

Datación arqueomagnética de un horno romano excavado en el yacimiento arqueológico de Casa del Mitreo (Mérida, Extremadura, España)

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Carrancho-Alonso, Ángel

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1. CONTEXTO ARQUEOLÓGICO

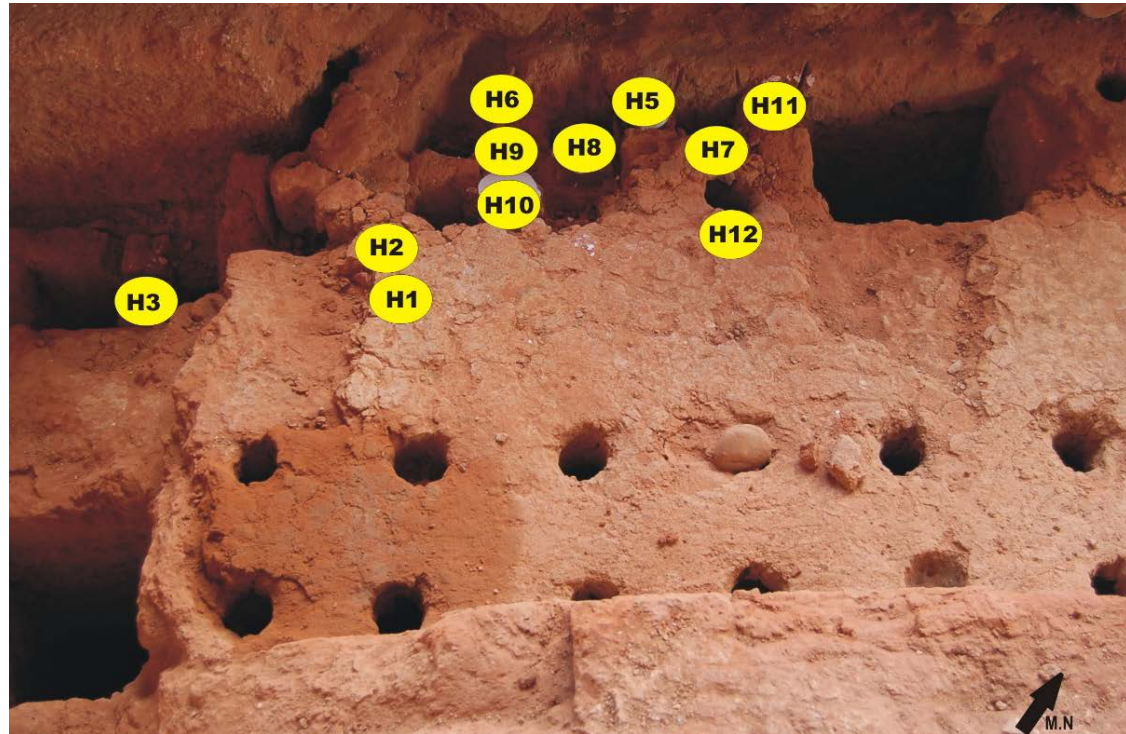
- Casa del Mitreo
(Mérida,
Extremadura,
España)
- Yacimiento
arqueológico
- Lujosa vivienda
romana (s.I-II d.C)
- Taller artesanal
- Cerámica:
sigillata itálica
(40 – 80 d.C)





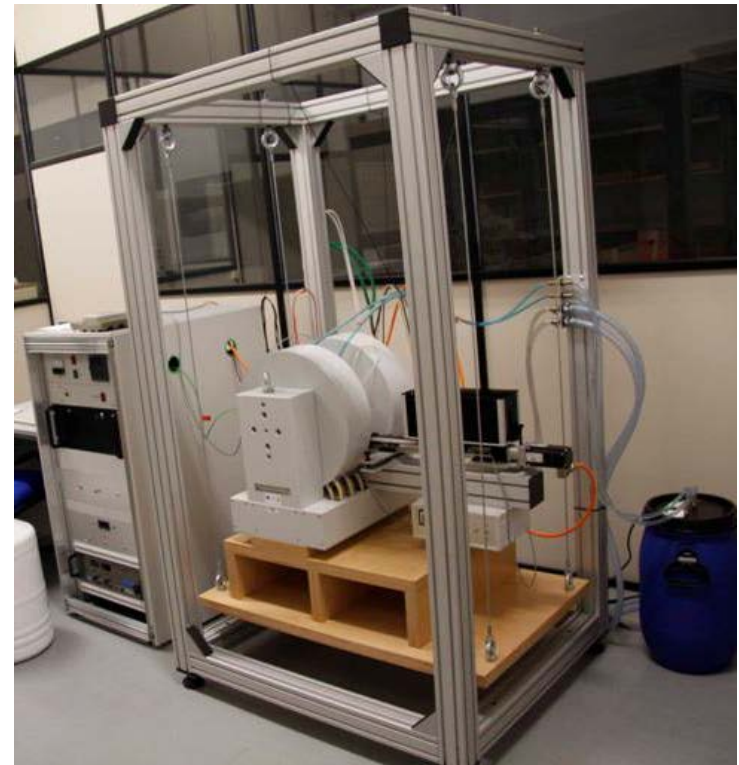
2. TRABAJO DE CAMPO

- Experimentos de paleomagnetismo:
 - 11 bloques de mano orientados
- Experimentos de magnetismo de las rocas y de arqueointensidad:
 - Muestra suelta
 - Asociada a cada bloque de mano

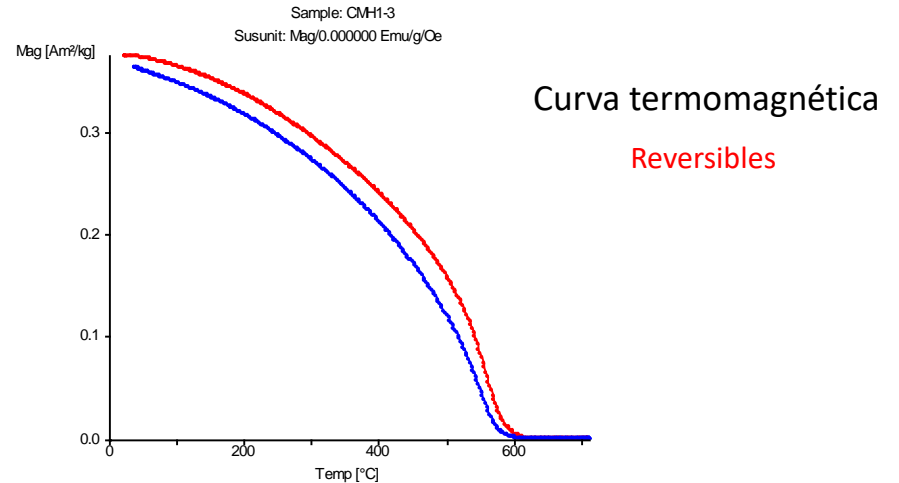
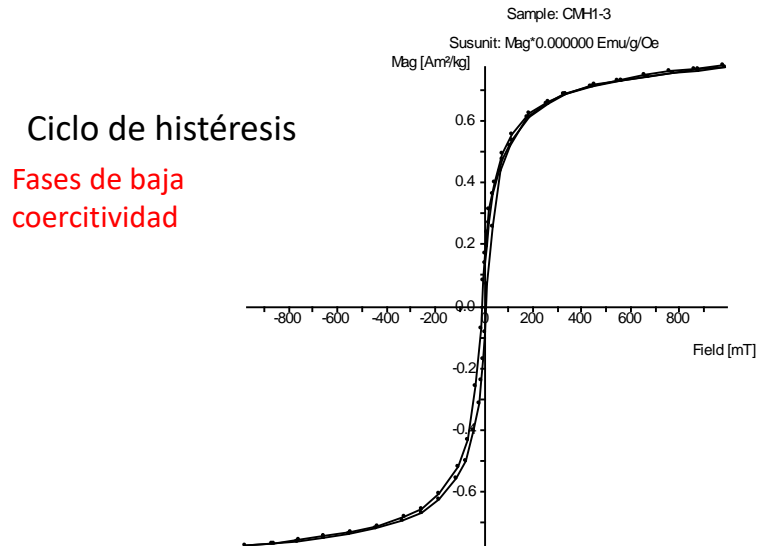
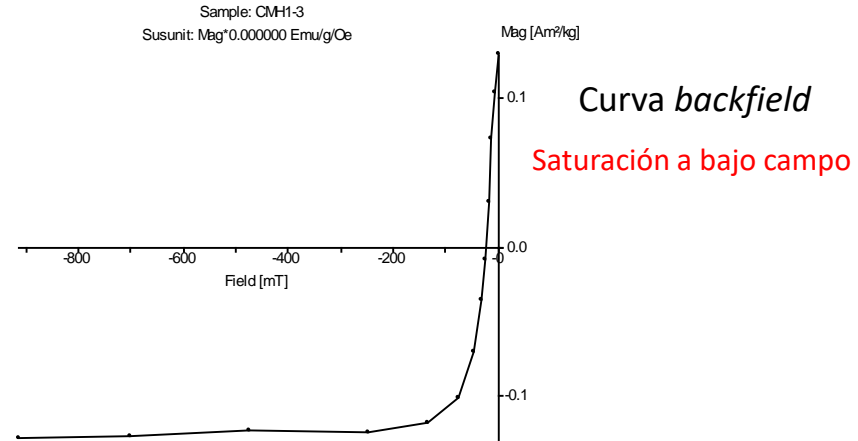
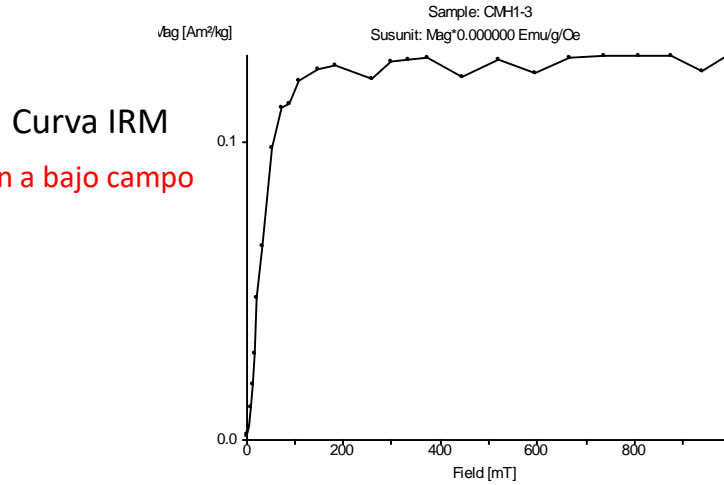


3. EXPERIMENTOS DE MAGNETISMO DE LAS ROCAS

- Laboratorio de Paleomagnetismo de la Universidad de Burgos (UBU)
 - Balanza de traslación de campo variable
- Experimentos:
 - Curvas IRM
 - Curvas *backfield*
 - Ciclos de histéresis
 - Curvas termomagnéticas



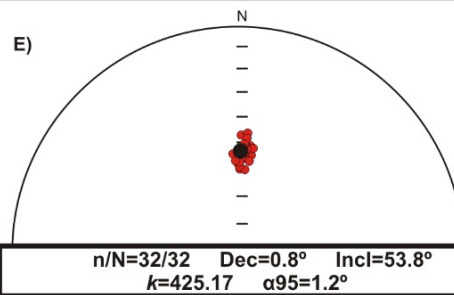
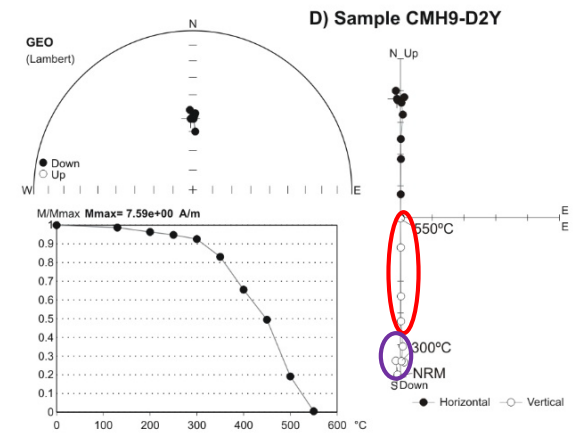
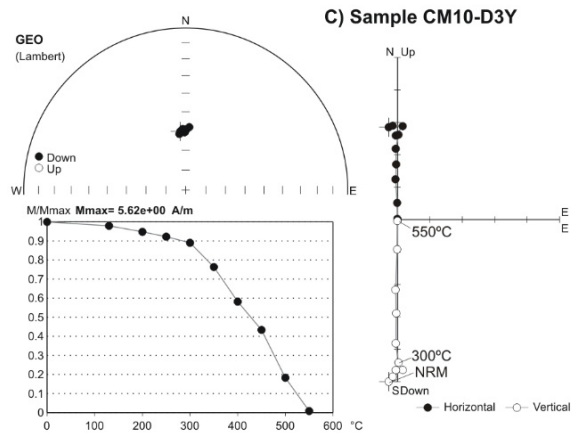
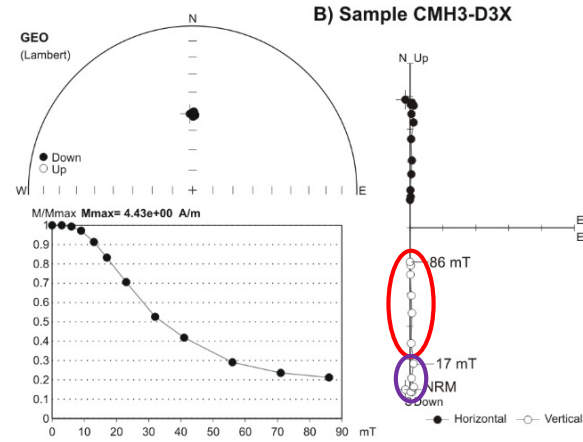
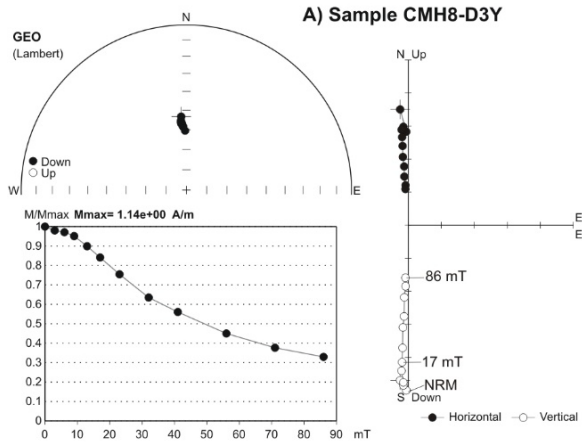
3. EXPERIMENTOS DE MAGNETISMO DE LAS ROCAS



4. ANÁLISIS PALEOMAGNÉTICOS

- Laboratorio de Paleomagnetismo de la Universidad de Burgos (UBU)
 - Direcciones del CMT:
 - Magnetización remanente natural (NRM)
 - Desmagnetización progresiva térmica (TH)
 - Desmagnetización por campos alternos decrecientes (AF)
 - Alteraciones en la mineralogía:
 - Susceptibilidad magnética

4. ANÁLISIS PALEOMAGNÉTICOS

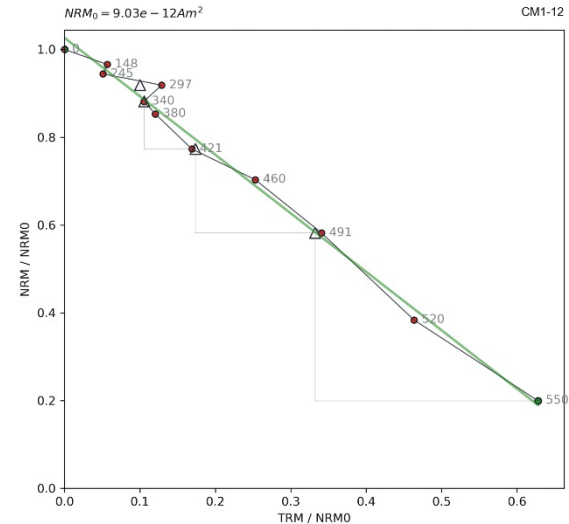


5. EXPERIMENTOS DE ARQUEOINTENSIDAD Y DE CORRECCIÓN DE LA ANISOTROPÍA

- Laboratorio de Paleomagnetismo de la Universidad de Burgos (UBU)
 - Experimentos de tipo Thellier-Coe
 - 11 pasos de temperatura → 580°C
 - pTRM-checks: 4
 - Campo aplicado: 40μT
 - Gas argón
 - Enfriamiento: natural durante ~24horas

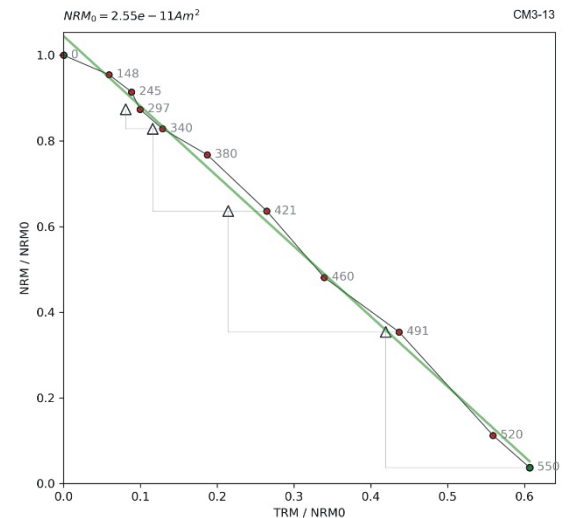
A) Sample CM1-12

Arai plot



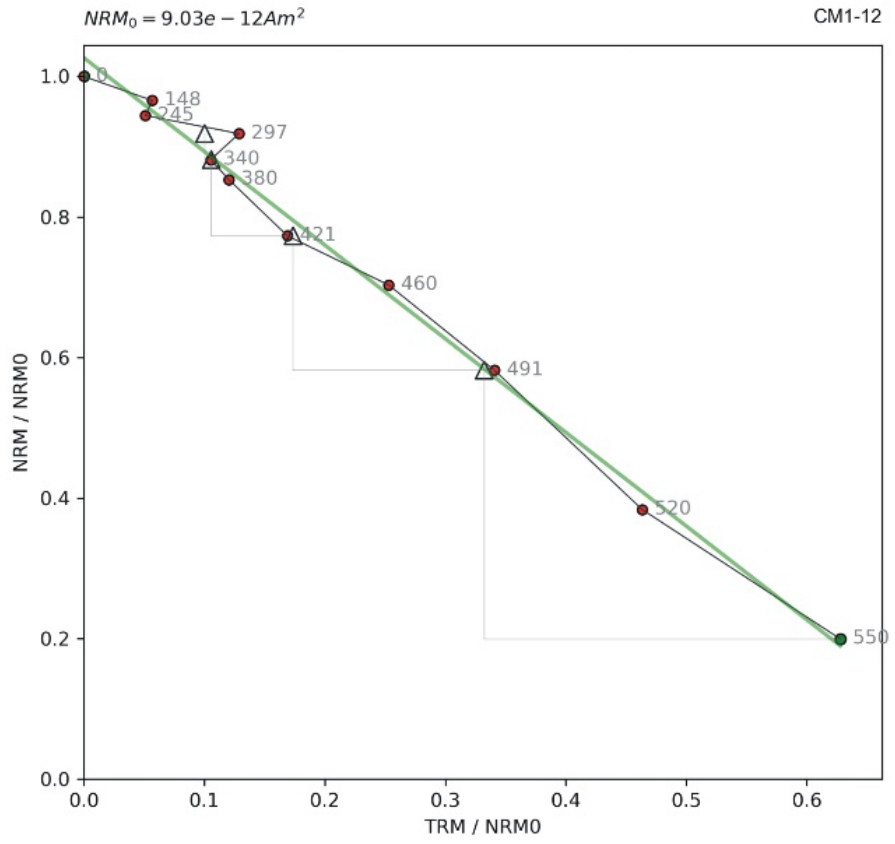
B) Sample CM3-13

Arai plot



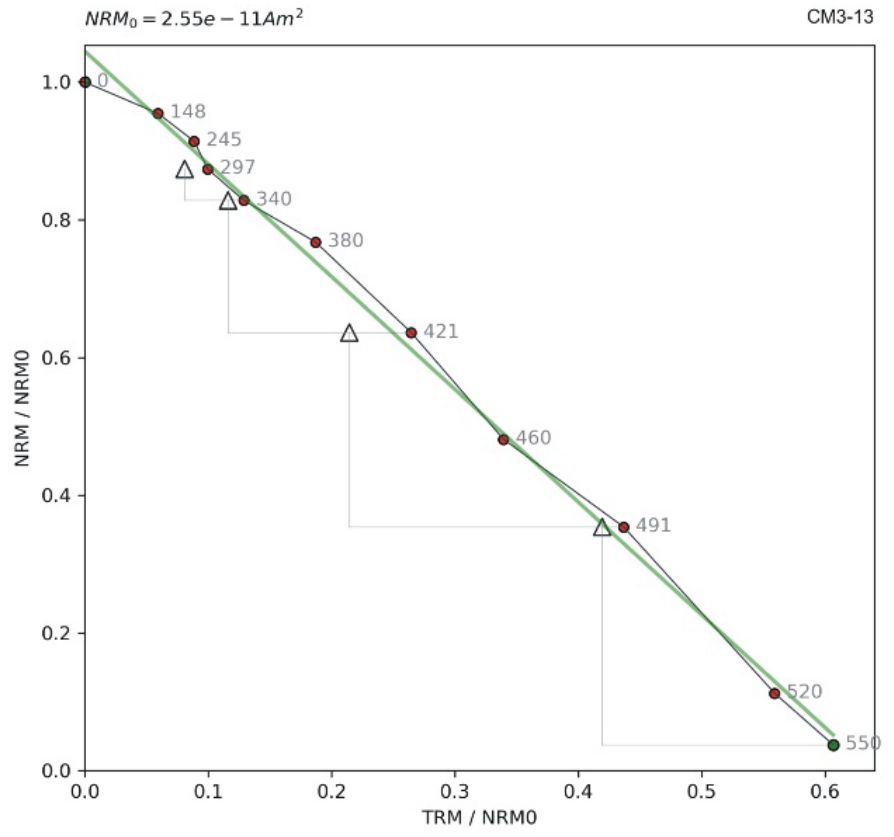
A) Sample CM1-12

Arai plot



B) Sample CM3-13

Arai plot



- Criterios de calidad

		Clase A	Clase B
Puntos alineados	$N \geq$	5	5
Fracción de la NRM	$f >$	0.5	0.35
Error estándar/pendiente absoluta de la línea de mejor ajuste	$\beta <$	0.1	0.15
Factor de calidad	$q >$	5	1
Alteración químico-mineralógica	δ_{ck}	7	9
Alteración químico-mineralógica	δ_{-pal}	10	18
Desviación Angular Media	$MAD \leq$	6	15
Diferencia angular ajuste/dir. sin anclar	$\alpha <$	15	15
Curvatura	$k' \leq$	0.164	0.164

La fiabilidad de las muestras se evaluó utilizando los criterios del **ThellierTool modificados por Paterson** (Paterson et al., 2014).

El umbral que hemos seguido también se basa en **Paterson et al (2014)**.

5. EXPERIMENTOS DE ARQUEOINTENSIDAD Y DE CORRECCIÓN DE LA ANISOTROPÍA

SAMPLE	N	T _{min} -T _{max}	f	β	dck	dpal	K'	q	MAD	α	B _{raw} [μT]	B _{An corr} [μT]
CM1-9	11	0-550	0.77	0.05	4.26	6.24	0.164	12.52	8.1	1.75	50.5	48.48
CM1-10	10	0-520	0.99	0.00	4.92	19.70	0.054	7.31	9.4	9.40	<i>Rejected</i>	
CM1-11	11	0-550	0.76	0.051	4.44	3.50	0.145	12.54	10.7	3.35	52.5	50.4
CM1-12	11	0-550	0.8	0.035	3.71	2.72	-0.018	19.33	6.8	2.04	53.3	51.16
CM3-13	11	0-550	0.94	0.022	7.85	2.21	-0.125	37.18	8.7	1.21	65.5	68.12
CM3-14	12	0-580	1.01	0.029	7.24	10.10	0.03	30.51	4.1	0.18	57.2	59.48
CM3-15	12	0-580	1	0.025	4.08	4.94	0.191	34.13	2.8	0.52	59	61.36
CM3-16	12	0-580	0.99	0.019	5.46	3.06	0	44.95	7.2	1.74	64.6	67.18
CM5-17	12	0-580	0.96	0.038	5.26	3.90	0	22.52	6.3	2.68	55.4	52.07
CM5-18	12	0-580	1	0.018	3.98	0.21	0	50.19	5.2	1.45	<i>Rejected</i>	
CM5-19	12	0-580	0.99	0.029	5.82	14.20	0.053	29.79	4.6	1.66	60.4	56.77
CM5-20	10	0-520	0.88	0.044	1.80	2.78	-0.178	16.86	2.6	1.08	52.8	49.63
CM7-21	12	0-580	0.97	0.027	4.48	8.03	0	31.41	2.8	0.86	53.2	47.88
CM7-22	12	0-580	0.96	0.035	6.13	10.10	0	24.07	7.5	2.27	59.9	53.91
CM7-23	12	0-580	0.97	0.018	4.54	4.93	0.003	47.69	5.9	2.15	58.1	52.29
CM7-24	12	0-580	0.94	0.061	5.56	16.50	0	13.69	11.2	3.98	56.6	50.94
CM9-25	12	0-580	0.99	0.018	4.74	5.16	0.104	47.71	4.2	1.12	59.7	57.90
CM9-26	12	0-580	0.98	0.054	7.00	4.77	0	15.64	7.5	1.65	66	64.02
CM9-27	12	0-580	0.98	0.028	6.20	3.63	0	31.37	5.1	1.23	57.7	55.96
CM9-28	12	0-580	0.99	0.019	6.65	4.45	0	44.97	4.4	0.57	60.2	58.39
CM10-29	12	0-580	0.99	0.014	4.26	4.78	0.029	61.14	3.1	0.83	60.3	62.71
CM10-30	9	0-491	0.78	0.08	5.97	17.80	0	8.08	11.8	1.96	56.2	58.44
CM10-31	12	0-580	0.98	0.027	5.79	1.29	-0.058	30.91	4.6	1.21	58	60.32
CM10-32	12	0-580	0.99	0.017	3.72	3.80	0.008	52.51	3.9	0.96	58.1	60.42
CM11-33	12	0-580	0.97	0.022	3.06	3.83	-0.054	38.9	5	1.79	56.4	54.71
CM11-34	12	0-580	0.99	0.021	8.76	9.66	-0.012	41.16	5.6	2.08	60.2	58.39
CM11-35	12	0-580	0.95	0.031	4.01	4.70	-0.15	27.12	4.8	1.90	57.9	56.16
CM11-36	12	0-580	0.95	0.038	3.70	3.66	0	21.99	4.4	1.59	56.9	55.19
Mean =											57.9 ± 3.8	56.6 ± 5.5

5. EXPERIMENTOS DE ARQUEOINTENSIDAD Y DE CORRECCIÓN DE LA ANISOTROPÍA (ATRM)

– Corrección de la anisotropía de la termoremanencia (ATRM):

- Método de Veitch et al. (1984)
- Seis direcciones: -x, +x, -z, +z, -y, +y
- Temperatura: 500°C
- Campo aplicado: 40 μ T
- Gas argón
- Enfriamiento: natural durante ~24horas
- Desmagnetización AF \rightarrow 100mT
- Paso extra: ¿alteraciones mineralógicas?

5. EXPERIMENTOS DE ARQUEOINTENSIDAD Y DE CORRECCIÓN DE LA ANISOTROPÍA

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CM5-18	12	0-580	1	0.018	3.98	0.21	0	50.19	5.2	1.45	<i>Rejected</i>	<i>Rejected</i>
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Mean =											57.9 ± 3.8	56.6 ± 5.5

6. DATACIÓN ARQUEOMAGNÉTICA

- Dirección media + valor medio de arqueointensidad → **SCHA.DIF.14k** (Pavón-Carrasco et al., 2014).
- Software: ***archaeo_dating*** (Pavón-Carrasco et al., 2011).

Journal of Archaeological Science 38 (2011) 408–419



Contents lists available at ScienceDirect

Journal of Archaeological Science

journal homepage: <http://www.elsevier.com/locate/jas>



A Matlab tool for archaeomagnetic dating

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ARTICLE INFO

Article history:
Received 21 June 2010
Received in revised form
15 September 2010
Accepted 17 September 2010

Keywords:

ABSTRACT

A Matlab tool for archaeomagnetic dating has been developed in this work. Well-dated palaeosecular variation curves (PSVCs) can be used to date archaeological artefacts with unknown ages. The archaeomagnetic direction (declination and/or inclination) and the archaeointensity obtained from the archaeological artefact are compared with a master PSVC. In addition, historical lava flows with controversial ages can be dated using this methodology. The dating process follows the descriptions given by Lanos (2004), which is based on the combination of temporal probability density functions of the three geomagnetic field elements. Here, we develop an interactive tool in Matlab code to carry out

archaeo_dating

Archaeomagnetic Dating by Palaeosecular Variation Curves

Dating

Archaeomagnetic Data

Declination (decimal degree) Value

Inclination (decimal degree) Value

Alpha 95 (decimal degree) Value

Intensity (microTesla) Value

Intensity uncertainty (microTesla) Value

Location Data

Longitude (decimal degree) Value

Latitude (decimal degree) Value

'Site Name' name

Choose your master PSVC

Regional PSVC Global Models

Regional Models New PSVC

Parameters

Time Interval

Defined Interval Initial Time Final Time

Entire Interval

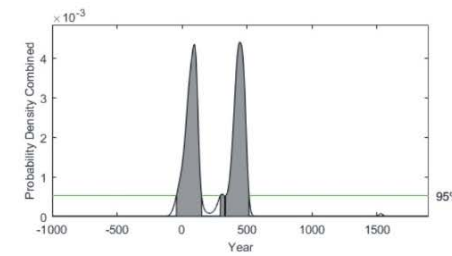
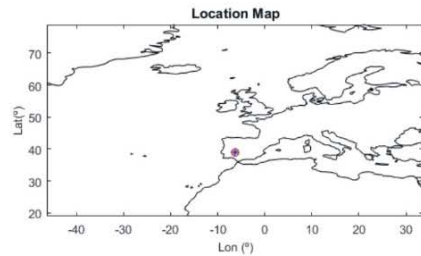
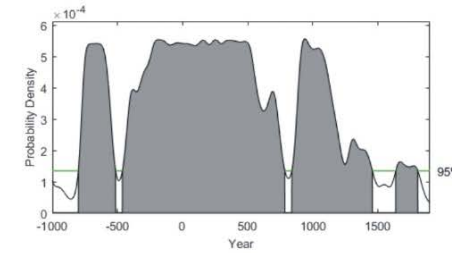
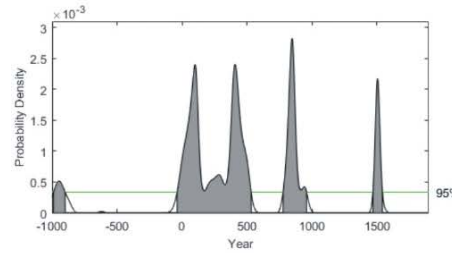
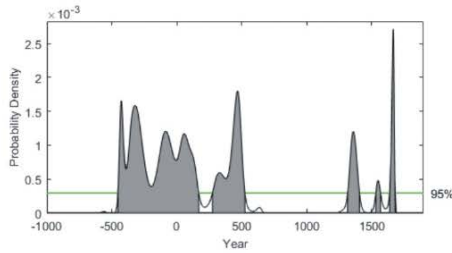
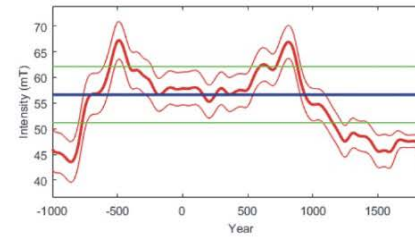
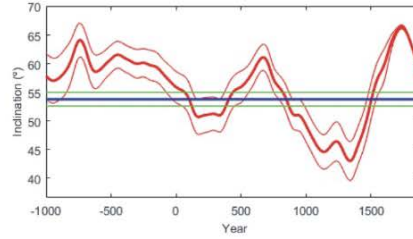
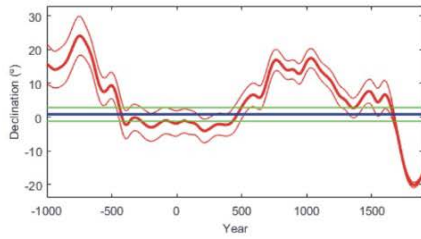
Probability

65% 95%

Help

Pavón-Carrasco et al. (2010). A Matlab tool for archaeomagnetic dating. Visit http://pc213fis.fis.ucm.es/archaeo_dating/index.html for updates

6. DATACIÓN ARQUEOMAGNÉTICA



Dating: Mitreo's house

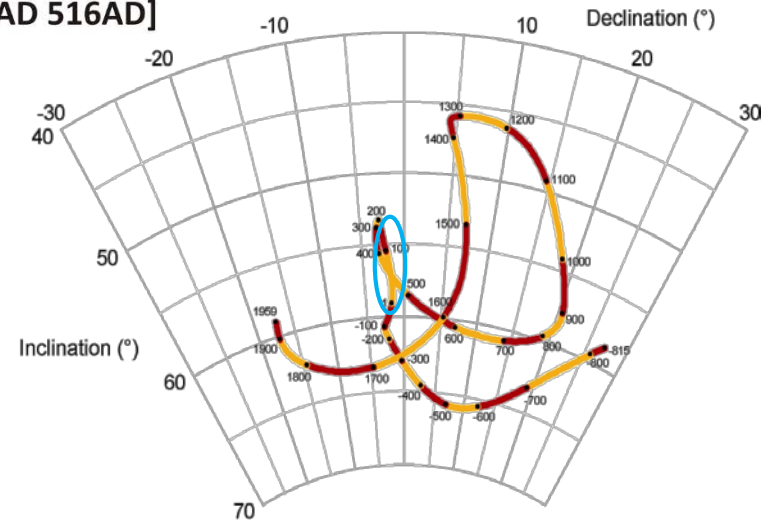
Combining Probability Density Functions

Threshold = 0.00052463 (Confidence = 95%)

Between $t = 1000$ BC and 1900 AD

[42BC 151AD]

[296AD 516AD]



7. CONCLUSIONES

- Dirección media:
 - **Dec = 0.8°; Inc = 53.8°; $k = 425.17$; $\alpha_{95} = 1.2^\circ$**
- Determinación de arqueointensidad absoluta:
 - **56.62 ± 5.48 μT**
- Datación arqueomagnética (SCHA.DIF.14k):
 - **42BC – 151 AD**
- Contexto arqueológico:
 - s.I – II d.C
 - Cerámica (*sigilata itálica*): 40 – 80 d.C

Gracias por su atención



AGRADECIMIENTOS

N-G.R agradece la financiación otorgada por la Junta de Castilla y León y la Unión Europea (fondos FEDER). El estudio fue financiado por el proyecto BU235P18 de la Junta de Castilla y León y el Fondo Europeo de Desarrollo Regional (ERD).

