

References

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