



Vulkane, Jahrringe und die Thera-Eruption

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Seminar: Dendrochronologisches Laborpraktikum
Wintersemester 2015/16

Dr. Thomas Frank



Gliederung

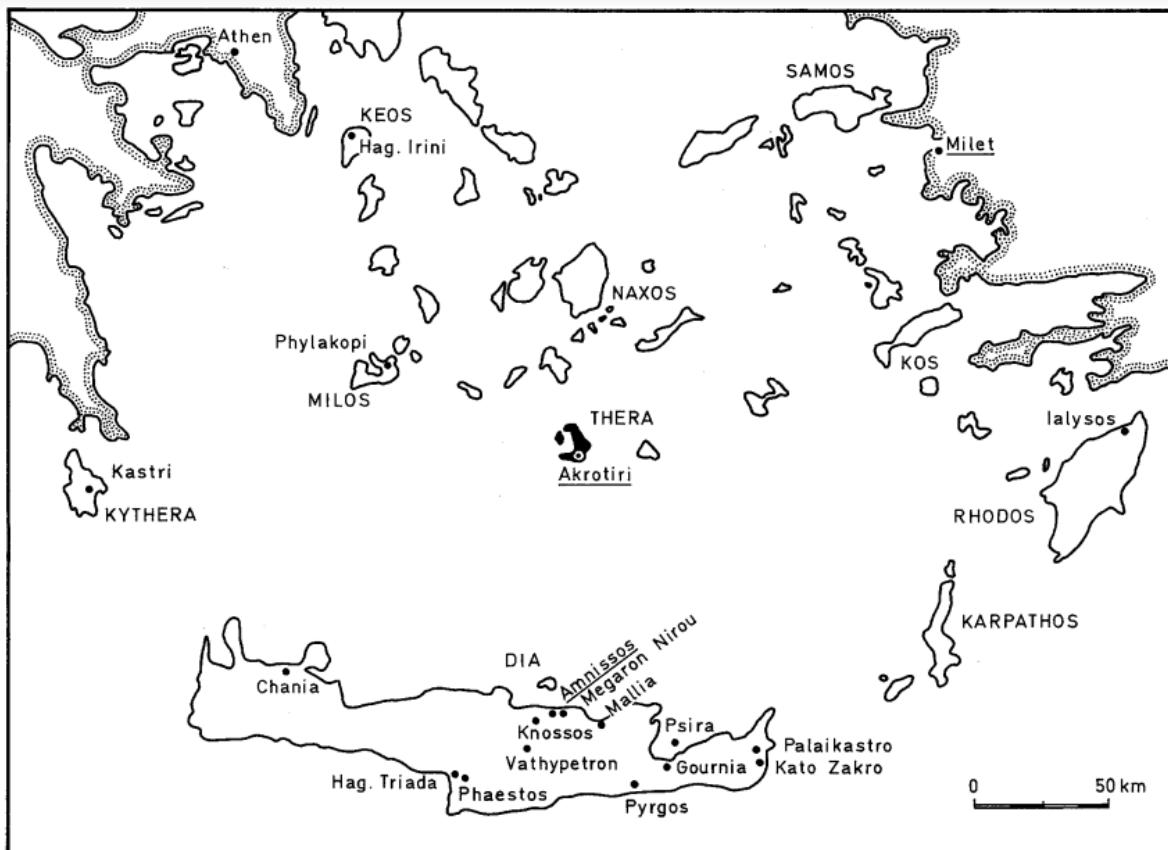
① Problemstellung und historische Datierung

② Baumringe, Eiskerne und Radiokohlenstoff

③ Résumé

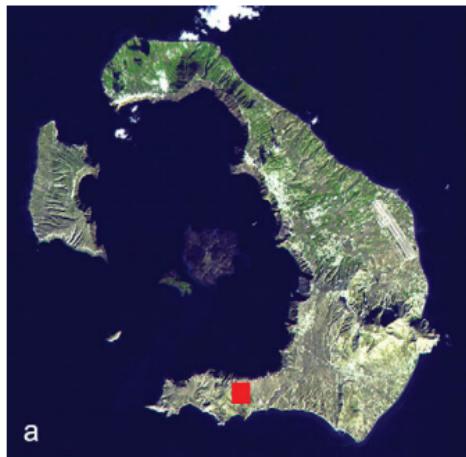


Thera





Thera heute





Die Fragestellung

MM IA	MC I	MH I
MM IB	MC II	MH II
MM II		
MM III	MC III	MH III
LM IA	LC I	LH I
LM IB	LC II	LH IIA
LM II		LH IIB
LM IIIA1		LH IIIA1
LM IIIA2		LH IIIA2
LM IIIB	LC III	LH IIIB
LM IIIC		LH IIIC
Subminoan		Submycenaean

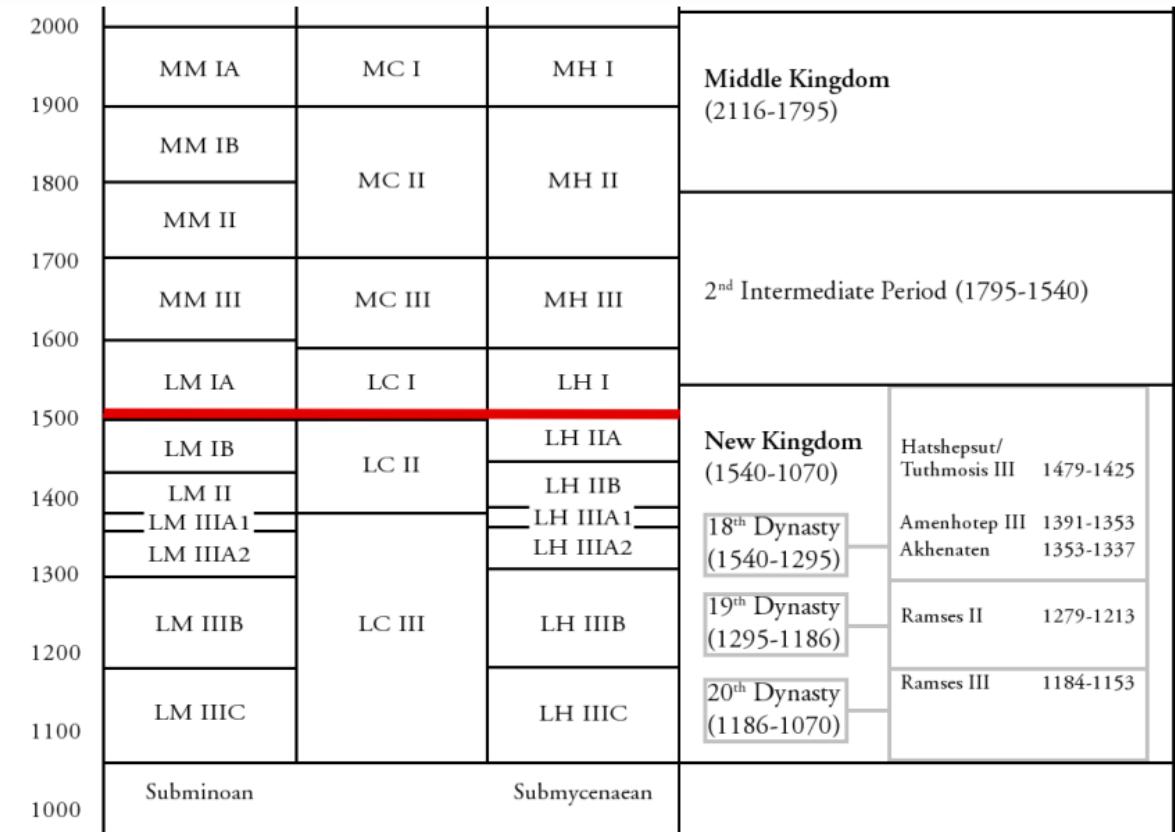


Die Fragestellung

MM IA	MC I	MH I	Middle Kingdom (2116-1795)
MM IB	MC II	MH II	
MM II			
MM III	MC III	MH III	2 nd Intermediate Period (1795-1540)
LM IA	LC I	LH I	
LM IB	LC II	LH IIA	New Kingdom (1540-1070)
LM II		LH IIB	Hatshepsut/ Tuthmosis III 1479-1425
LM IIIA1	LC III	LH IIIA1	Amenhotep III 1391-1353
LM IIIA2		LH IIIA2	Akhenaten 1353-1337
LM IIIB		LH IIIB	Ramses II 1279-1213
LM IIIC		LH IIIC	Ramses III 1184-1153
Subminoan		Submycenaean	

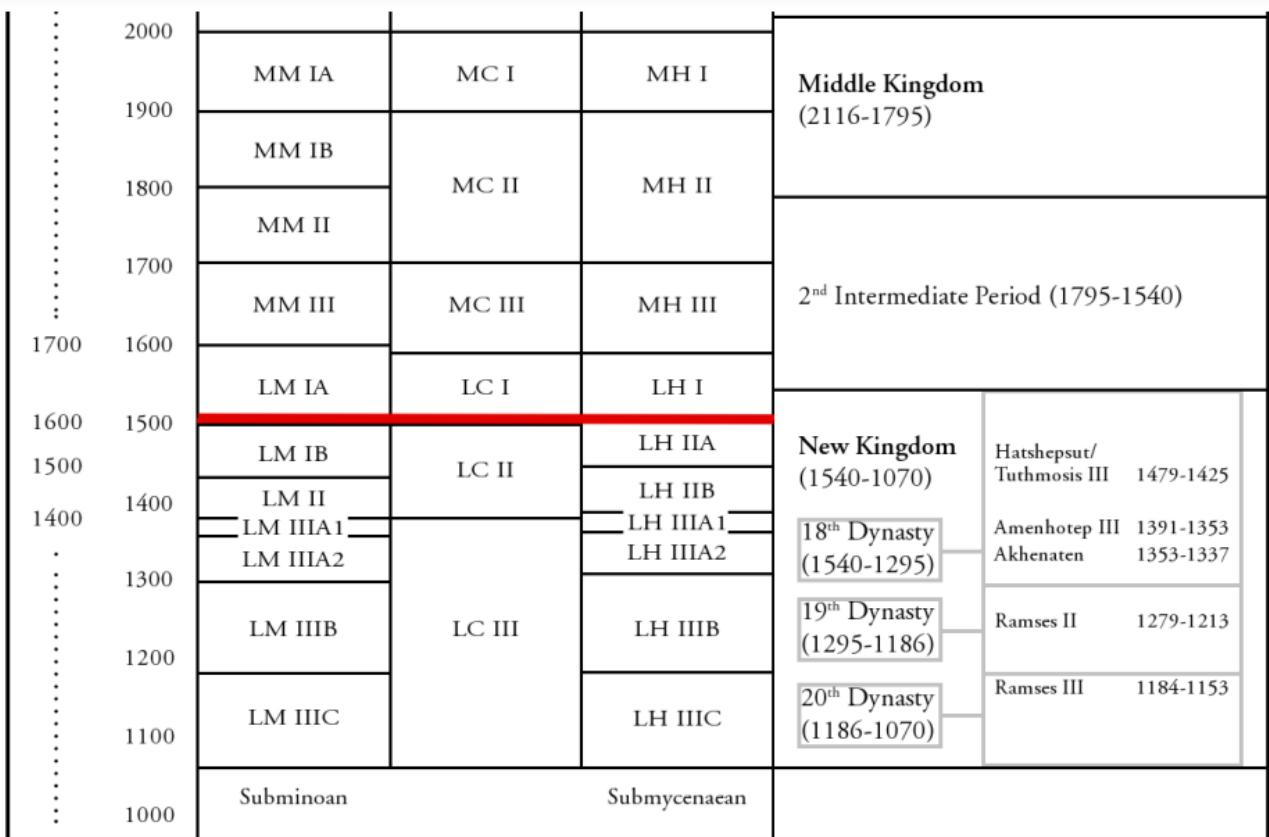


Die Fragestellung



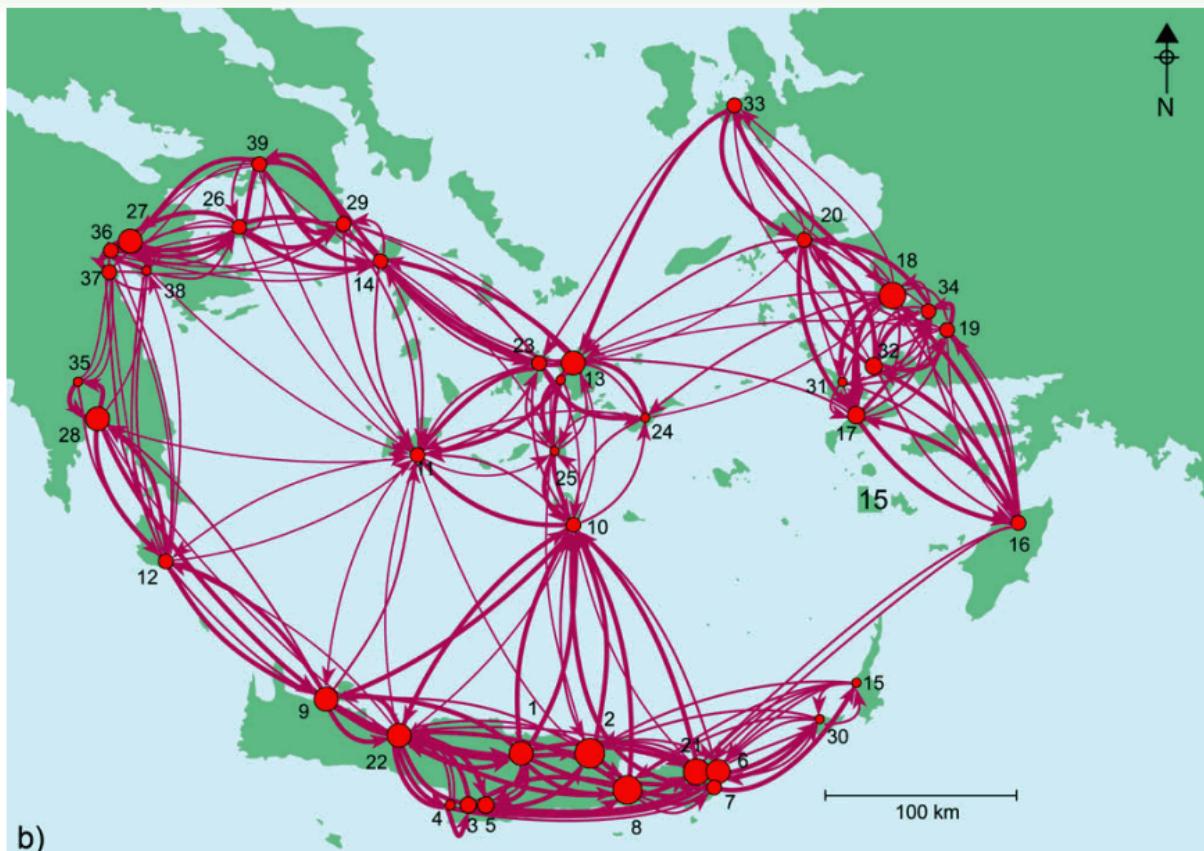


Die Fragestellung





Der allmähliche Zusammenbruch: Ausgangslage

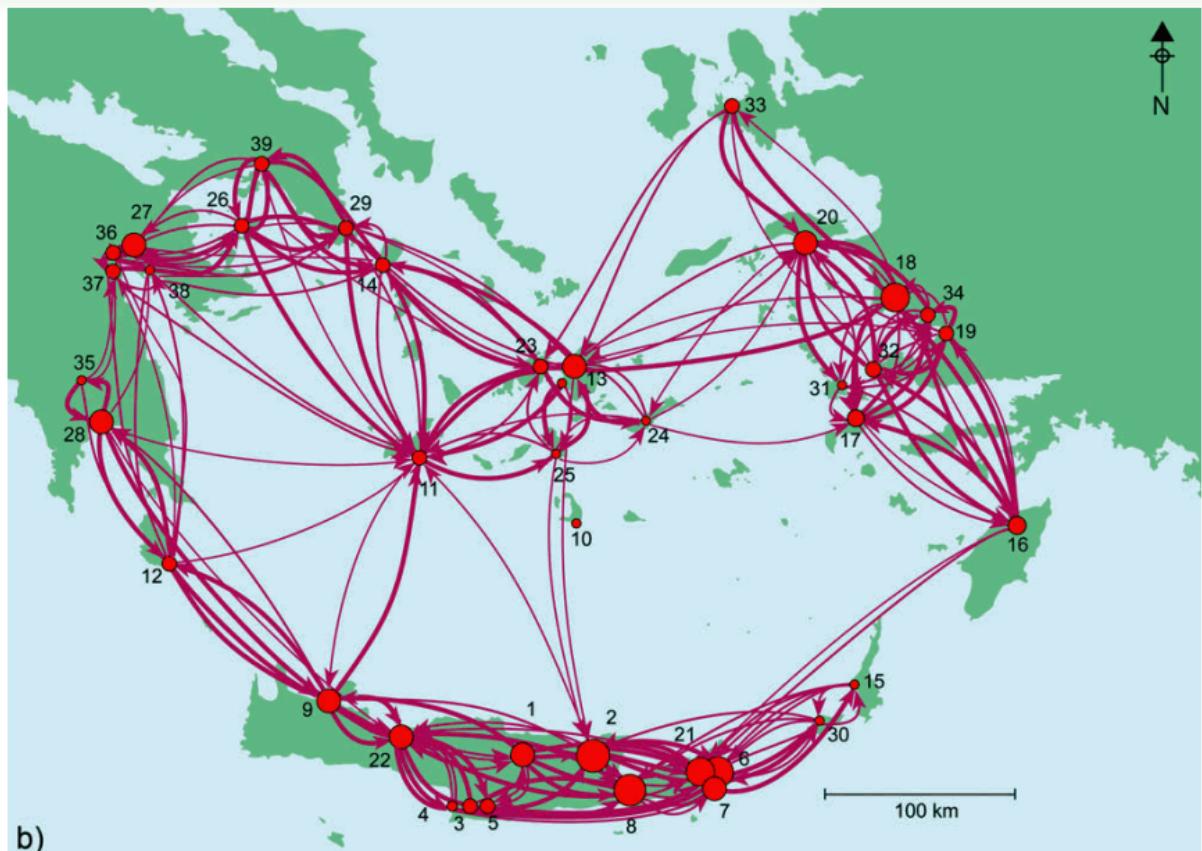


b)

Kn11

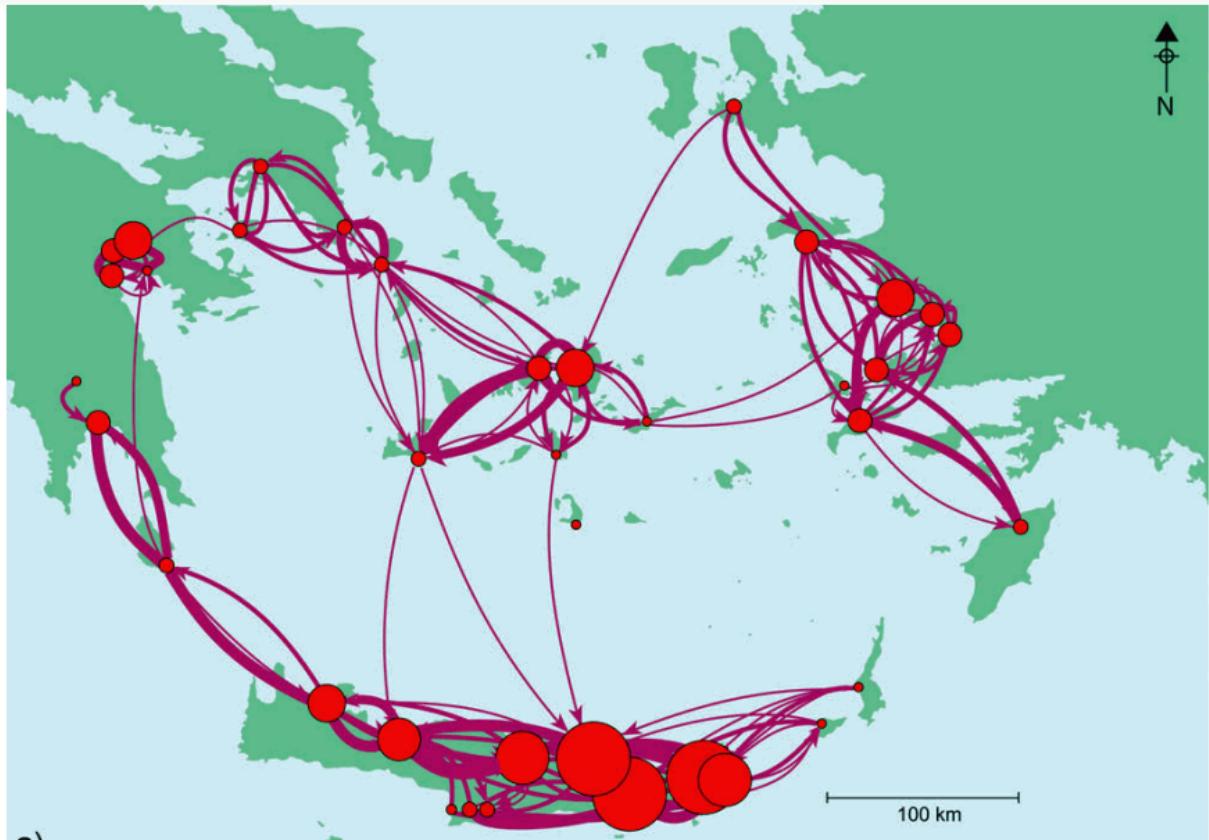


Der allmähliche Zusammenbruch: kurz nach dem Ausbruch



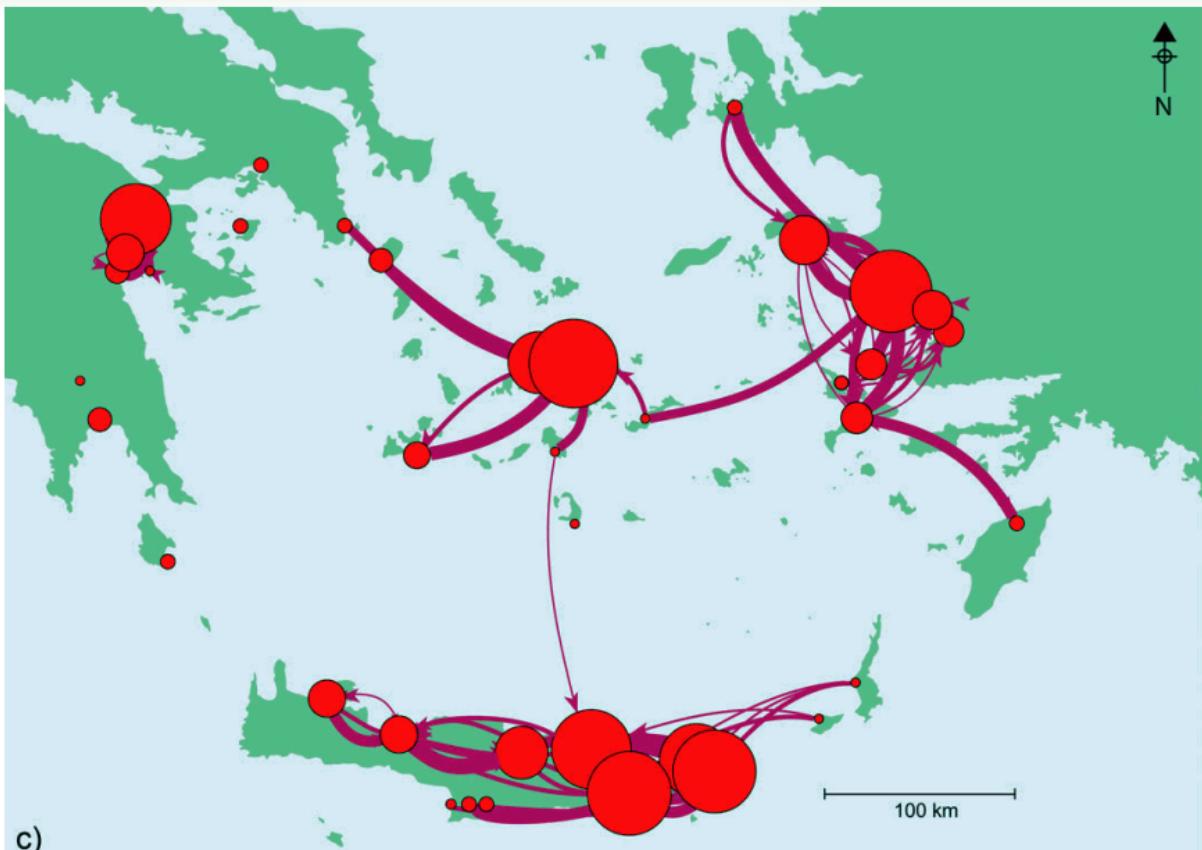


Der allmähliche Zusammenbruch: Niedergang





Der allmähliche Zusammenbruch: Endpunkt



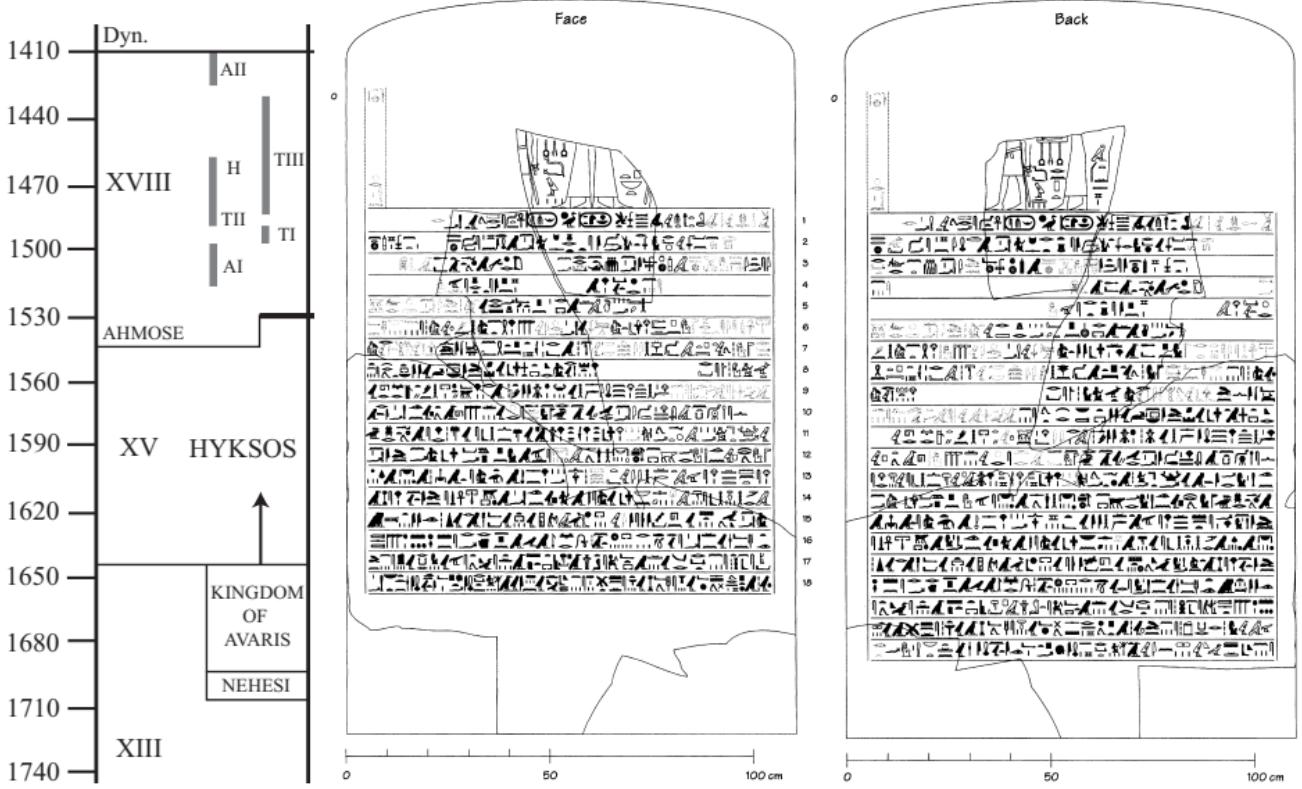
c)

100 km

Kn11

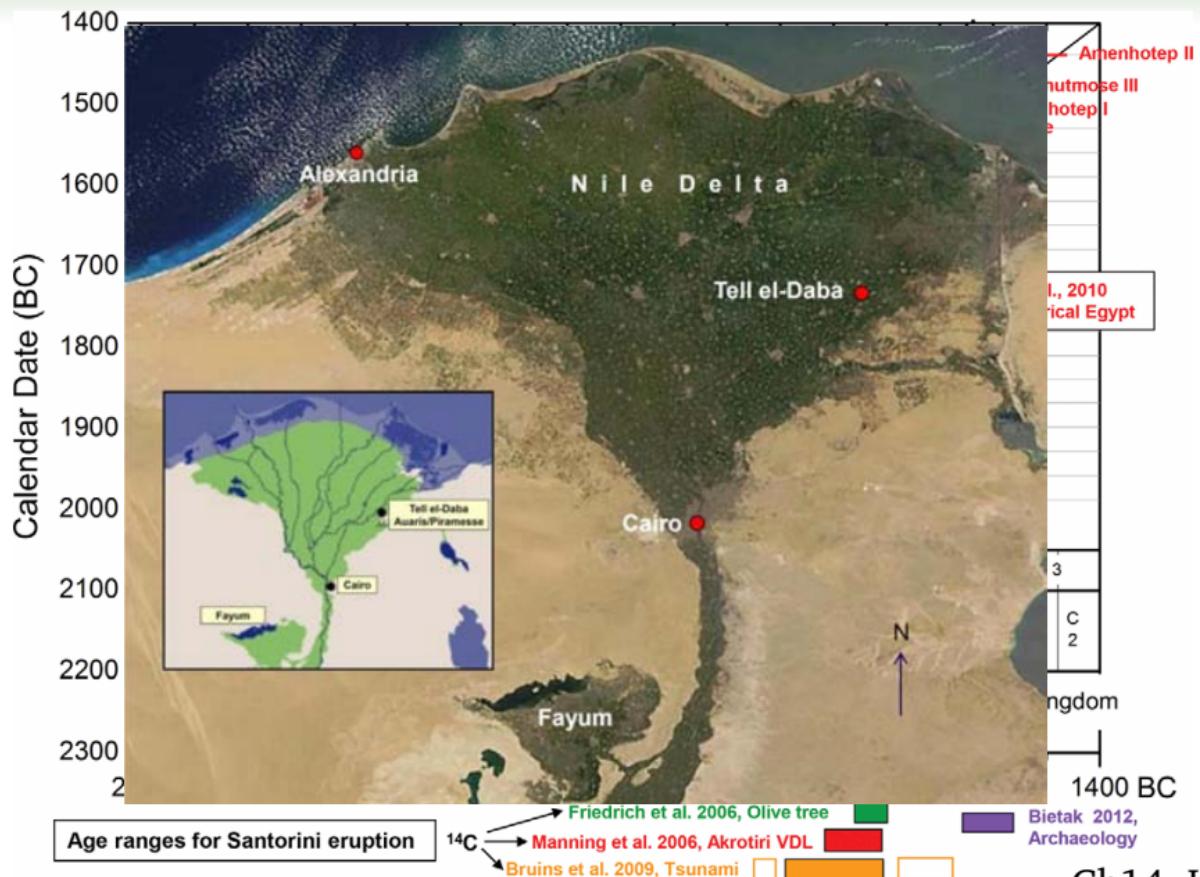


Die Ahmose-Stele



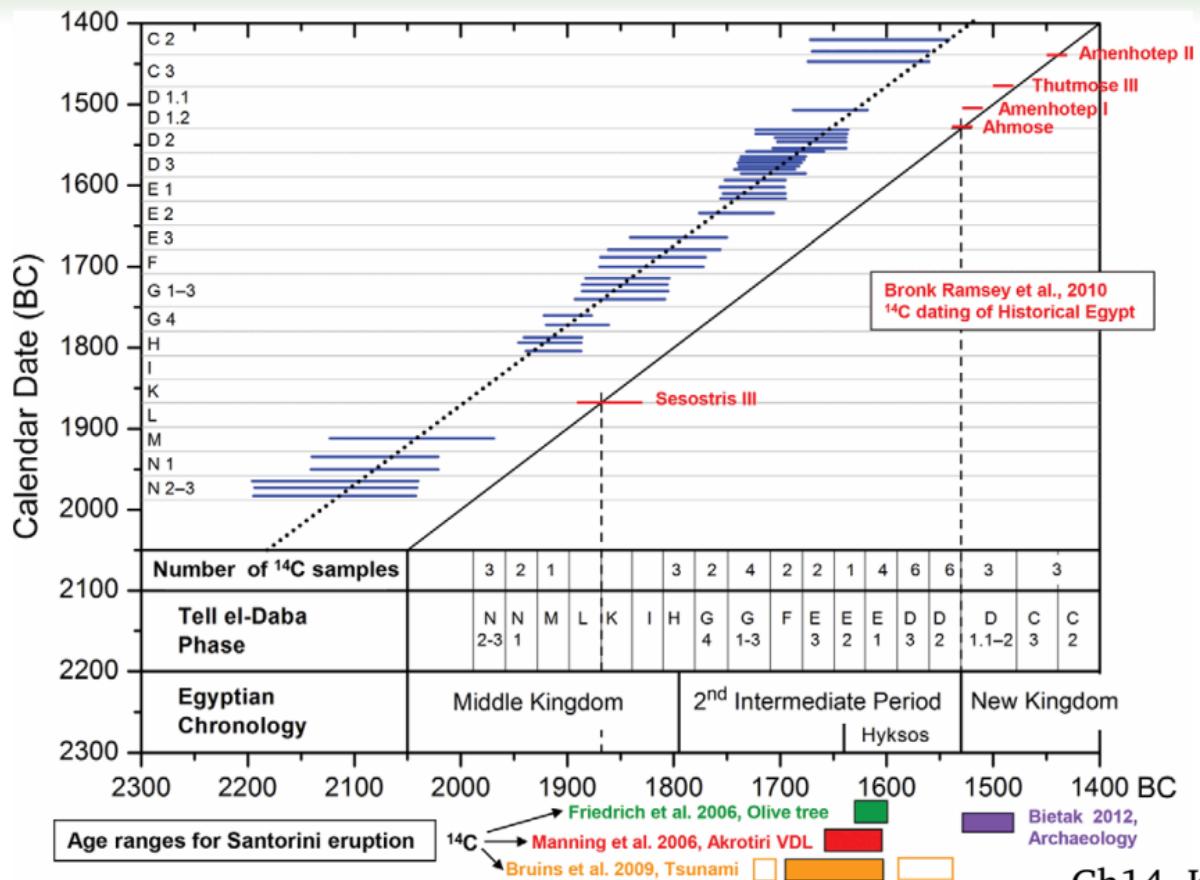


Offset von 120 a im Tell el-Dab'a



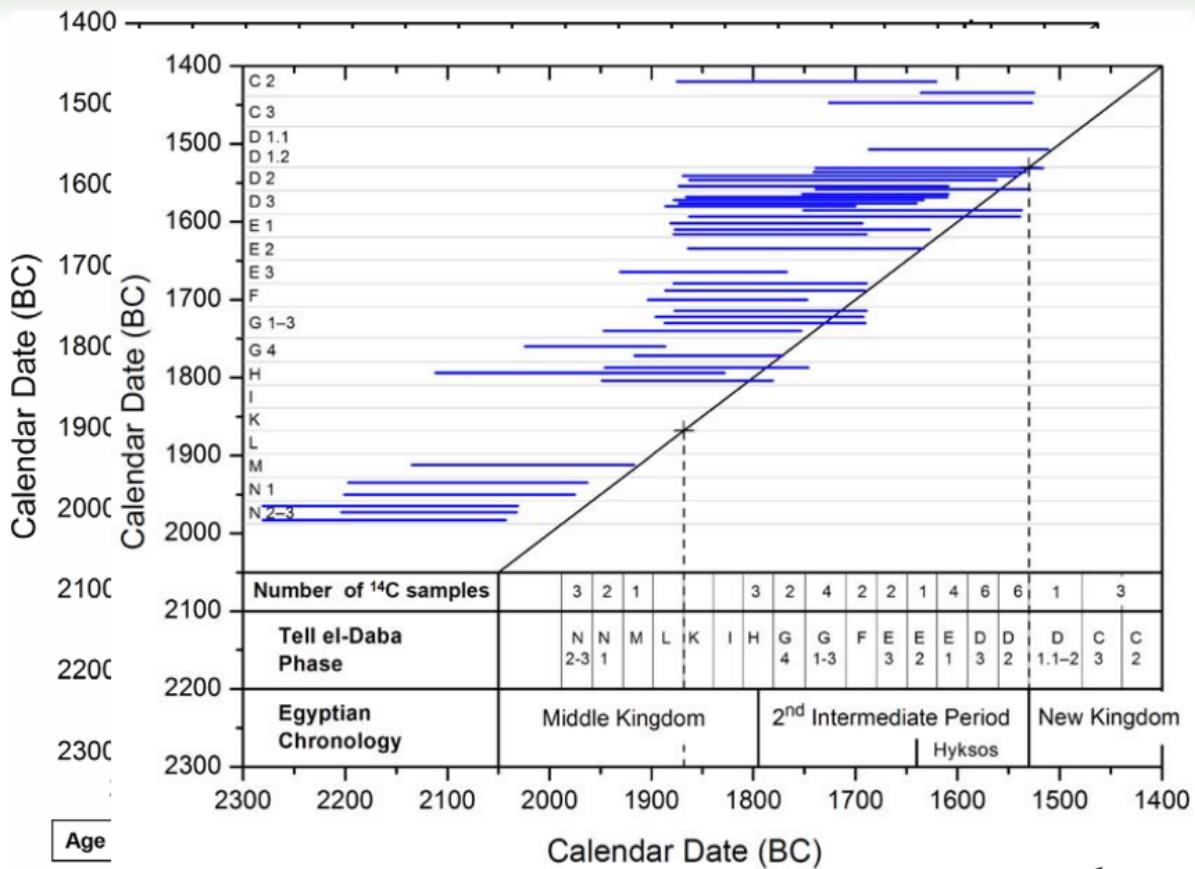


Offset von 120 a im Tell el-Dab'a



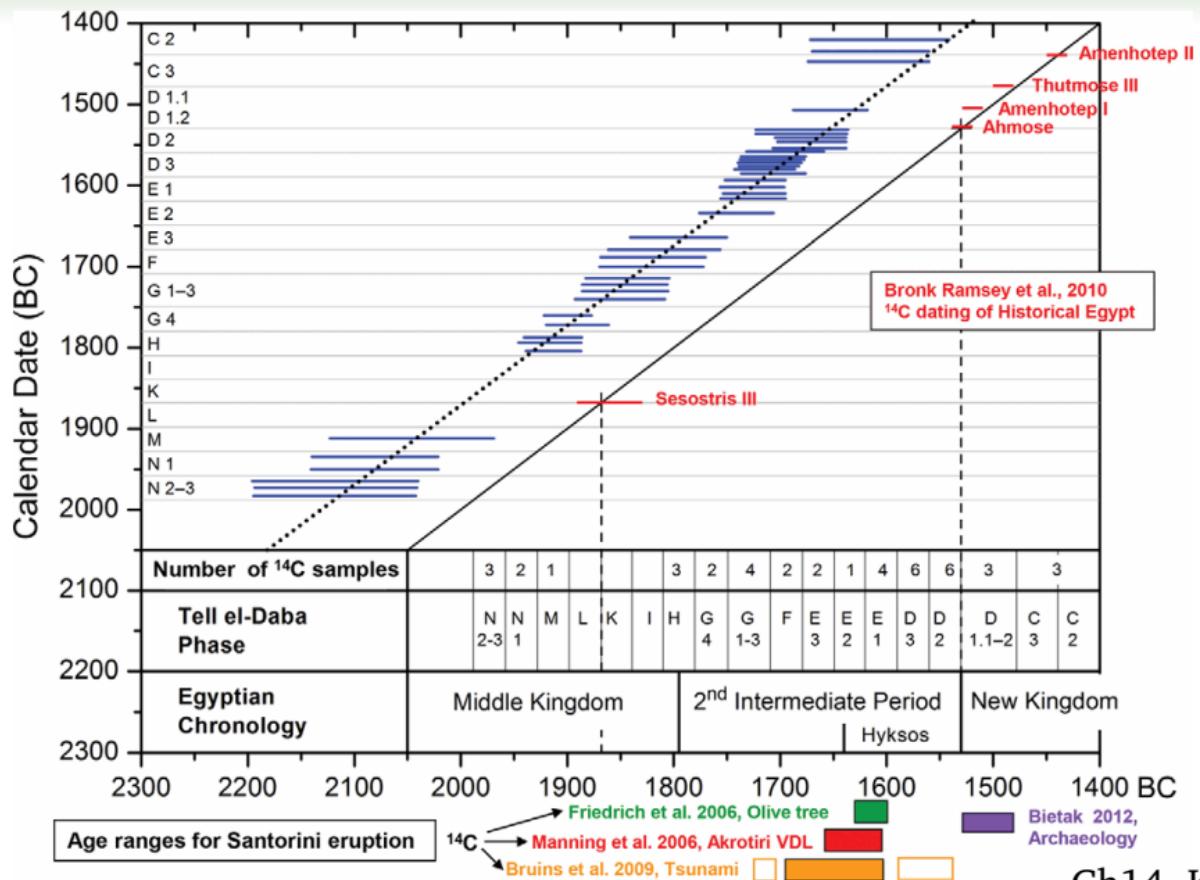


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Offset von 120 a im Tell el-Dab'a





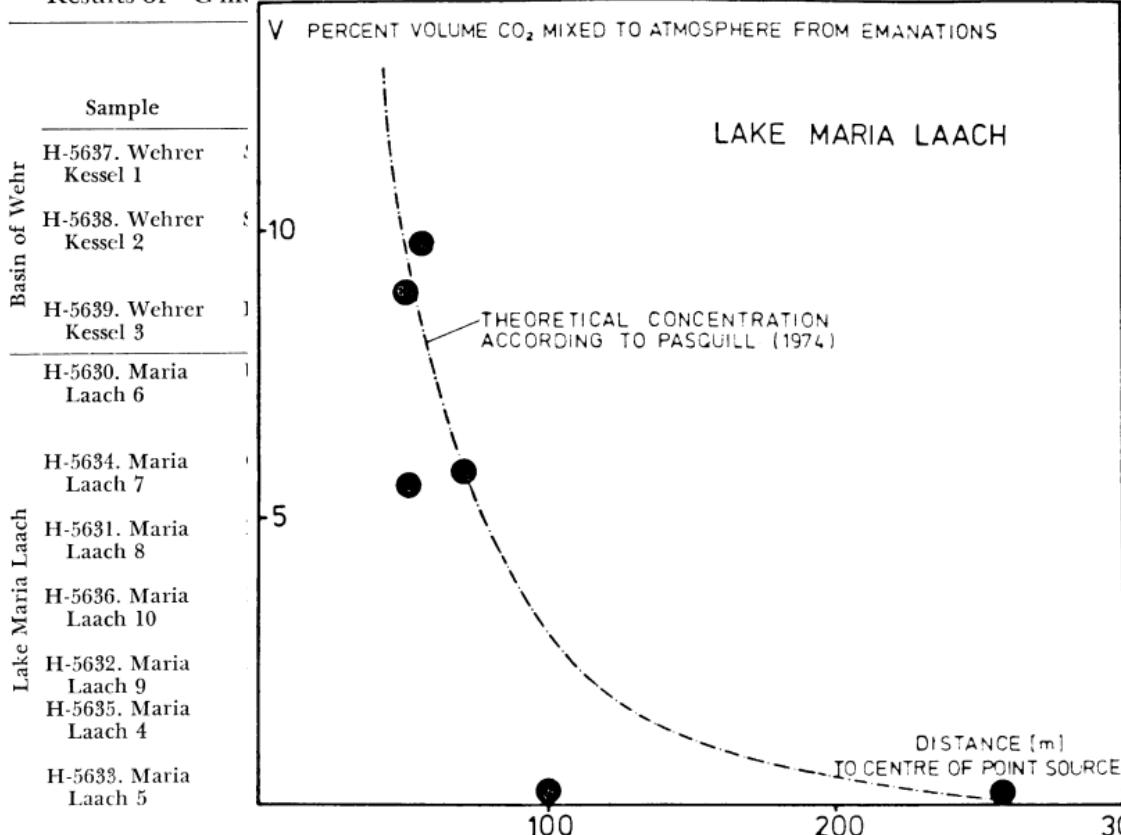
Vulkanisches altes Kohlendioxid

Results of ^{14}C measurements of recent plant material from Eifel area

	Sample	Description, location, distance to source area	$\Delta^{14}\text{C} [\text{\textperthousand}]$	V[%] admixed volcanic CO_2	"Age" [a]	$\delta^{13}\text{C}_{\text{PDB}} [\text{\textperthousand}]$
Basin of Wehr	H-5637. Wehrer Kessel 1	<i>Salix</i> , sprouts, 1978, 1.5-2m above brook showing strong emanations	128 ± 5	15.6	1360	-26
	H-5638. Wehrer Kessel 2	Species unknown, 200m E of center, 1-2m above ground, sprouts, 1977-78, 200m E of sources	325 ± 5	.1	90	-22.2
	H-5639. Wehrer Kessel 3	Reed, 1978, 2m SE of emanating source	201 ± 5	10.1	860	-25.1
Lake Maria Laach	H-5630. Maria Laach 6	Unknown species, sprouts and twigs, 1976-78, 1-2m above ground, 30m N of emanations	395 ± 5	—	—	-30.2
	H-5634. Maria Laach 7	Oak, leaves, 1978, 2m above ground, 5m from lake, near strong emanations	205 ± 7	9.8	830	-28.2
	H-5631. Maria Laach 8	Birch, sprouts 1978, 1m above lake, bubbling emanations	219 ± 5	8.8	736	-28.9
	H-5636. Maria Laach 10	Beech, leaves, 1978, 20m from lake, 5-7m above lake level	259 ± 5	5.8	480	-30.5
	H-5632. Maria Laach 9	Alder, sprouts, 1978 directly above emanation	262 ± 7	5.5	460	-29.3
	H-5635. Maria Laach 4	Beech, leaves, 1978, 200m from lake, 1-2m above ground	334 ± 7	—	—	-30.3
	H-5633. Maria Laach 5	Beech, leaves, 1978, 50m from lake, 8m above lake level	329 ± 8	—	—	-30.0



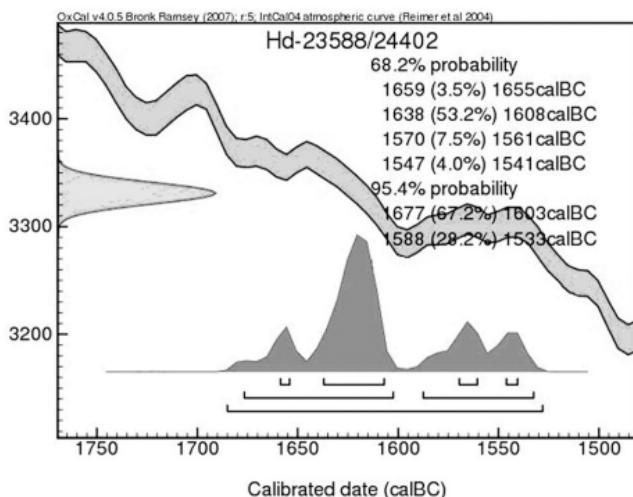
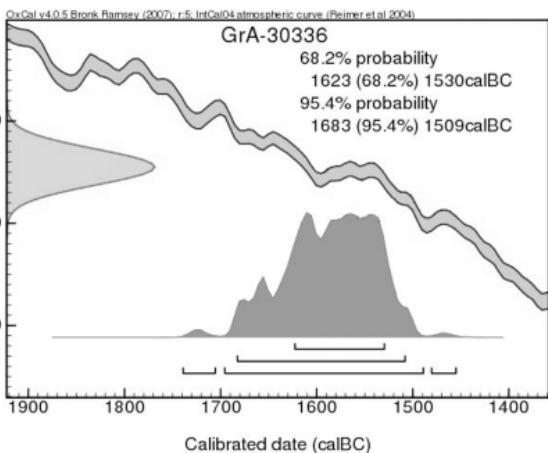
Vulkanisches altes Kohlendioxid

Results of ^{14}C measurements of ancient plant material from Eifel area



Kritik an Radiokohlenstoff

Radiocarbon determination (BP)

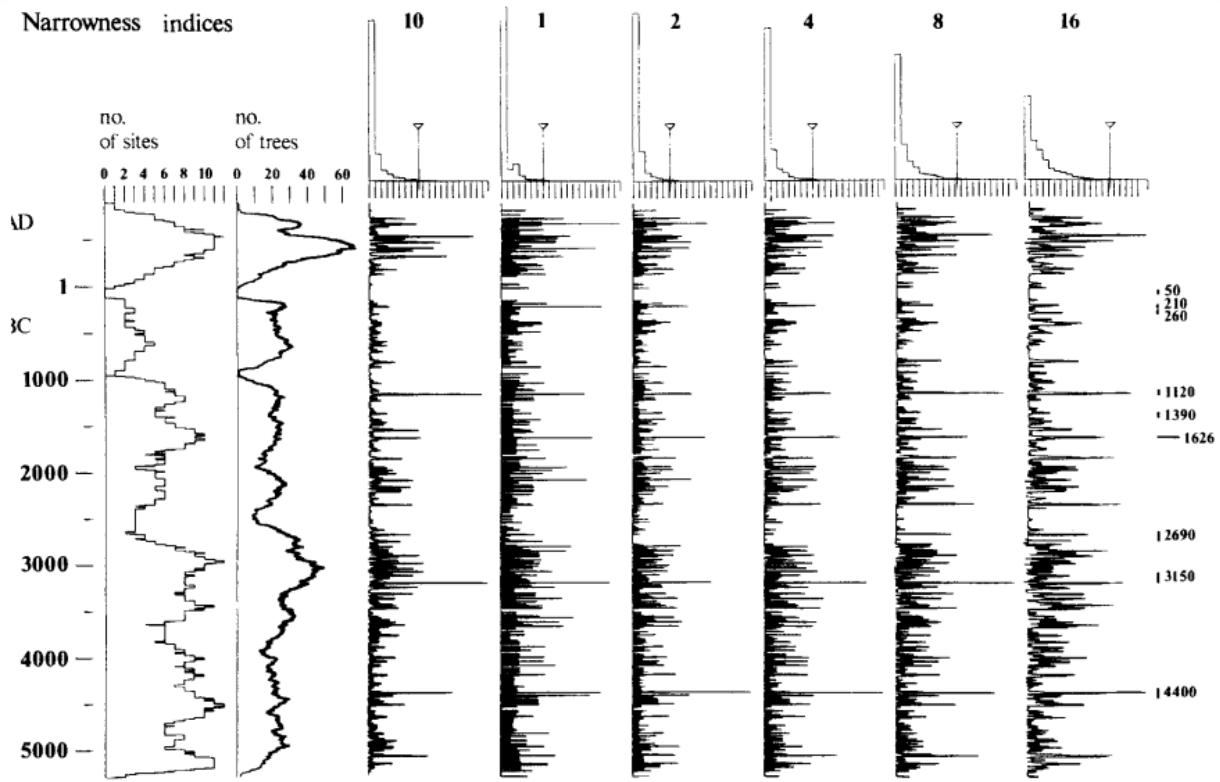


Probe aus der Tsunamiablagerung auf Palaikastro (links) und der äußere Bereich des Olivenbaumastes von Akrotiri (rechts) [Fa07].



Der größte Ausbruch für mehrere Jahrtausende

Narrowness indices

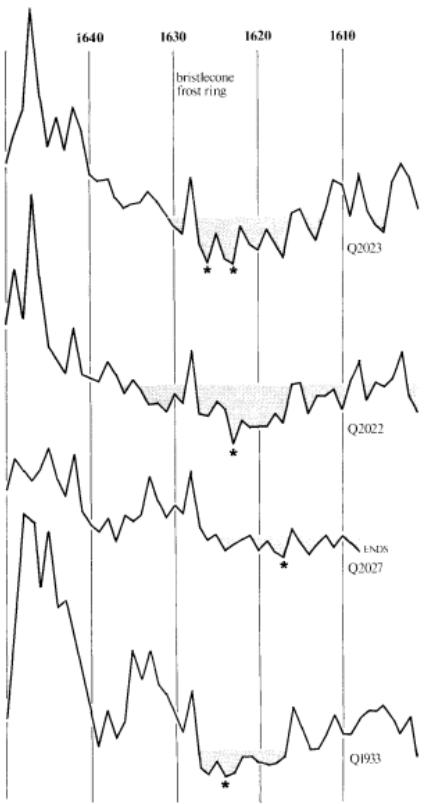
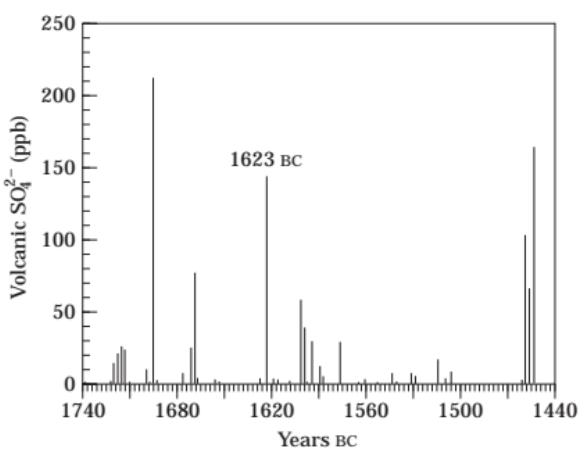
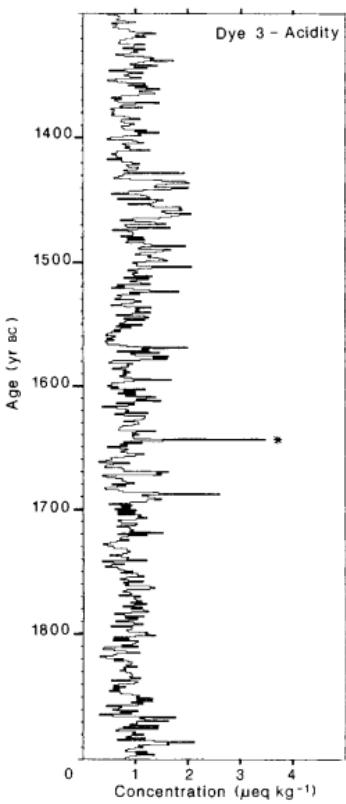


Narrowness-Index für irische Eichen über sechs Jahrtausende [Ba88].

Ba88

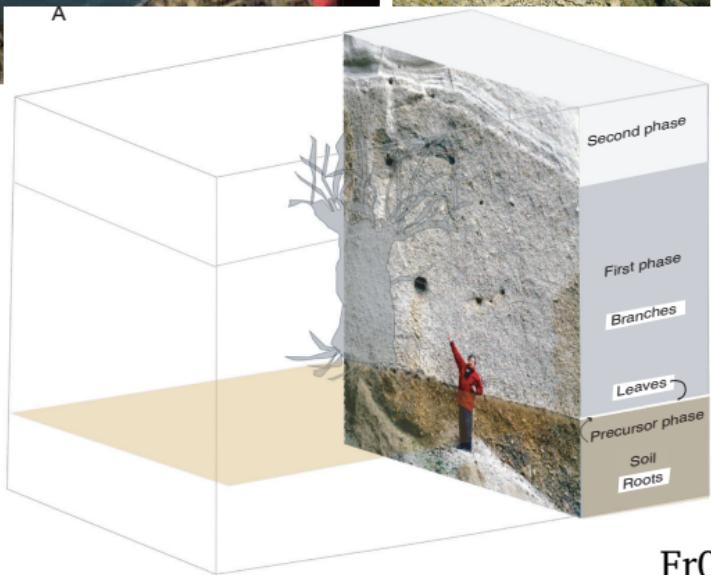
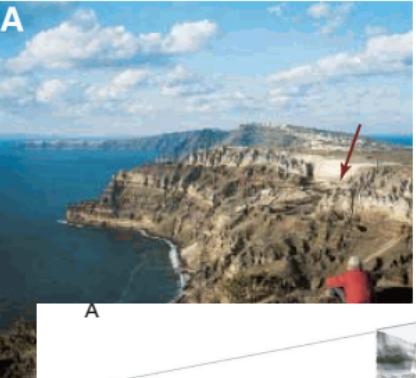


Das 17. und 16. Jahrhundert – Dye 3, GISP2 und irische Eichen



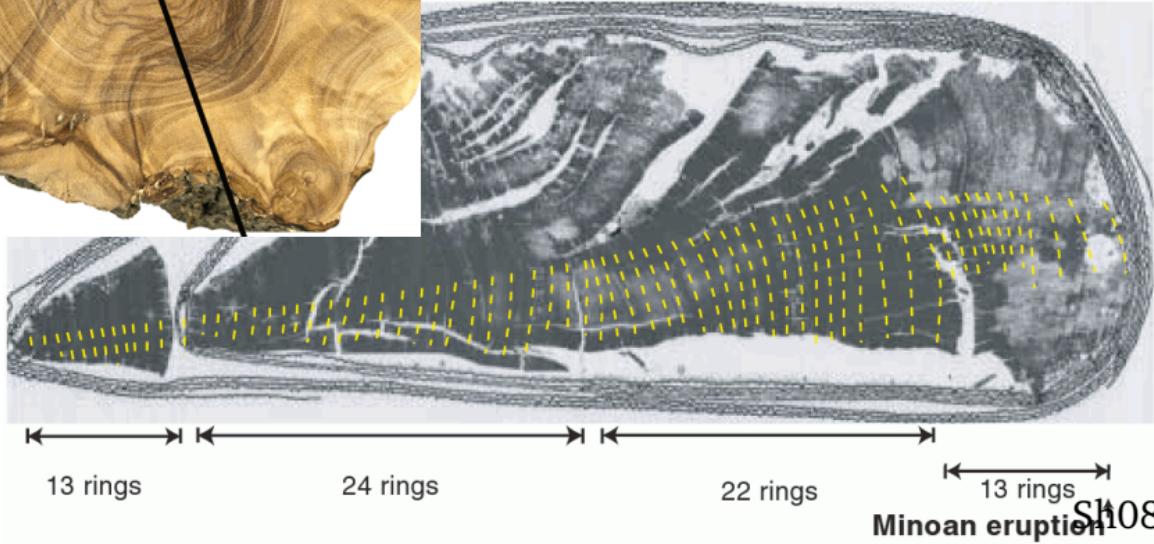
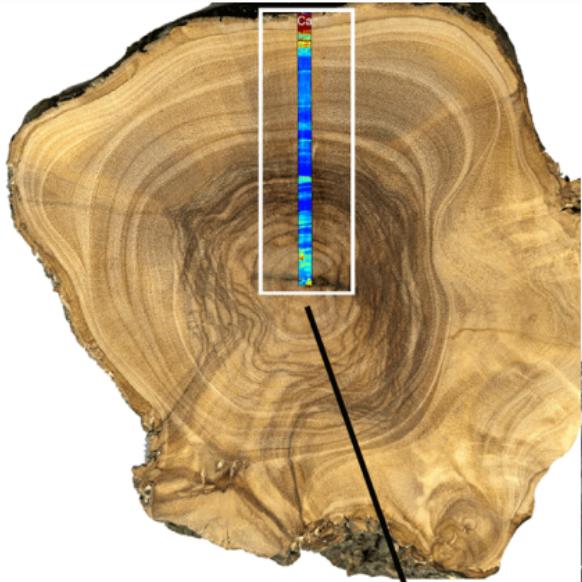


Wann sollen wir suchen? Radiokohlenstoff



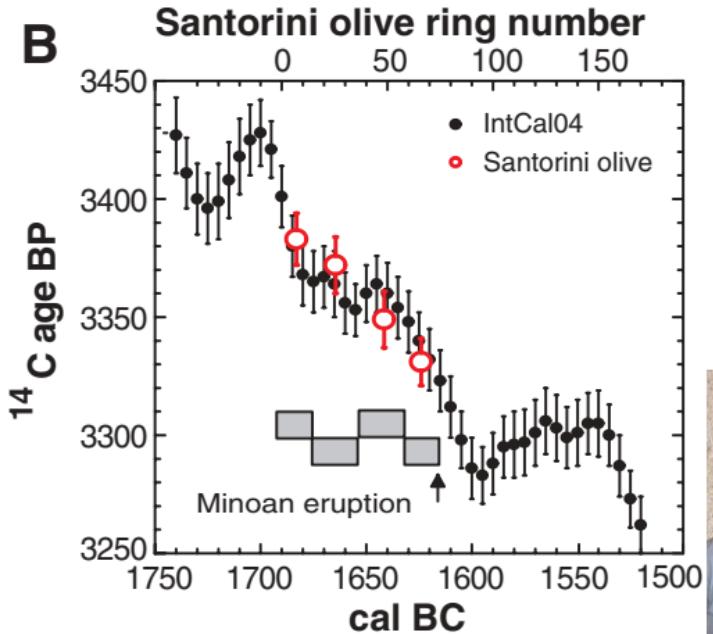
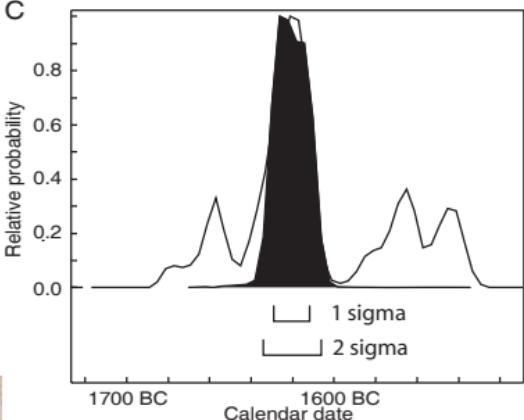


Gibt es Jahrringe bei Oliven?



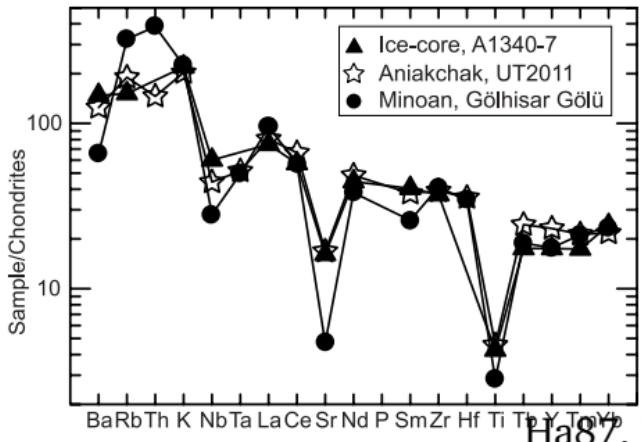
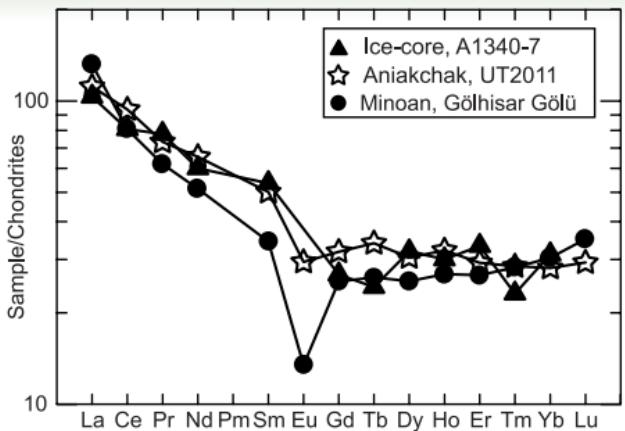
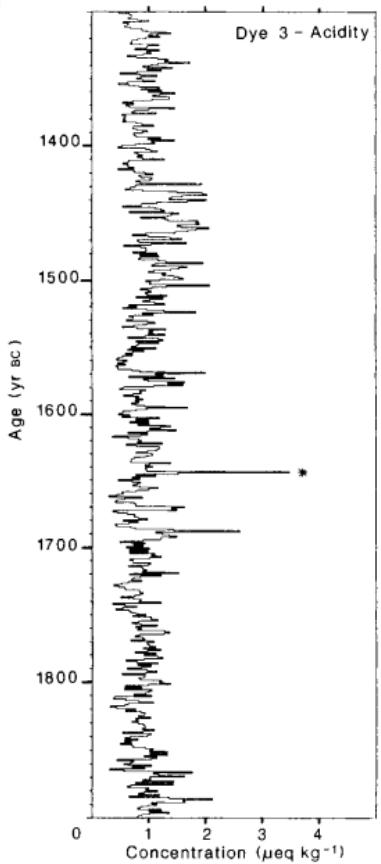


Die Datierung des Olivenastes

B**C**



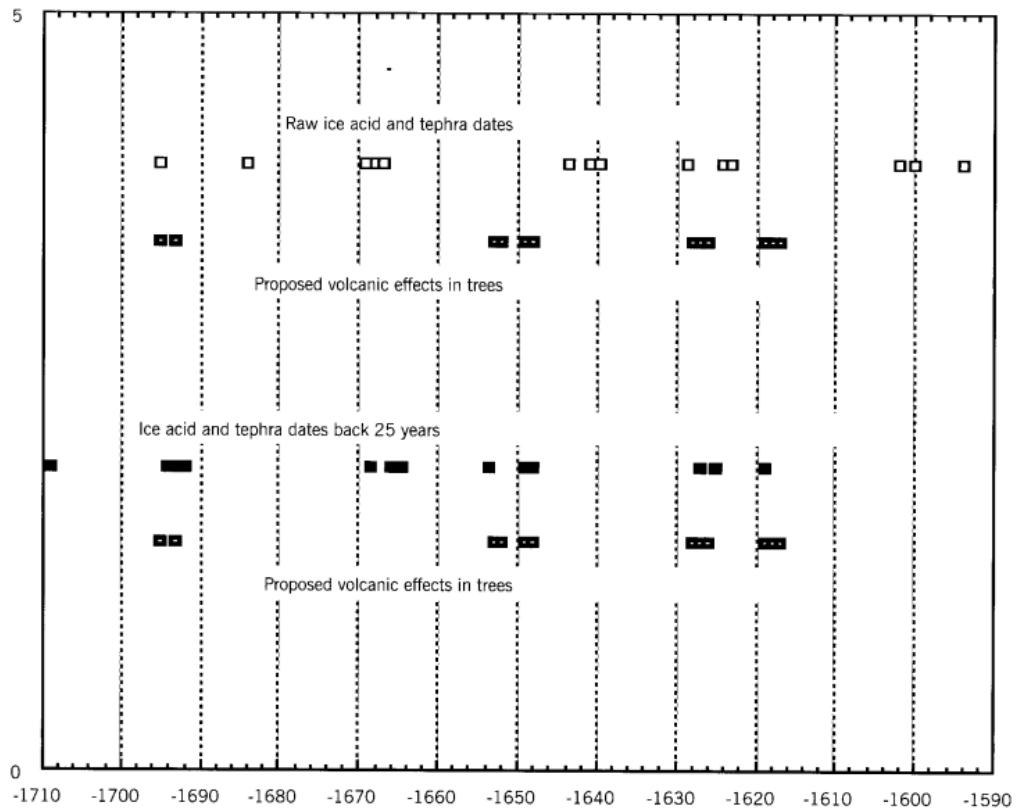
Welcher Vulkanausbruch ist es?



Ha⁸⁷, Pe04



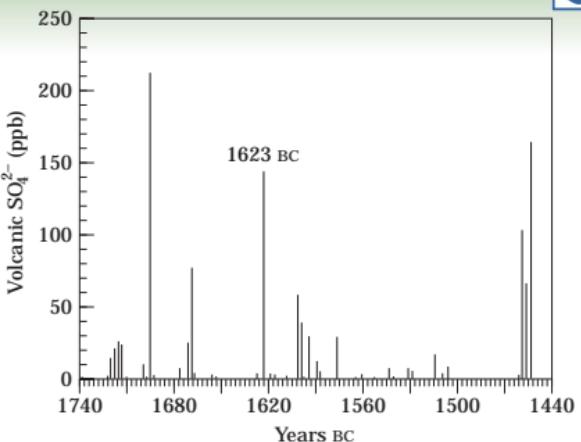
Synchronisation der Eis- und Dendrochronologien



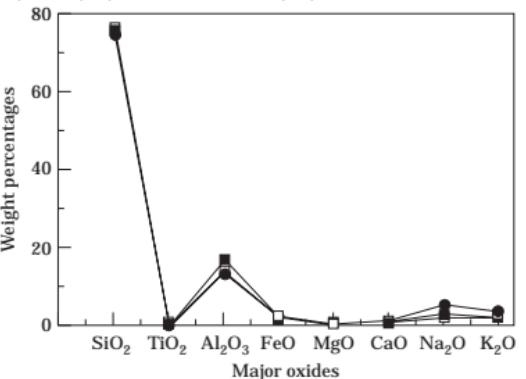


Identifikation von Thera in GISP2

	a) Tree-ring minima and frost rings	b) GISP2 all Acidities in 17 th century	c) Dates in Columns d and e moved back 25 years
90s	1693; 1695	1693,1–1695,4	1692–1693
80s			
70s		1674,9–1671,4	
60s		1669,2–1671,4 1667,1–1668,6	1668–1669 1666–1667 1664–1666
50s	1652; 1653 f	1651,1–1655,8	1653–1654
40s	1649; 1648		1649
30s			
20s	1626–1628 1627 f	1625,7–1627,8 1621,3–1623,7	1625
10s	1617; 1618; 1619	1613,9–1619	1619
00s			
90s	1597	1599–1602 1596–1599	1598–1600
80s		1584,9–1589,5	1591
70s			
60s			

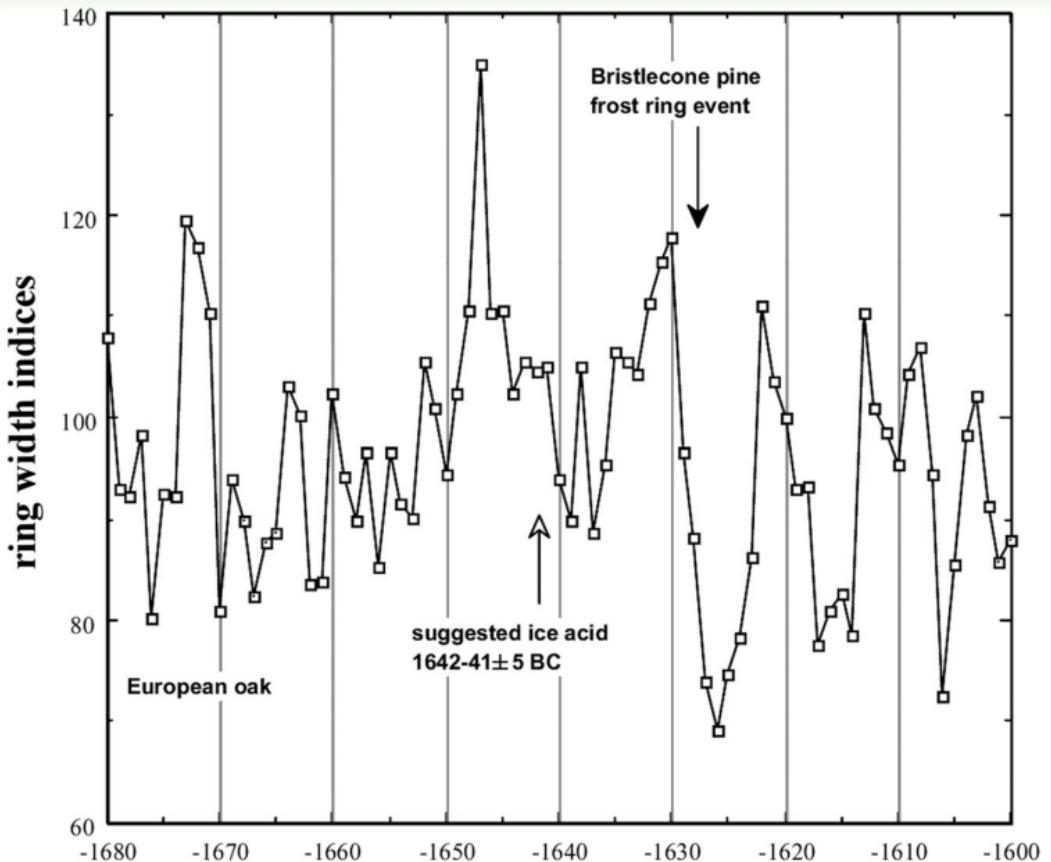


■, GISP2; □, Santorini "Mochlos"; ●, Santorini "Rose Pumice"





Das genaue Datum liegt zwischen 1630 und 1628 BC





Résumé

Die Konvergenz und Übereinstimmung aller naturwissenschaftlichen Datierungen lassen inzwischen keinen Zweifel mehr an einem Ausbruchsdatum im Jahr 1630/28 BC.

Auf welche Weise die historische Datierung damit in Übereinstimmung gebracht kann und ob der Fehler in der Parallelisierung oder der ägyptischen Chronologie selbst zu suchen ist, muß den auf diesem Gebiet arbeitenden Fachleuten überlassen bleiben.



Handout und Literatur

Vielen Dank

Handout und Literatur liegen auf:
www.axel.berger-odenthal.de/work/Referat/



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