Review of the most recent archaeomagnetic investigation in Europe

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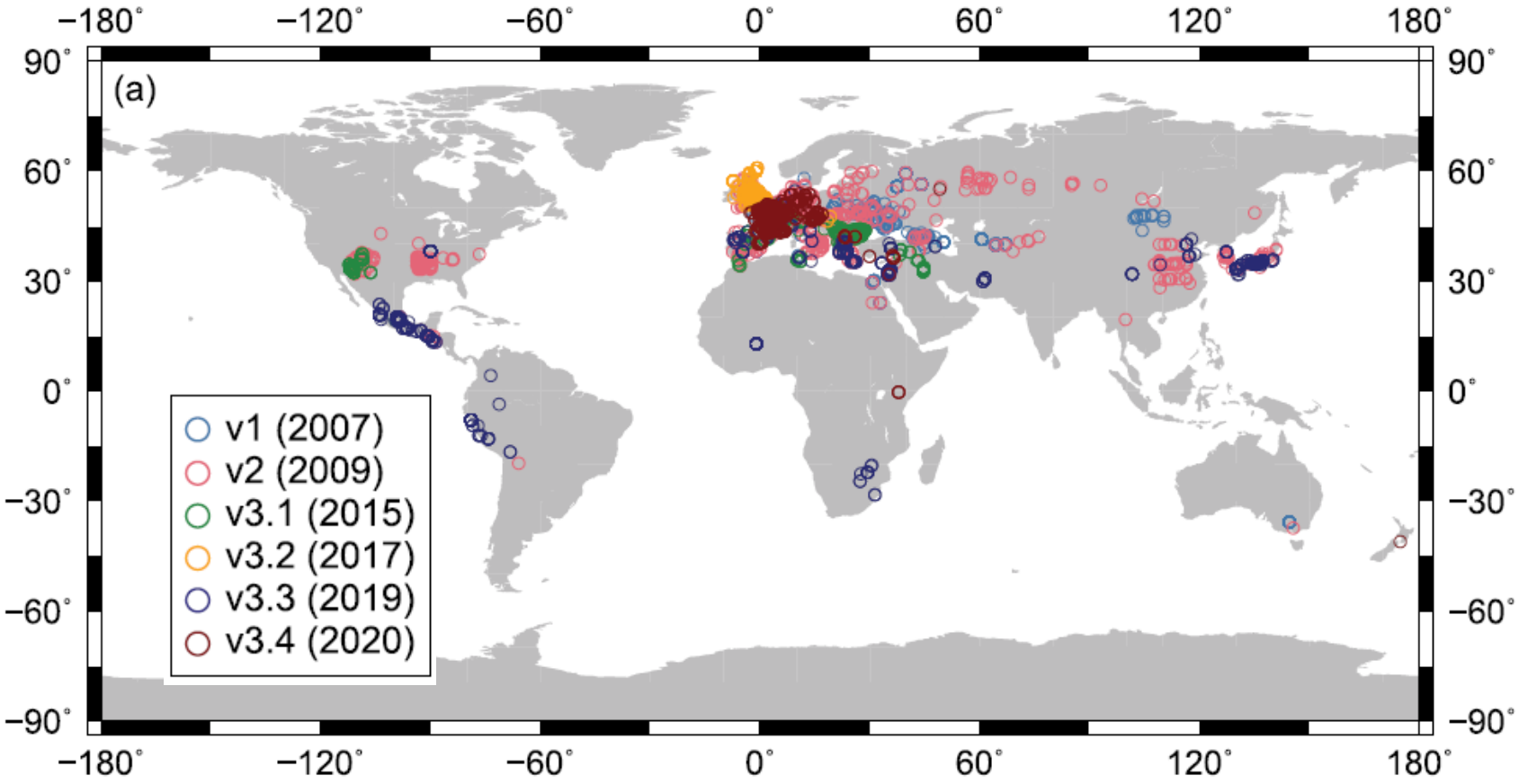
Contents

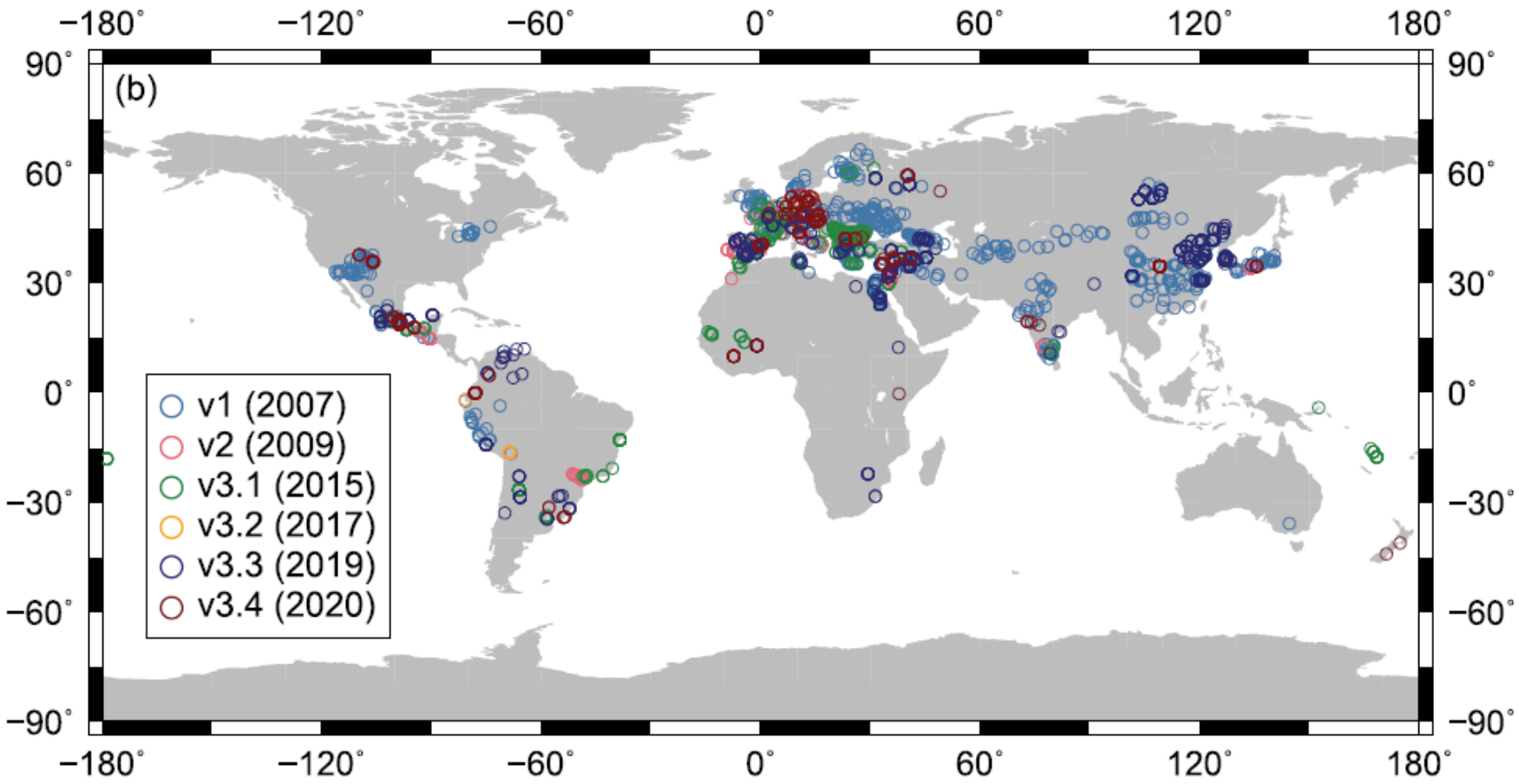
- Global distribution of archaeomagnetic data
- Studies outside Europe (Africa, China, America..)
- Distribution of archaeomagnetic data in Europe
- Recent studies in UK, Spain , Italy , Central Europe
- Recent studies in Greece
- Examples of archaeomagnetic dating

Global archaeomagnetic directional data



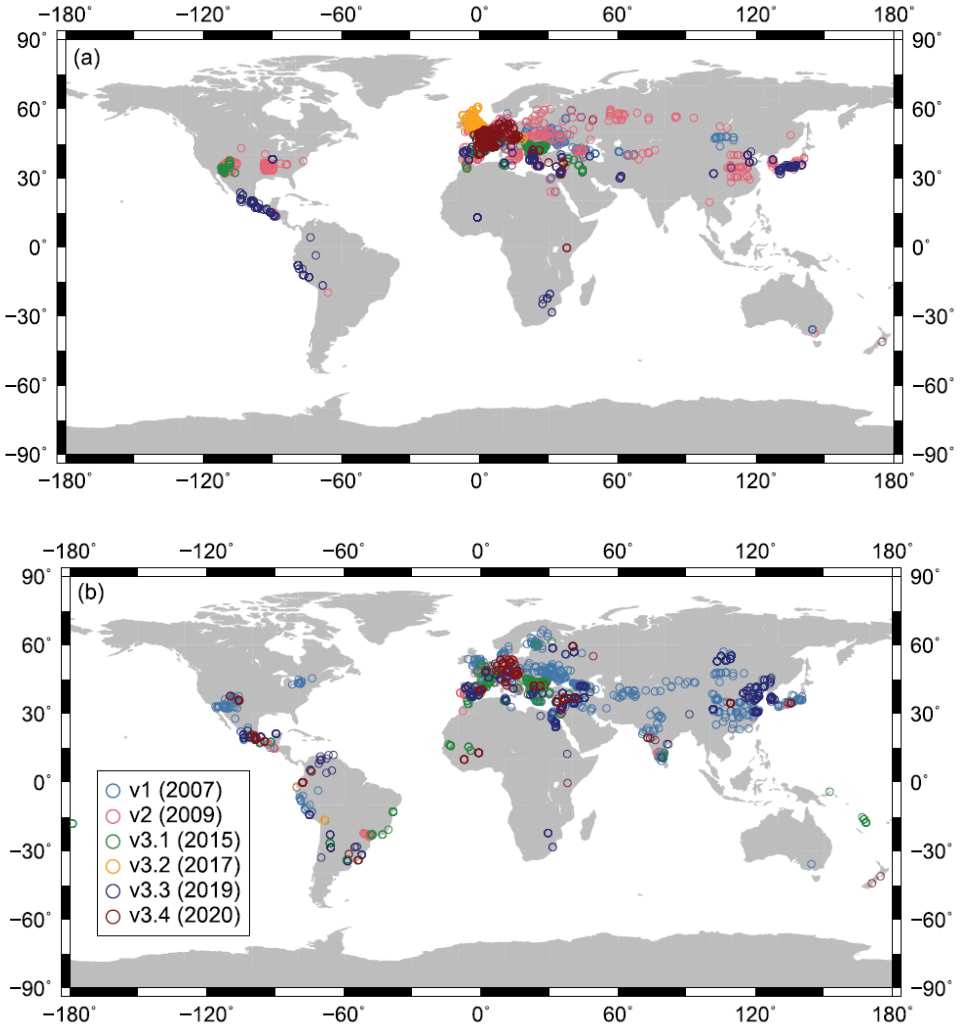
Brown et al., 2021

Global archaeomagnetic intensity data



Brown et al., 2021

Global archaeomagnetic data



Large disparity in the global distribution of archaeomagnetic data

Europe : dominates with 59% entries (with Russia) – 51% (without Russia)

USA: 7%
China: 6%
Japan: 4%
Mexico: 3%

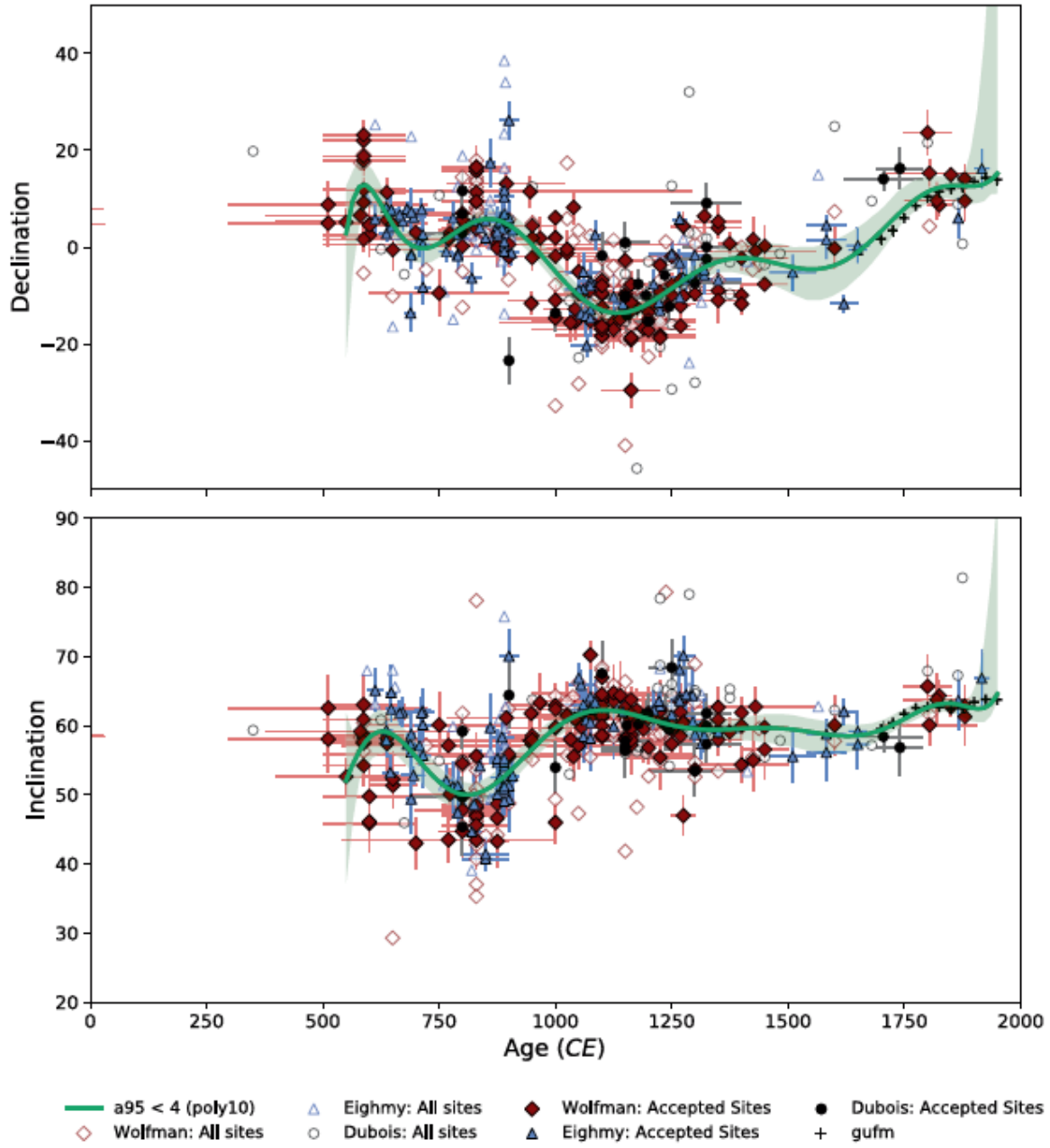
} Main contributors

South hemisphere: currently poorly represented (4%) but the data continues to improve!

GEOMAGIA!!!

Brown et al., 2021

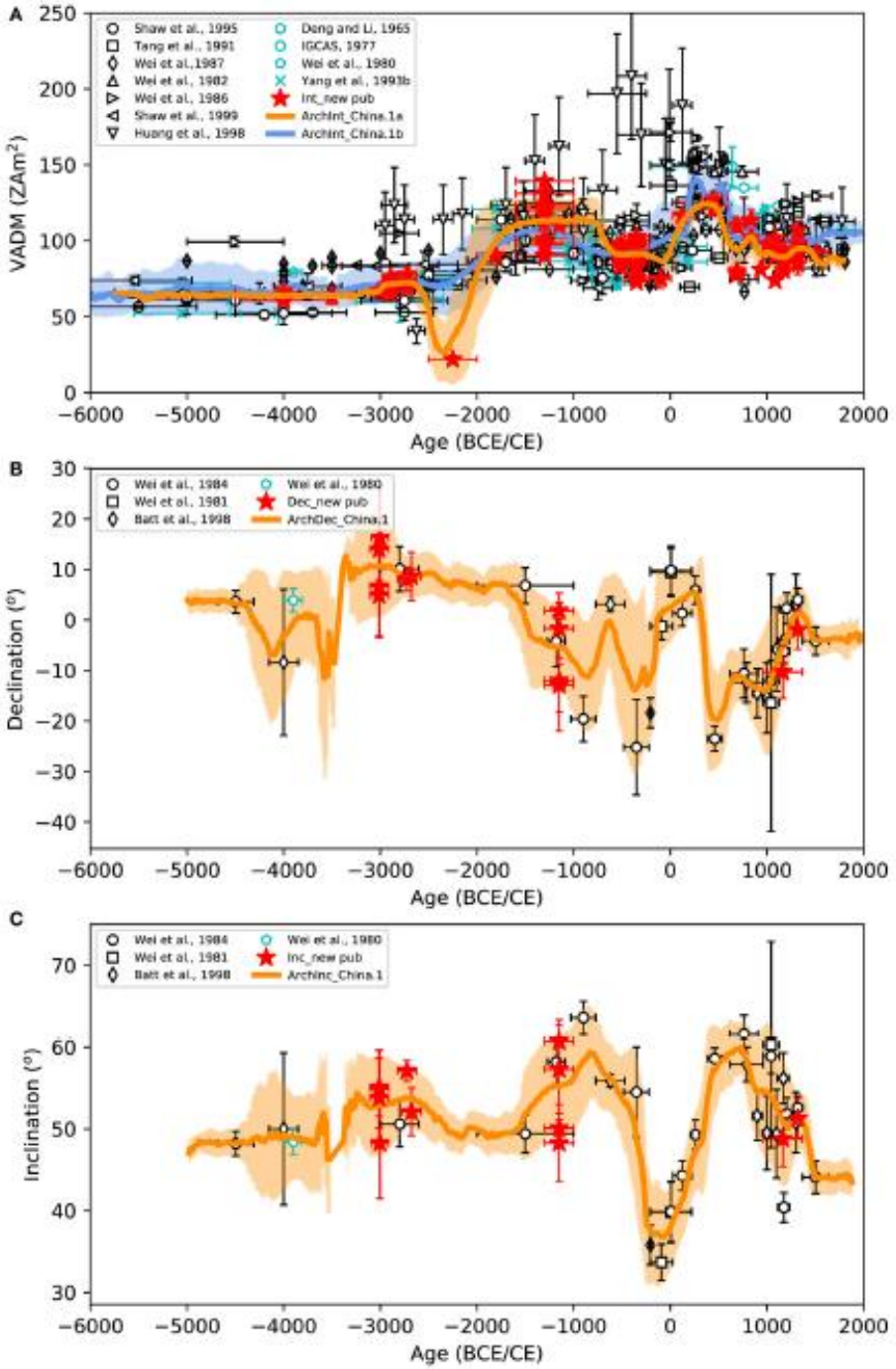
USA



In 2015, a salvage archival project was initiated to recover the life's work of three North American archaeomagnetists. The effort resulted in the digitization and formatting of the data within DuBois' and Wolfman's estates, and Eighmy's archive. In total, data from more than 5,377 archeological features, were processed and uploaded to a centralized online data repository, MagIC. This repository ensures that the data, are now findable and accessible, permitting the data to be re-used in future modeling projects. One such application for these data is the development of a new regional model for the Four Corners region of the United States Southwest (defined here as the four states of New Mexico, Arizona, Utah, and Colorado).

Jones et al., 2021

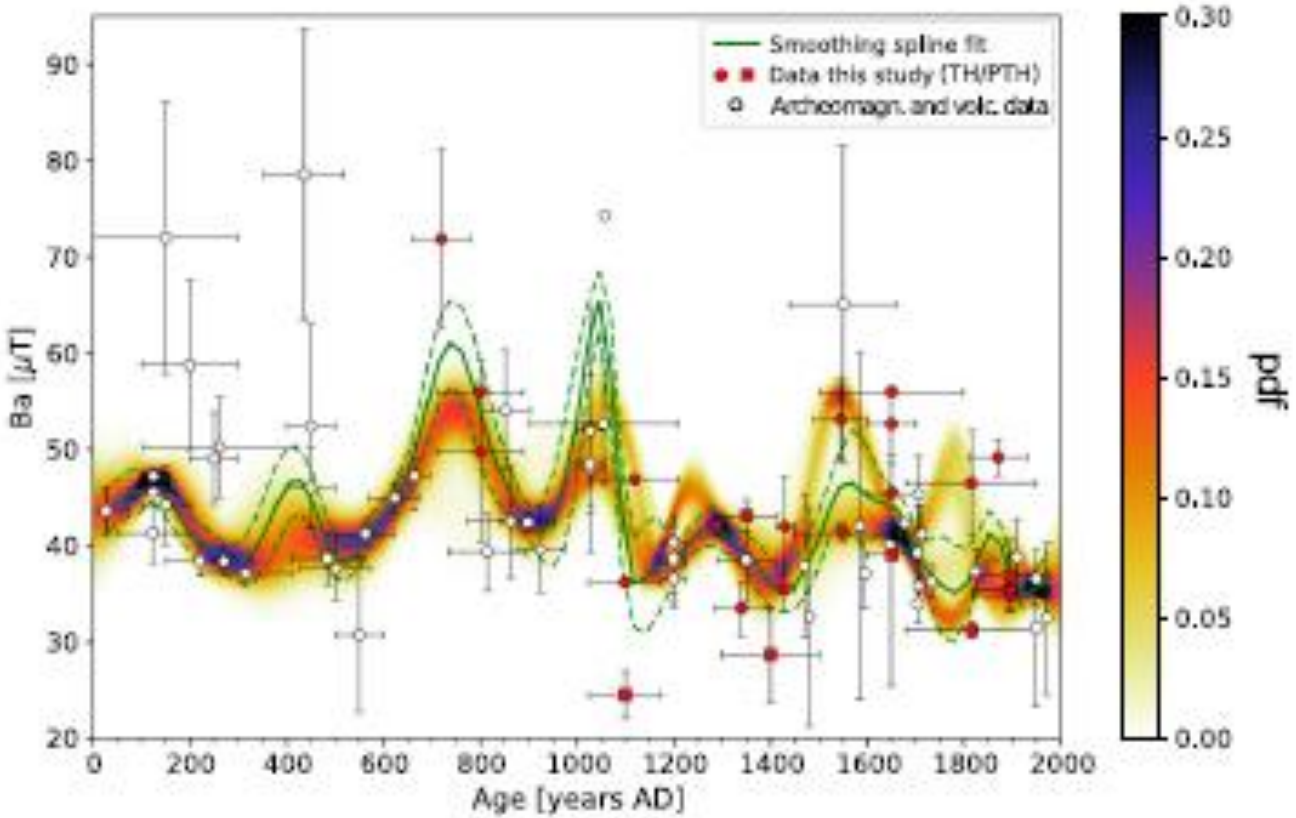
China



The main work of Chinese archeomagnetism was carried out in the 1980s and 90s, followed by a break of more than a decade; in the 2010s activity resumed. the first, albeit preliminary, archeomagnetic reference curves (with 42 declination / inclination pairs and 76 / 192 archeointensities) for the geomagnetic field in China

Cai et al., 2017.

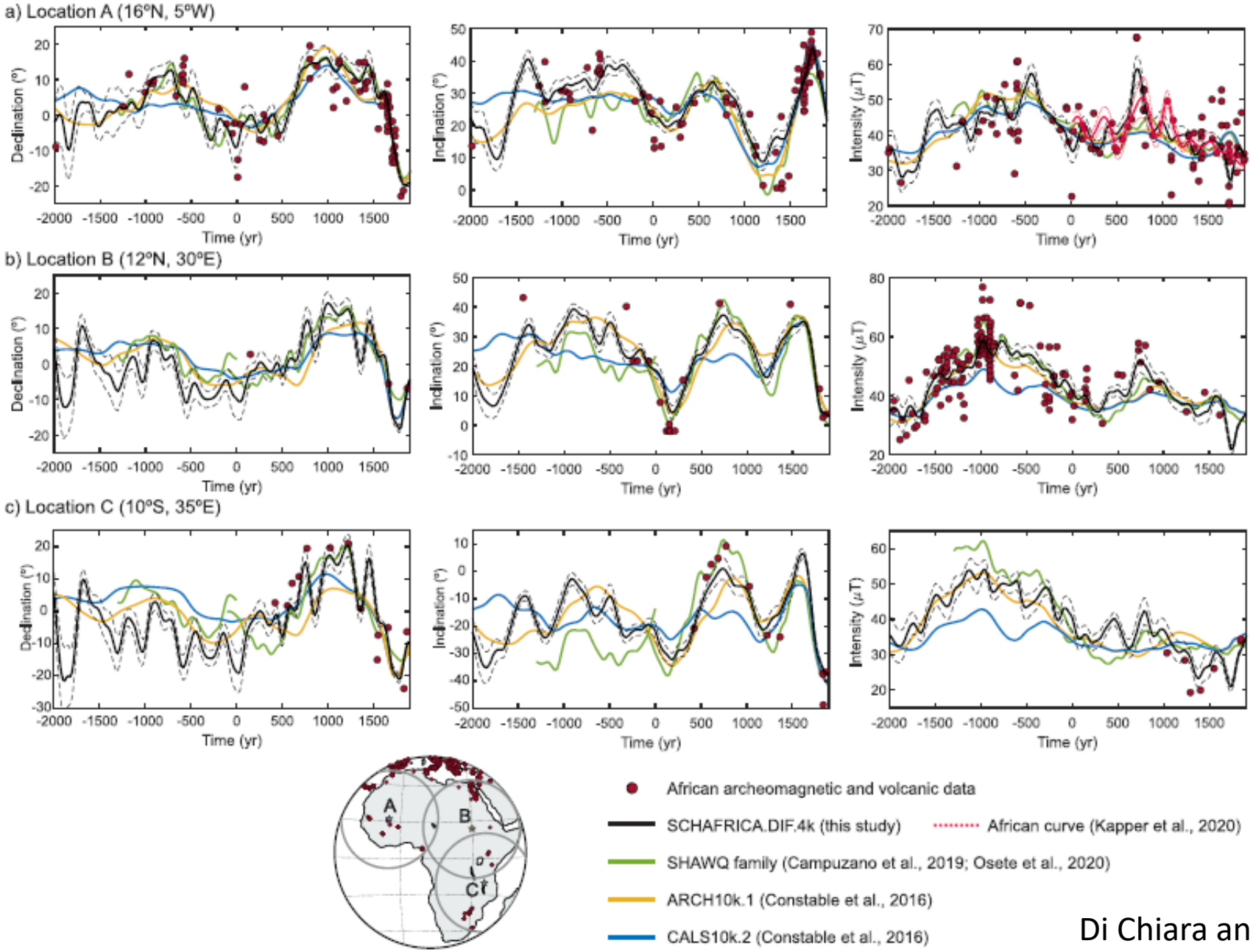
Africa



New reference curve for West Africa for the past 2000 years

Kapper et al., 2020

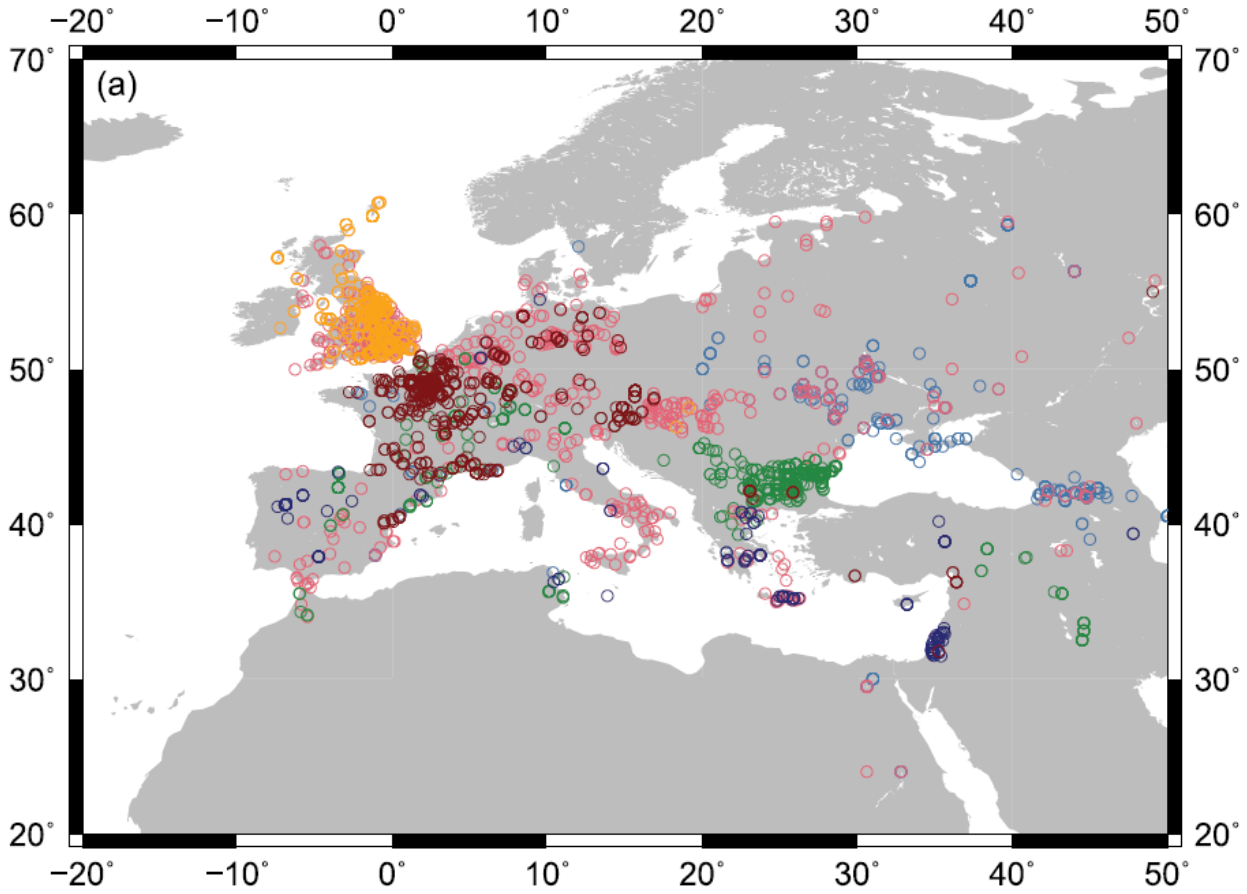
Africa



A first regional model from Africa for the past 4000 years

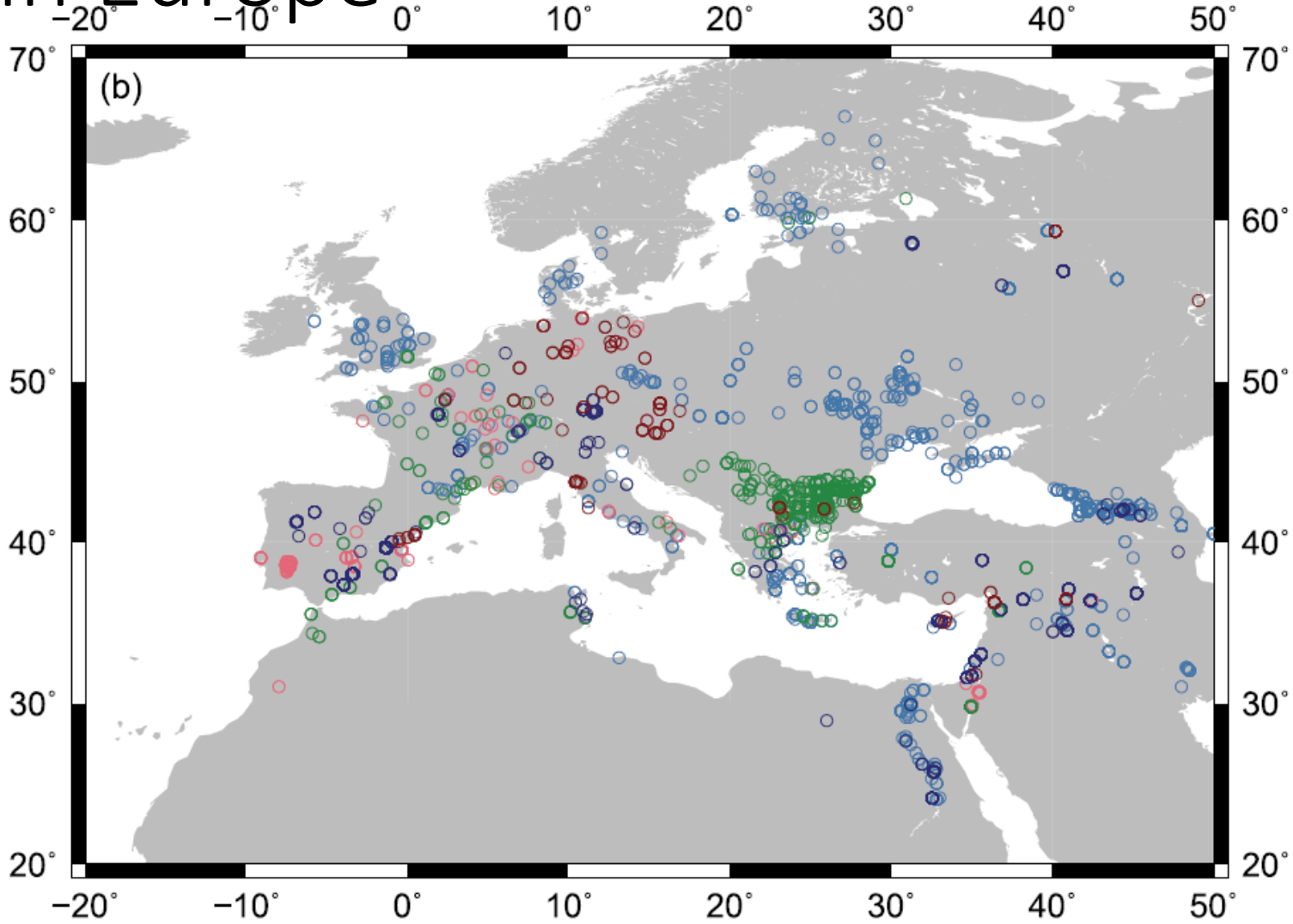
Di Chiara and Pavón-Carrasco, 2022

Distribution of archaeomagnetic directional data in Europe



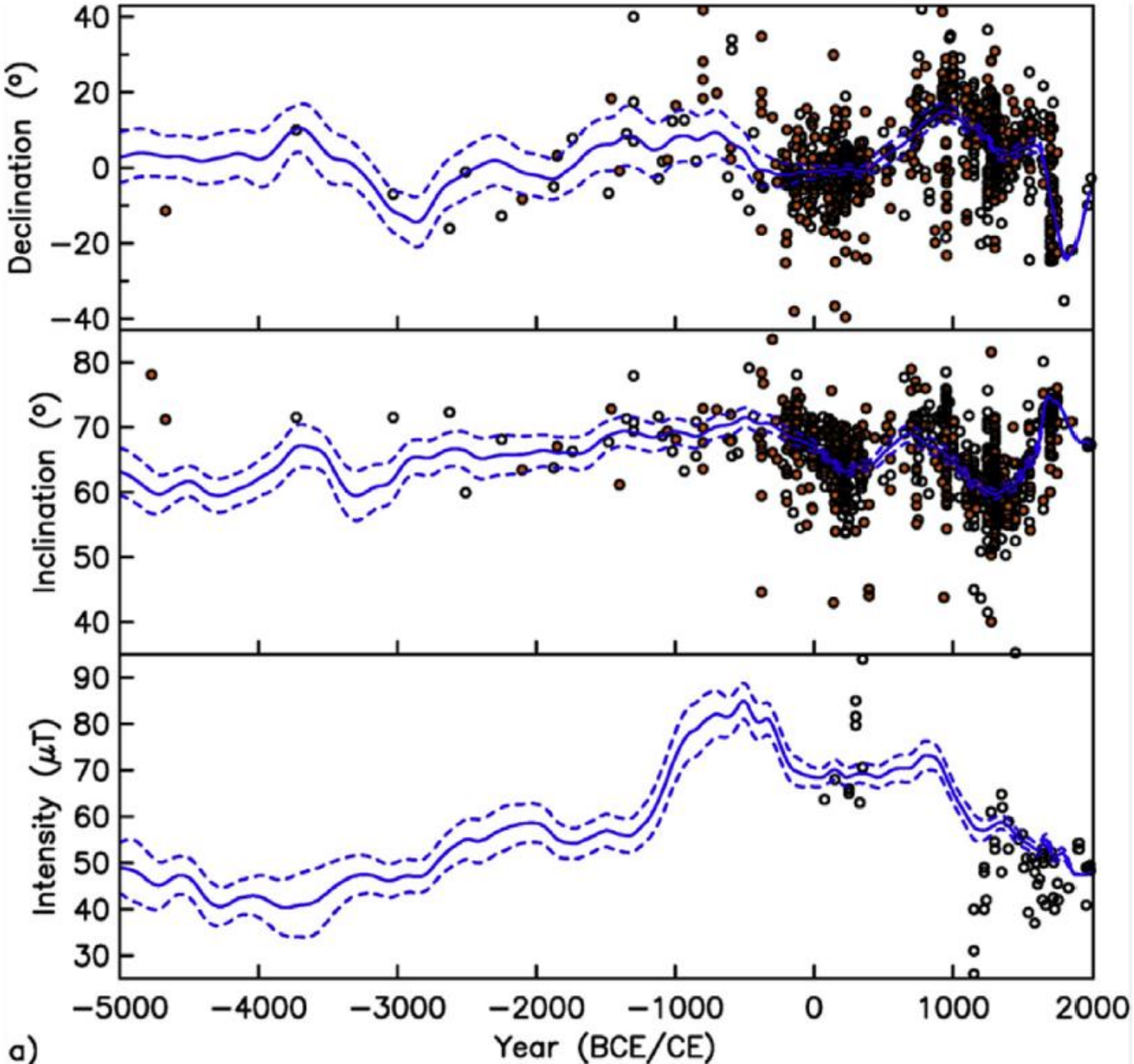
Brown et al., 2021

Distribution of archaeomagnetic intensity data in Europe



Brown et al., 2021

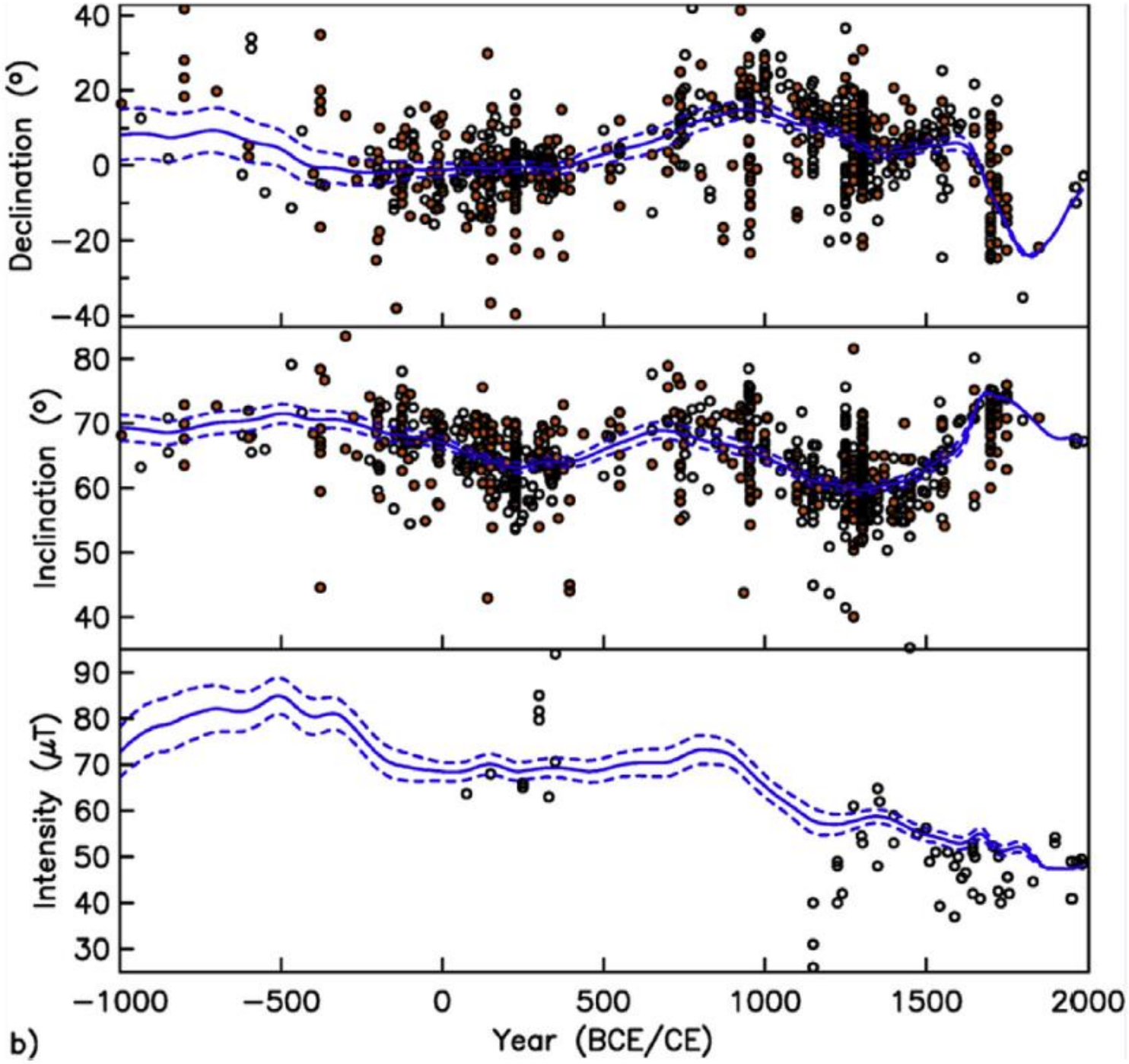
UK



A global dataset was used and derived a new global model, while aiming for highest accuracy in the UK region. The global dataset is the same as used for ARCH10k.1 (Constable et al., 2016), i.e. all archaeomagnetic and volcanic data available from GEOMAGIA50.v3 (Brown et al., 2015a) up to 30th April, 2015. However, all UK directional data were removed from this data set and replaced by the updated and new data aiming the highest possible accuracy for the UK. They have down-weighted data from other regions by weighting all UK data four times more strongly than non-UK data.

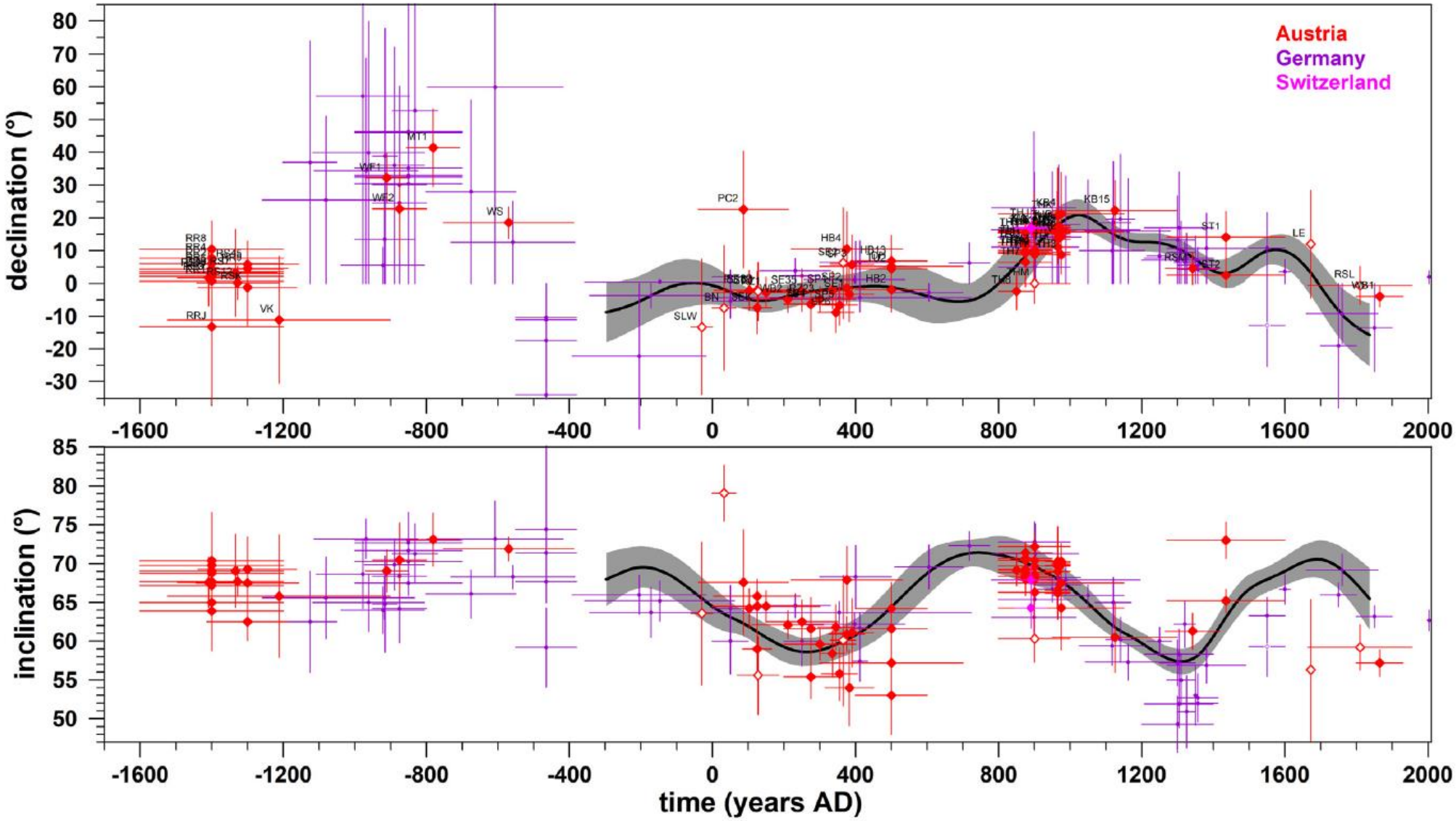
Batt, et al., 2017

UK



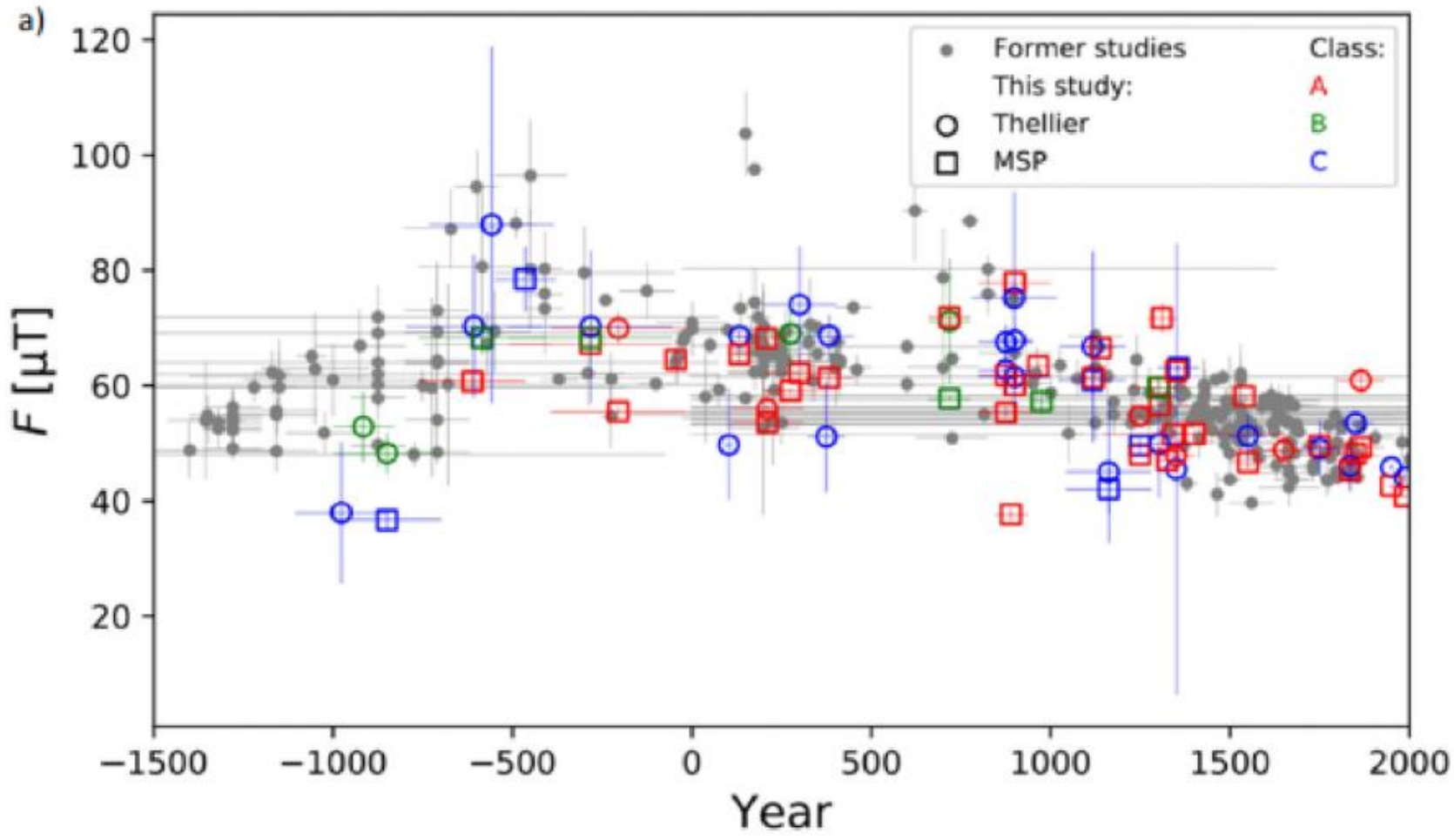
Batt, et al., 2017

Central Europe - Directions



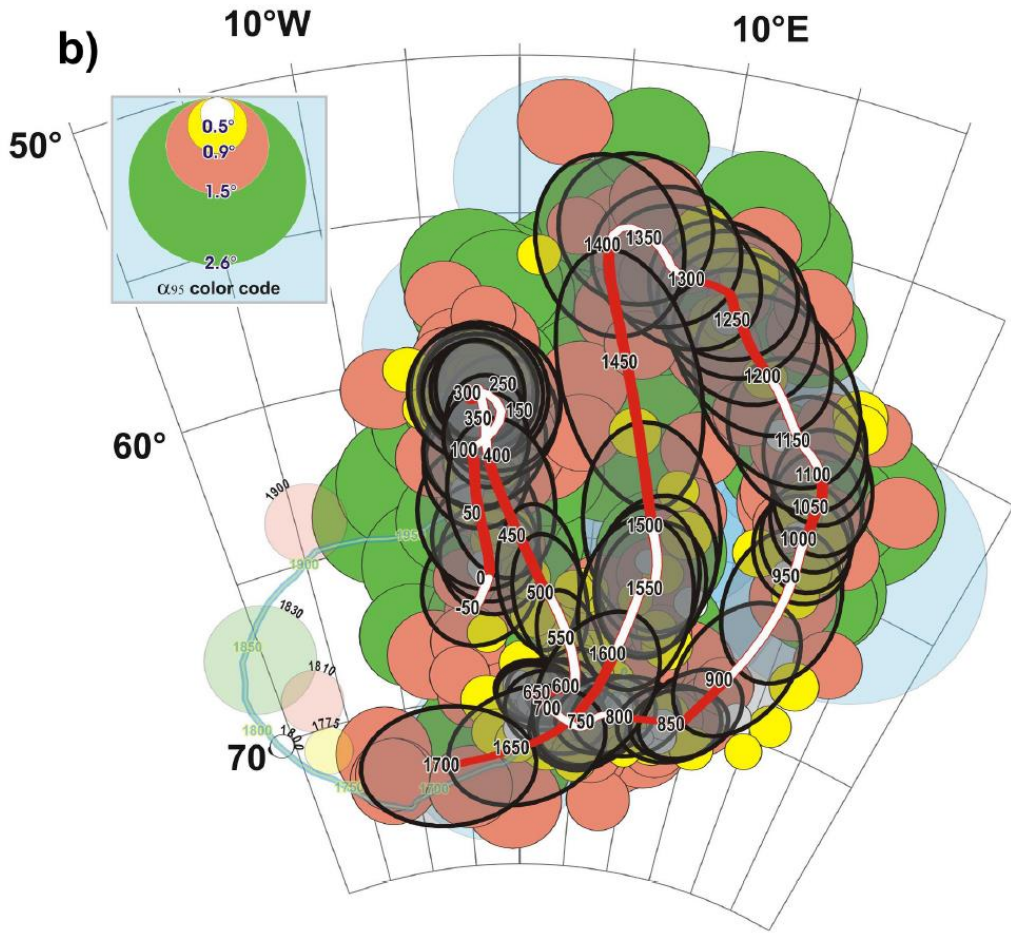
Schnepp, et al., 2020a

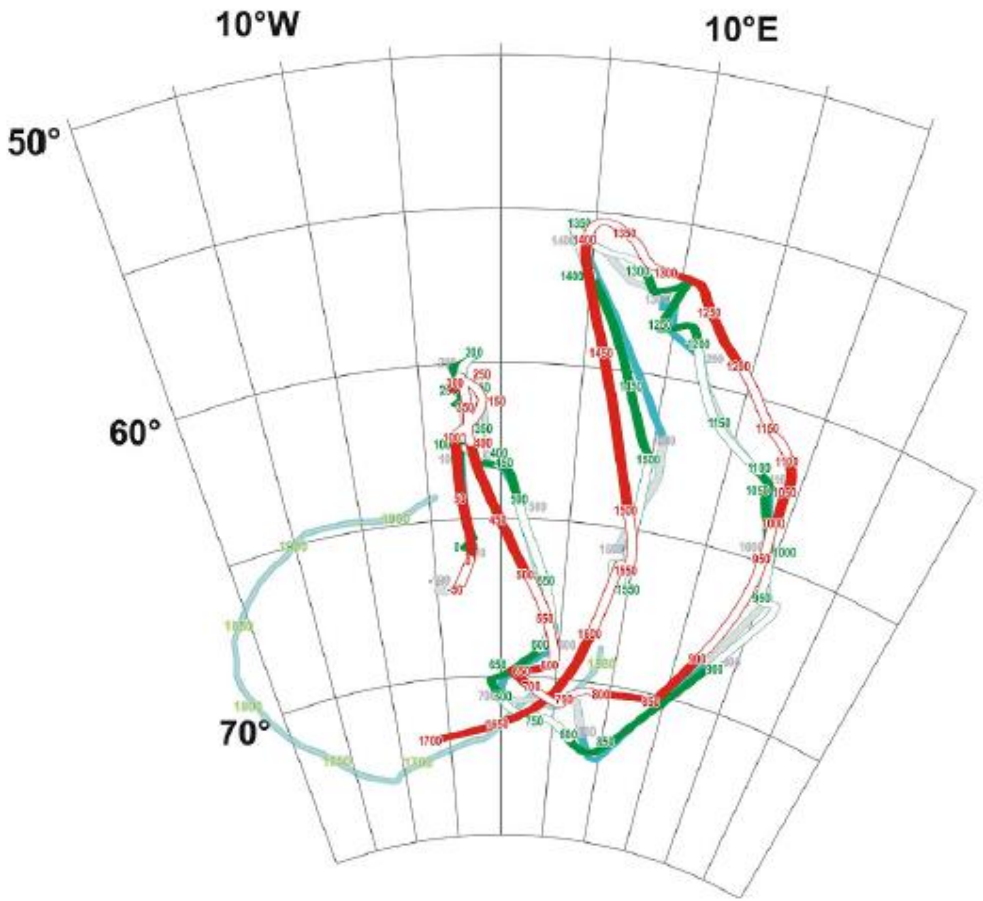
Central Europe - Intensities



Schnepp, et al., 2020b

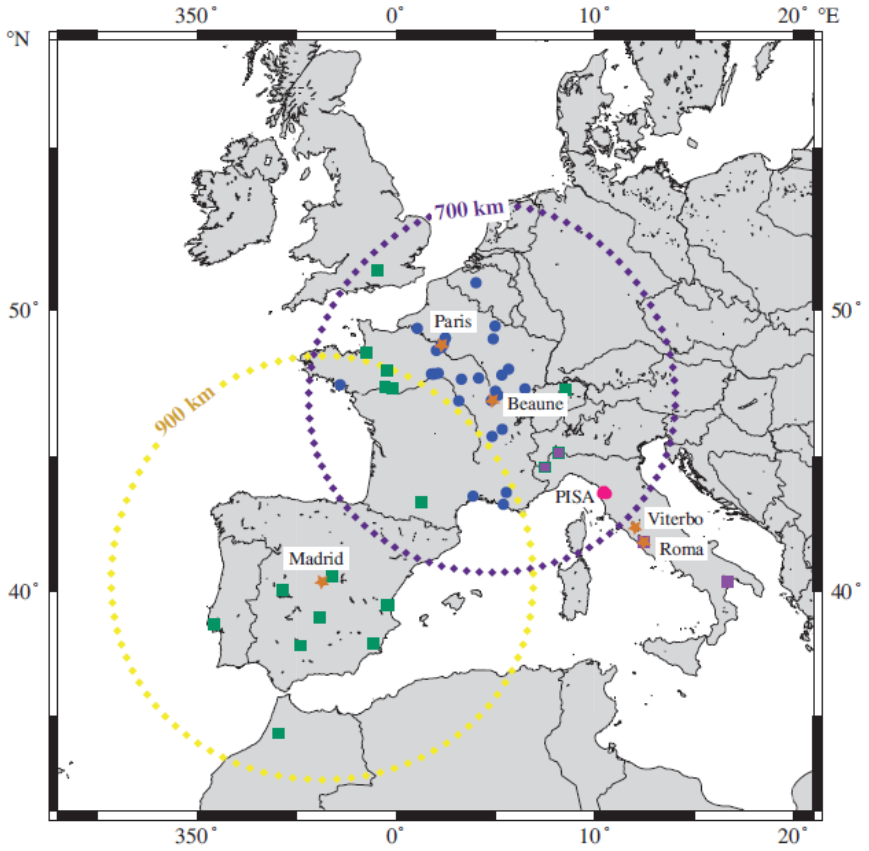
France - Directions

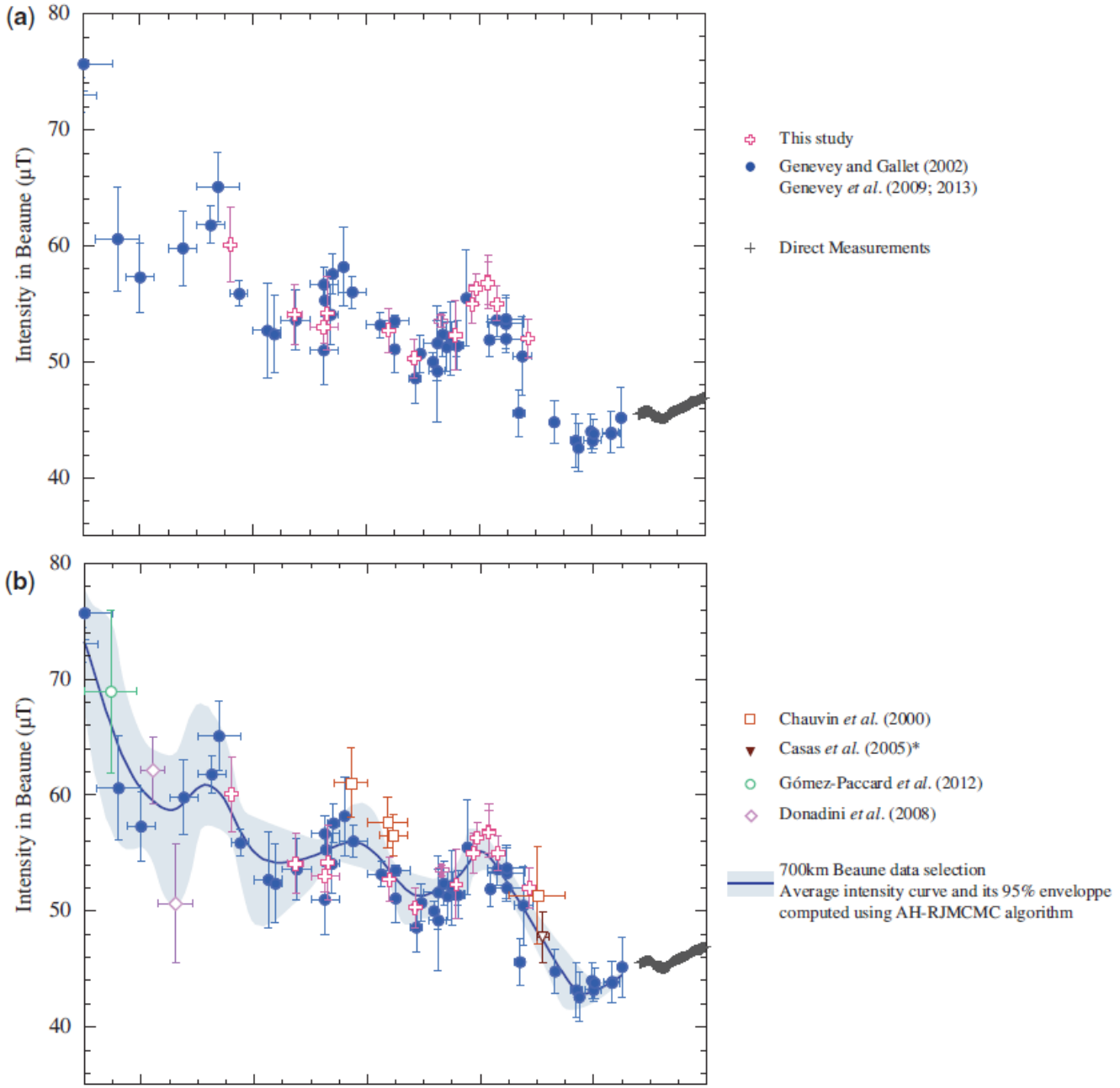




Le Goff, et al., 2020

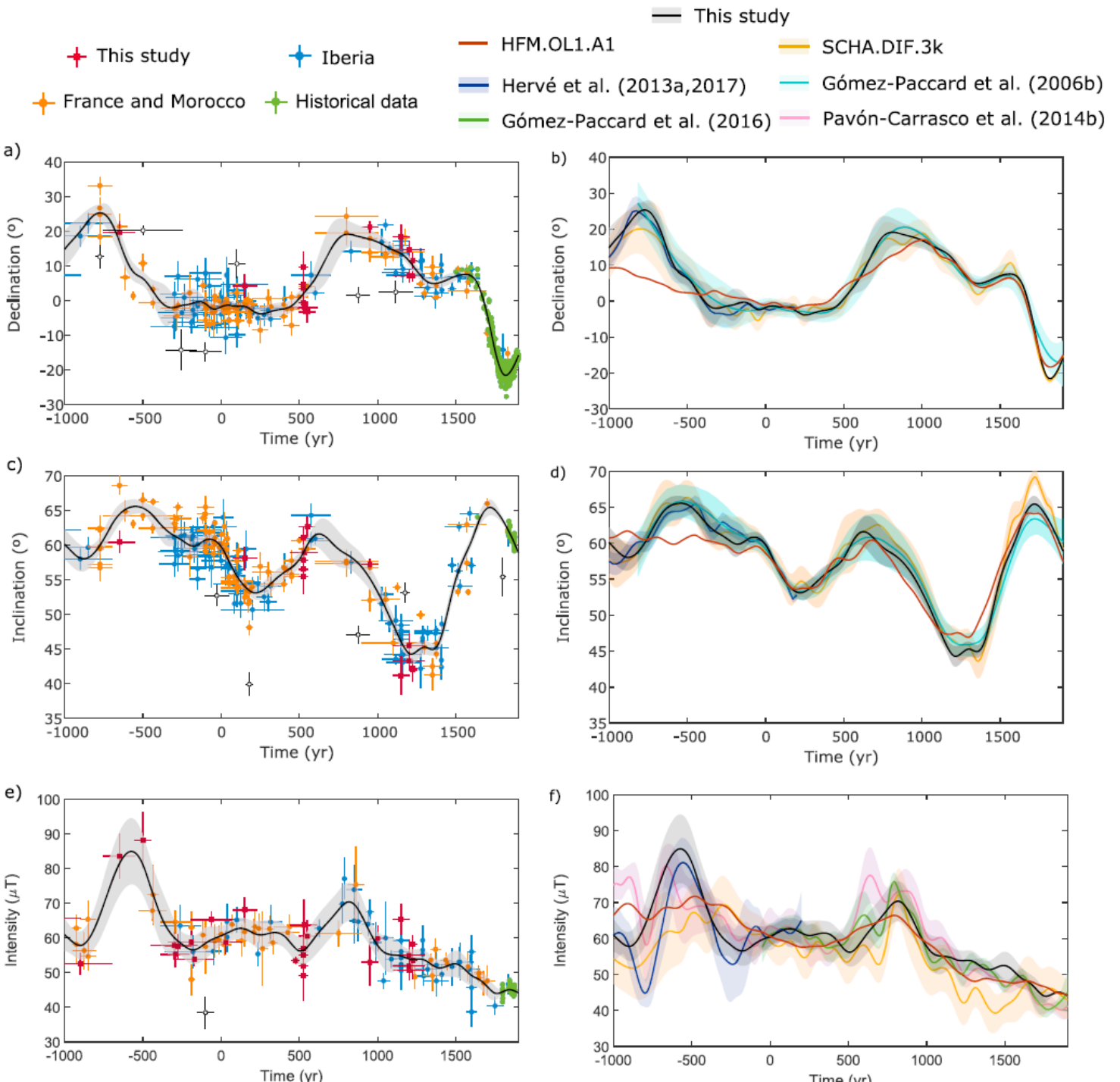
France - Intensities





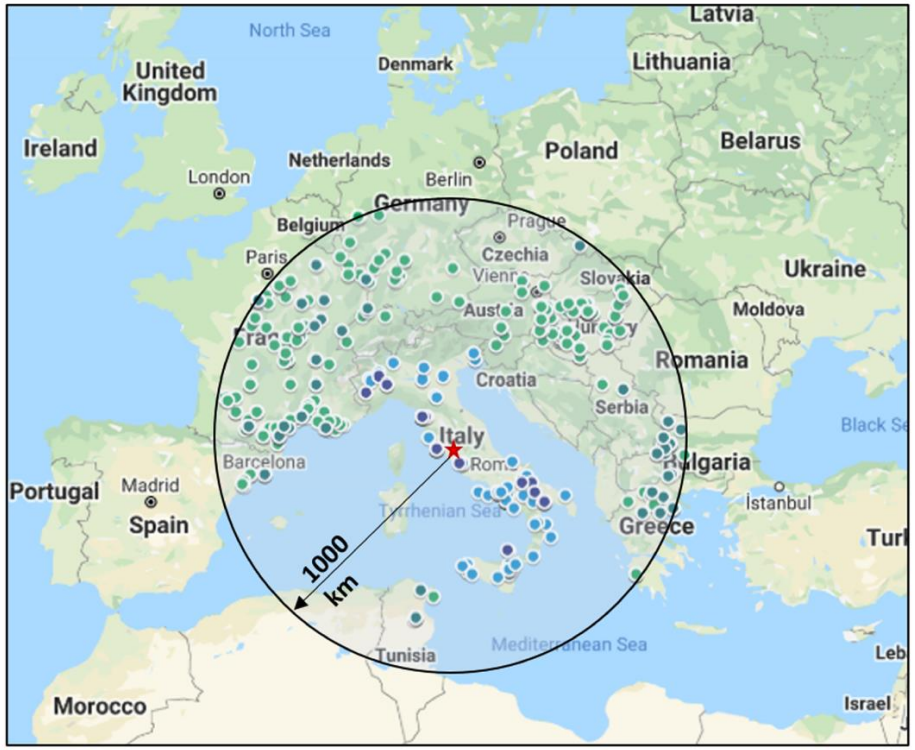
Genevey et al., 2019

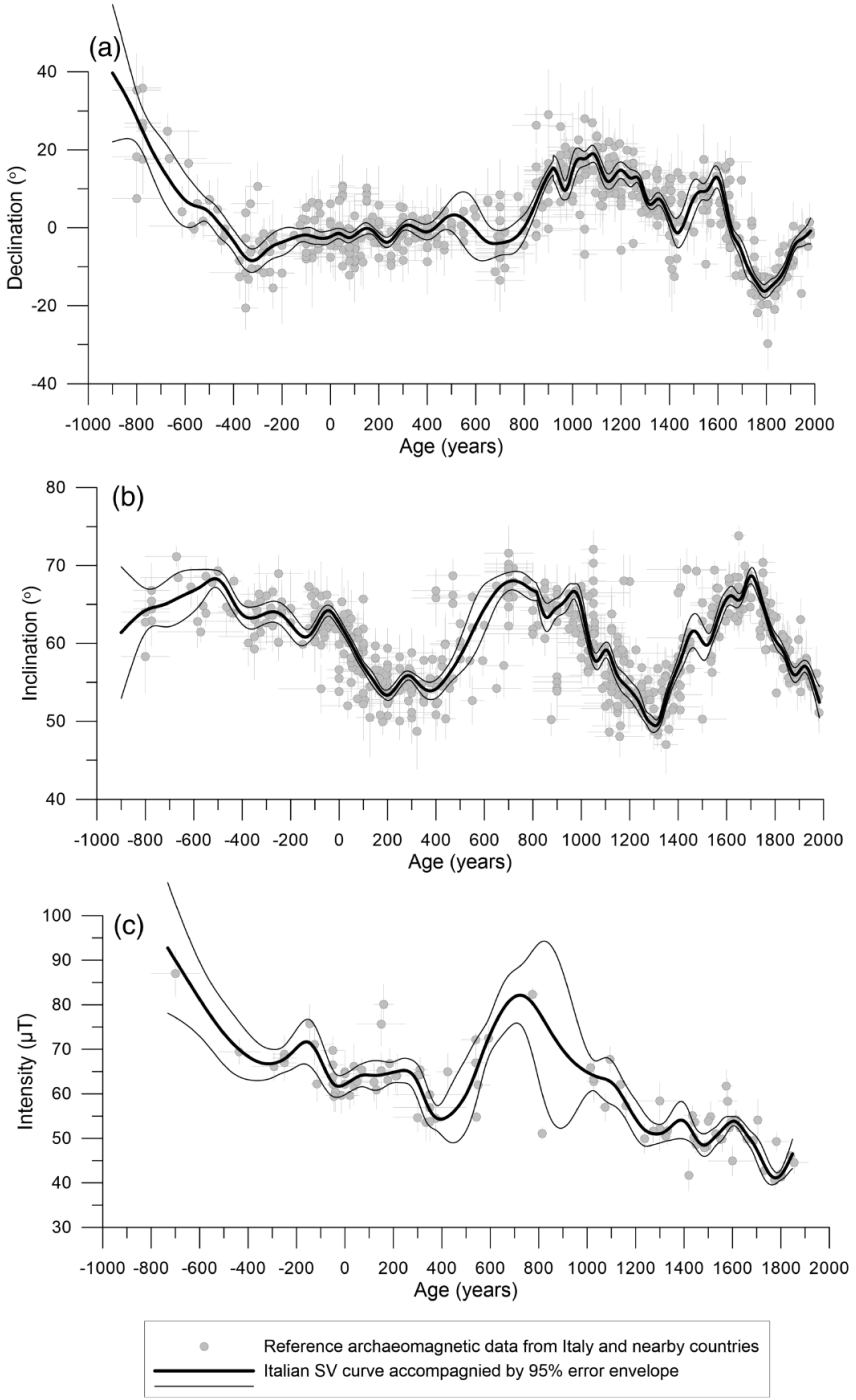
Spain



Molina-Cardin, et al., 2018

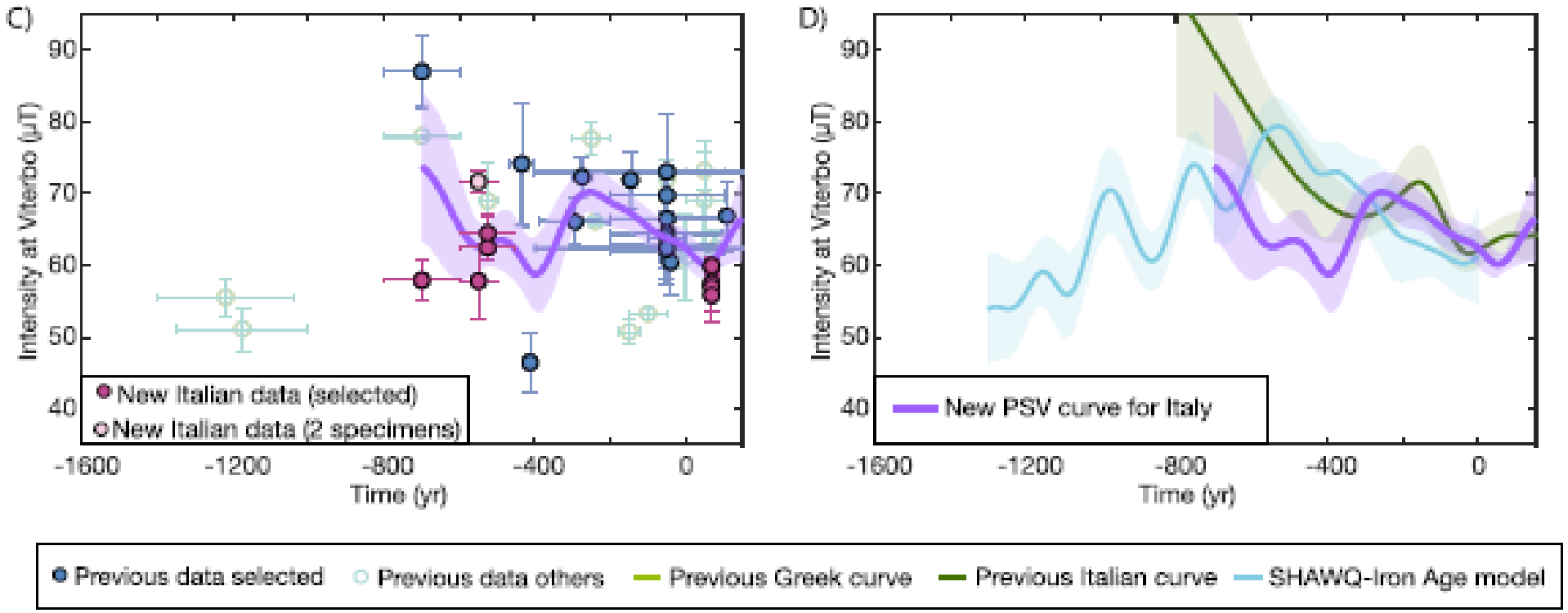
Italy





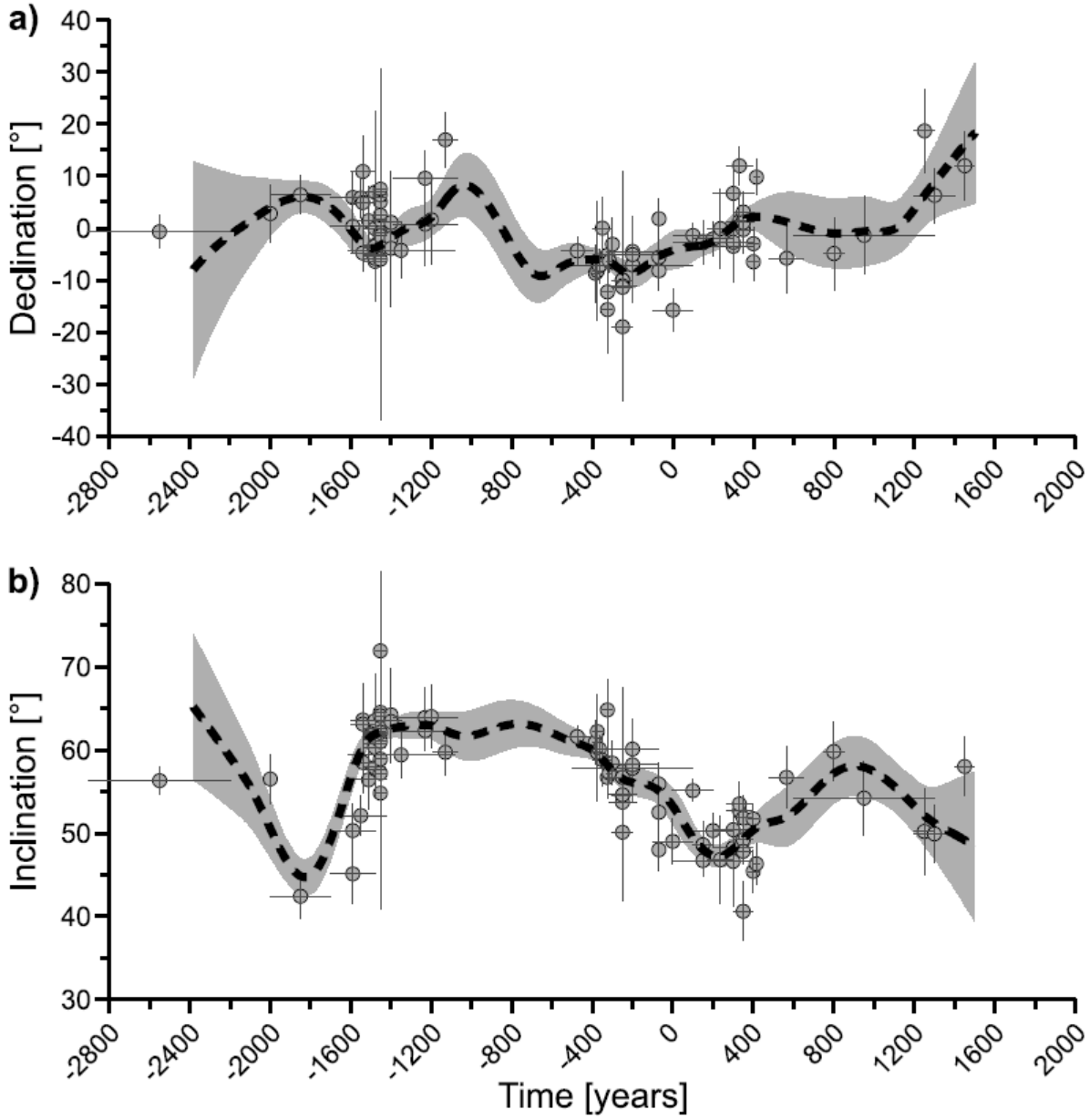
Tema and Lanos, 2020

Italy



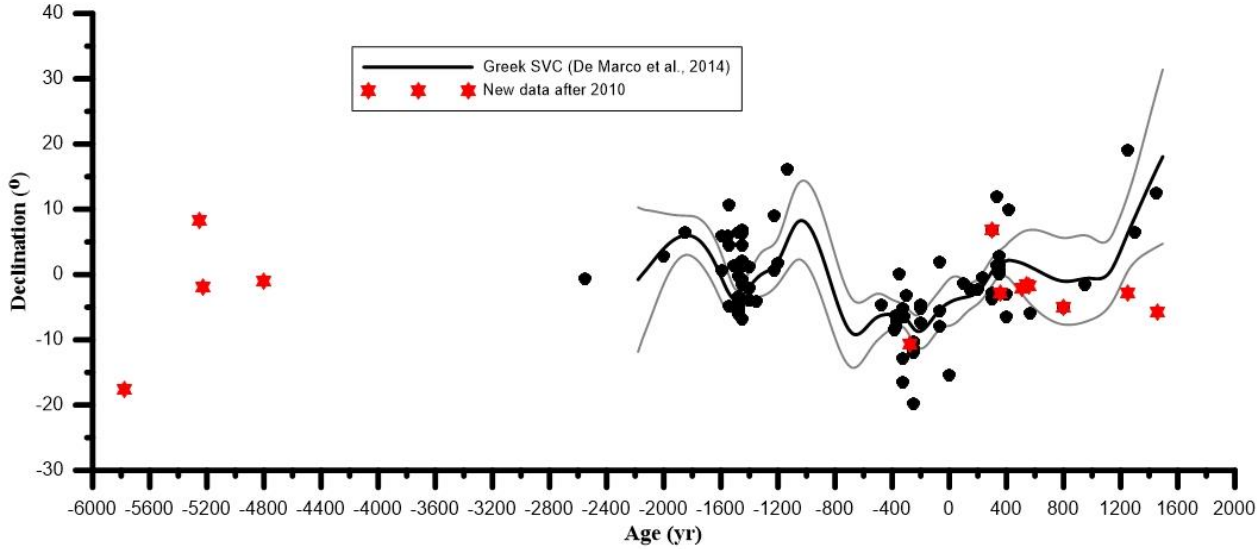
Rivero-Montero et al., 2021

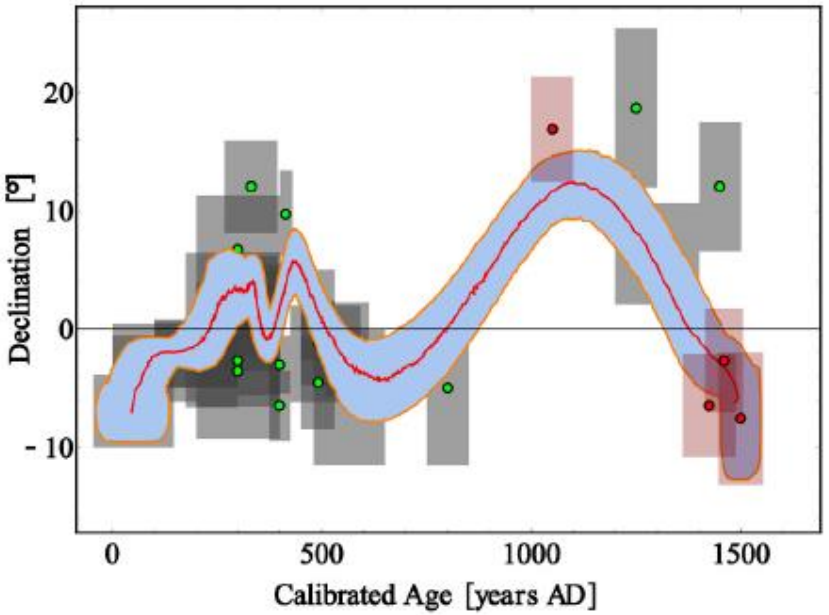
Greece - Directions

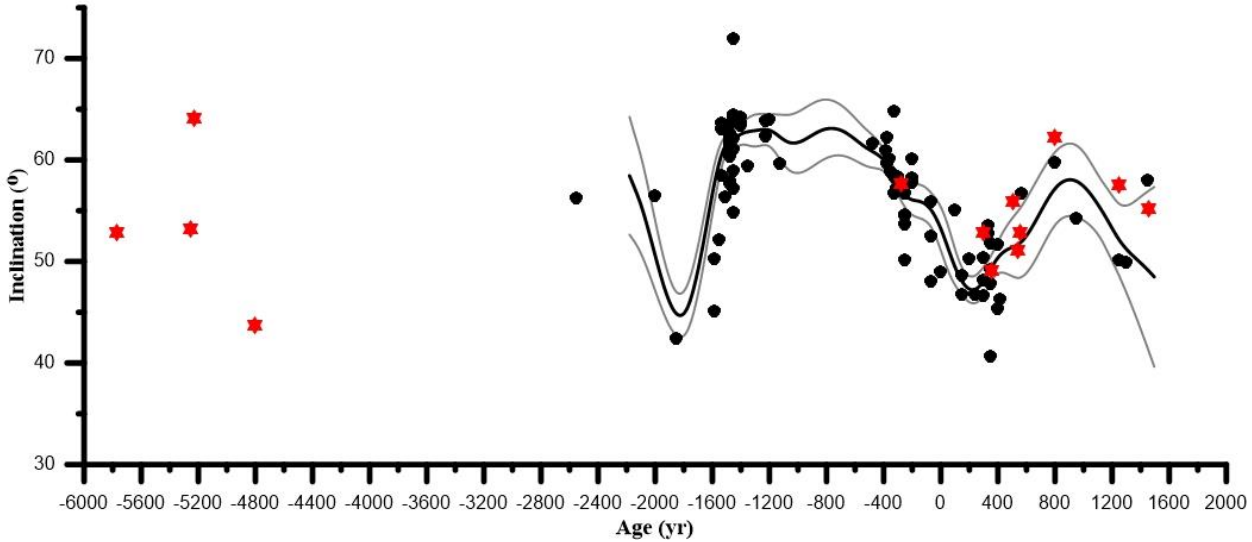


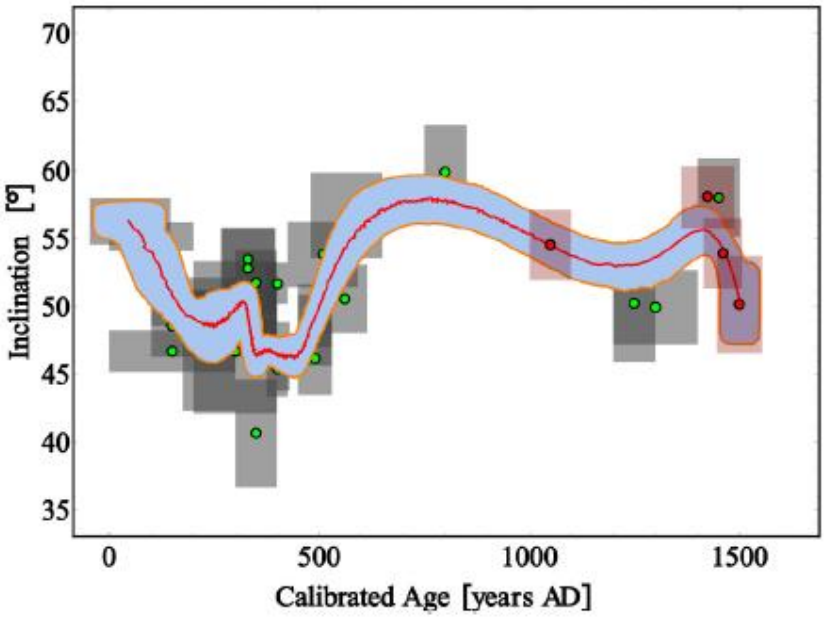
De Marco et al., 2014

Greece - Directions



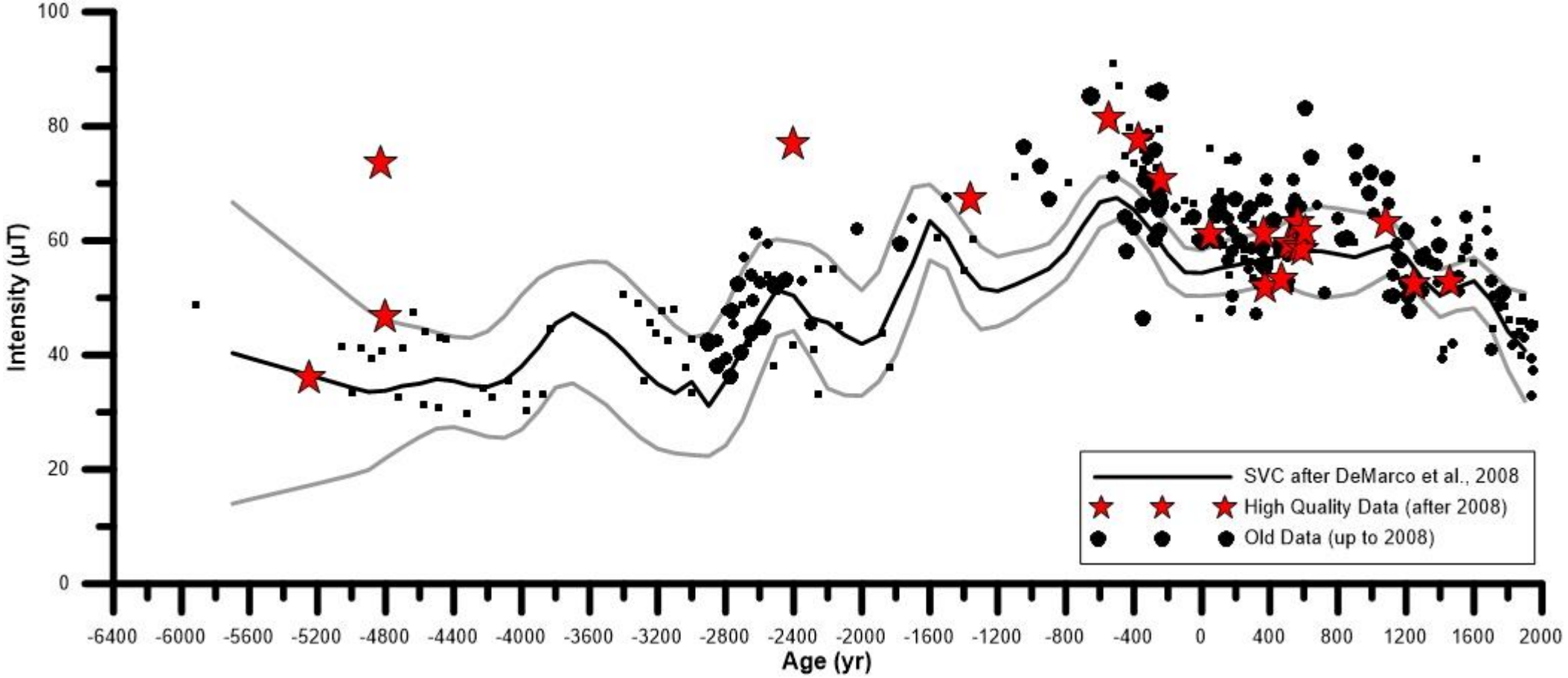






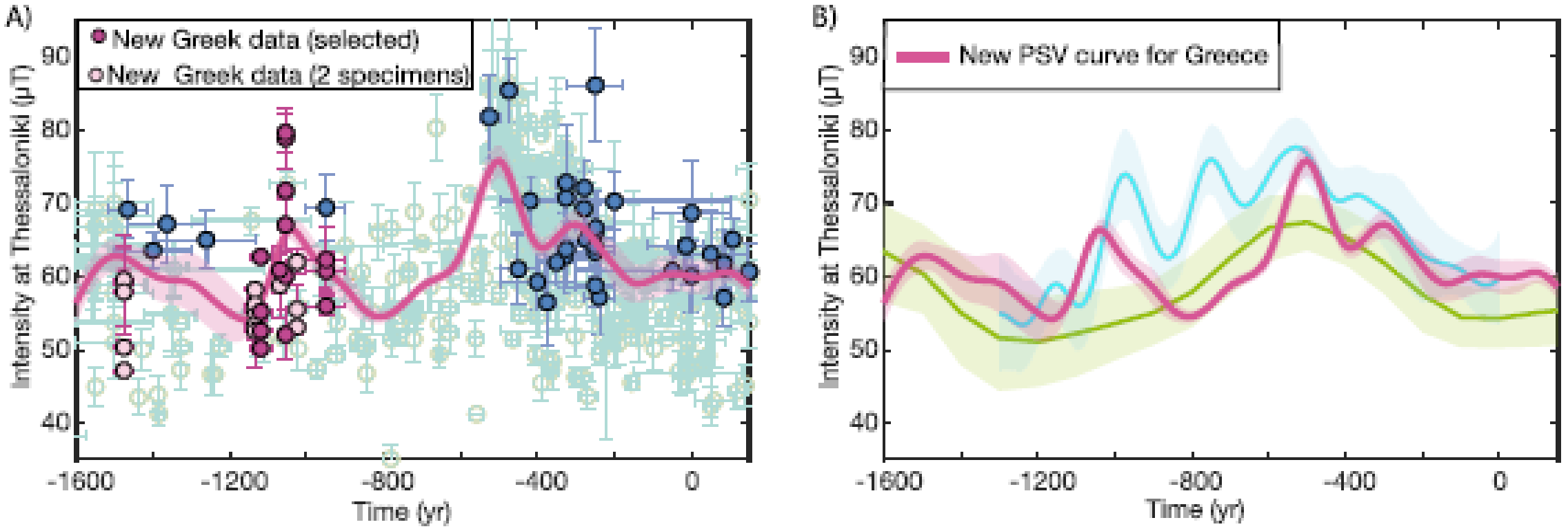
Aidona et al., 2021

Greece - Intensities



De Marco et al., 2008

Greece - Intensities



Rivero-Montero et al., 2021

Archaeomagnetic dating examples

Archaeomagnetic dating of Dogmersfield Park brick kiln (Southern England) (Casas et al., 2007)

Archaeomagnetic dating of samples from a brick kiln discovered at Dogmersfield Park has been achieved using both field direction and intensity. The archaeomagnetic measurements were assigned time-probability distributions by comparing with predictions from a global model at the sampling site, this procedure suppresses errors arising from relocation to a common central reference location. All three probability distributions consistently indicate the same age (~AD 1700). Once the probability distributions are combined a narrower probability distribution is obtained, stressing the importance of pursuing combined (directional and intensity) archaeomagnetic analyses. The inferred age is also highly consistent with available historical evidence.

Archaeomagnetic dating examples

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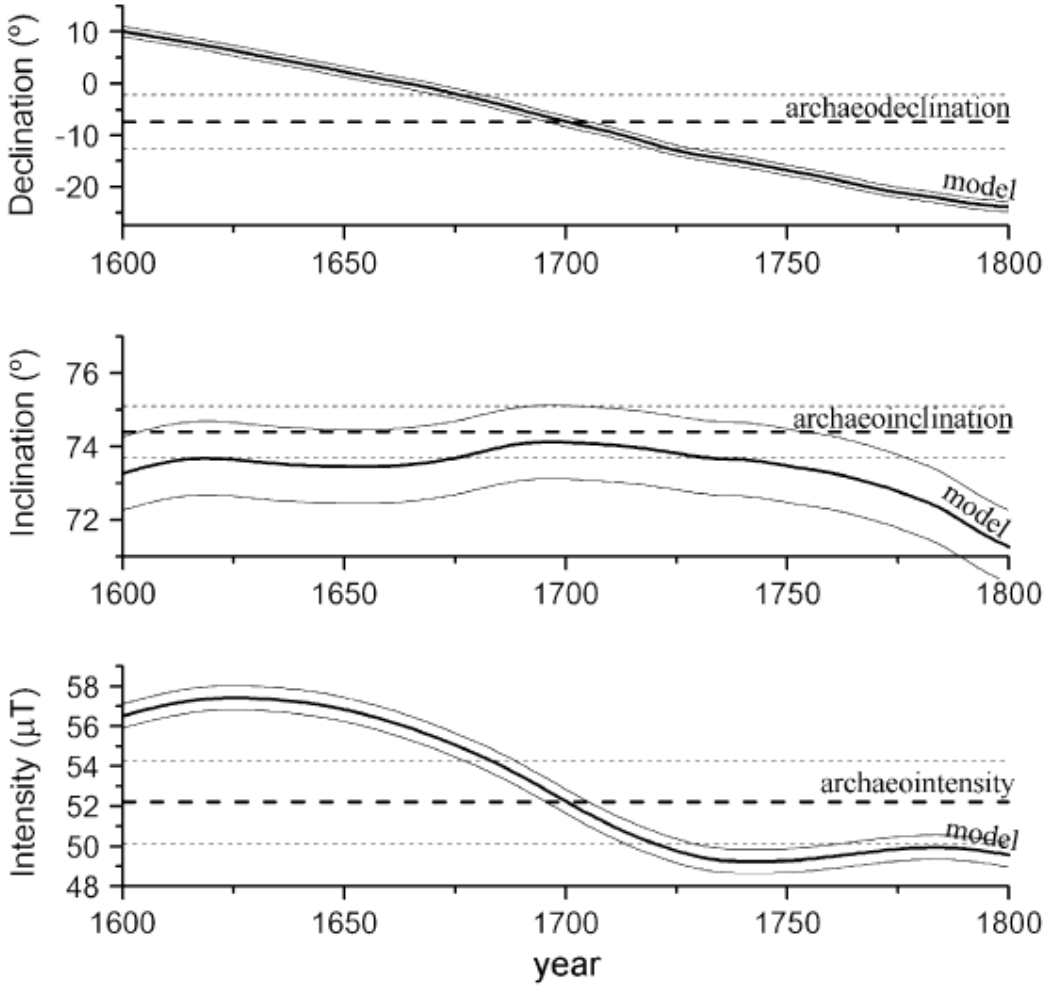
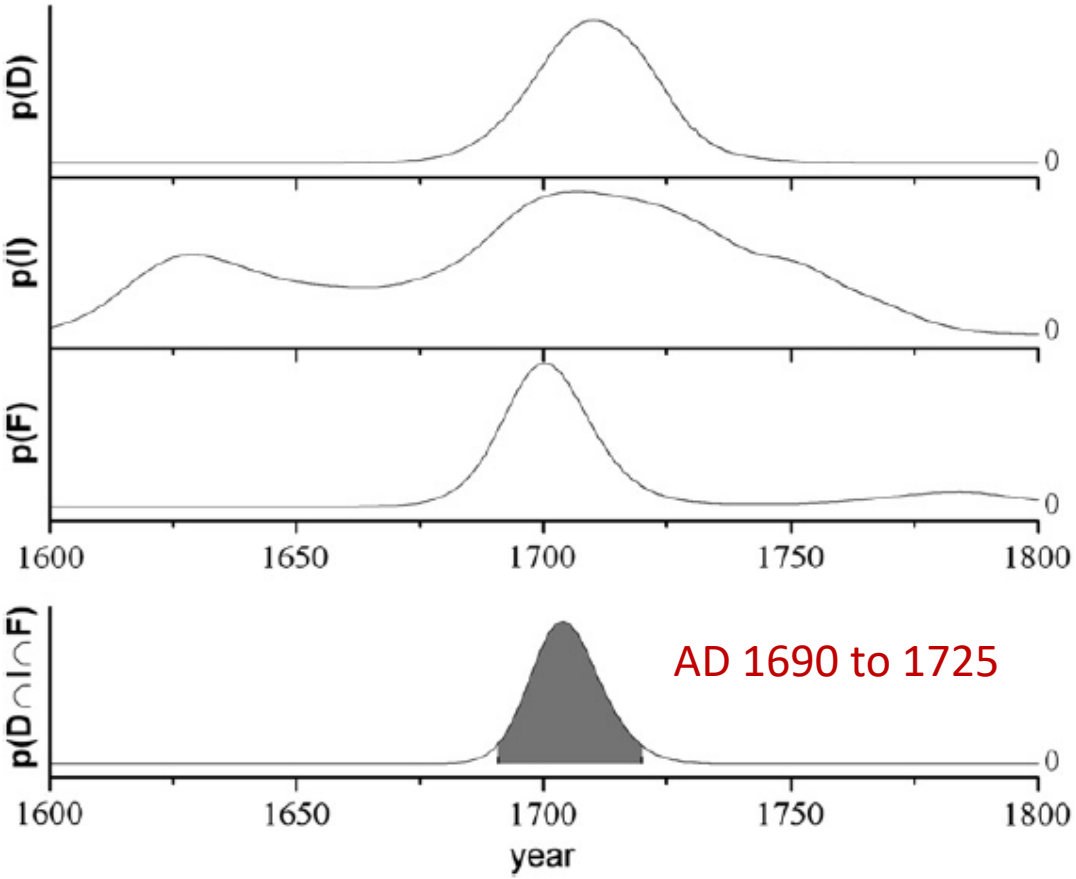
(Casas et al., 2007)

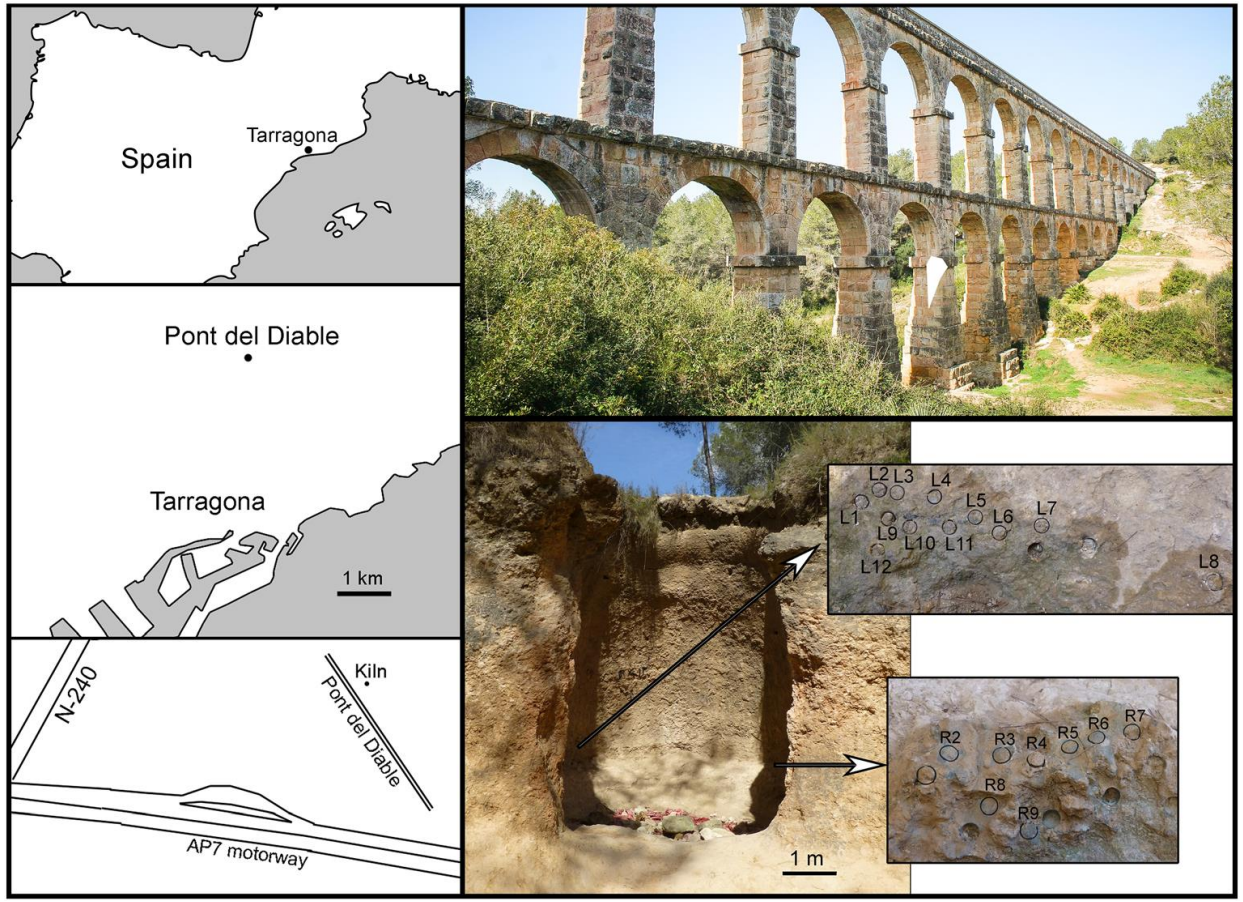




AD 1698 to 1719 obtained from documentary sources

Archaeomagnetic dating examples

Archaeomagnetic study of a limekiln in the Les Ferreres Roman aqueduct, World Heritage Site of Tarraco (Casas et al., 2020)



The Archaeological Ensemble of Tarraco is located in Catalonia (NE Spain). The ensemble groups the existing Roman ruins in the present-day city of Tarragona and a number of elements within the surrounding territory, including the magnificent Les Ferreres aqueduct which is one of the most well-preserved Roman aqueducts. Historical and archeological interpretations point to the construction of the aqueduct in the first century AD. There are some hypotheses on ancient restorations of the monument The first well-documented restoration was performed in the mid-nineteenth century. The present paper presents the archaeomagnetic dating of the remains of a limekiln found excavated into the ground near the bottom of the Roman aqueduct, in order to identify the link between these two constructions.

Archaeomagnetic dating examples

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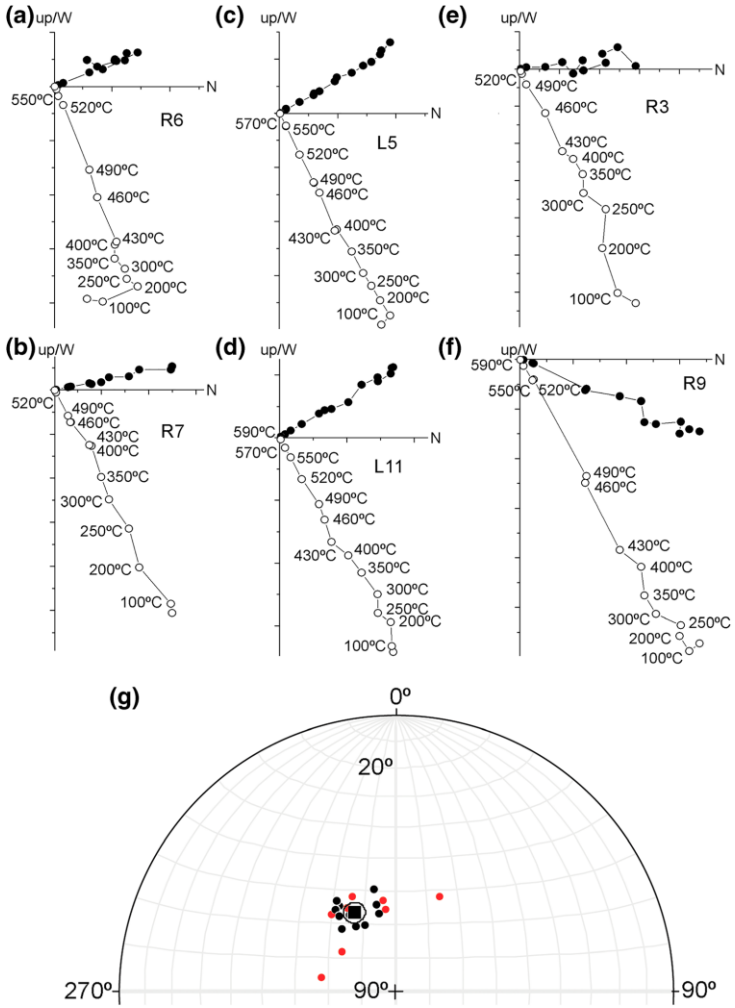
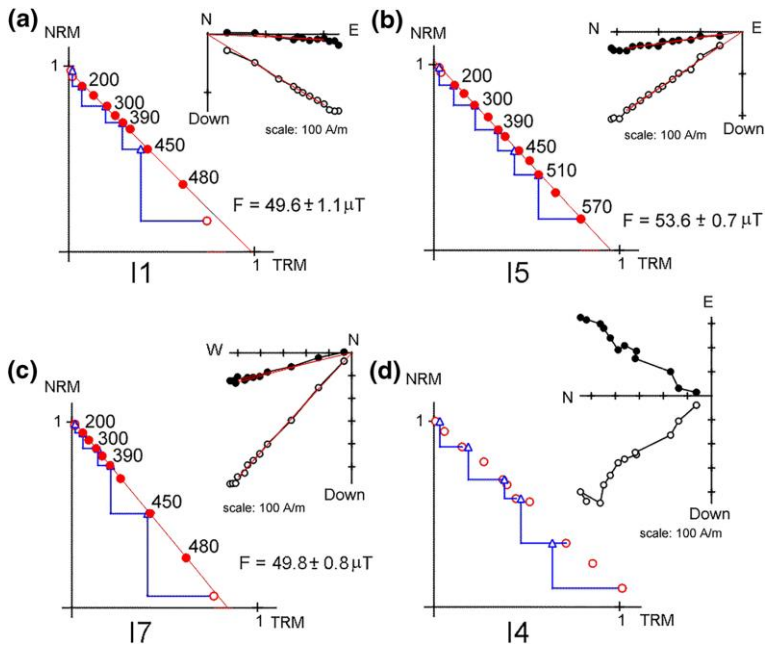
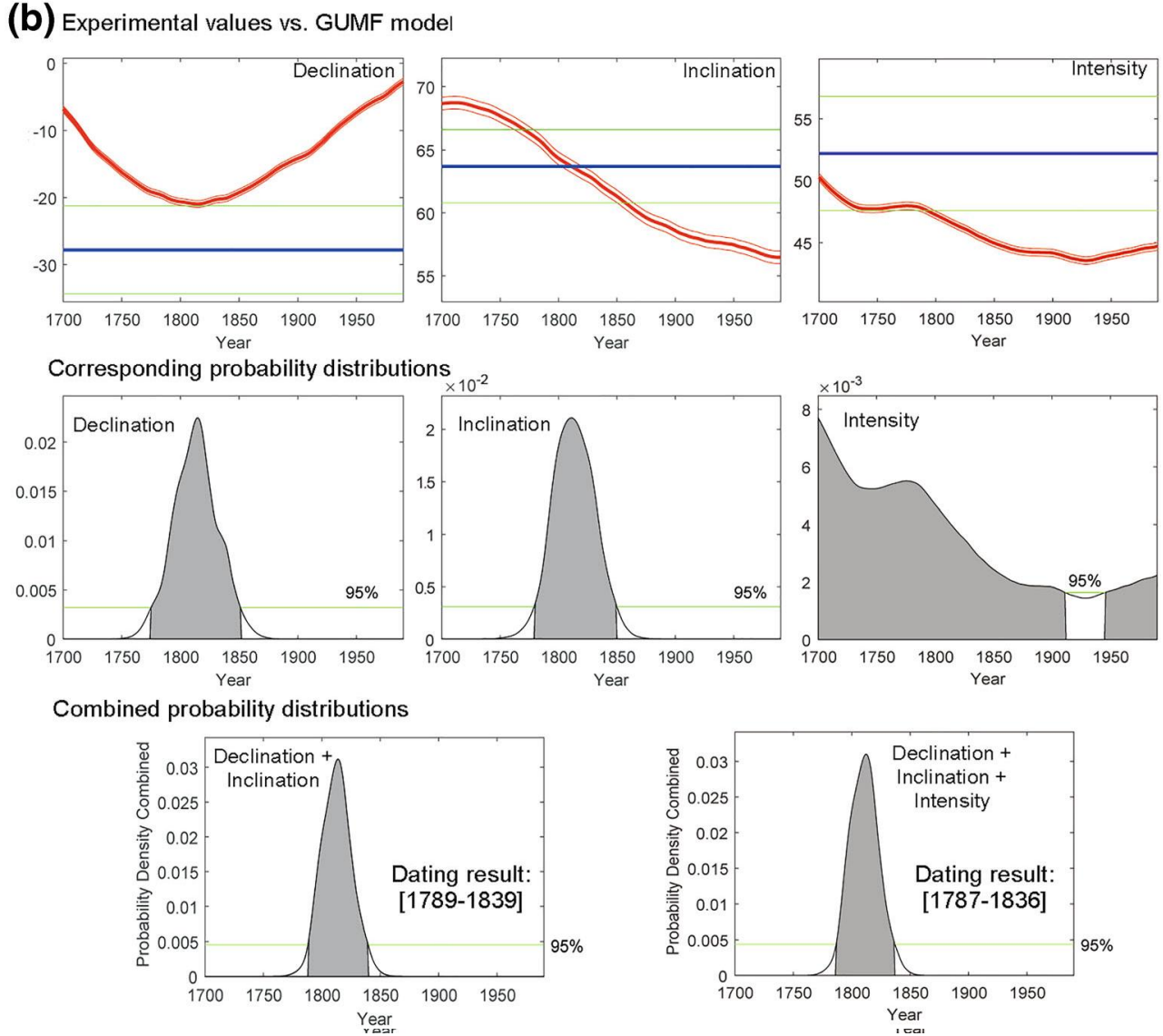




Archaeomagnetic dating examples

Archaeomagnetic study of a limekiln in the Les Ferreres Roman aqueduct, World Heritage Site of Tarraco

The limekiln is a modern structure linked neither to the original construction of the aqueduct nor to any undocumented ancient restoration.



Archaeomagnetic dating examples

Archaeomagnetic dating and magnetic characterization of ceramics from the Paquimé, Casas Grandes region, Chihuahua, Mexico (Alva-Valdivia et al., 2021)

Casas Grandes is a prehistoric culture area located between Chihuahua, northern Mexico, and New Mexico, southwest of USA. It had an intense occupation with large buildings during the ceramic period, from 0 to 1450 CE, developing very particular painted potteries. In this study, magnetic properties and archaeointensity experiments were investigated on two special ceramic types called Mimbres and polychrome Ramos. They come from four archaeological sites from Casas Grandes region in northern Chihuahua: Paquime, Villa Ahumada, Galeana, and Samalayuca. Archaeological timing and typology assign Mimbres and Ramos to an age period between 900 and 1450 CE, but no absolute ages are available.

Archaeomagnetic dating examples

Archaeomagnetic dating and magnetic characterization of ceramics from the Paquimé, Casas Grandes region, Chihuahua, Mexico (Alva-Valdivia et al., 2021)