Geophysical Research Abstracts
Vol. 15, EGU2013-5218, 2013
EGU General Assembly 2013

Is it possible to receive information about the historical geomagnetic declination from church orientations?

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It is widely known that the main structure of many churches was planned and built in an east-ward direction. This procedure, called "easting", was used for centuries especially in catholic structures. "Easting" usually refers to the direction of sunrise at the church patron's day. Assuming however that this direction is estimated by compasses there could be a significant correlation between the geographic orientation of the churches and the value of magnetic declination at the date of building. In Europe compasses are known since the 11^{th} century. For this study altogether 124 churches located in lower Austria and built between 1100 to 1900 were analysed. Of primary interest is the geographic orientation of the churches, which was extracted out of georeferenced satellite images in Google Earth and the NO Atlas. The measured orientation of the church's nave is then compared to the geographic east direction as well as to the magnetic east direction, according to the magnetic field in the church's construction year which is determined by published geomagnetic field models. The resulting deviations for the geographic east direction split our data into two groups: churches that were built before 1500 and churches that were constructed after 1500. The boundary between these two data sets is marked by the Ottoman wars in the 16^{th} century, where a lot of churches were destroyed. After 1500 the differences between the church's orientation and the geographic east direction are significantly bigger than before the Ottoman wars, so we shifted our focus for the following calculations on the time span from 1100 to 1500, where we found quite small deviations for both the geographic and the magnetic east direction.

The principle idea of church orientation, usually referred to as "Easting" is to direct the church to the point of sunrise on the patron saint's day. Therefore we also calculated the solar azimuth on the patron saint's day and compared it to the orientation of the church. The differences we found were bigger than the deviations we got from the comparisons to the geographic and magnetic east directions, so this indicates that practically the solar azimuth was not used for the church's direction. Furthermore, our investigations indicate that the orientation of the investigated churches is more likely to be related to the geographic east direction than to magnetic east.