# BULGARIAN ARCHAEOMAGNETIC DATABASE AND APPLICATIONS

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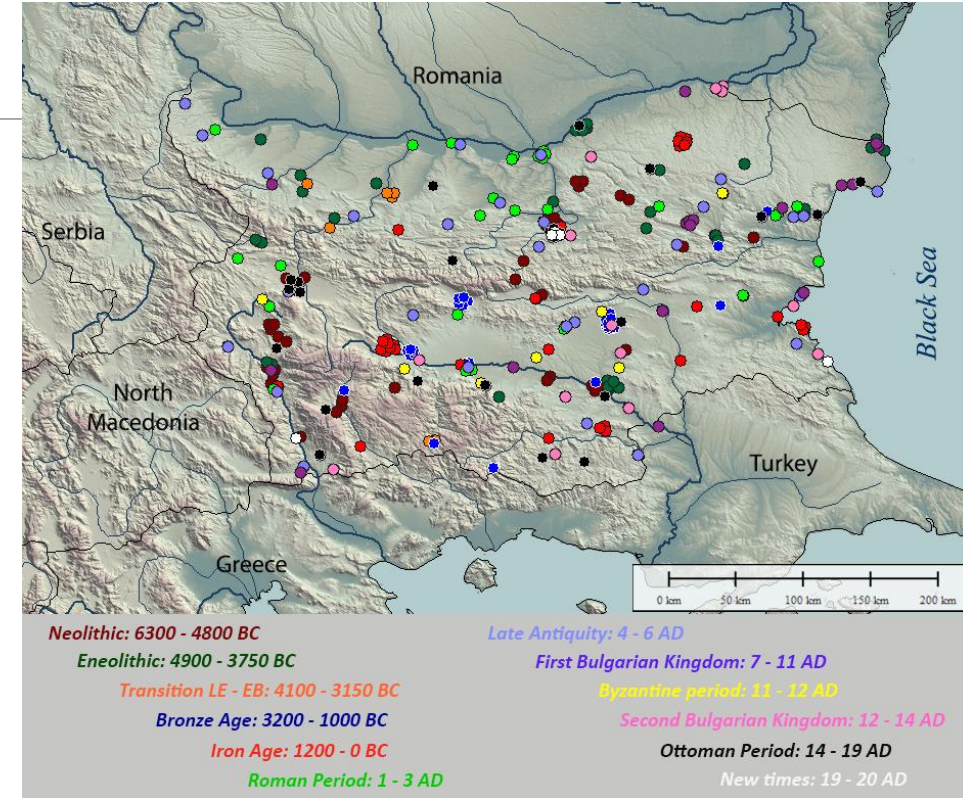
# Archaeomagnetic database

📚 The beginning of archaeomagnetic studies in Bulgaria - in 1967 by Prof. Mary Kovacheva

📚 Archaeomagnetic determinations – both DIRECTION and PALAEOINTENSITY from burnt clay structures *in situ*

⬇️

extended local series of the three main geomagnetic elements – declination (D), inclination (I) and intensity (Fa)

*DATABASE*



Neolithic: 6300 - 4800 BC
Eneolithic: 4900 - 3750 BC
Transition LE - EB: 4100 - 3150 BC
Bronze Age: 3200 - 1000 BC
Iron Age: 1200 - 0 BC
Roman Period: 1 - 3 AD

Late Antiquity: 4 - 6 AD
First Bulgarian Kingdom: 7 - 11 AD
Byzantine period: 11 - 12 AD
Second Bulgarian Kingdom: 12 - 14 AD
Ottoman Period: 14 - 19 AD
New times: 19 - 20 AD

**310 reference points, obtained by archaeomagnetic investigation of numerous, relatively evenly distributed in space, _archaeological sites_ of different age from Bulgaria**

# DATABASE

> the database undergo regular updating and revision
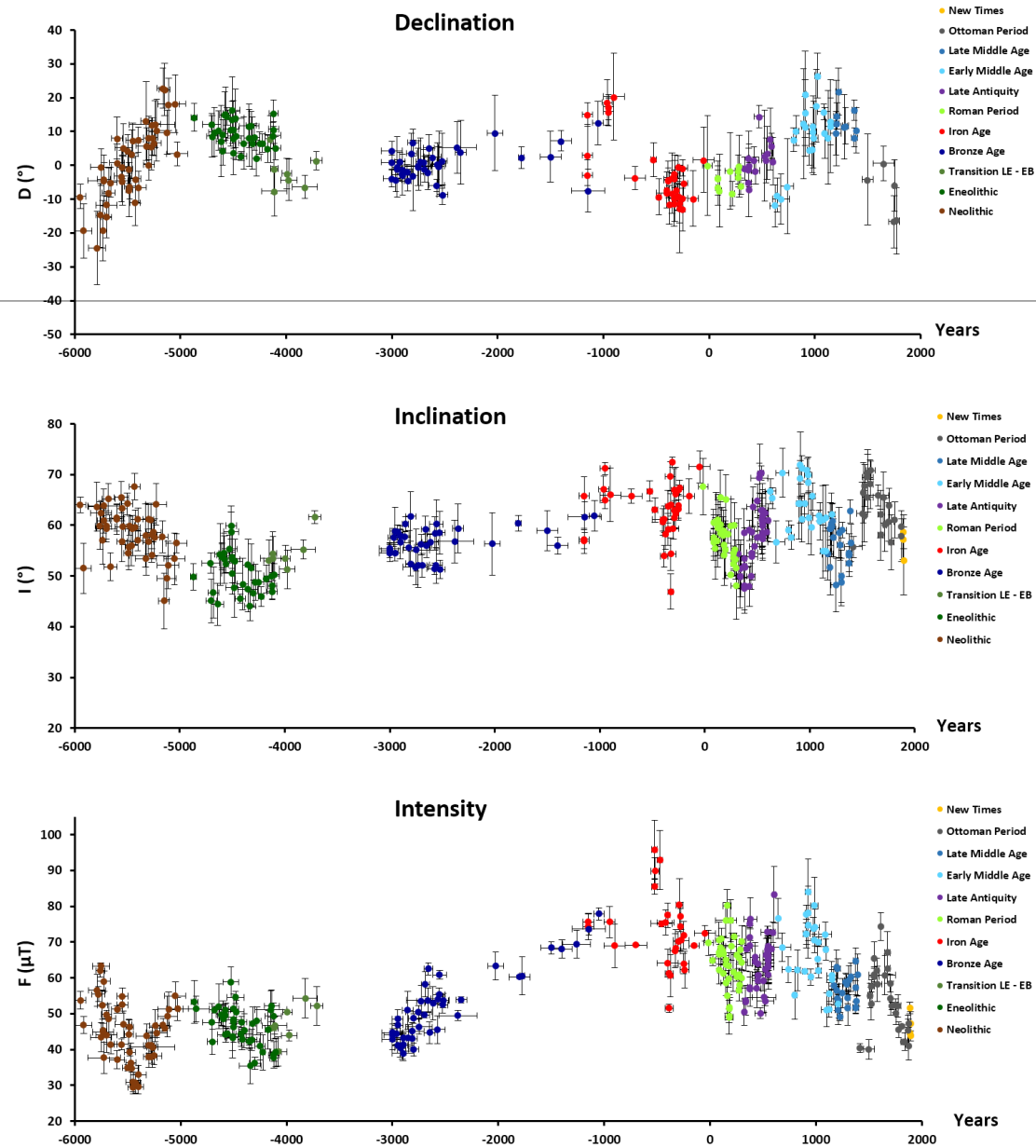
# SECULAR VARIATION CURVES OF GEOMAGNETIC FIELD FOR BULGARIA

THE MOST RECENT COMPILATION:
D, I and Fa reference curves were smoothed by Bayesian statistics (Lanos, 2004) (Kovacheva et al., 2014).

The main Bulgarian geomagnetic secular variation patterns are generally consistent with those observed in the Central Mediterranean and in Western and Central Europe

Bulgarian geomagnetic secular variation curves are successfully used for absolute dating since more than 20 years

# ARCHAEOMAGNETIC DATING



a)
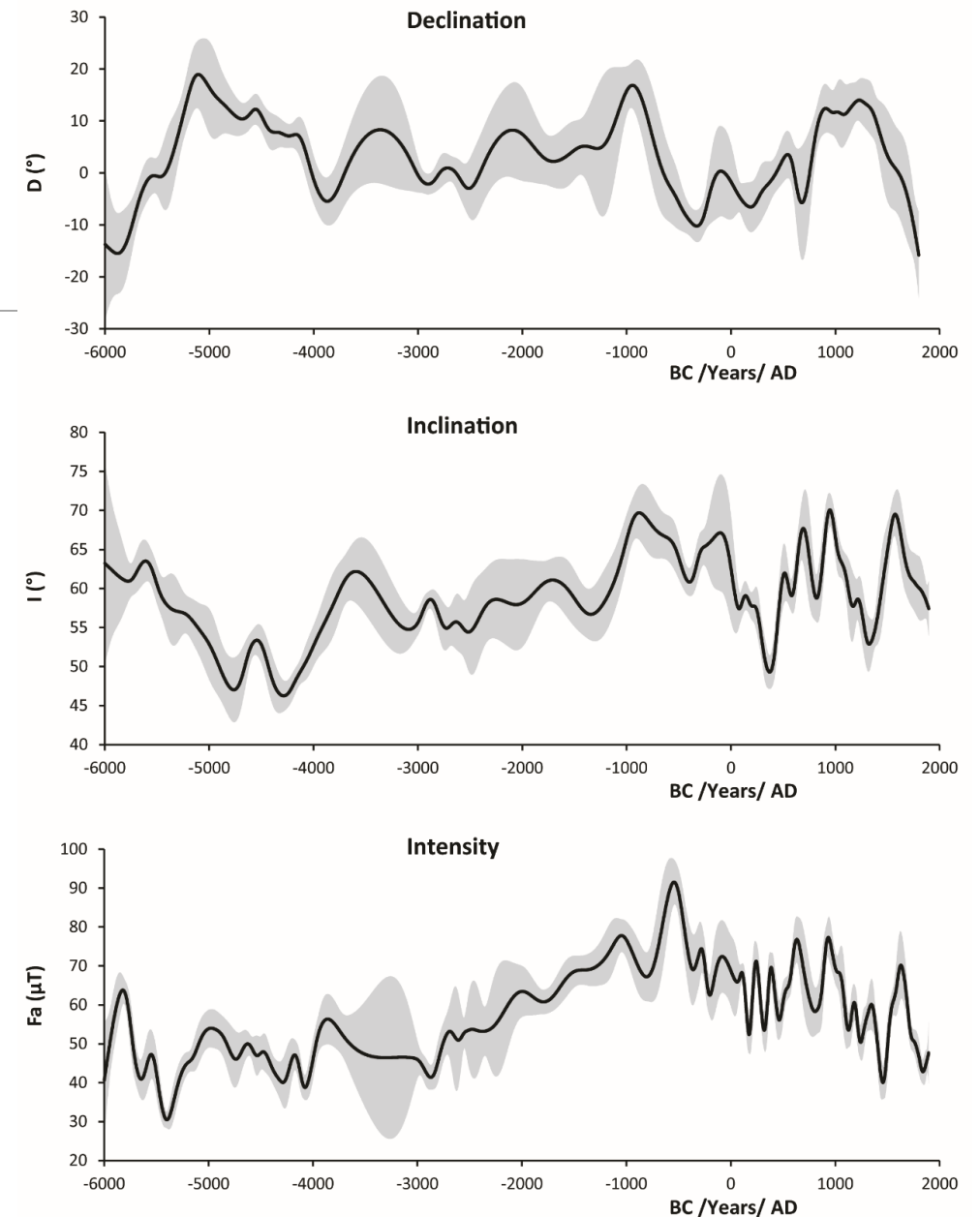
📚 The archaeomagnetic dating compares the obtained archaeomagnetic results for a site (or a feature) with the local reference curves representing D, I and Fa variations in the corresponding period, and several possible intervals are usually distinguished.

📚 The final solution is a combination of all defined intervals and depends not only on the accuracy of the experimental results and the reference curves used, but also on the rate of the geomagnetic field change during the period in question.
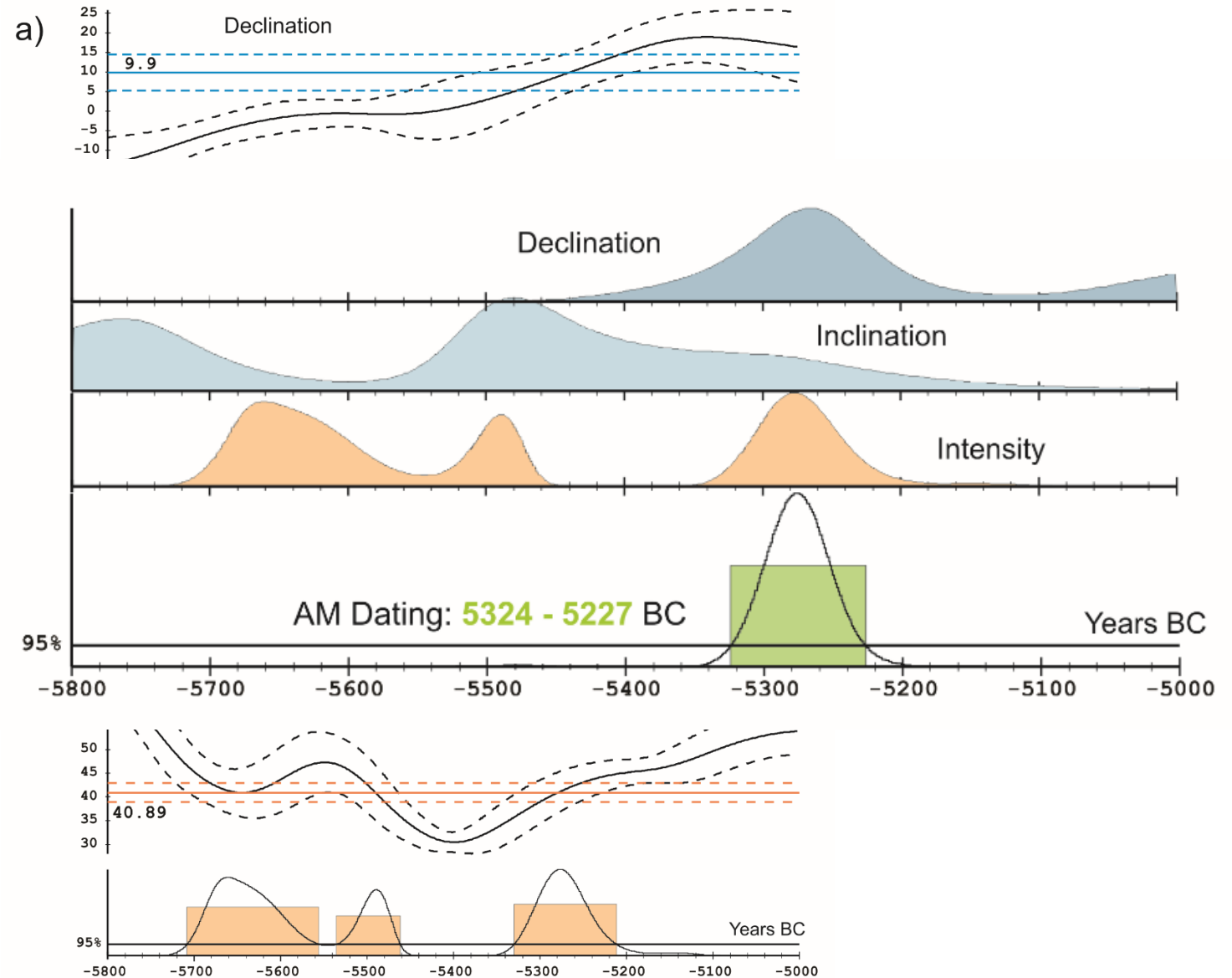
# ARCHAEOMAGNETIC DATING EXAMPLES

*Prehistoric multilevel settlement Maleva Mound*



→ According to the archaeological data the oven should be connected with the Early Bronze Age but its stratigraphy cast some doubt

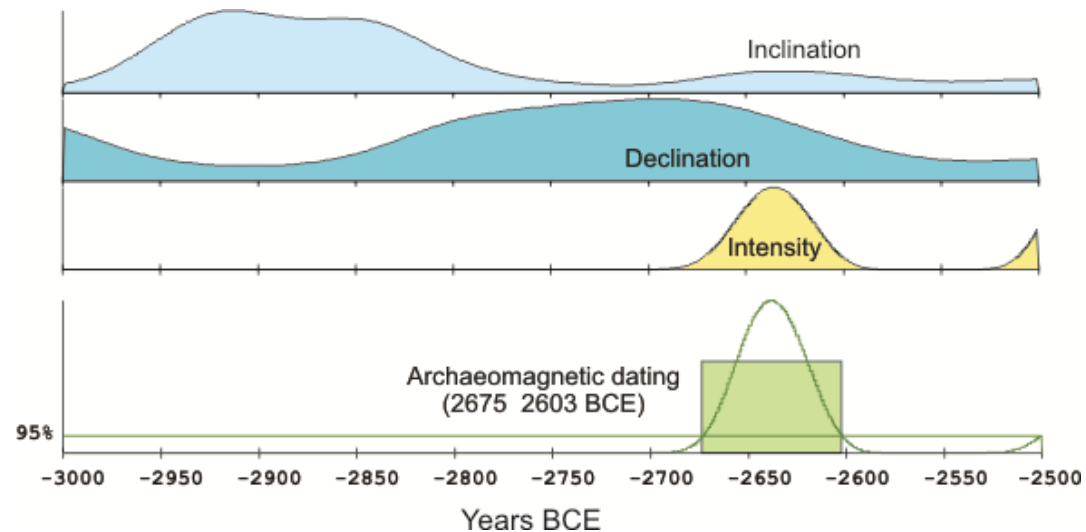Only one possible solution of 2675 – 2603 BCE was found with 95 % probability density.



➤The remains found show that it was inhabited most intensively during the Bronze (3200 – 1000 BCE) and Middle Ages (7 – 15 c. CE) – two epochs that are not only very distant, but also cover quite wide time intervals.

➤ two levels of an badly preserved oven were sampled for archaeomagnetism

The studied oven was most likely in operation during the third phase of the Early Bronze Age (2800 – 2500 BCE) which correspond very well with the assumed archaeological context