Ports, bones, pollen and pottery.

Harbours of the Byzantine world as sources of environmental history and global connectivity

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DFG Deutsche Forschungsgemeinschaft

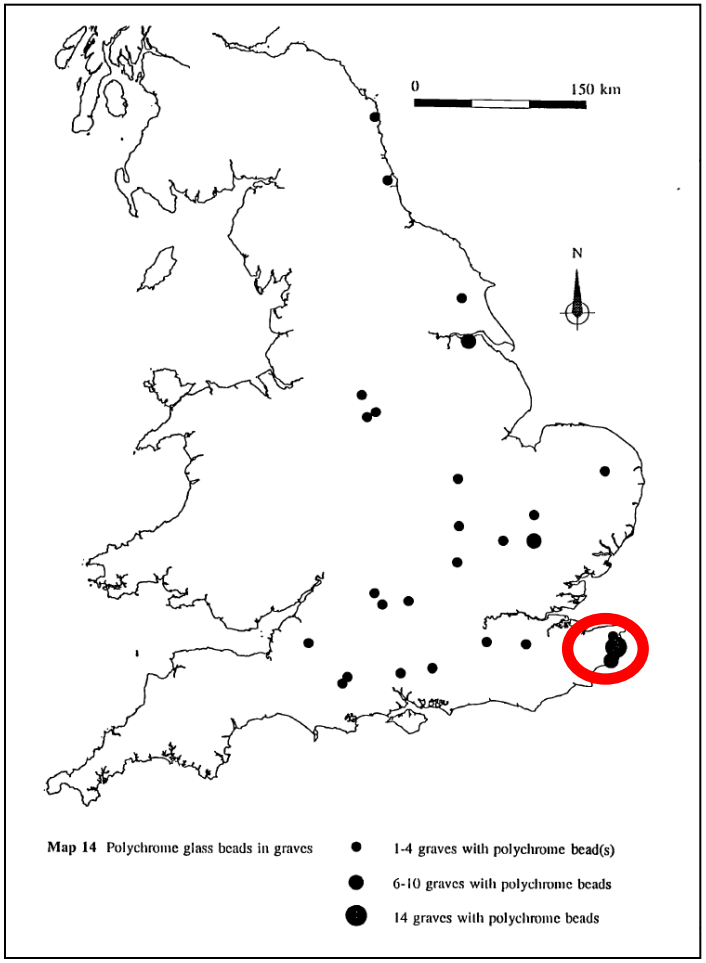
SPP 1630 HÄFEN

RGZM

The blue glass beads of the 6th cent. AD in Mkukutu in the Rufiji Delta (Tanzania)

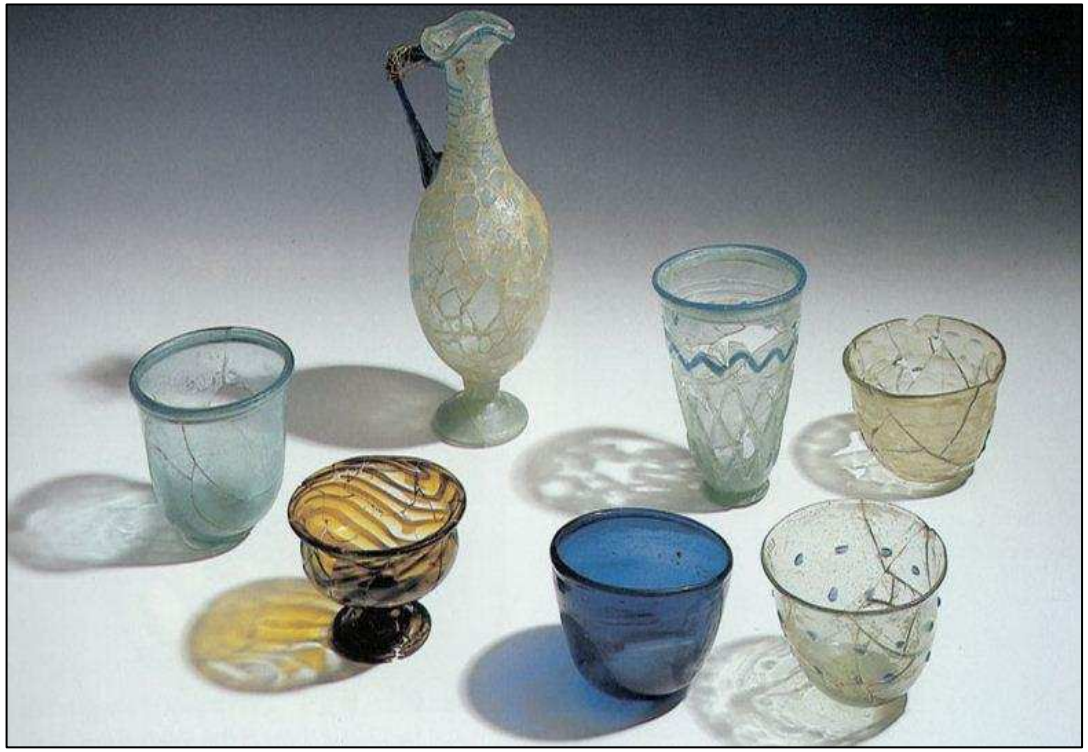
M. Wood, Interconnections. Glass beads and trade in southern and eastern Africa and the Indian Ocean – 7th to 16th centuries AD. Uppsala 2011.

The blue glass beads at the Canal coast in 6th cent. AD Anglo-Saxon England



H. Geake, PhD-Thesis 1995

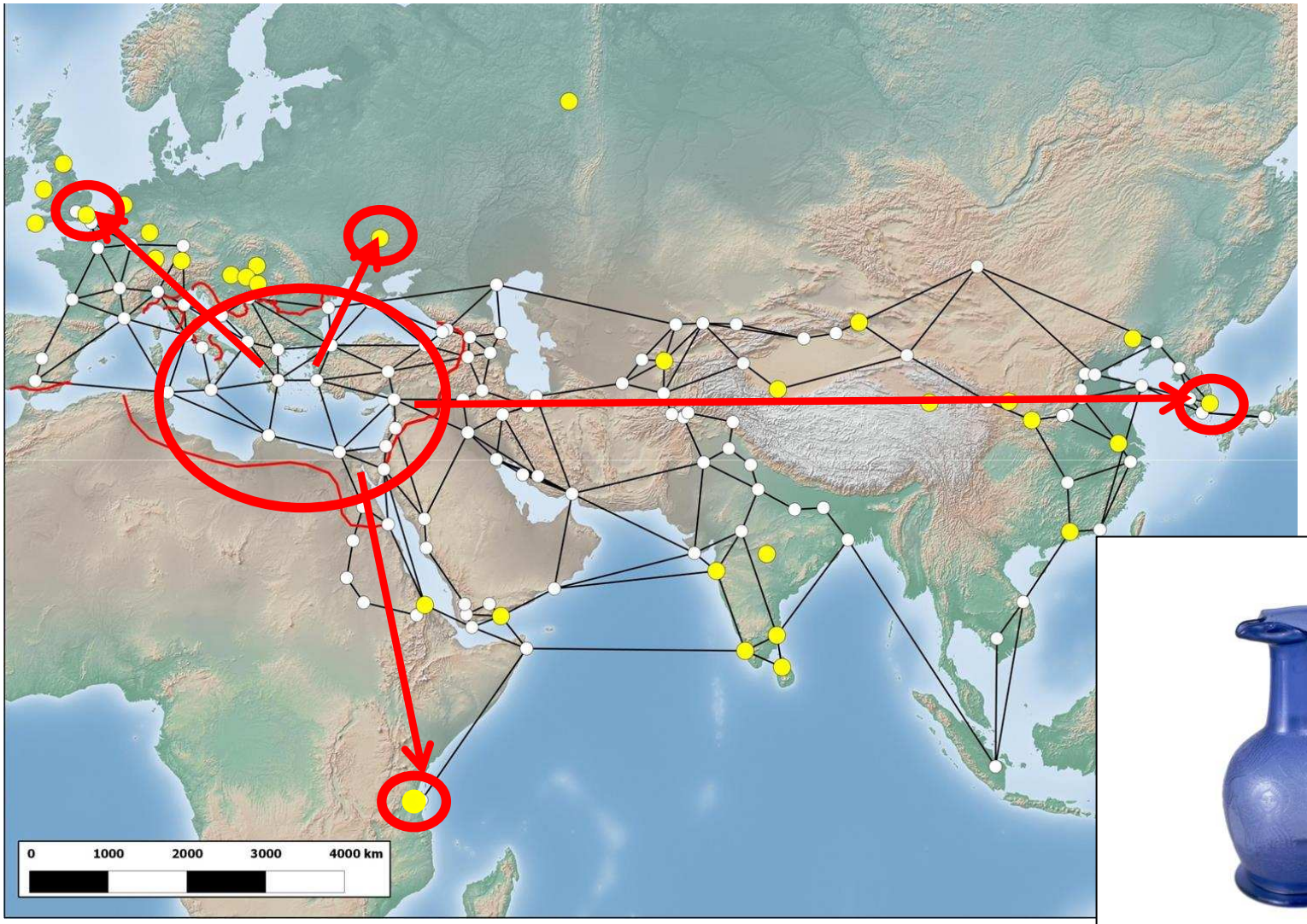
The blue glass in the 6th cent. AD royal tombs of Silla (Korea)

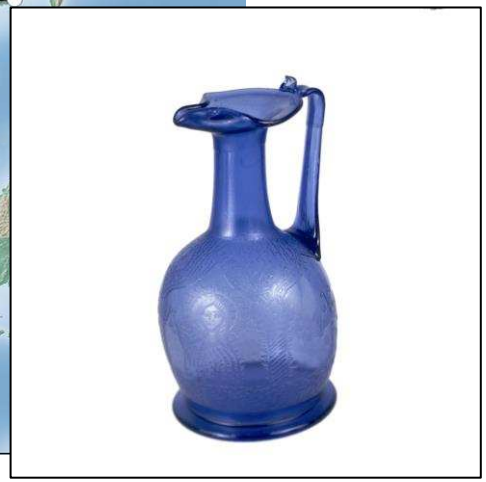


Silla, Metropolitan Museum New York 2013

http://www.caitlingreen.org/2017/03/a-very-long-way-from-home.html

The „*People of the Blue Glass*“ (a thought experiment)





Ports, bones, pollen, pottery

CCHRI
Climate Change and History Research Initiative

http://climatechangeandhistory.princeton.edu/

http://rapp.univie.ac.at/

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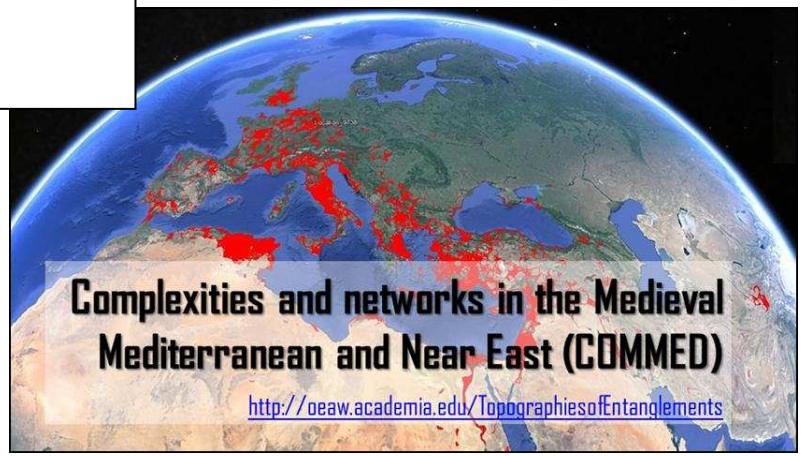
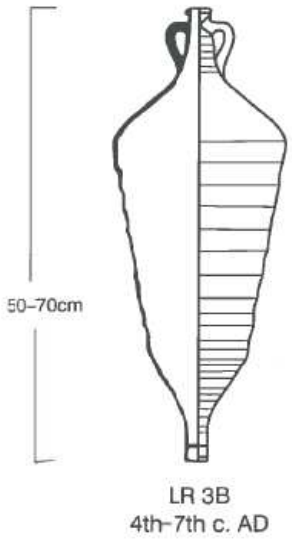
DPP Digitising Patterns of Power

http://dpp.oeaw.ac.at/



The Mediterranean core of the „*People of the Blue Glass*“



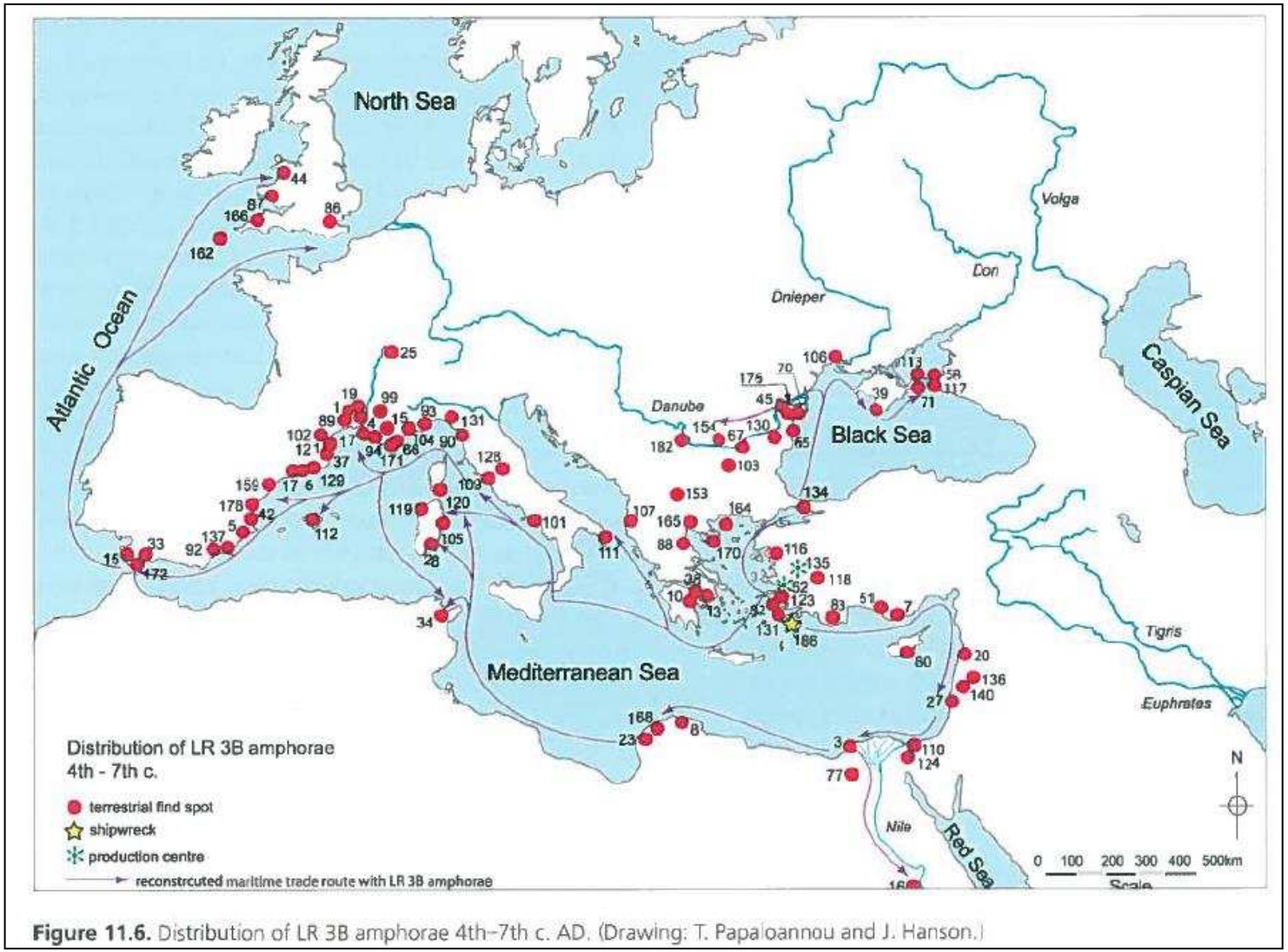


Figure 11.6. Distribution of LR 3B amphorae 4th–7th c. AD. (Drawing: T. Papaioannou and J. Hanson.)

From: Robinson – Wilson 2011

37 shipwrecks of Yenikapı in Istanbul, 5th-11th century

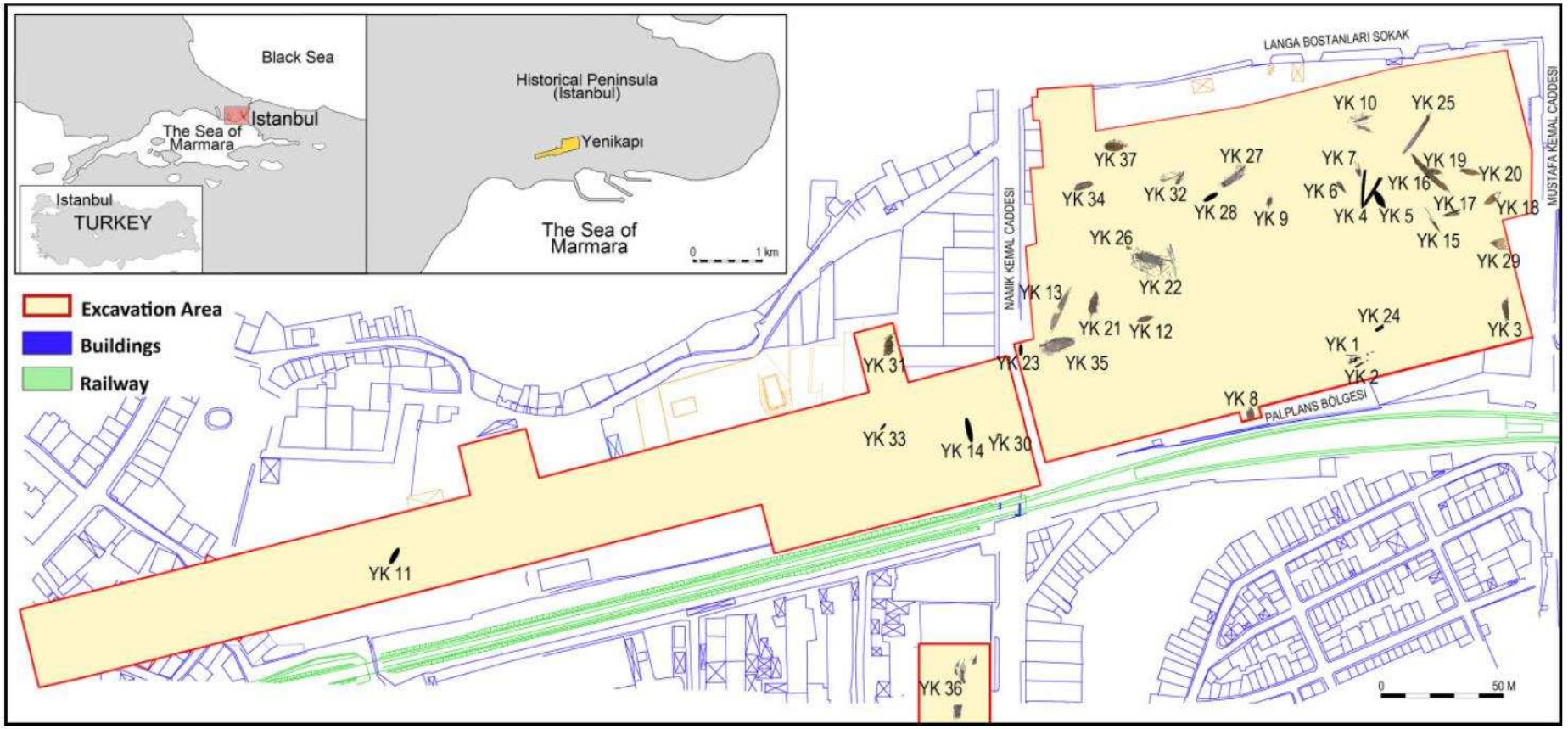
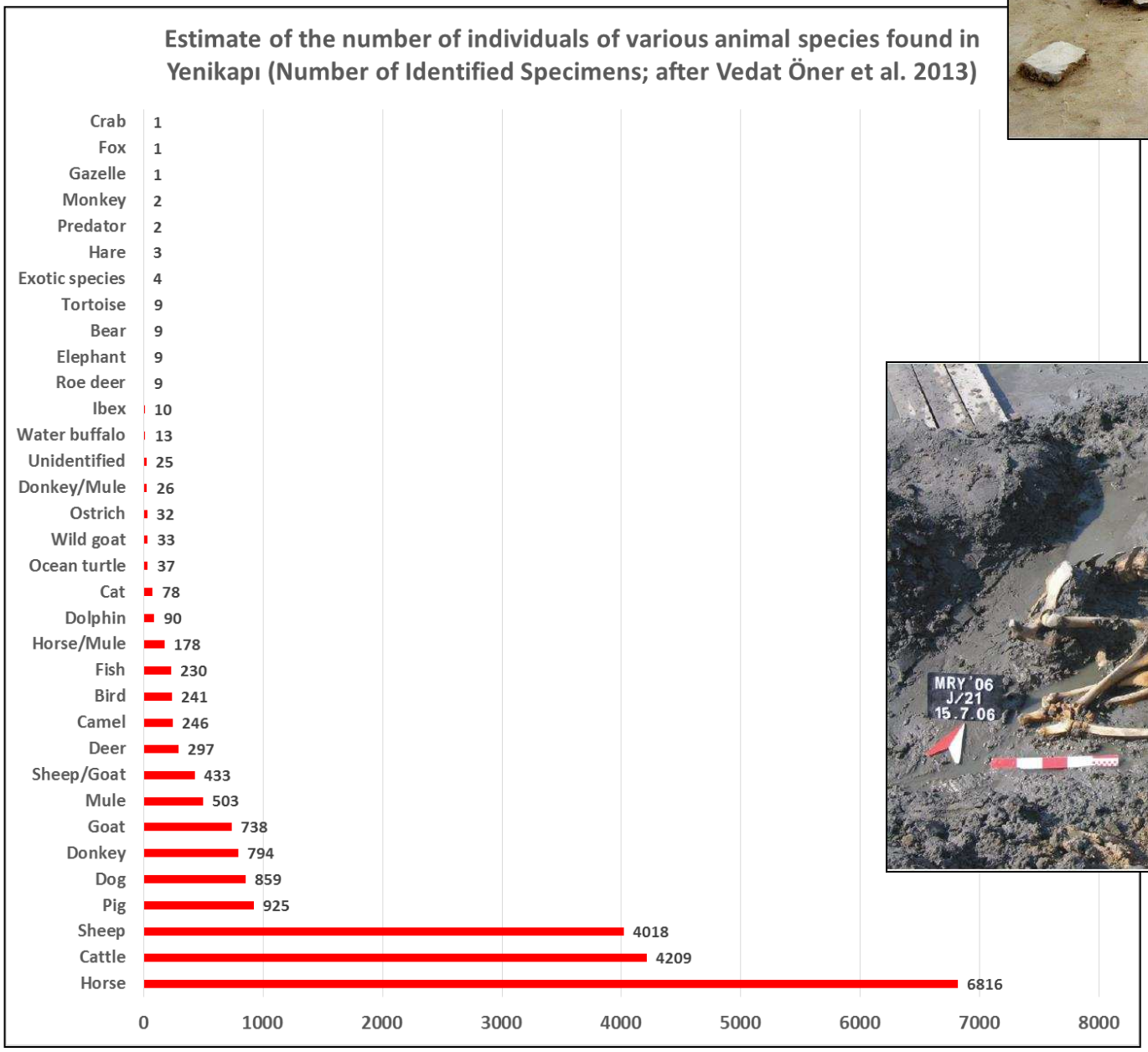


Figure 5. Distribution of wrecks across the excavation site at Yenikapı. (IU Yenikapı Shipwrecks Project Archive)

The International Journal of Nautical Archaeology (2015) 44.1: 5–38

Reconstruction of the harbour at Yenikapı – a centre of the „*People of the Blue Glass*“

Findings of remains of animals in Yenikapı



Pollution and siltation of the Harbour basin up to the 11th century AD (1-2 > 10-20 mm/year)

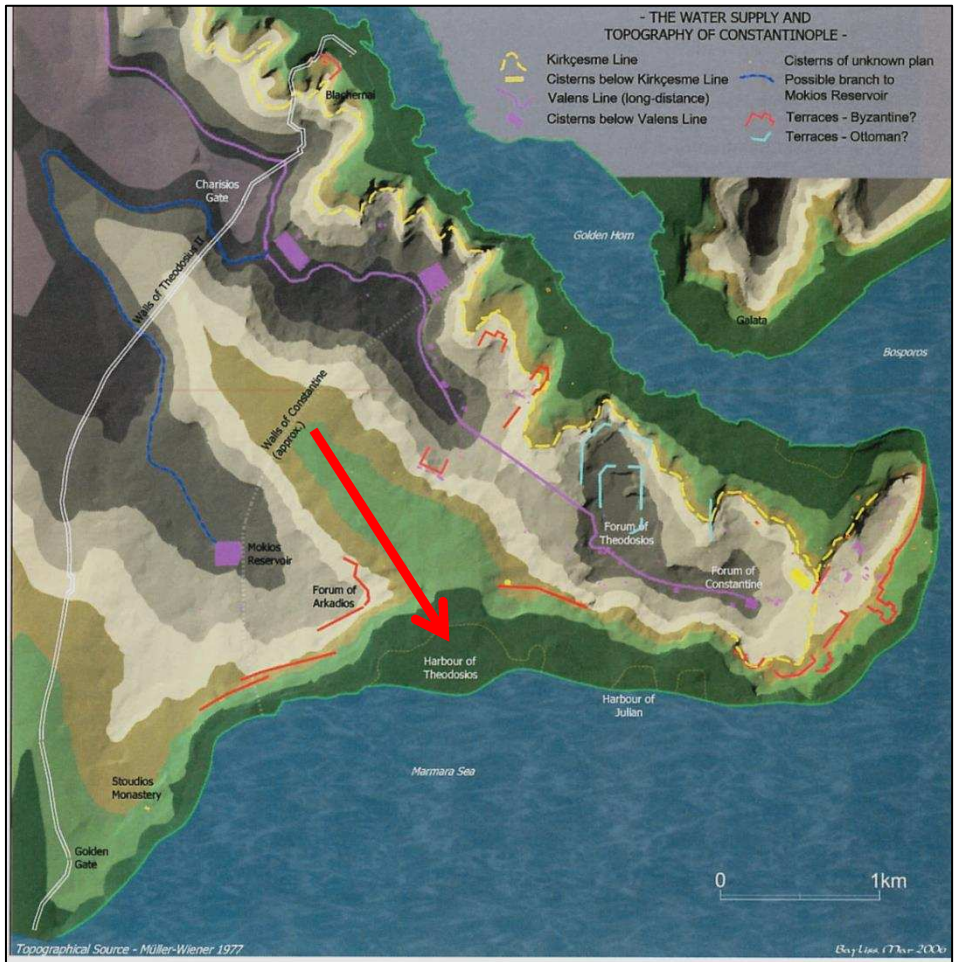


FIG. 2.2 Map of Byzantine Constantinople showing relief, the projected line of the main aqueduct channels, and the distribution of major cisterns and reservoirs.

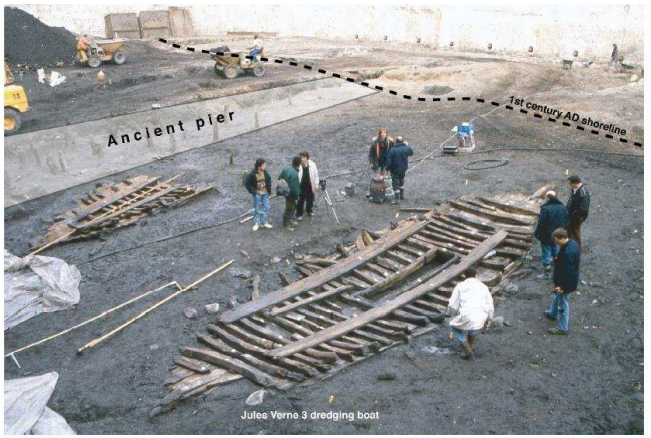


Fig. 8 – Shipwreck *Jules Verne 3*, a Roman dredging boat unearthed in Marseilles' ancient harbour. The vessel dates from the 1st to 2nd centuries AD. The central dredging well measures 255 cm by 50 cm (photo CCJ/CNRS).

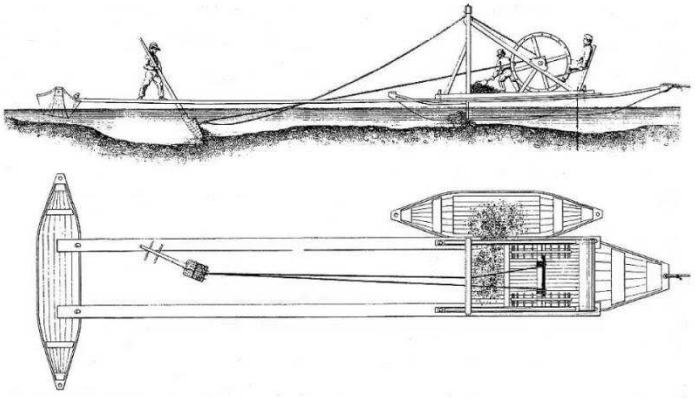


Fig. 9 – Eighteenth and nineteenth century dredging equipment used in European fluvial contexts. The vessel immediately adjacent to the 'pull boat' is equipped with a removable bottom, to facilitate the dumping of dredged material at a distal location (engraving in BILLAUD and MARGUET 2006).

The ceramic assemblage at Burgaz, South-west Asia minor (6th-7th cent. AD): four harbours, local production and regional trade

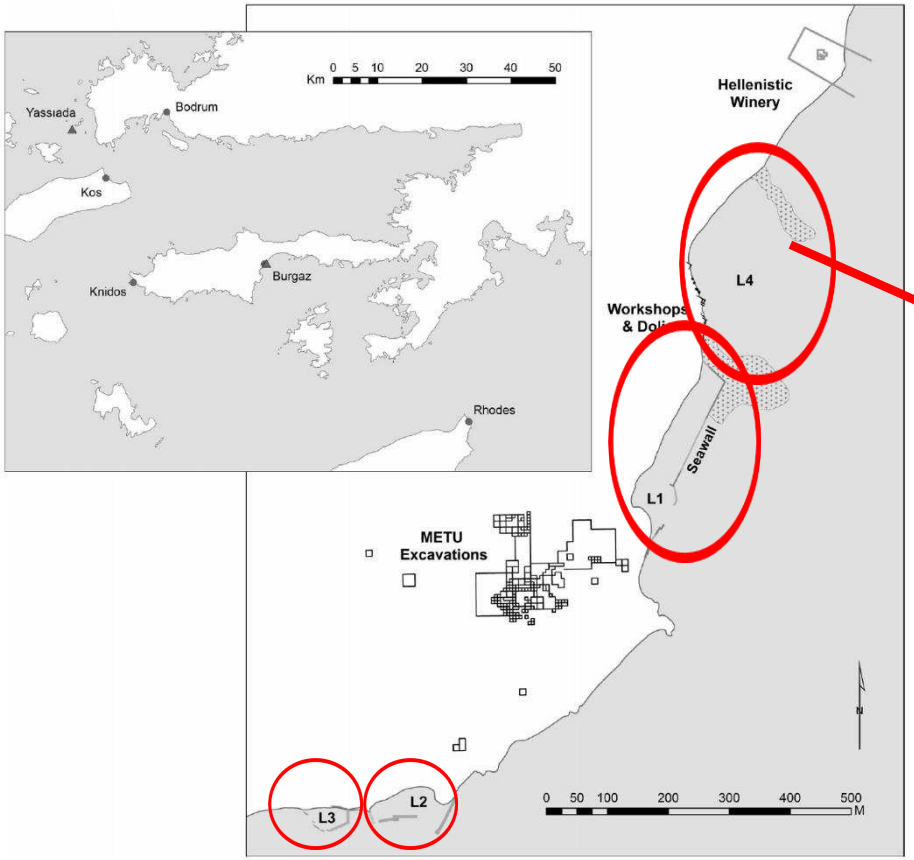
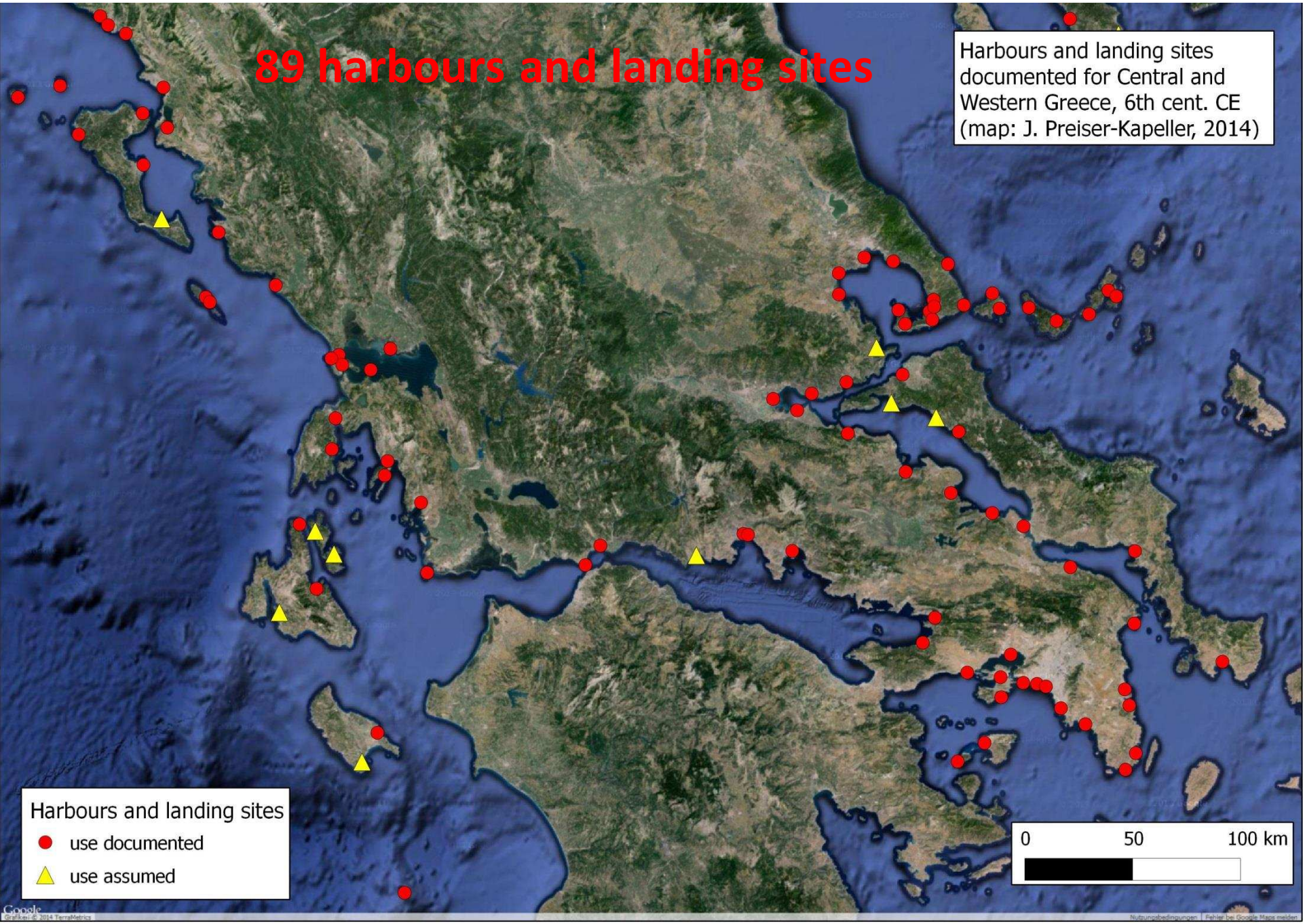


Figure 1. *Inset*, map of the south-east Aegean region showing Burgaz and other sites of interest (J. Leidwanger); Plan o the Burgaz area showing Harbour 4 (L4); the submerged rubble breakwaters are illustrated with hatching, while the cerami assemblage is located just inside the northern breakwater. (N. Riddick and J. Leidwanger)

Figure 3. Facilities for production and storage of wine along the south-west edge of Harbour 4 (L4), including large built dolia eroding out of the scarp and a fragmentary wine press visible in the water. (E. S. Greene)

The International Journal of Nautical Archaeology (2015) 44.2: 300–311


89 harbours and landing sites
Harbours and landing sites documented for Central and Western Greece, 6th cent. CE (map: J. Preiser-Kapeller, 2014)
Harbours and landing sites
use documented
use assumed
0
50
100 km

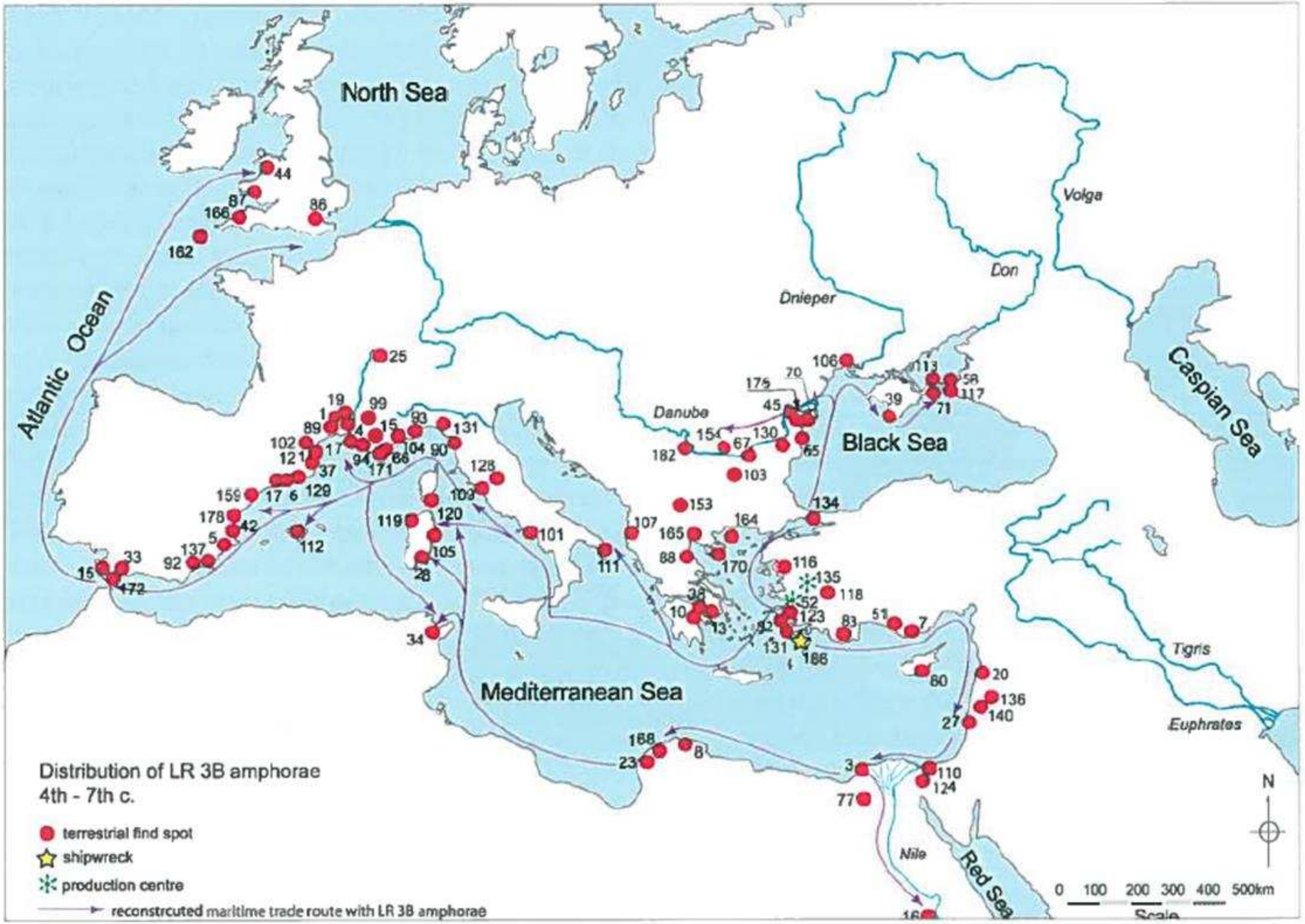
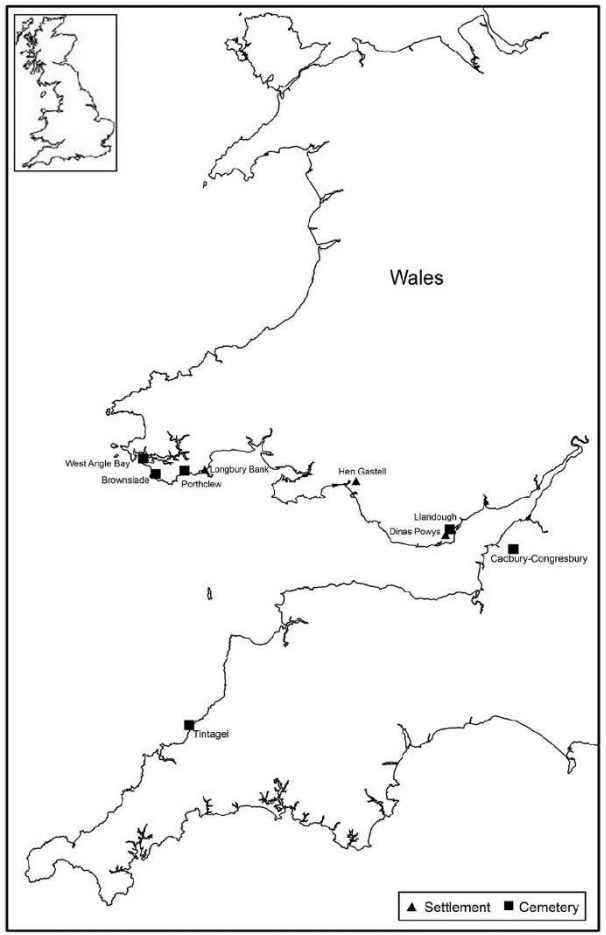
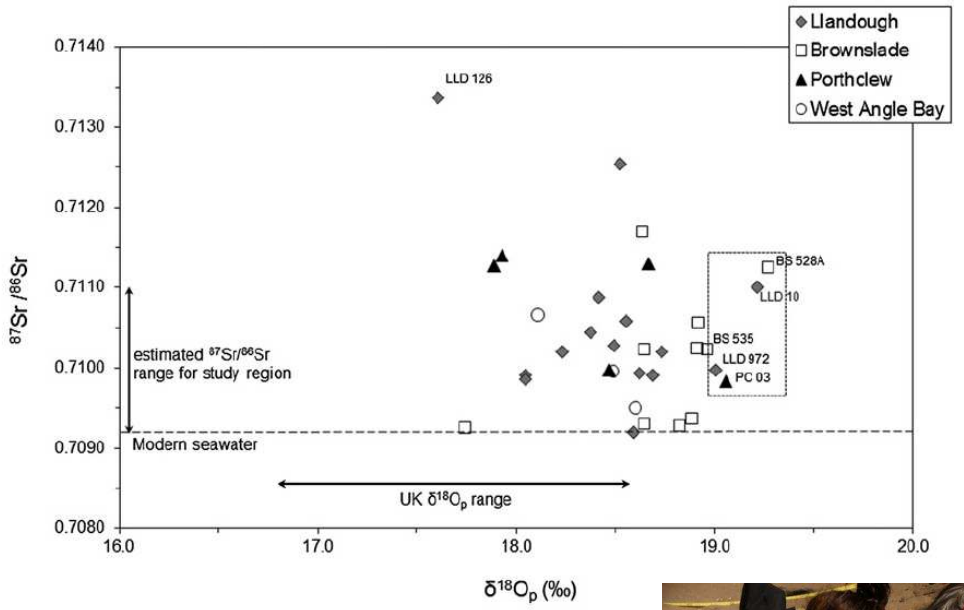


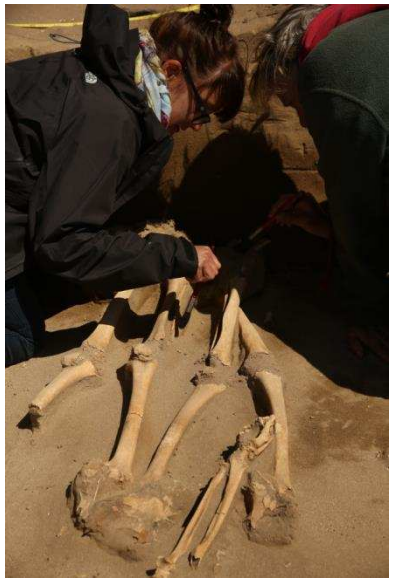
Figure 11.6. Distribution of LR 3B amphorae 4th–7th c. AD. (Drawing: T. Papaioannou and J. Hanson.)

From: Robinson – Wilson 2011

Mediterranean mobility towards Wales, 5th-7th cent. AD: ceramics, bones and isotopes

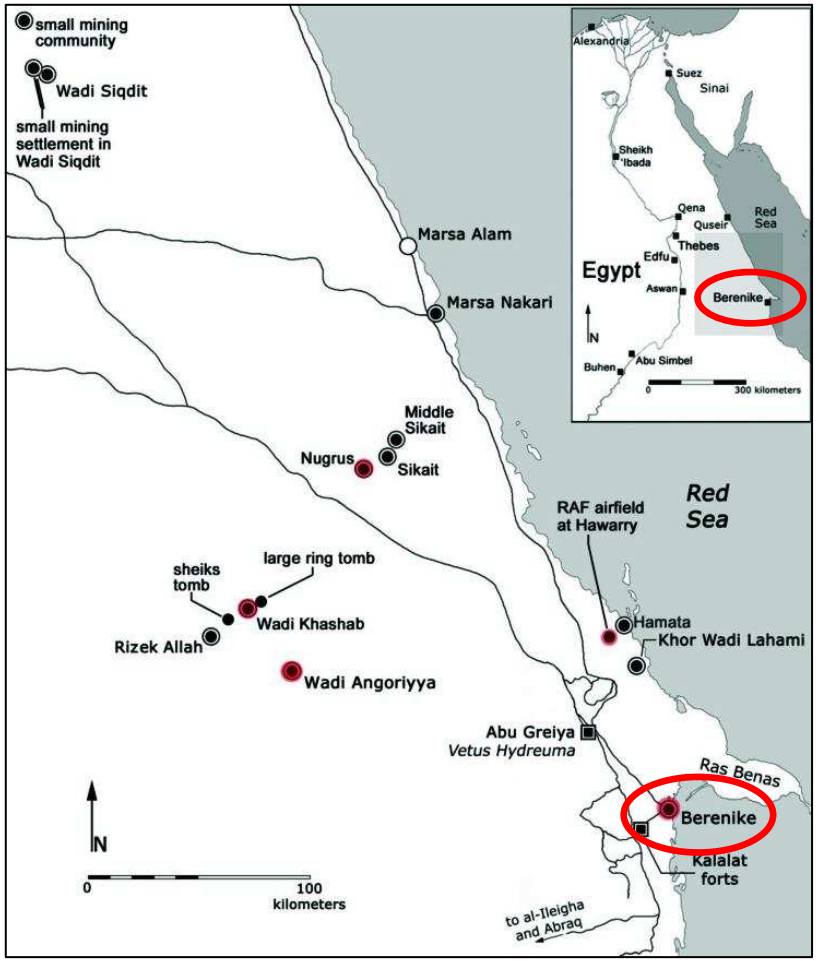


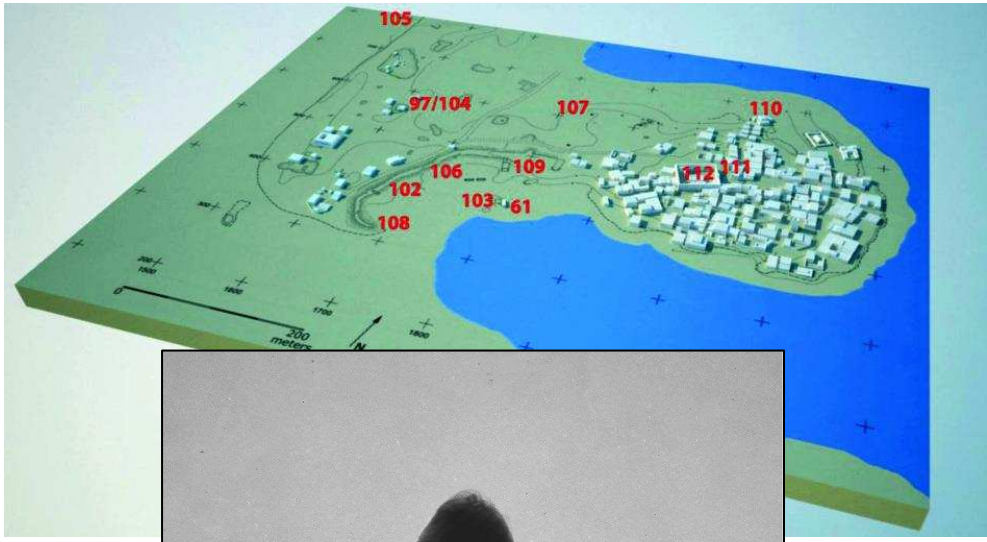


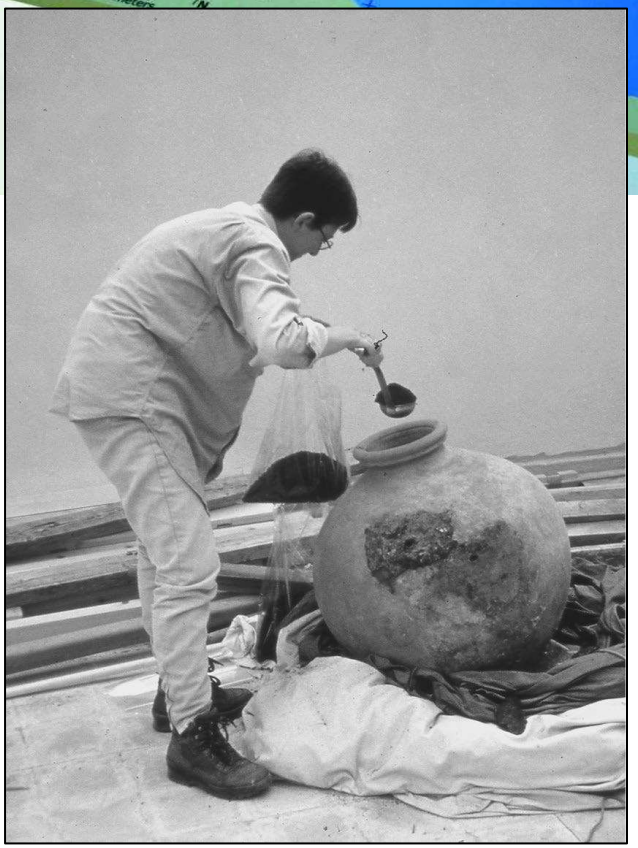


Hemer et al. / Journal of Archaeological Science 40 (2013) 2352-2359

The harbour of Berenike in Egypt

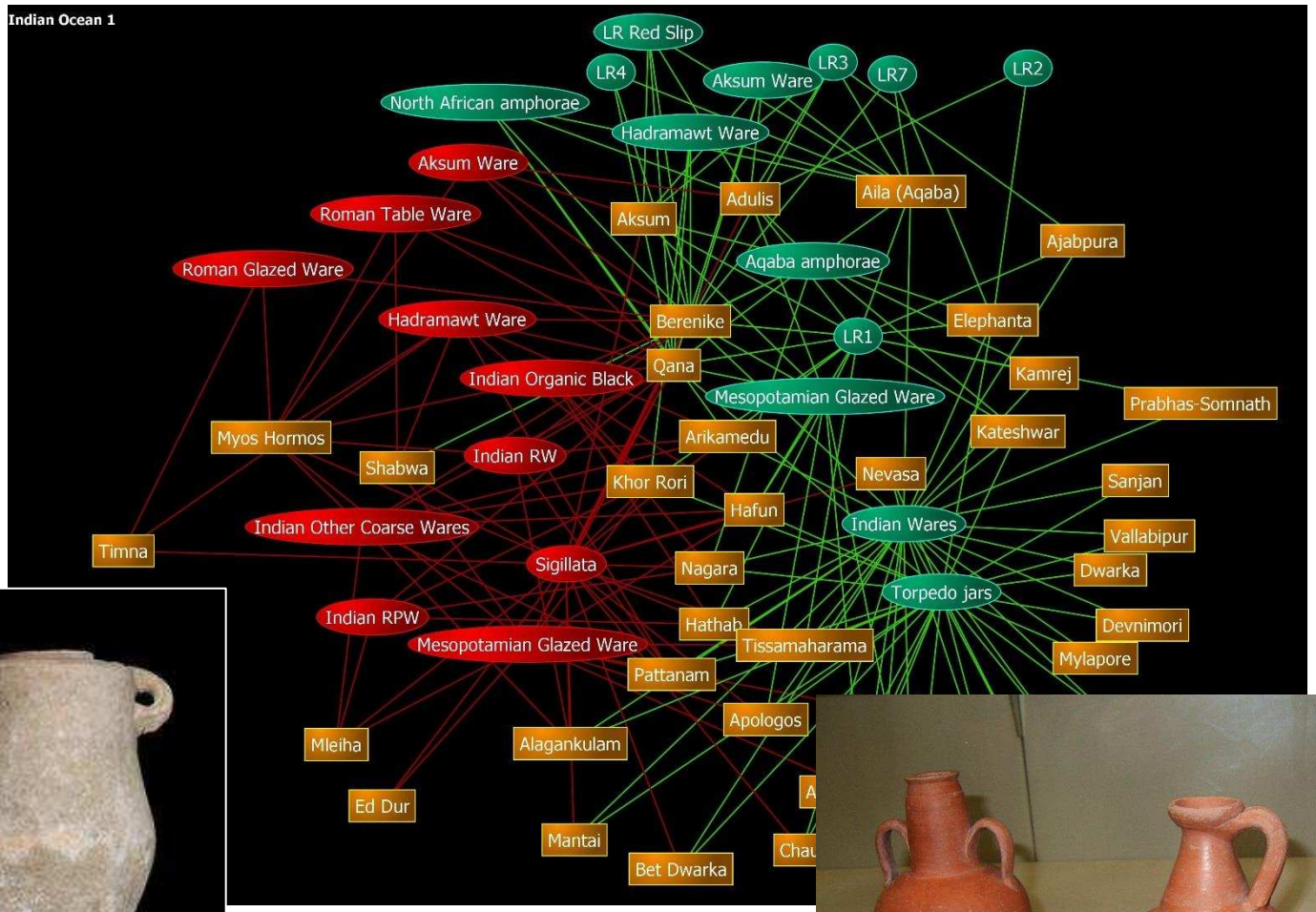


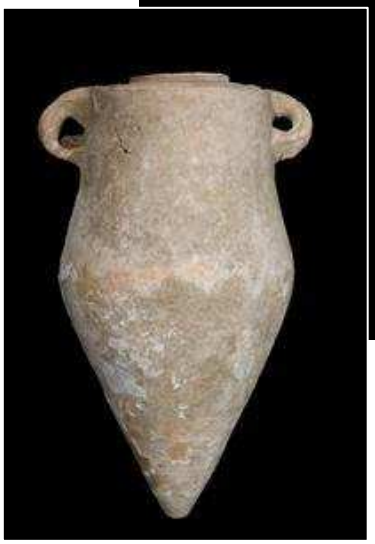




R. T. J. Cappers, Roman Foodprints at Berenike. Archaeobotanical Evidence of Subsistence and Trade in the Eastern Desert of Egypt. Los Angeles 2006.

50 shapes of clay: networks of ceramics in the western Indian Ocean, 4th-6th cent. AD





Networks of ceramics in the western Indian Ocean, 4th-6th cent. AD

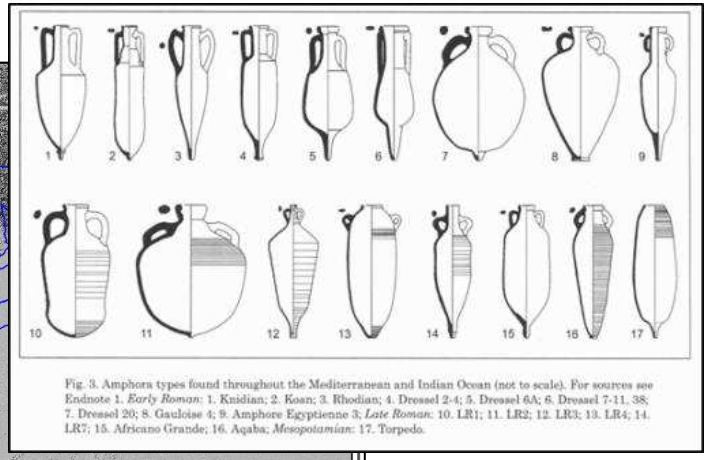
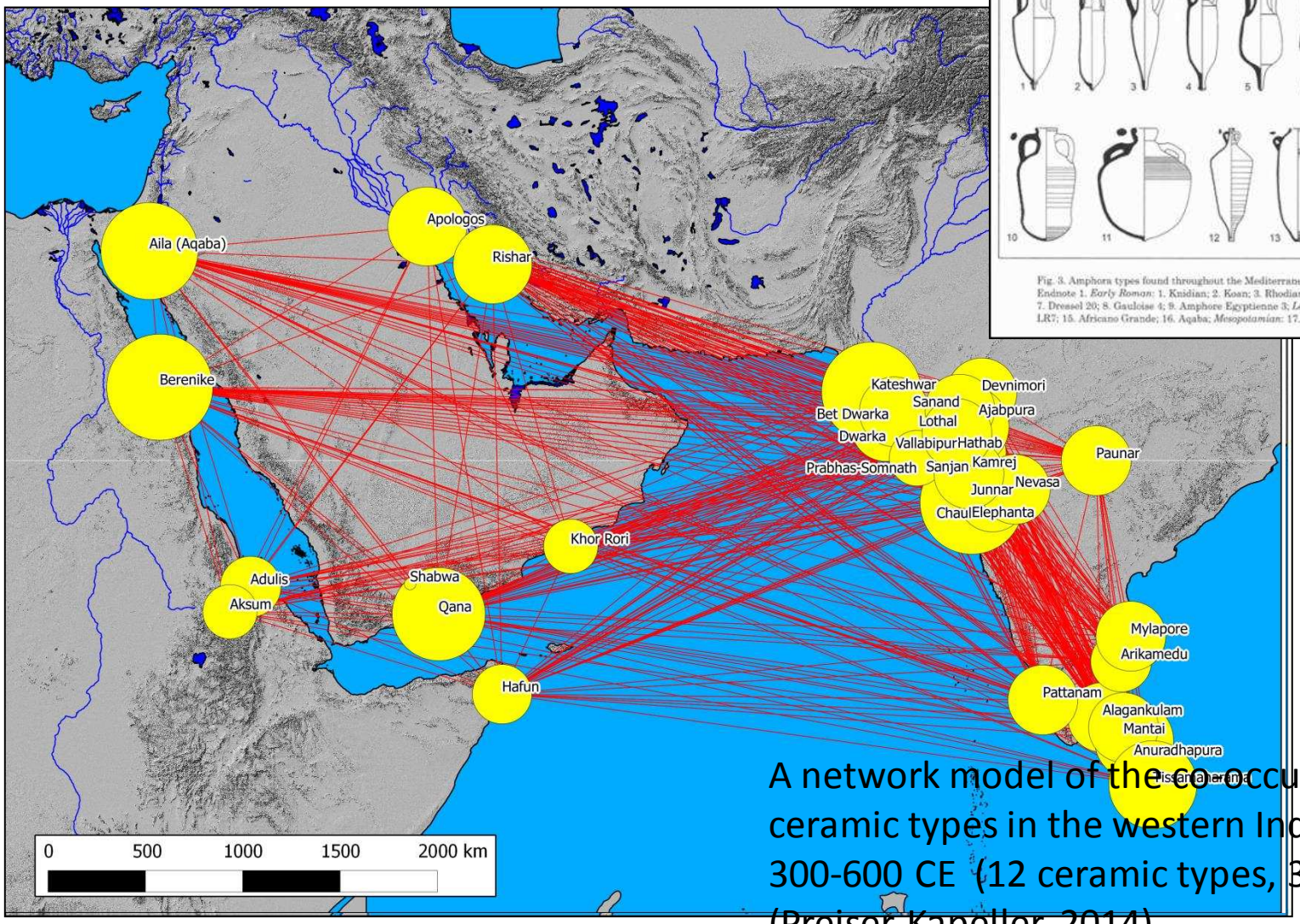
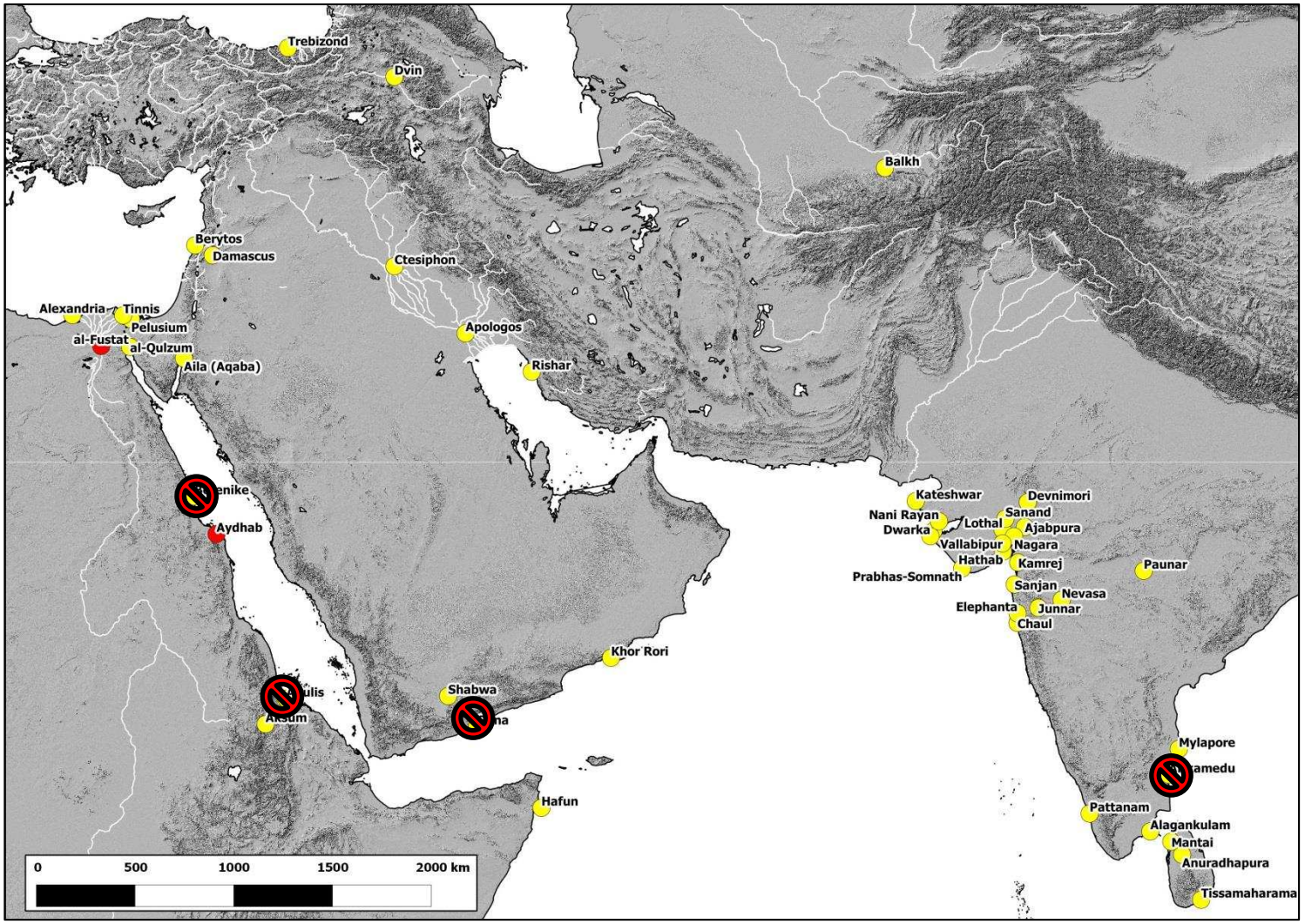


Fig. 3. Amphora types found throughout the Mediterranean and Indian Ocean (not to scale). For sources see Endnote 1. *Early Roman:* 1. Knidian; 2. Koan; 3. Rhodian; 4. Dressel 2-4; 5. Dressel 6A; 6. Dressel 7-11, 38; 7. Dressel 20; 8. Gauloise 4; 9. Amphore Egyptienne 3; *Late Roman:* 10. LR1; 11. LR2; 12. LR3; 13. LR4; 14. LR7; 15. Africano Grande; 16. Aqaba; *Mesopotamian:* 17. Torpedo.

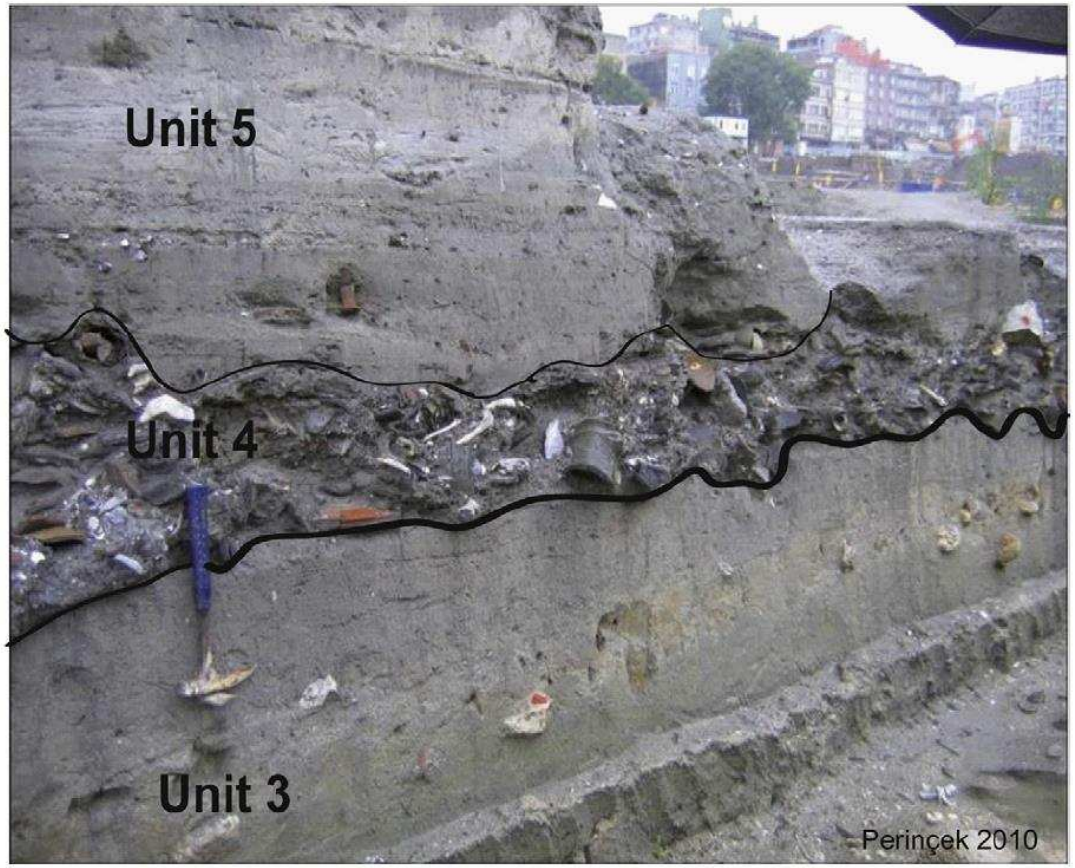


A network model of the co-occurrence of ceramic types in the western Indian Ocean, 300-600 CE (12 ceramic types, 36 sites) (Preiser-Kapeller, 2014)

The „decline“ of the Red Sea harbours in the late 6th and early 7th cent.



A high-energy deposit in the harbour of Yenikapı, 557 CE?



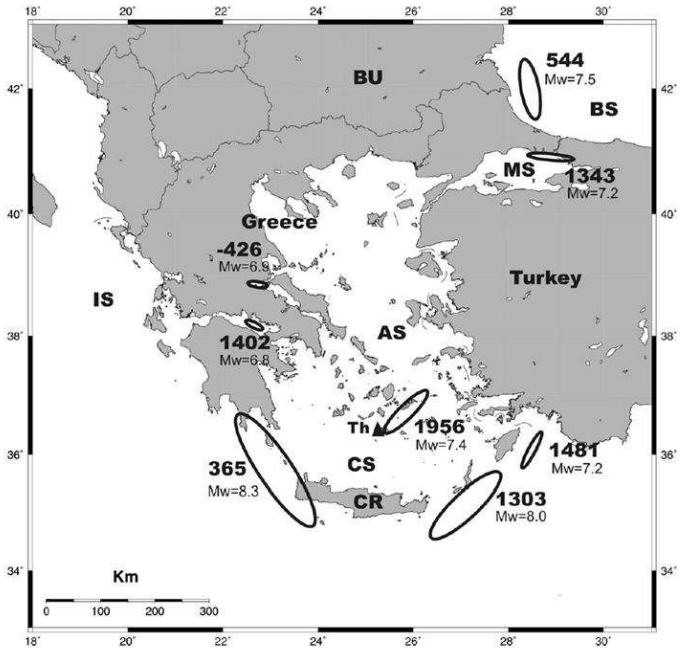


Fig. 4. Source areas of the largest tsunamigenic earthquakes historically known in Greece, Turkey and the surrounding regions. For calculation explanations see text and Table 1. Key geography: AS = Aegean Sea, BS = Black Sea, BU = Bulgaria, CR = Crete, CS = Cretan Sea, IS = Ionian Sea, MS = Marmara Sea. Symbol key: Figure near source area = year of earthquake occurrence (see Table 1), – means BC date, M_w = earthquake moment-magnitude (slightly modified from Papadopoulos and Papageorgiou, 2014).

gh-energy unit (unit 4). Chaotic deposit containing coarse marine and terrestrial material, characterised by an erosional basal contact (Perinçek, 2010).

Bony et al. / Quaternary International 266 (2012) 117-130

Marine Geology 354 (2014) 81–109

The harbour of Lechaion, sea level change and the earthquake of 551/552 AD

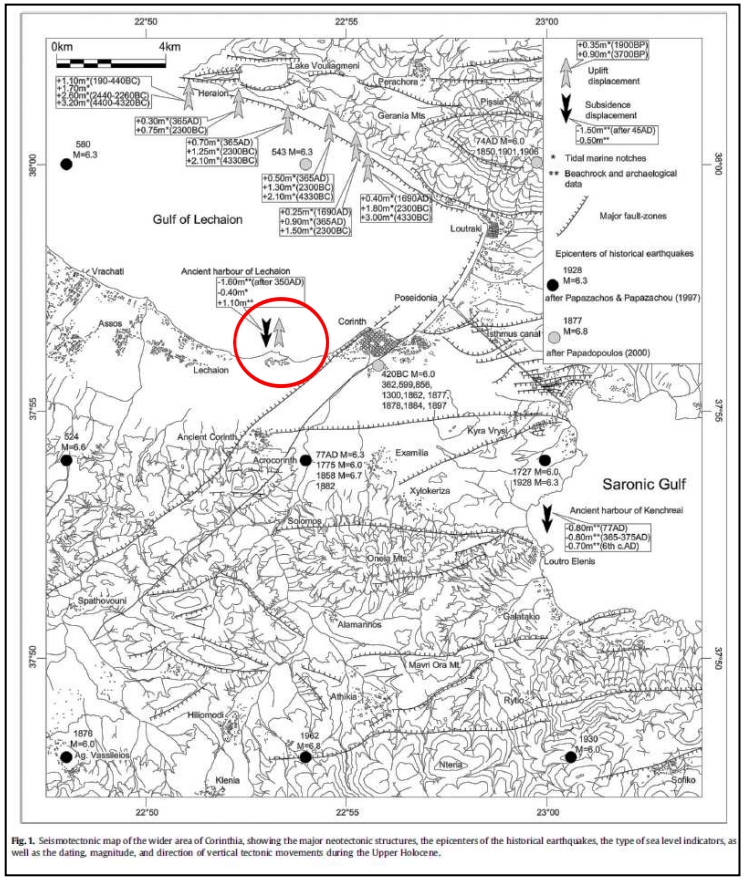


Fig. 1. Seismotectonic map of the wider area of Corinthia, showing the major neotectonic structures, the epicenters of the historical earthquakes, the type of sea level indicators, as well as the dating, magnitude, and direction of vertical tectonic movements during the Upper Holocene.

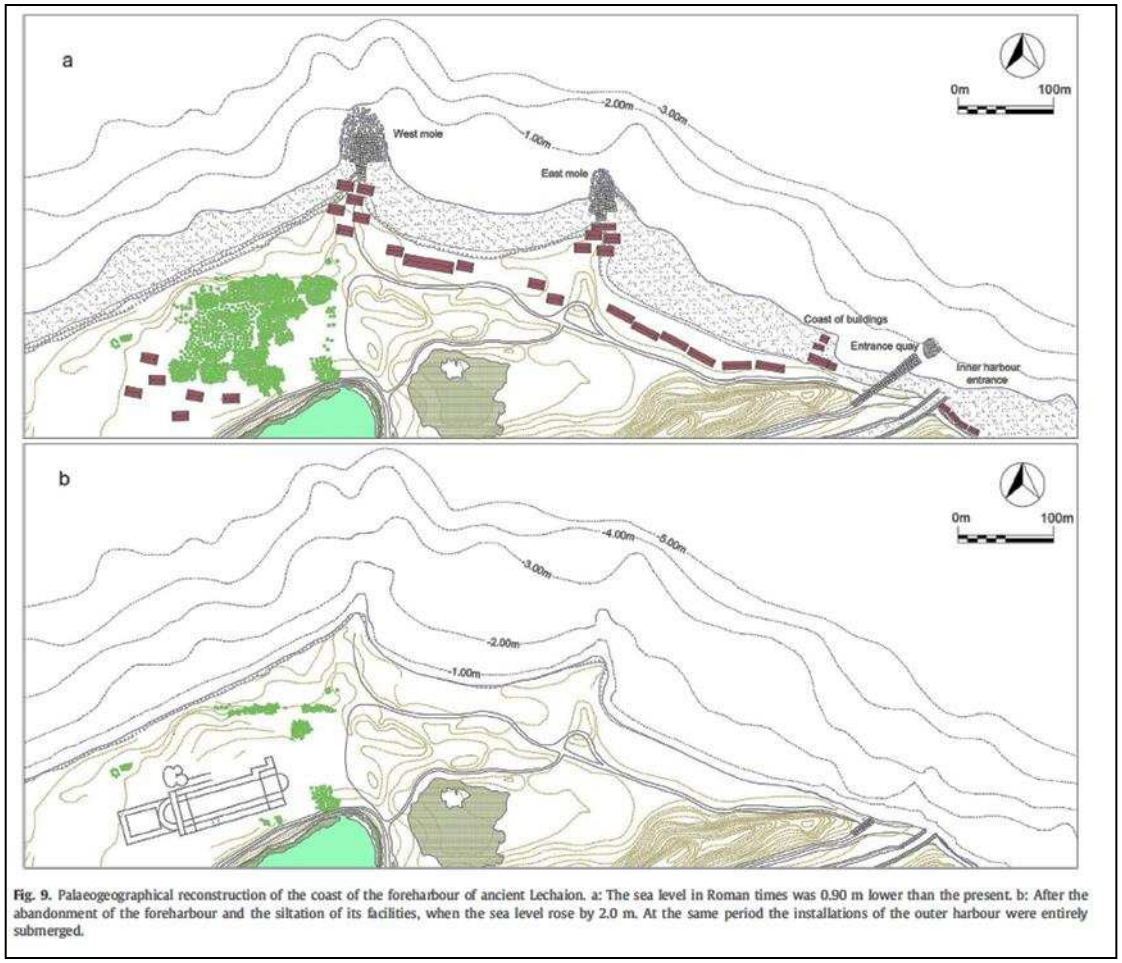
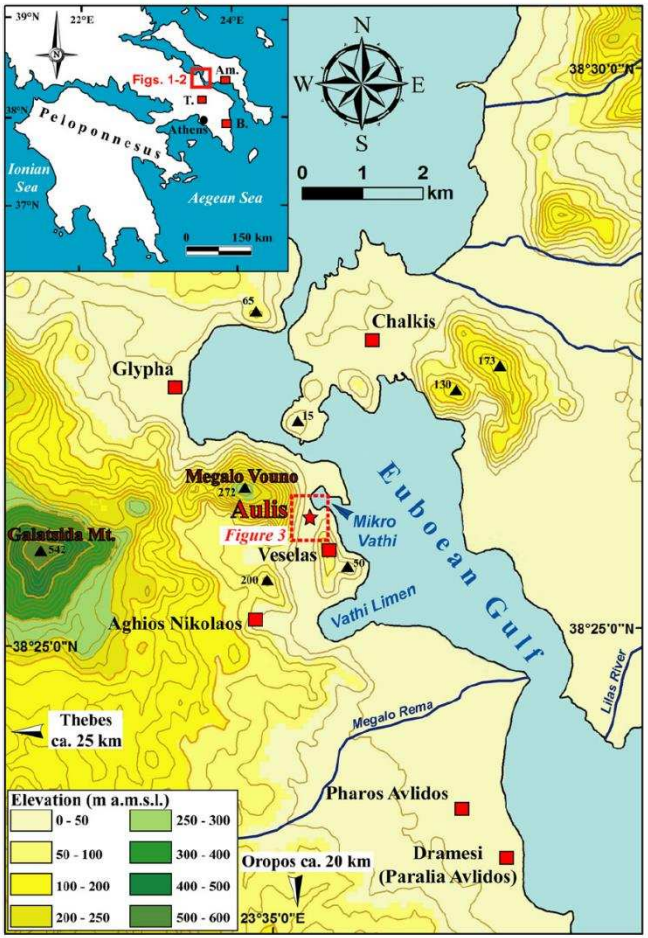


Fig. 9. Palaeogeographical reconstruction of the coast of the foreharbour of ancient Lechaion. a: The sea level in Roman times was 0.90 m lower than the present. b: After the abandonment of the foreharbour and the siltation of its facilities, when the sea level rose by 2.0 m. At the same period the installations of the outer harbour were entirely submerged.

Mourtzas et al. / Quaternary International 332 (2014) 151-171

The harbour of Aulis and changes of landscape



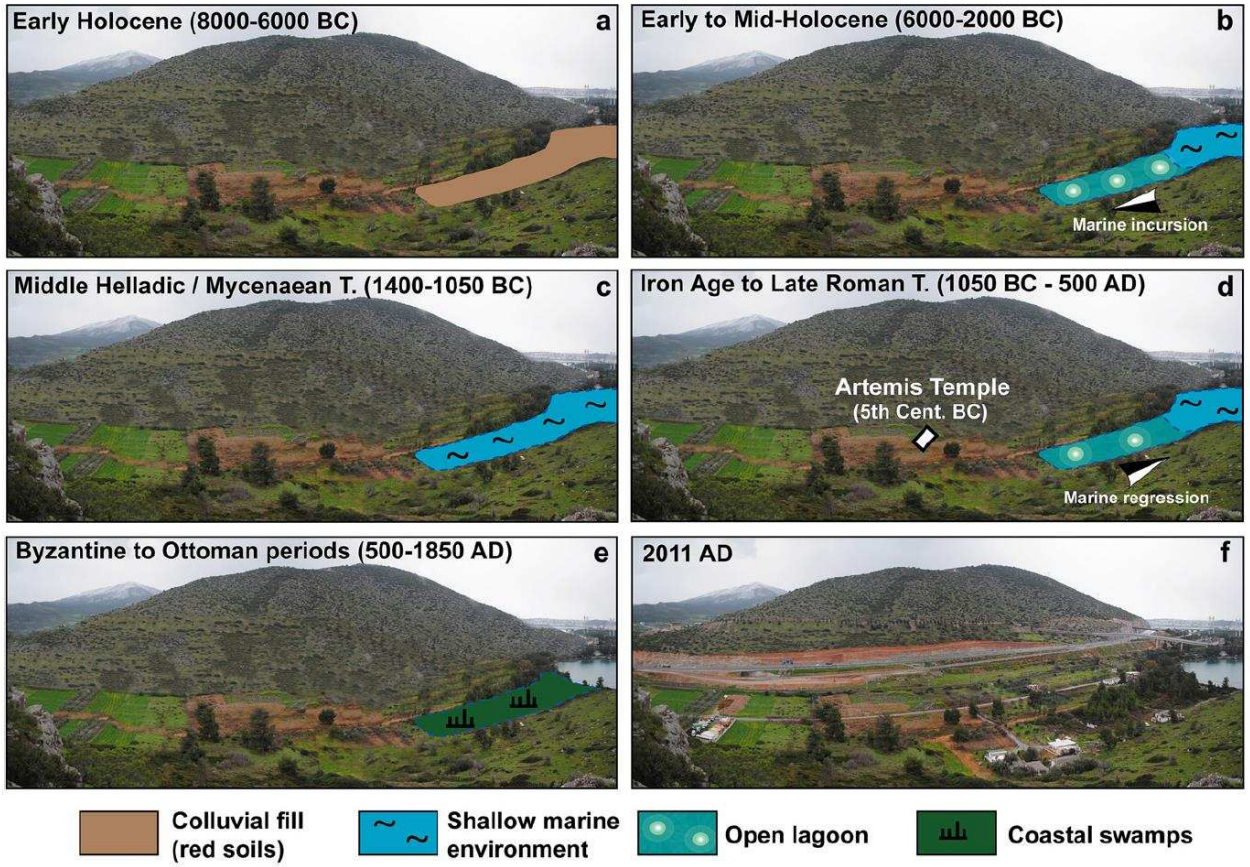
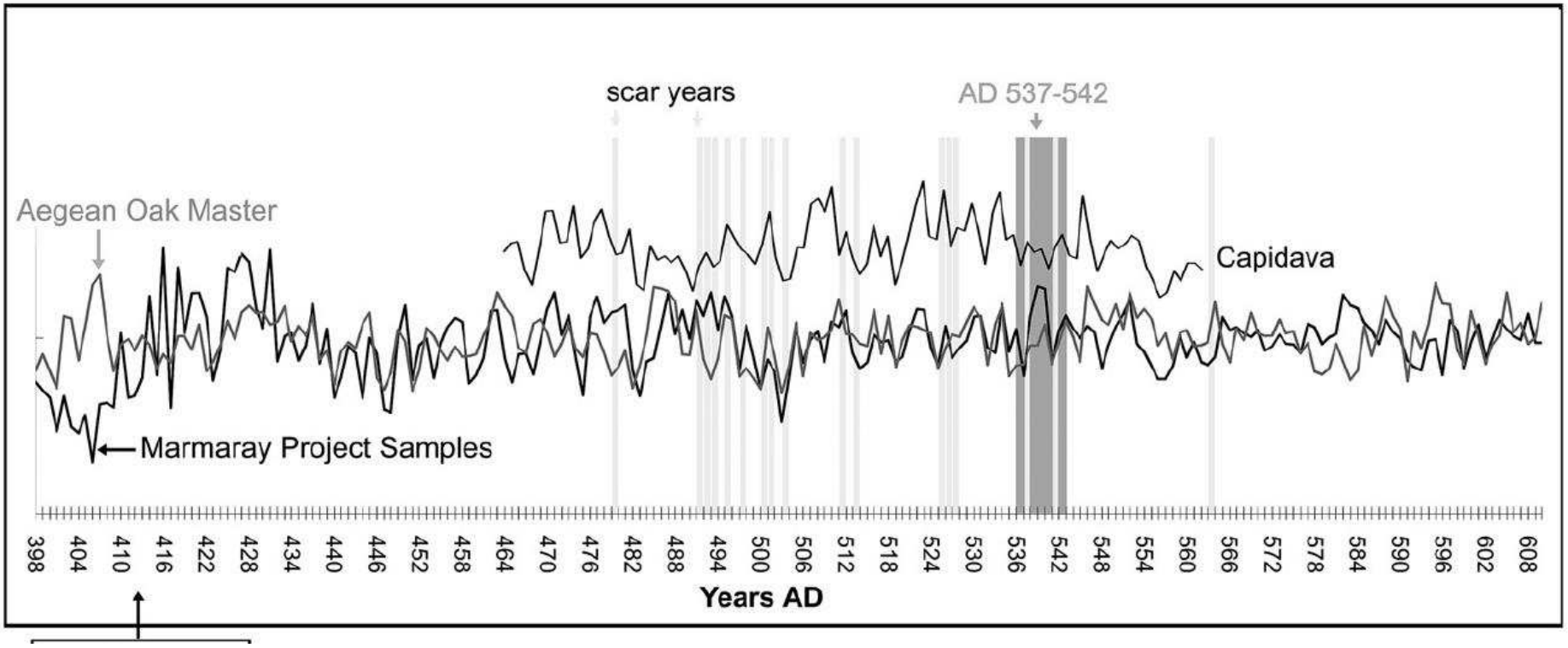


Fig. 8. Holocene paleogeographic reconstruction of the Aulis coastal plain. a is mainly inferred from sedimentological results of core Artemis A. b–e are drawn based on data from both cores studied in this paper.

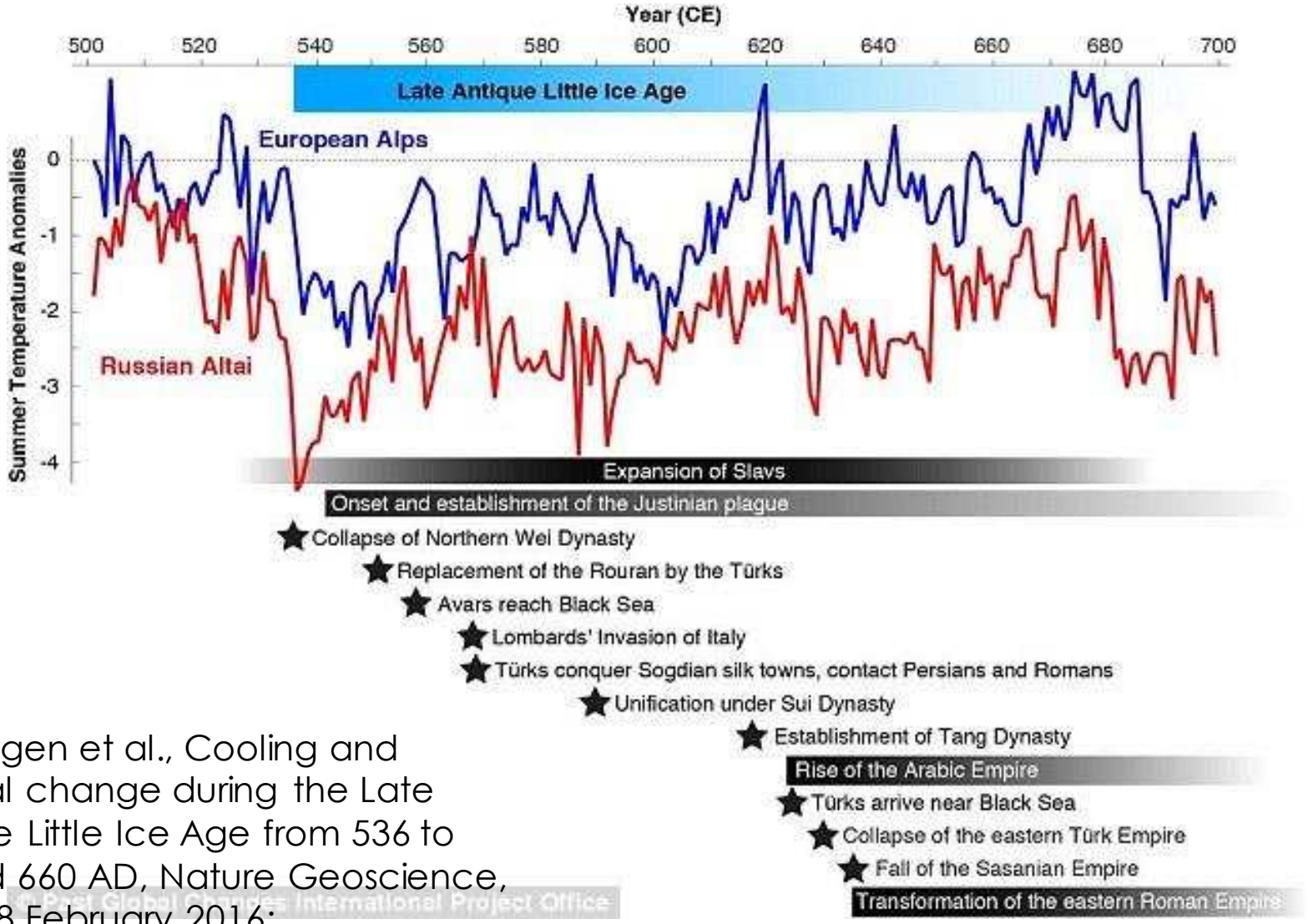
Ghilardi et al. / Journal of Archaeological Science 40 (2013) 2071-2083

Tree rings from Yenikapı and climate change in the mid-6th century AD



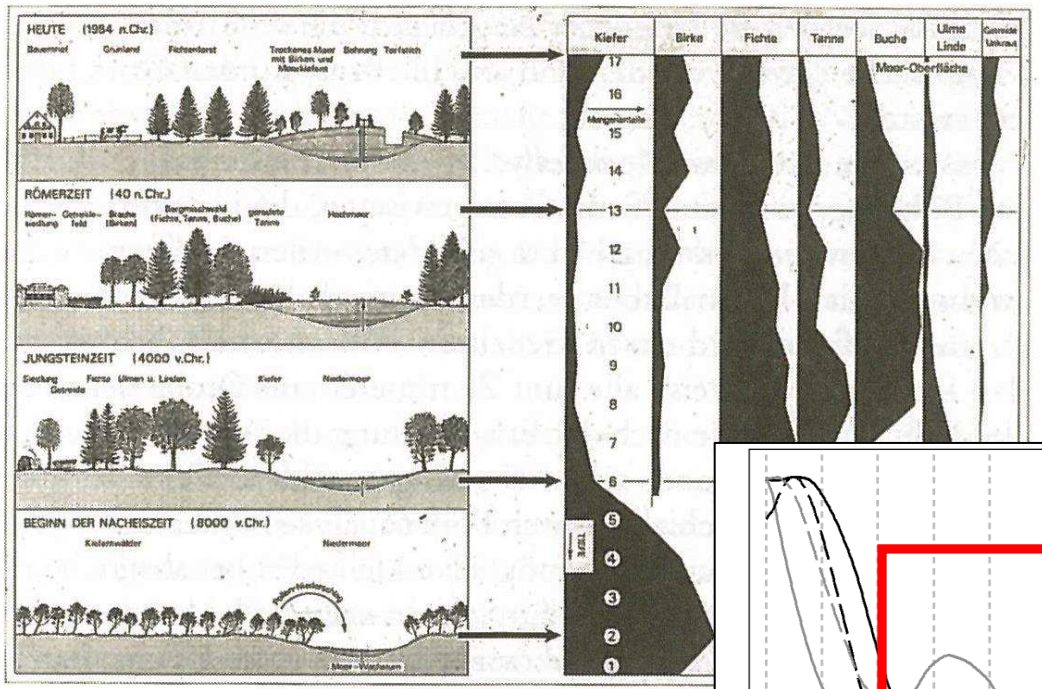
Pearson et al. / Journal of Archaeological Science 39 (2012) 3402-3414

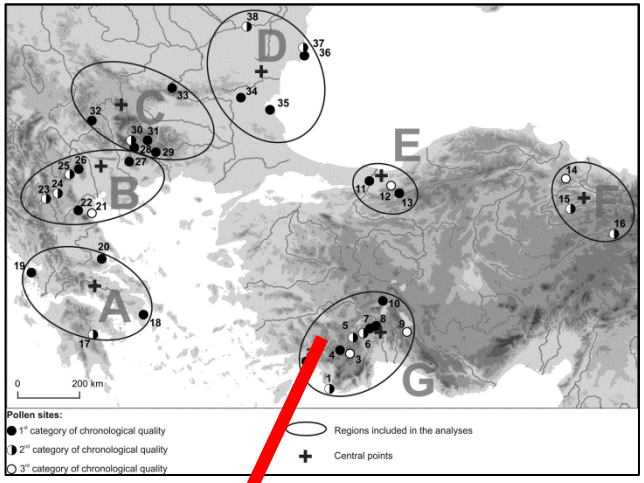
The „*Late Antique Little Ice Age*“ (LALIA, 536-660 AD)

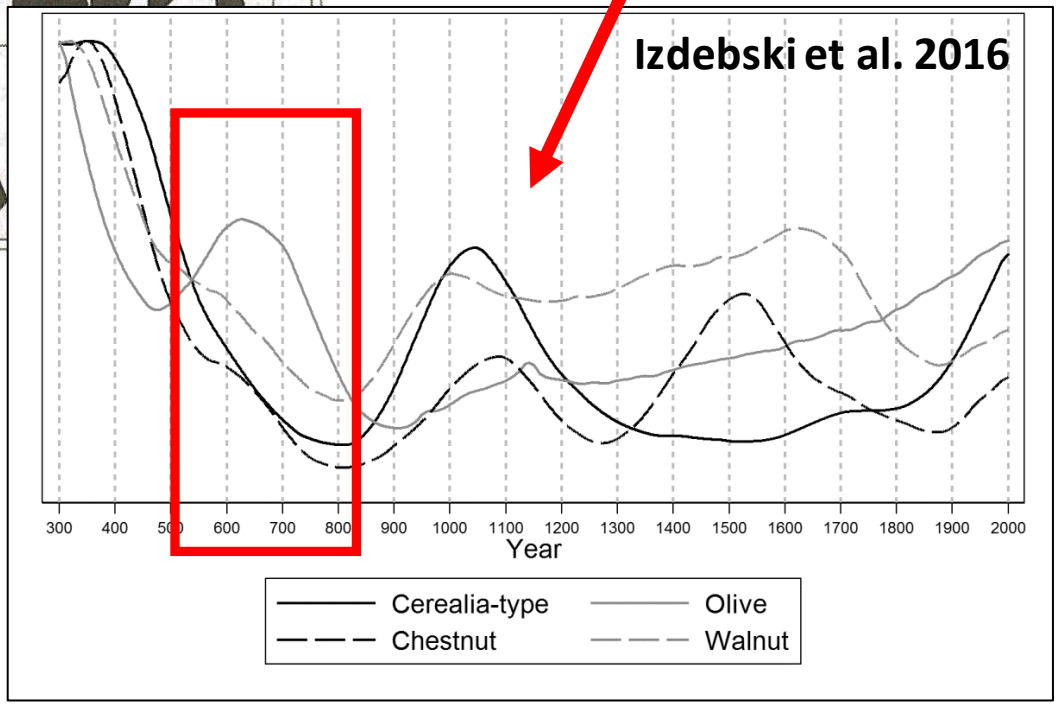


U. Büntgen et al., Cooling and societal change during the Late Antique Little Ice Age from 536 to around 660 AD, Nature Geoscience, online 8 February 2016: http://dx.doi.org/10.1038/ngeo2652

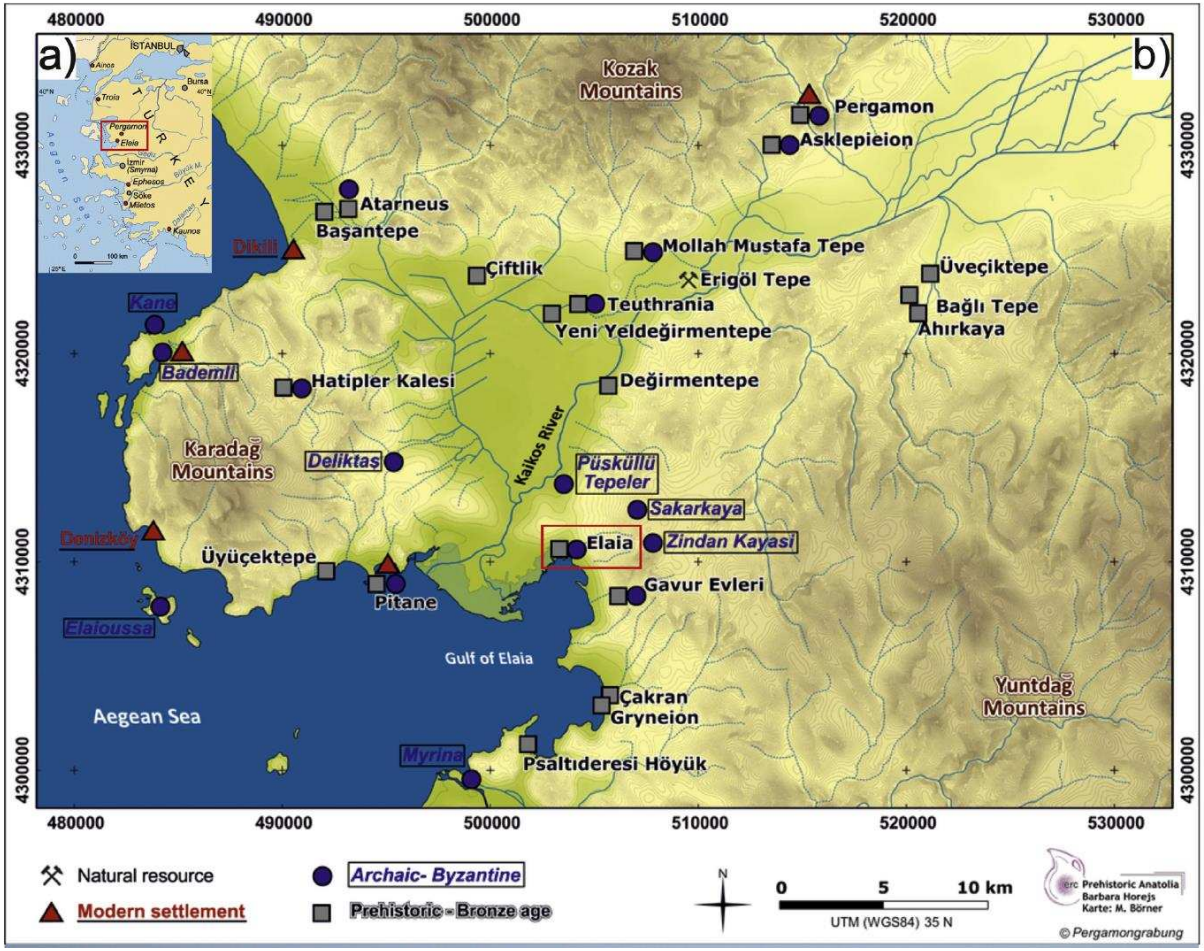
Pollen and sediments as archives of climate change and human activity: SW-Asia Minor

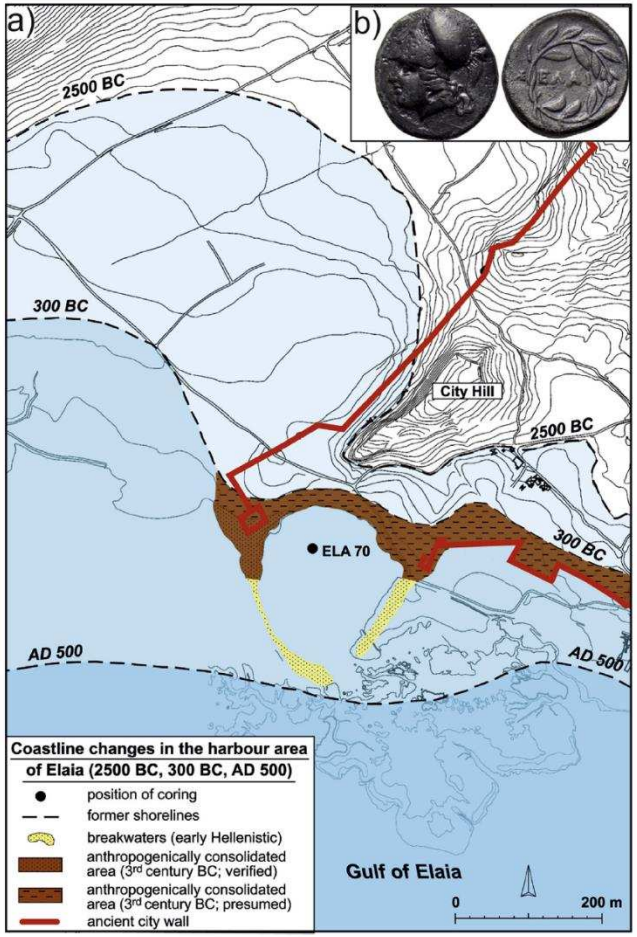






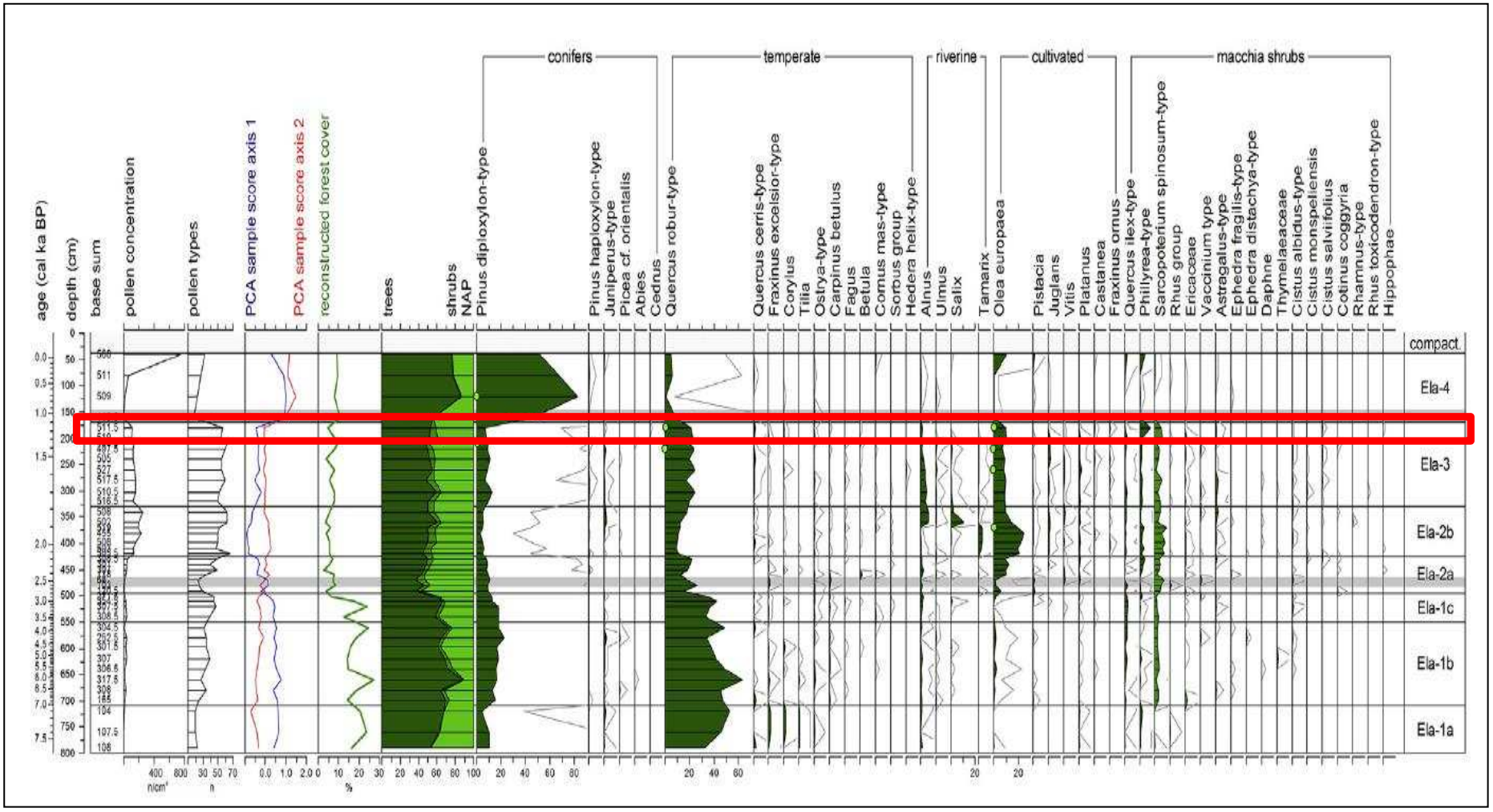
The harbour of Elaia until the 8th cent. CE



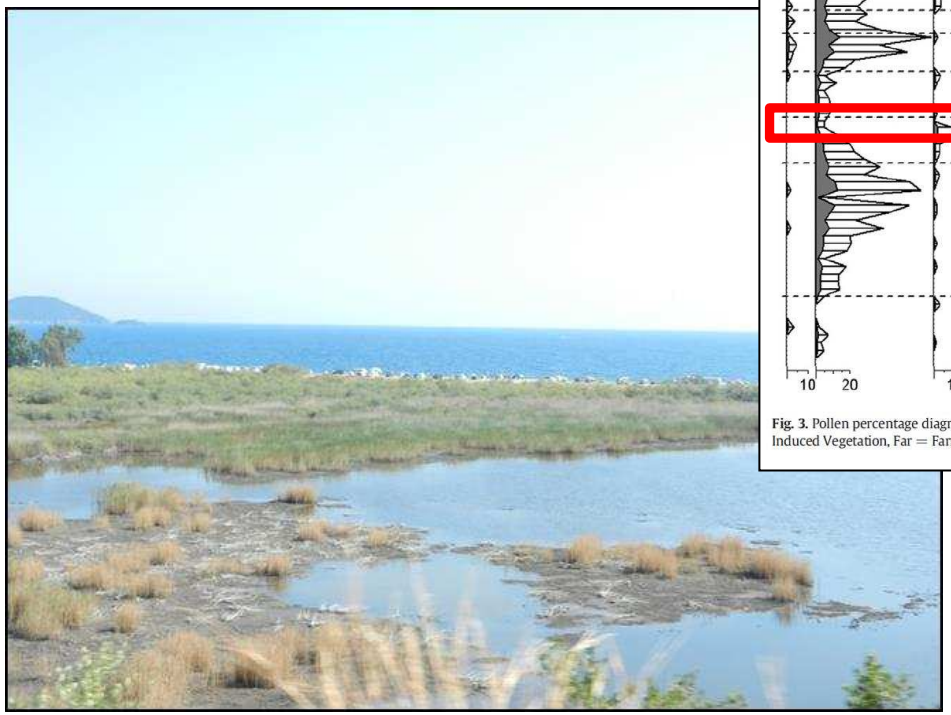


Shumilovskikh et al. / Quaternary Science Reviews 149 (2016) 167-187

The end of olive cultivation around Elaia in the 7th-8th cent. AD



Palynological investigations of sediments from the Tristinika coastal marsh near the harbour of Toroni: a „collapse“ in the 6th-8th cent. AD



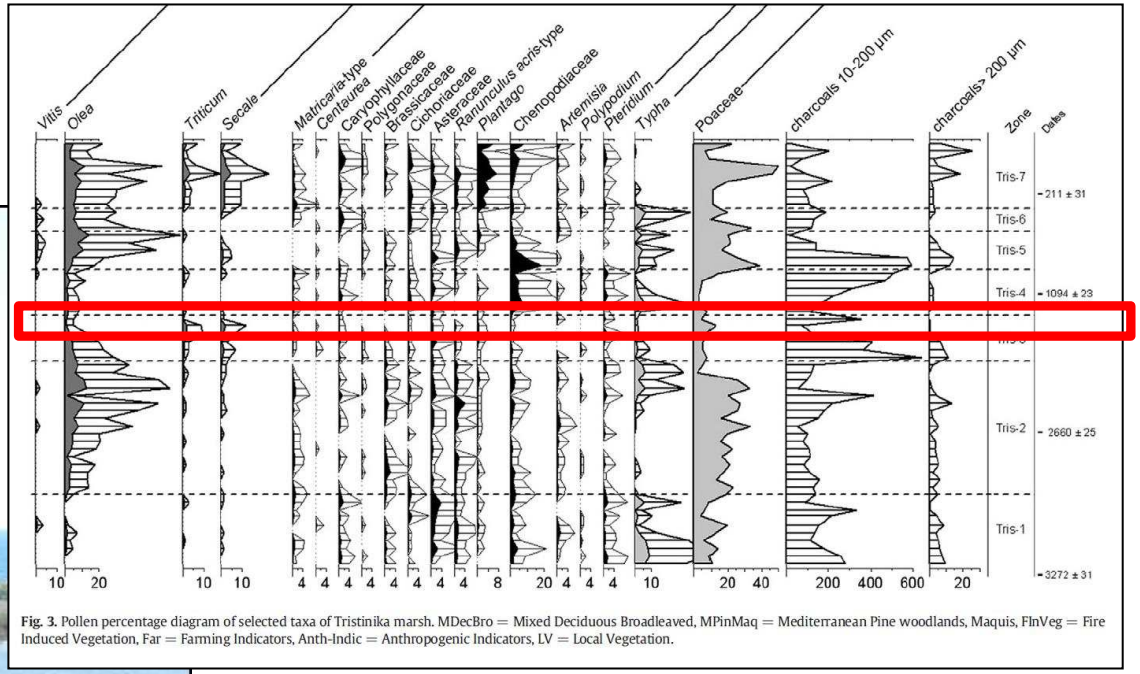
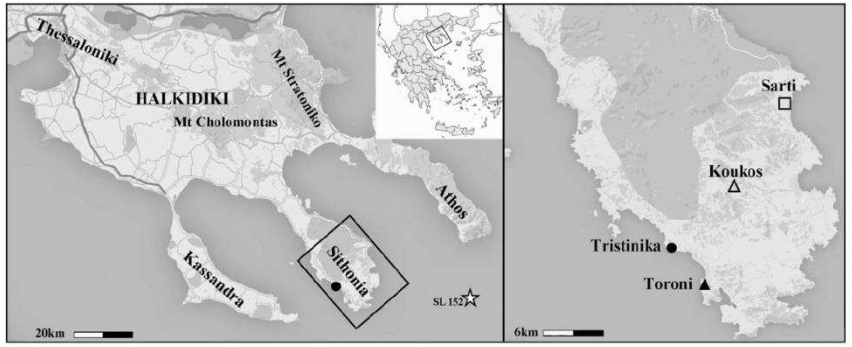
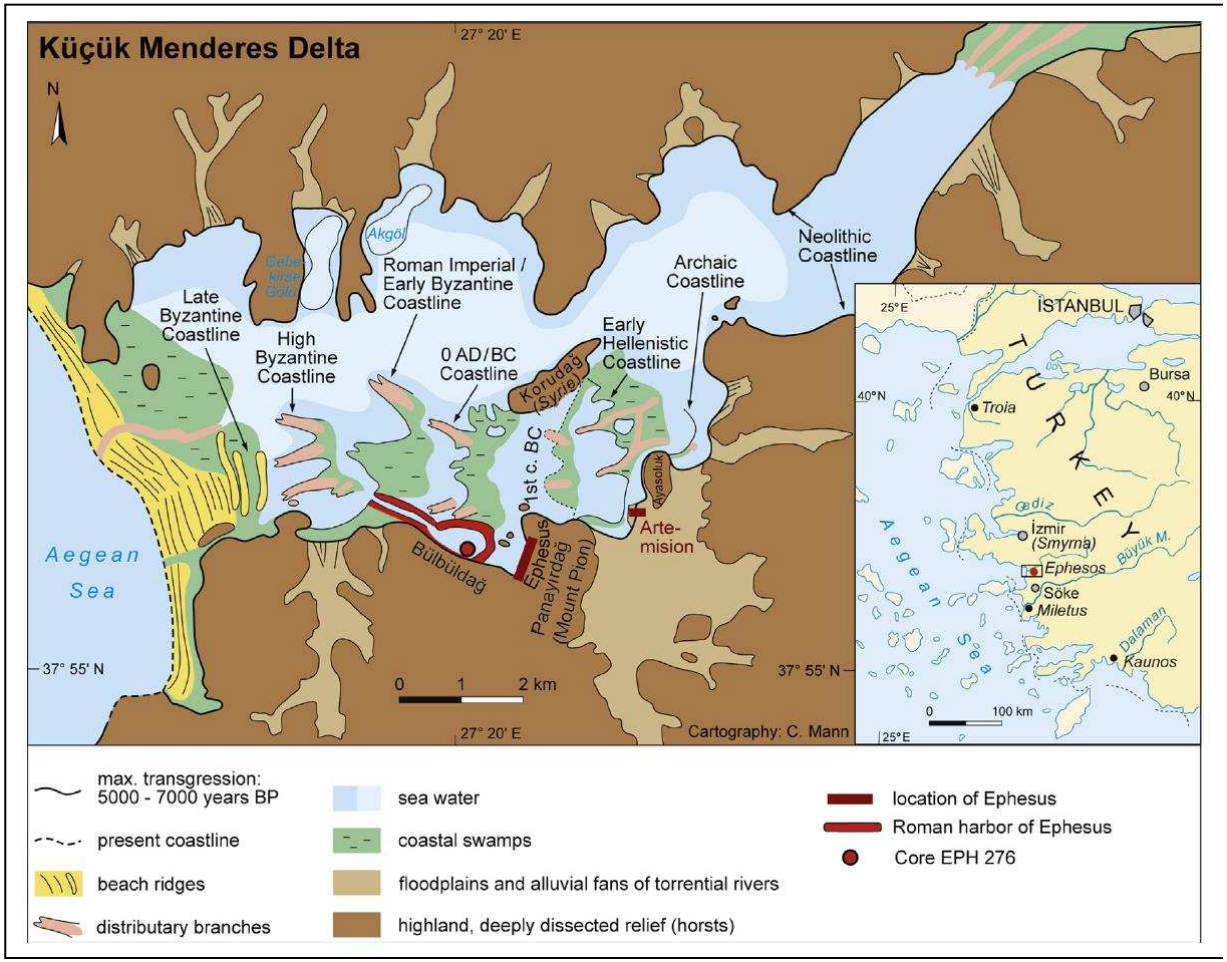


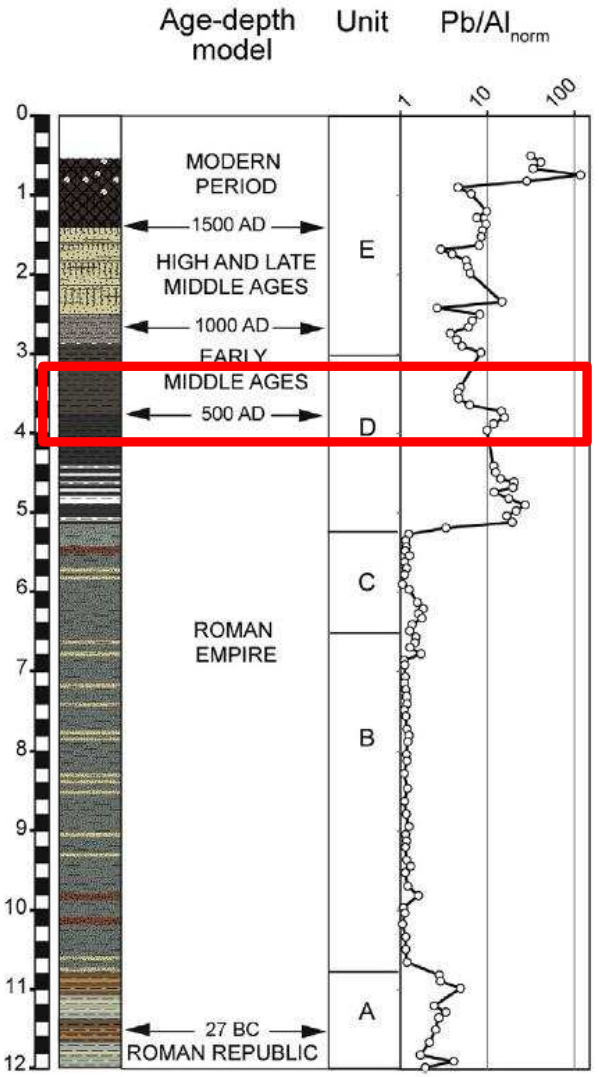
Fig. 3. Pollen percentage diagram of selected taxa of Tristinika marsh. MDecBro = Mixed Deciduous Broadleaved, MPinMaq = Mediterranean Pine woodlands, Maquis, FlnVeg = Fire Induced Vegetation, Far = Farming Indicators, Anth-Indic = Anthropogenic Indicators, LV = Local Vegetation.



Panajiotidis, M.L. Papadopoulou / Journal of Archaeological Science: Reports 7 (2016) 138–145

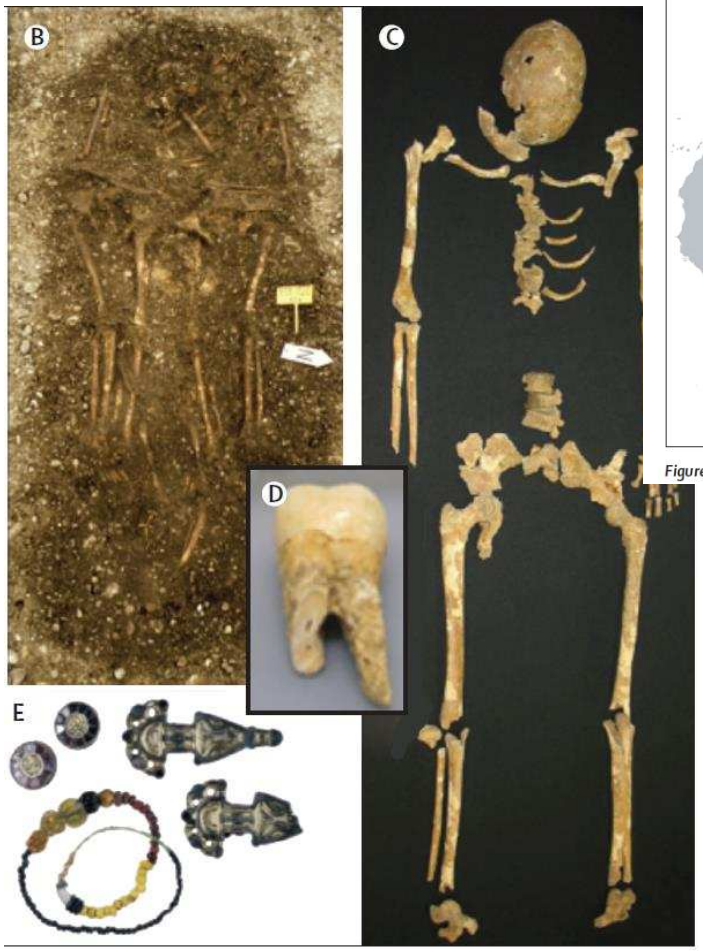
The decline of lead pollution in the habour basin of Ephesos





Delile et al. / Journal of Archaeological Science 53 (2015) 202-213

Yersinia pestis and the epidemics of the 6th-8th cent. AD: a genomic analysis in Aschheim (GER)



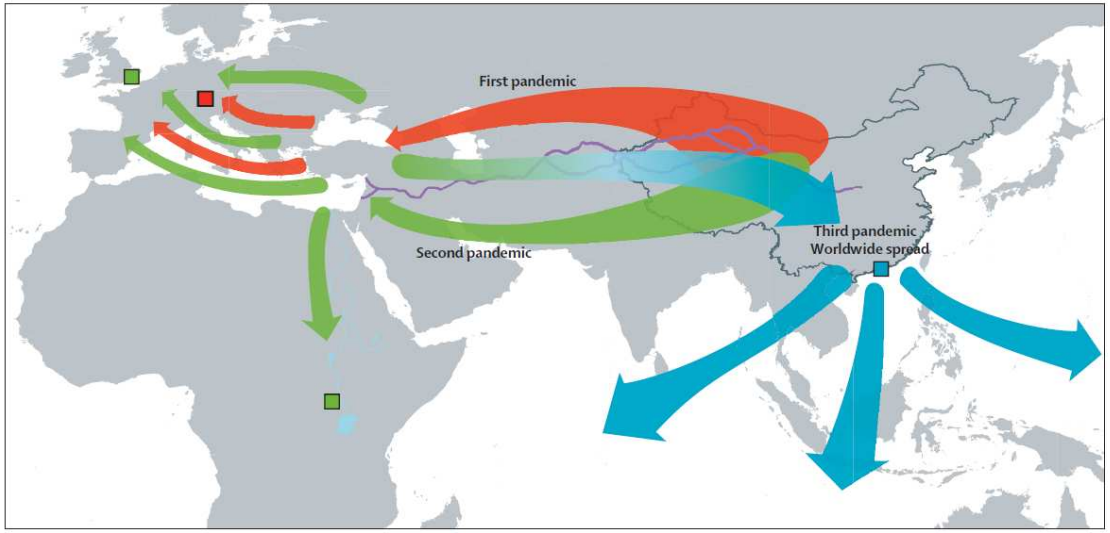
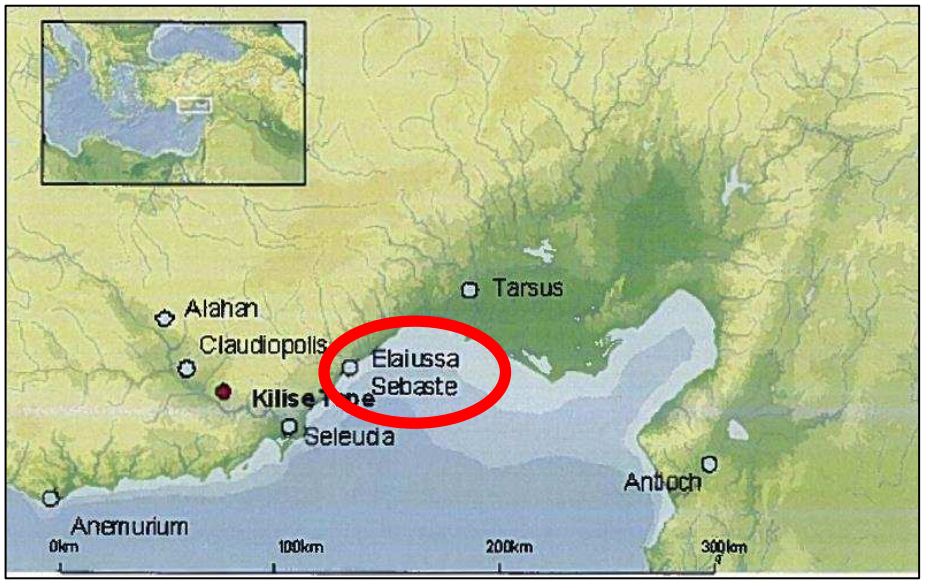


Figure 4: Hypothetical scenario for the geographic spread of *Yersinia pestis*

Lancet Infect Dis 2014, 14: 319–326

The port of Elaiussa Sebaste, mid-6th to mid-7th cent. AD: local elites with health problems



Journal of Comparative Human Biology 58 (2007) 173–190

The decline of maritime trade in the Mediterranean: number of shipwrecks

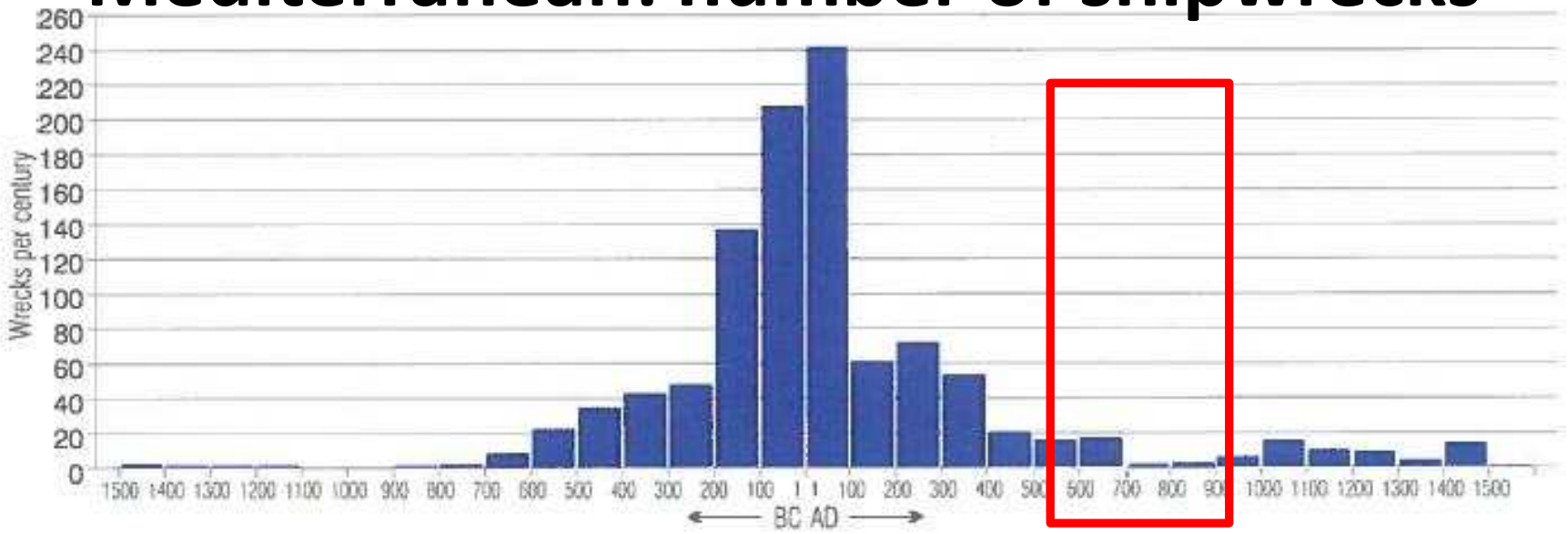
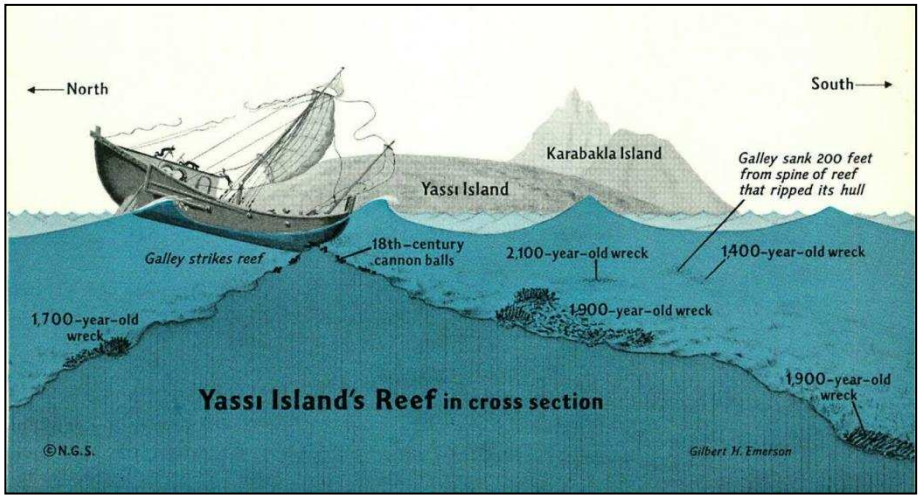
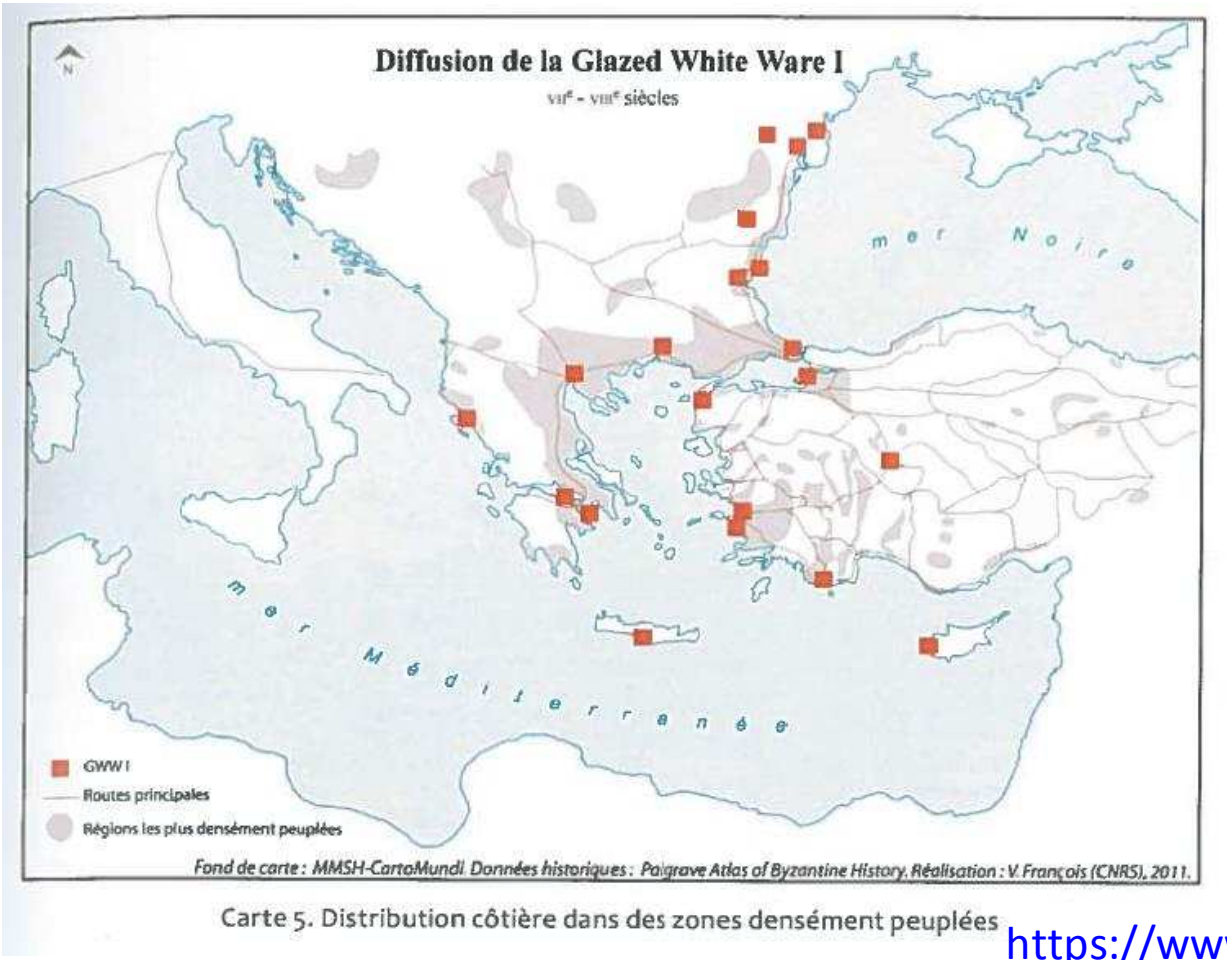


Figure 2.4. Mediterranean shipwrecks datable within 100-year ranges (n=1,062), graphed according to an equal probability of sinking in any year during the date range for each wreck. (Data collected by Julia Strauss.)



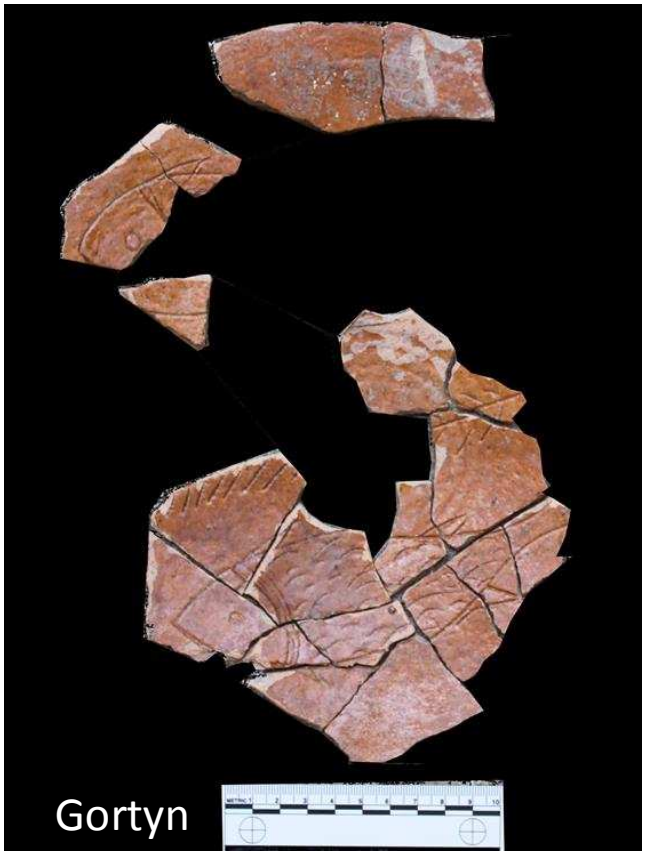
From: Robinson – Wilson (ed.), 2011

The shrinking trade and empire of the „Blue Glass People“

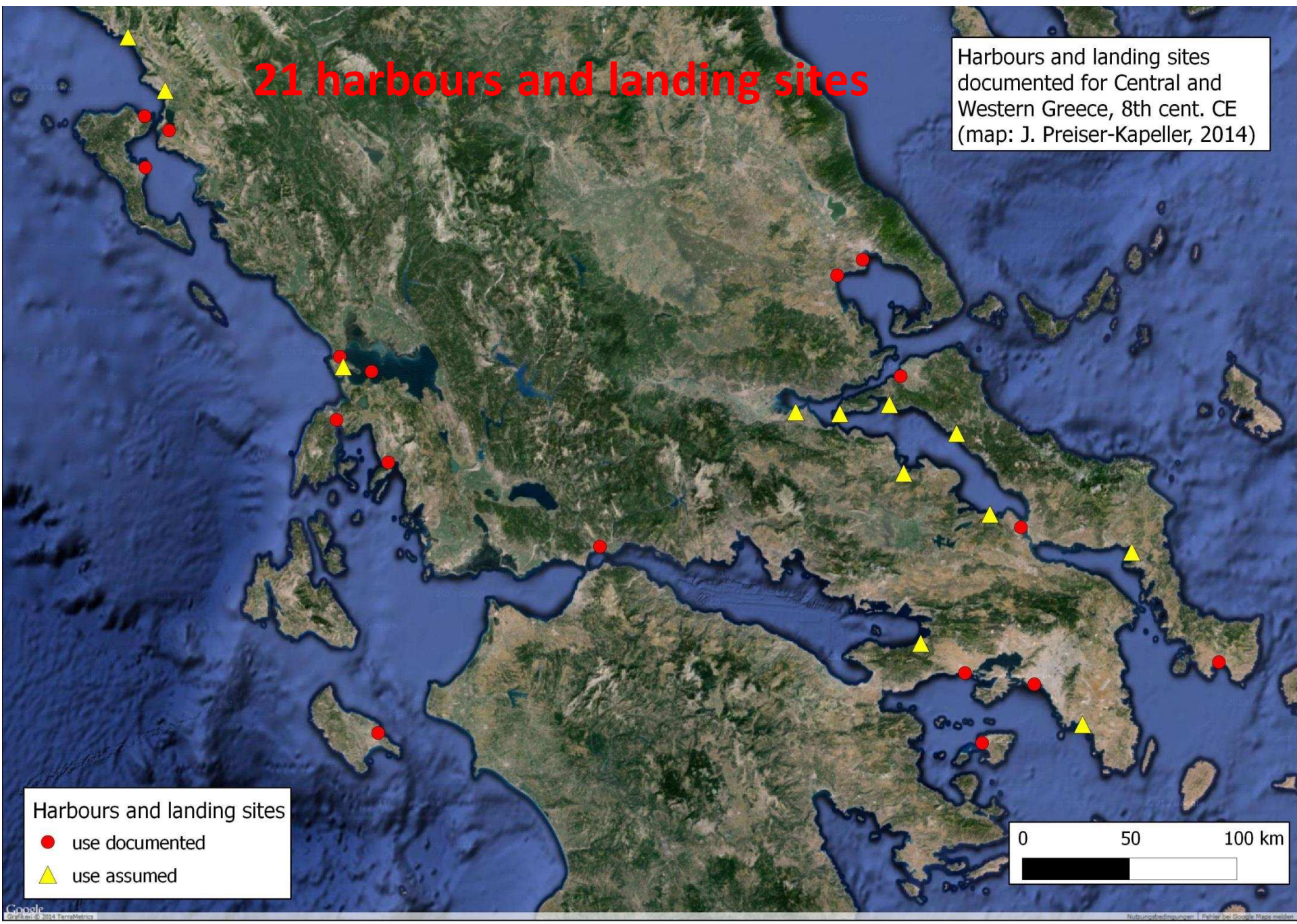


Carte 5. Distribution côtière dans des zones densément peuplées

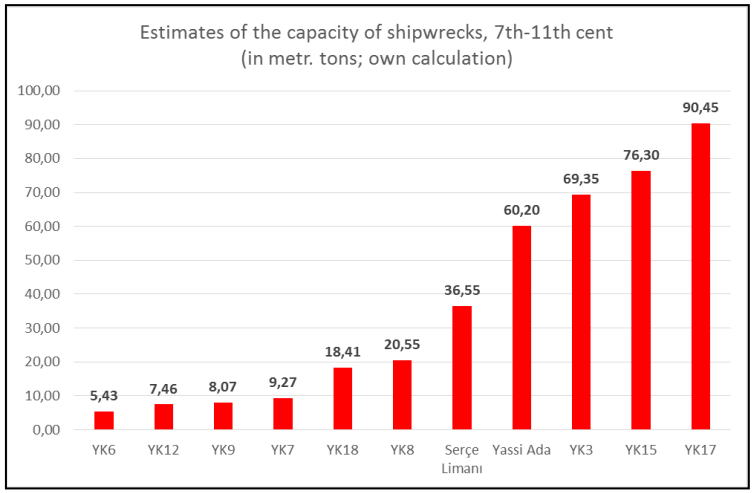
Véronique FRANÇOIS, 2012

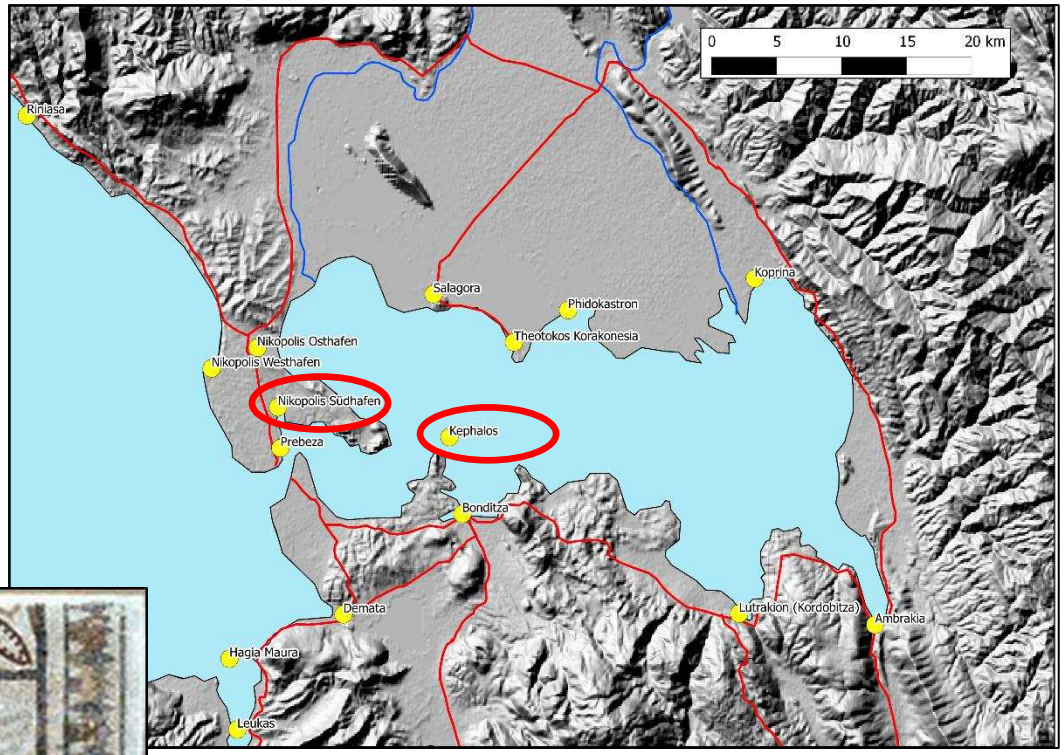


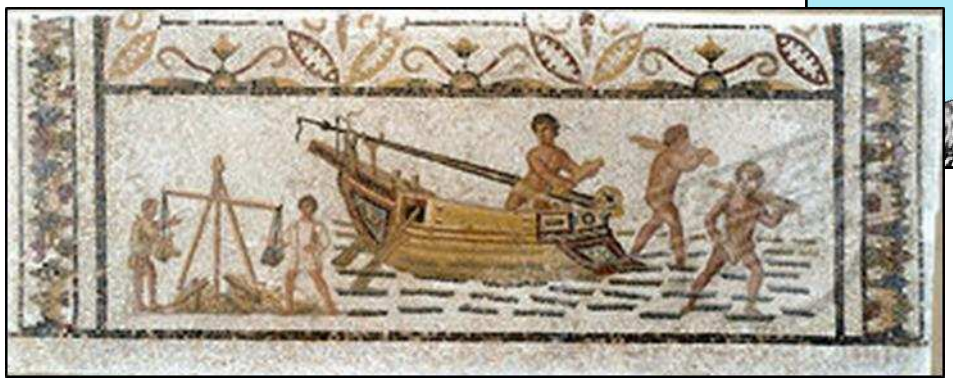
https://www.doaks.org/research/support-for-research/project-grants/reports/2011-2012/zanini


21 harbours and landing sites
Harbours and landing sites documented for Central and Western Greece, 8th cent. CE (map: J. Preiser-Kapeller, 2014)
Harbours and landing sites
use documented
use assumed
0
50
100 km

Smaller ships and harbours, the relocation of ports and settlements under security aspects



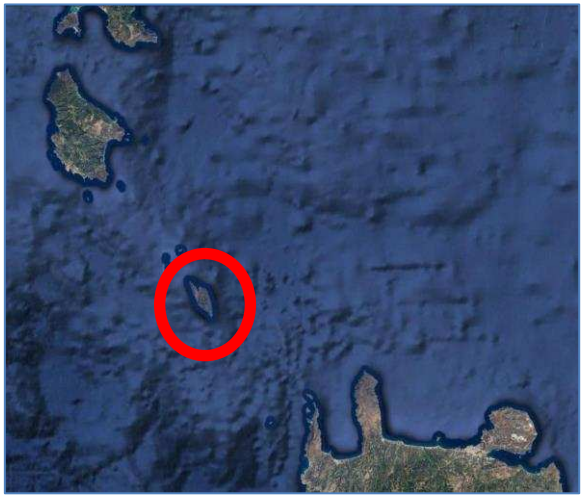




„Why, for example, did some coastal settlements flourish as commercial towns without artificial ports?“ (Horden/Purcell 2000)

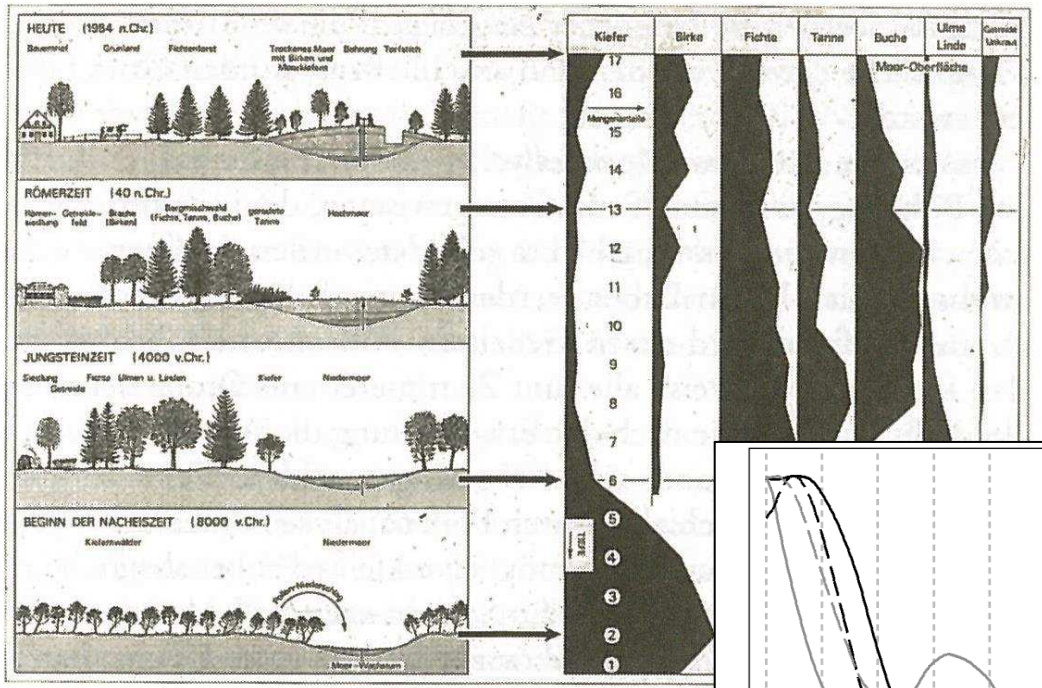
From: Veikou, in: Preiser-Kapeller – Daim 2015

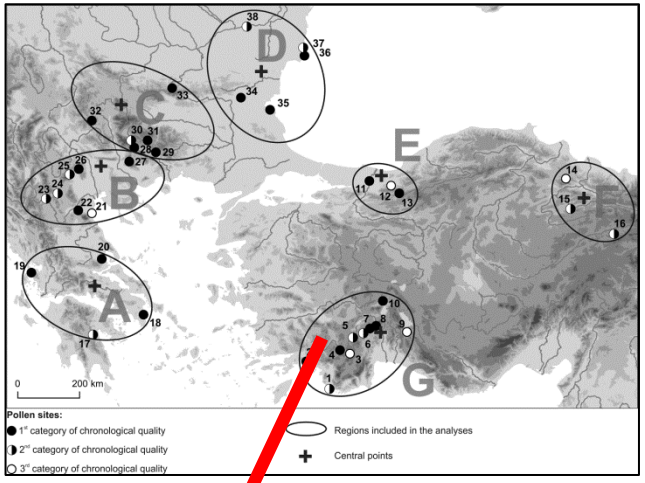
Six landing sites on Antikythera

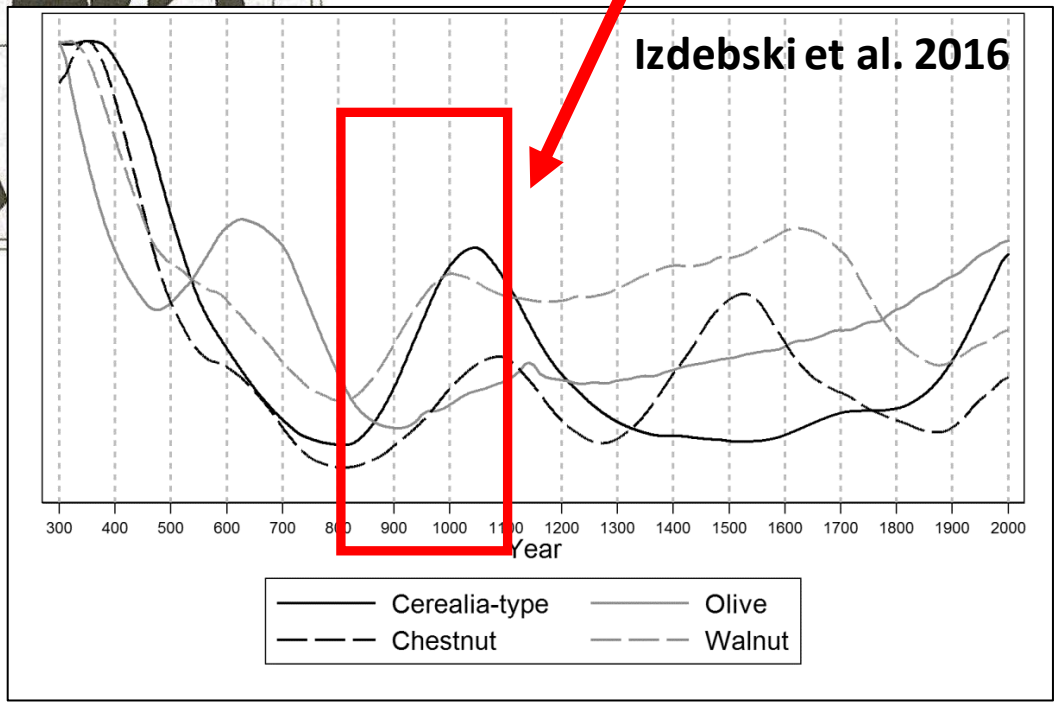


Cf. Bevan – Conolly 2013

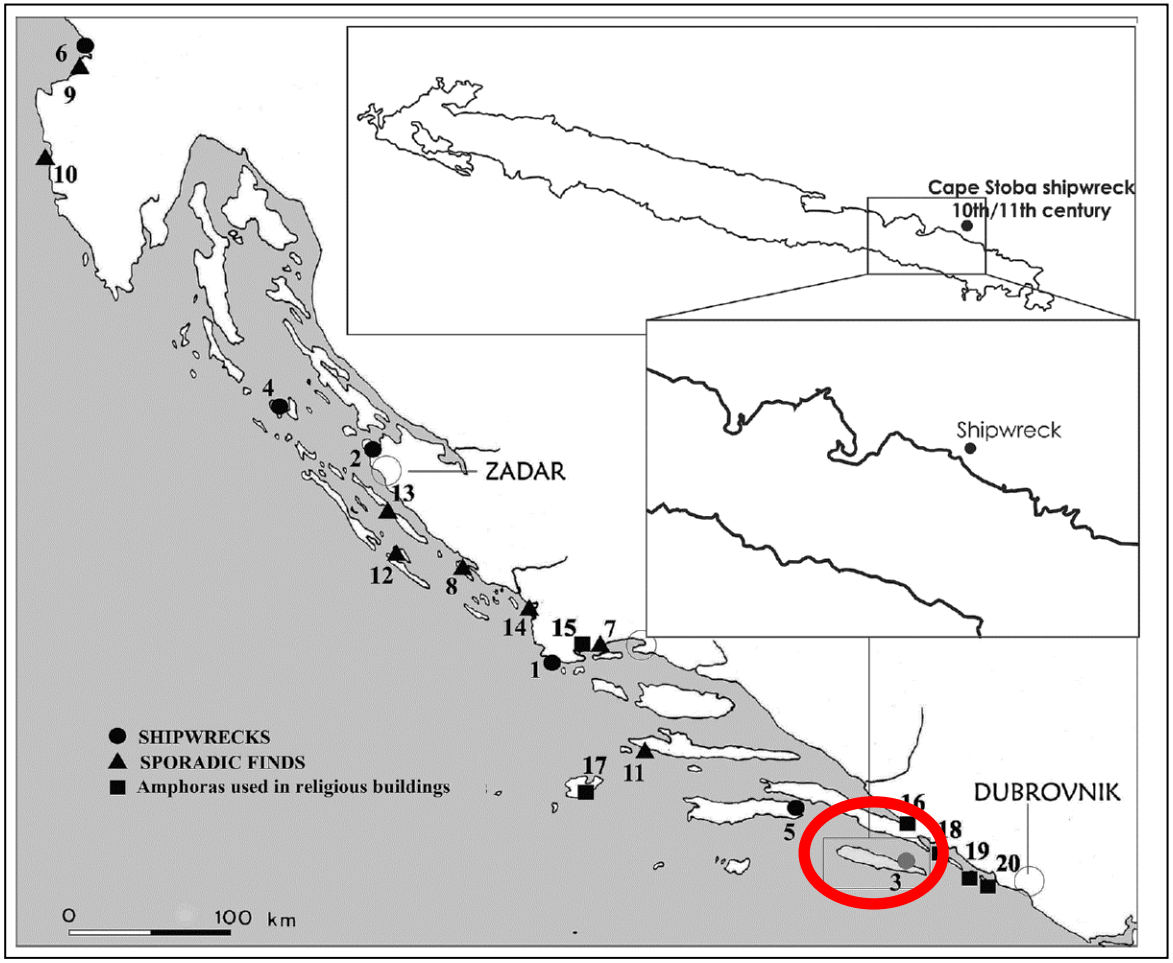
Re-expansion of agricultural activity in SW-Asia Minor in the 9th-11th cent. AD







The shipwreck from Cape Stoba, Mljet, Croatia (10th-11th cent. AD)



The International Journal of Nautical Archaeology (2016) 45.1: 42–58

Figure 4. Plan of the wreck-site of Cape Stoba 2010–2014. Different amphora types are marked with different colours. (E. Costa)

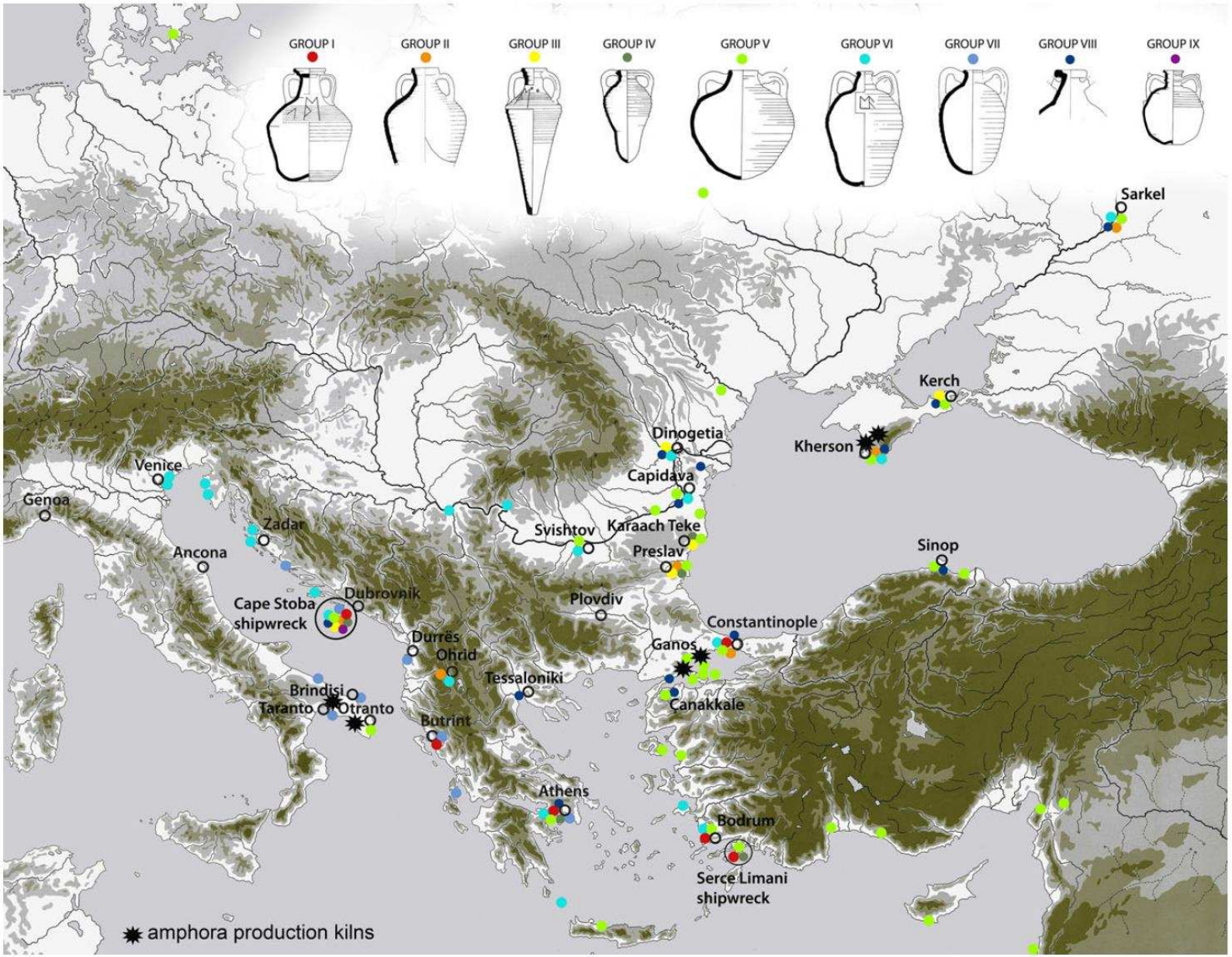
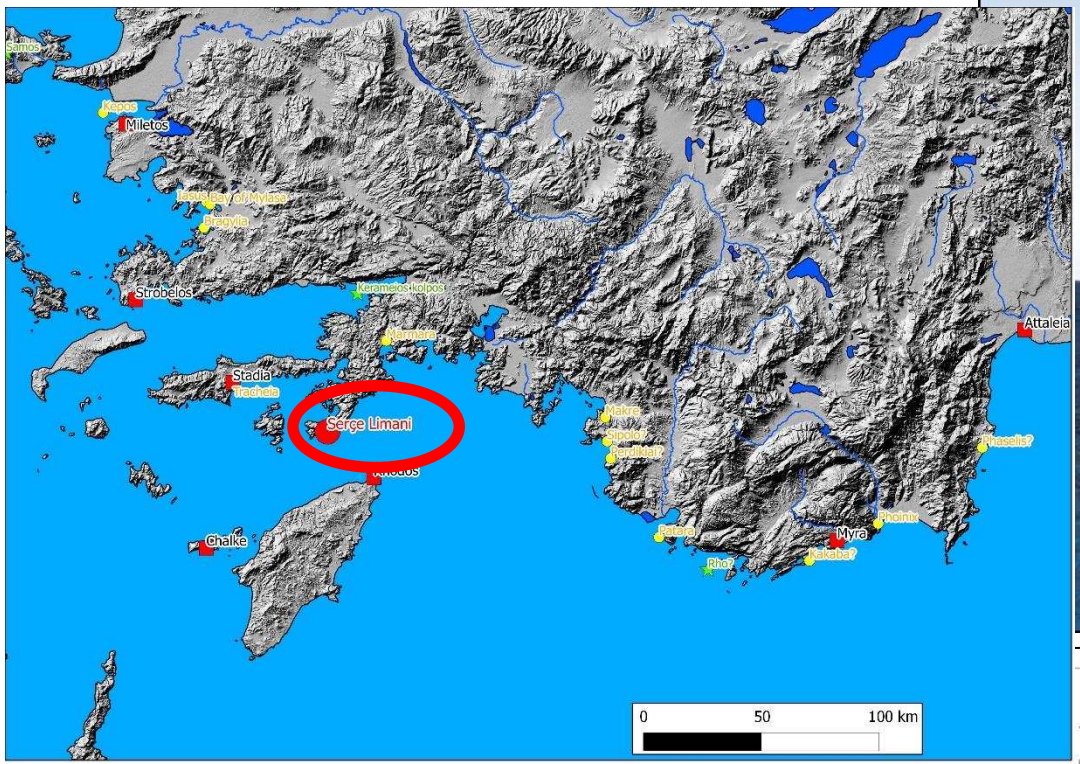
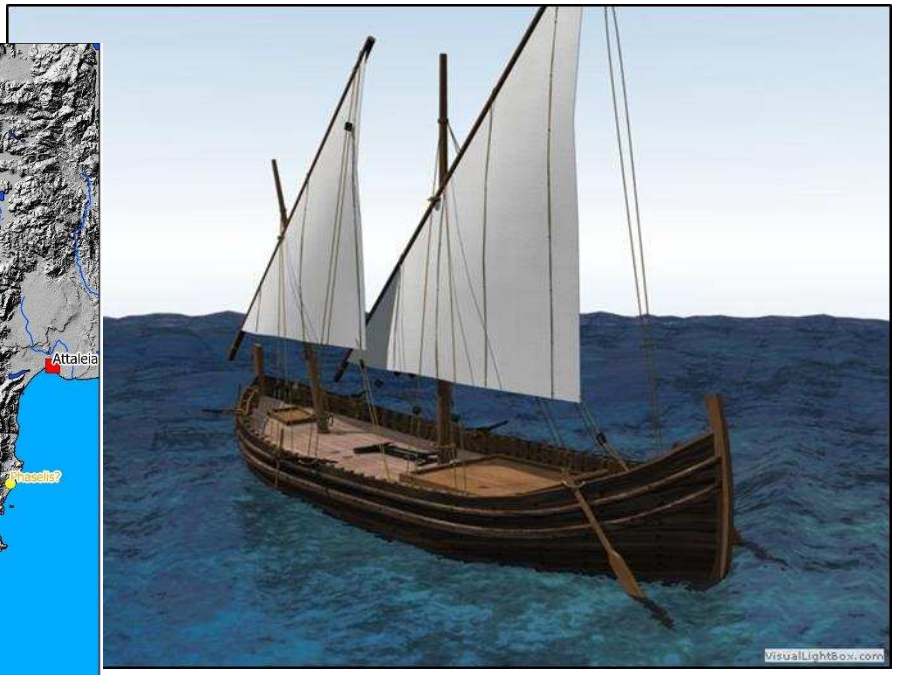


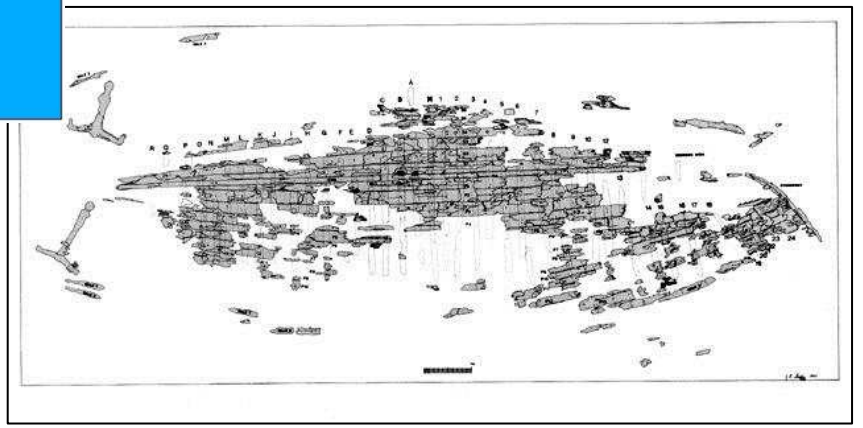
Figure 8. Distribution of Middle Byzantine amphora types found on the Cape Stoba wreck-site. (Drawing: V. Zmaić Kralj)

The International Journal of Nautical Archaeology (2016) 45.1: 42–58

The shipwreck of Serçe Limanı in SW Asia minor, 11th cent. AD







Serçe Limanı. An Eleventh-Century Shipwreck. Vol. 1, The Ship and Its Anchorage, Crew, and Passengers, by George F. Bass, Sheila Matthews, J. Richard Steffy, and Frederick H. van Doorninck, Jr. Texas A&M University Press, 2004.

A freight of glass – from Egypt

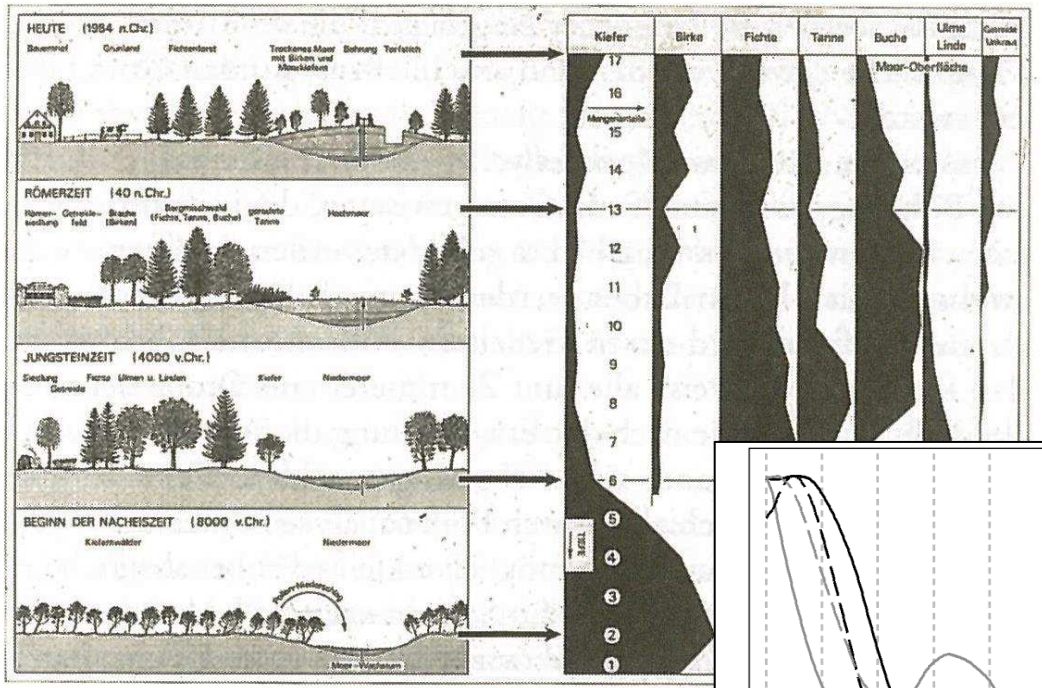
Ivory in the Mediterranean, Walrus, Iceland, Greenland and isotopes

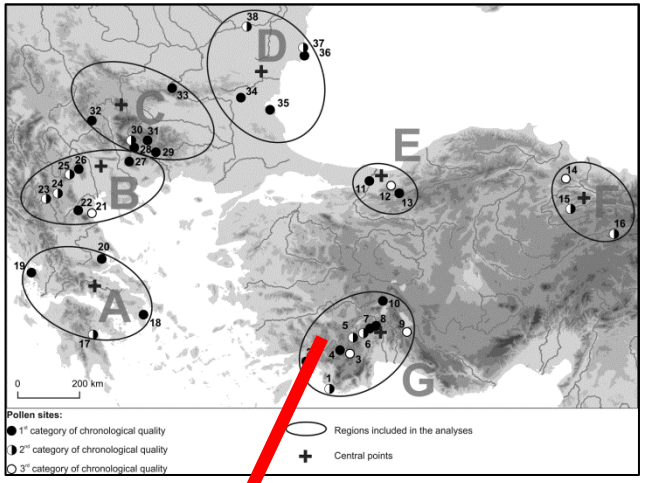
Figure 1 Location map of areas mentioned in the text (courtesy of Christian K Madsen).

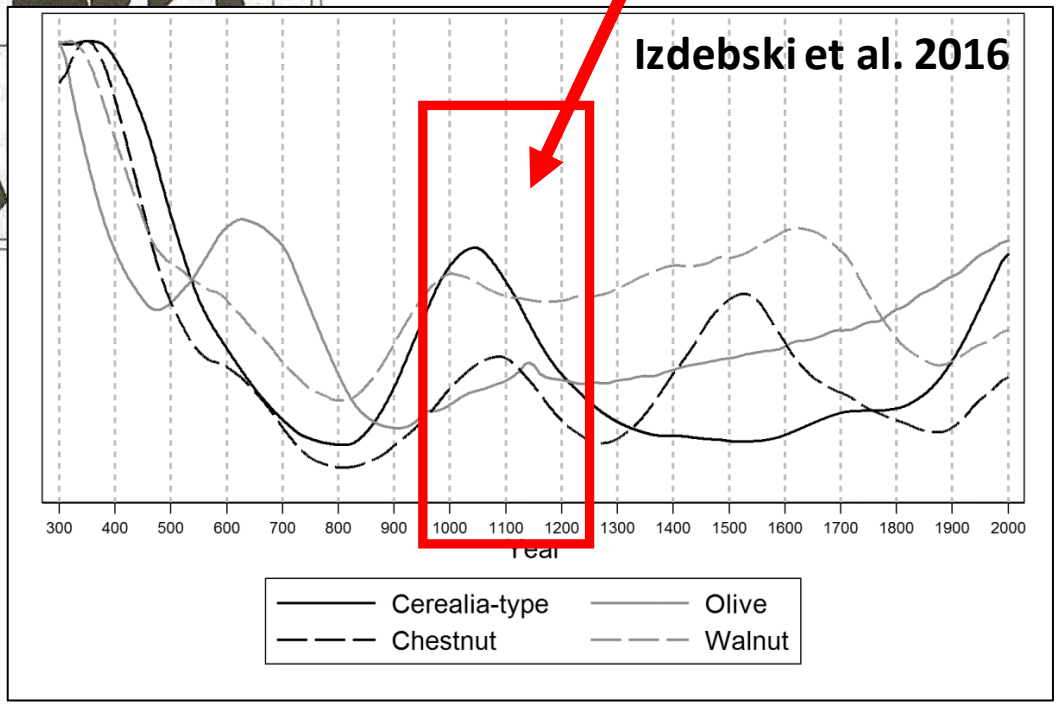
Hunting bag made from Walrus ivory,
11th-12th cent.
Mainz Landesmuseum

World Archaeology Vol. 47(3) 2015, 439–466

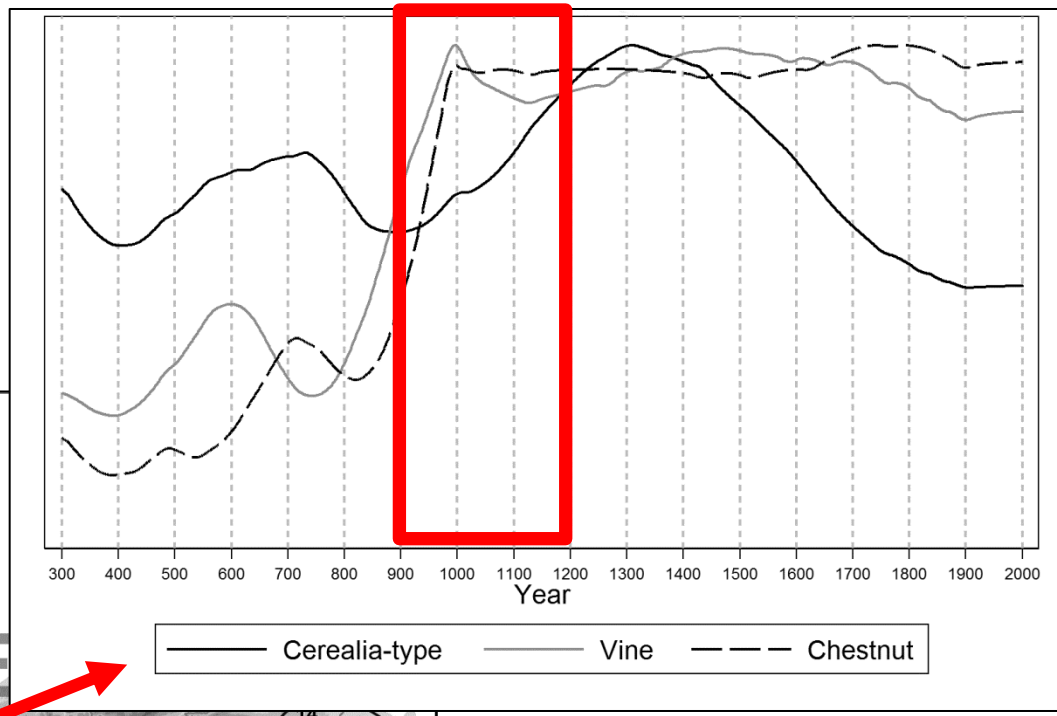
Pollen and sediments: decline of agricultural activity SW-Asia Minor in the late 11th and 12th century AD

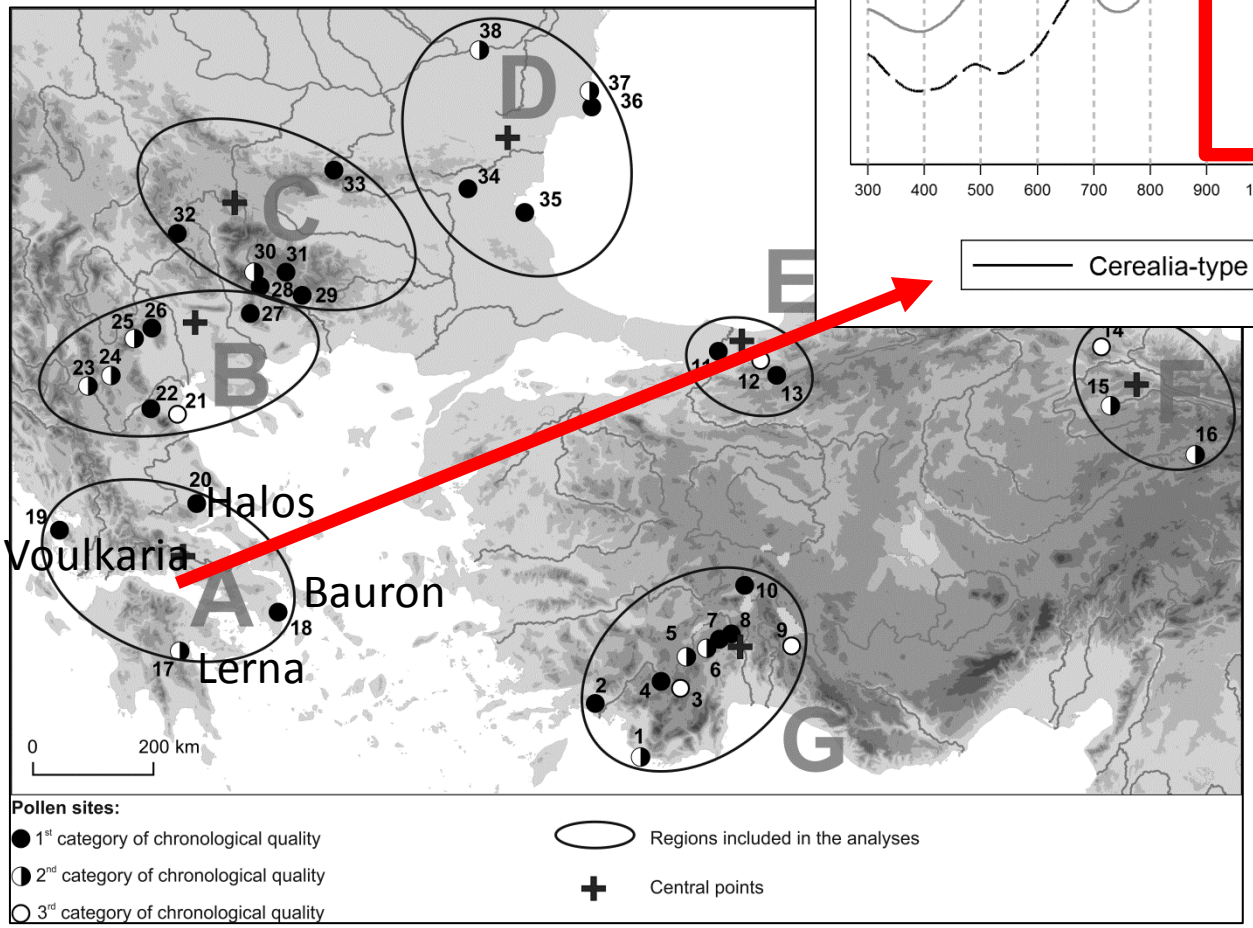




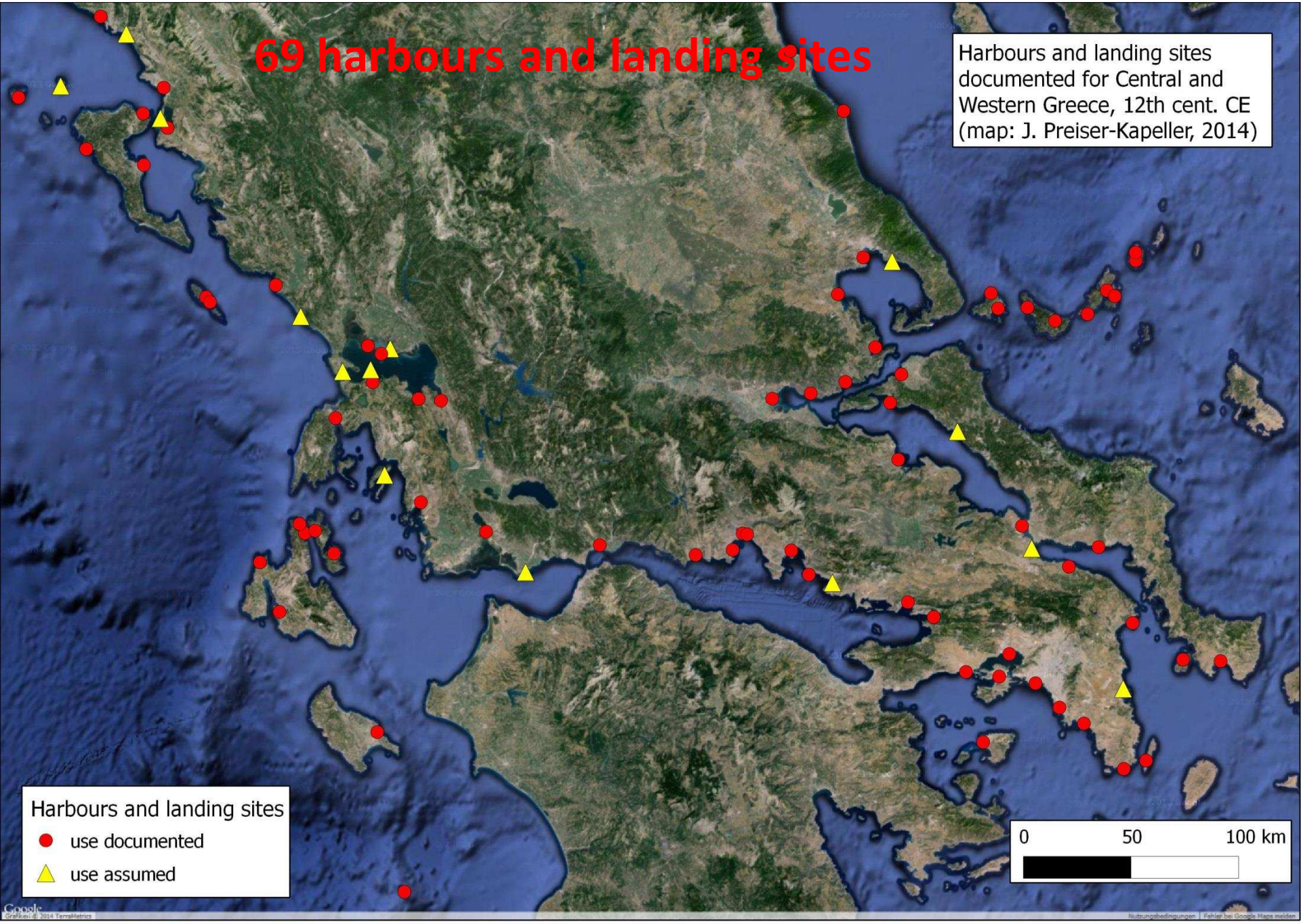


Continued growth in Central Greece

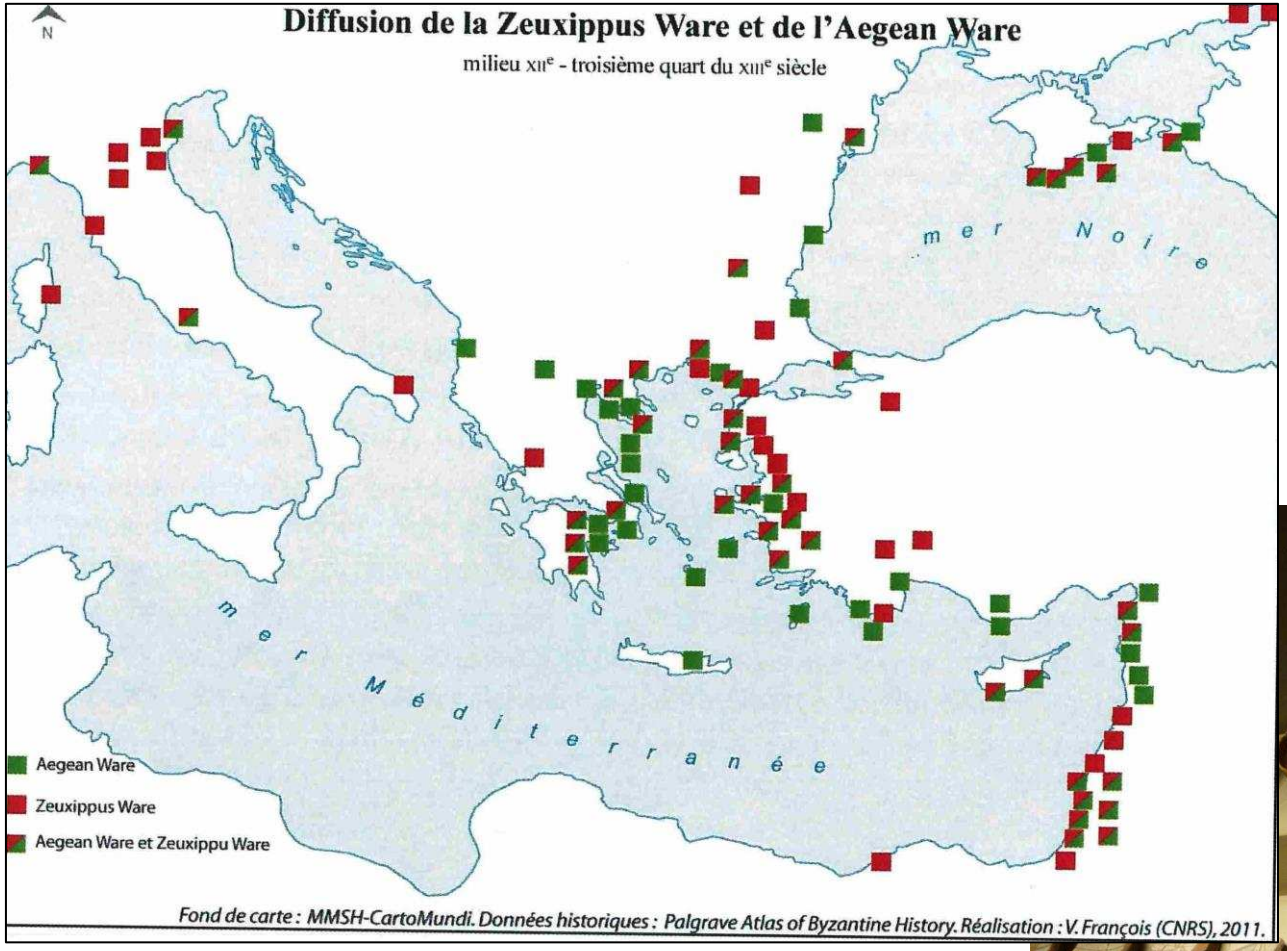




A. IZDEBSKI –
G. KOLOCH –
T. SŁOCZYŃSKI, Exploring Byzantine and Ottoman economic history with the use of palynological data: a quantitative approach. JÖB 65 (2015) 67–110.


69 harbours and landing sites
Harbours and landing sites documented for Central and Western Greece, 12th cent. CE (map: J. Preiser-Kapeller, 2014)
Harbours and landing sites
use documented
use assumed
0
50
100 km

The flourishing Mediterranean maritime trade of the „*People of the Blue Glass*“ in the 12th and 13th cent. AD



Véronique FRANÇOIS, 2012

Newcomers from Western Europe: human intestinal parasites from a latrine in the 12th century Frankish castle of Saranda Kolones in Paphos on Cyprus

Fig. 1. Map of Cyprus and aerial photograph of the castle of Saranda Kolones. The arrow indicates the geographic location of the castle in Paphos.

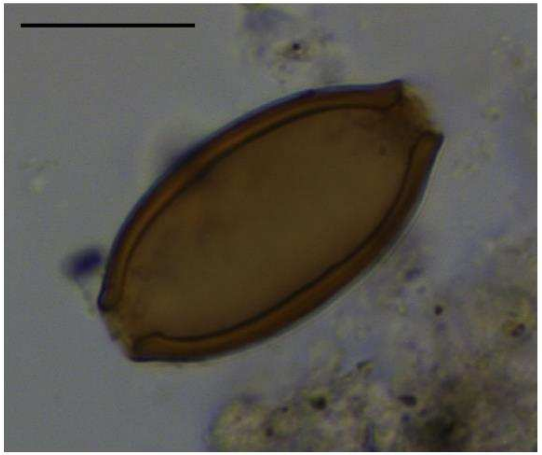


Fig. 5. *Trichuris trichiura* egg from Saranda Kolones castle. Measures 46 μm × 22 μm. Scale bar measures 20 μm.

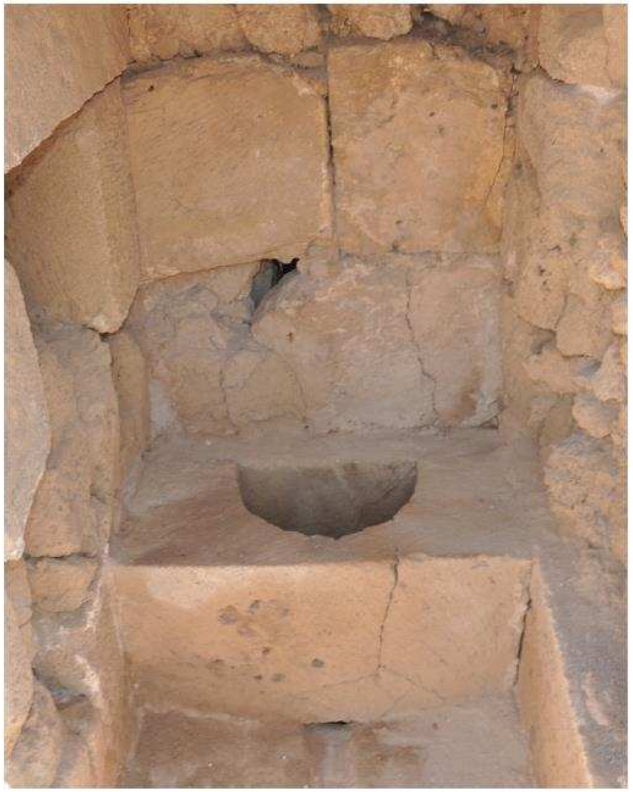


Fig. 3. The south latrine on the northwest pier of Saranda Kolones castle, from where samples were taken. Sediment from the cesspool was taken by reaching down through the hole in the latrine seat.

Anastasiou – Mitchell / International Journal of Paleopathology 3 (2013) 218–223

Changes in the production of glazed ceramics in the 13th cent. in Corinth

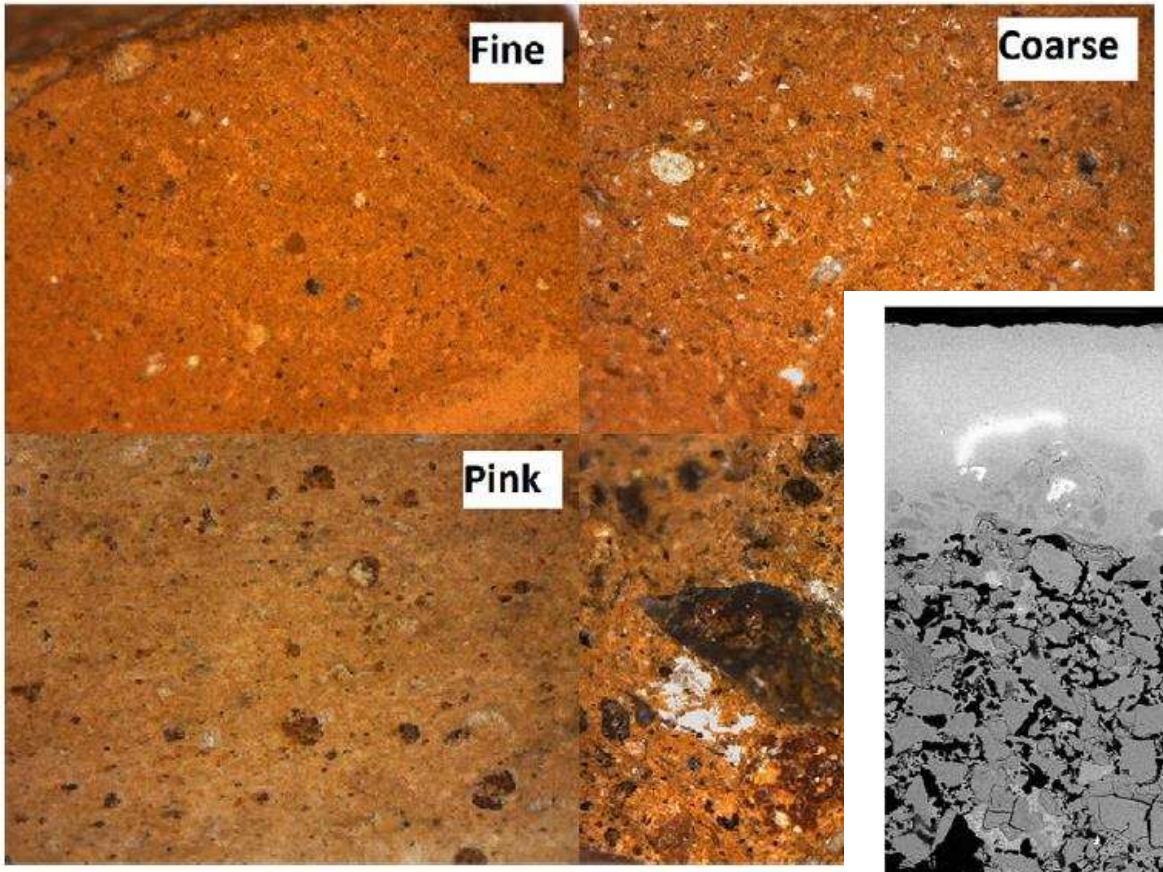


Fig. 2. Representative examples of redware fabrics (FOM images, mag

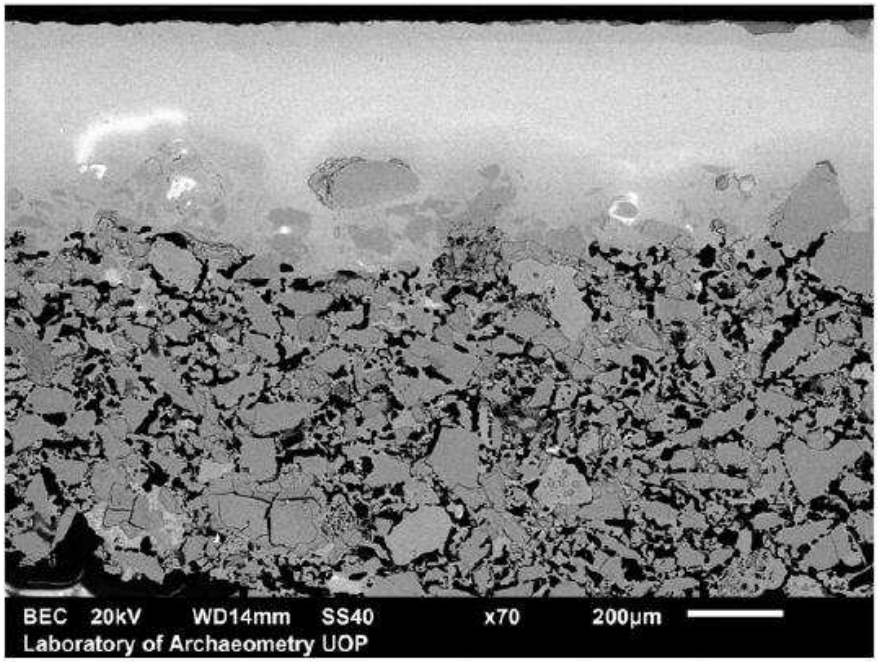


Fig. 4. Representative SEM image of a Group II sample. The quartz grains are bonded together by interparticle glass, suggesting a stonepaste body.

E. Palamara et al. / Microchemical Journal 129 (2016) 137–150

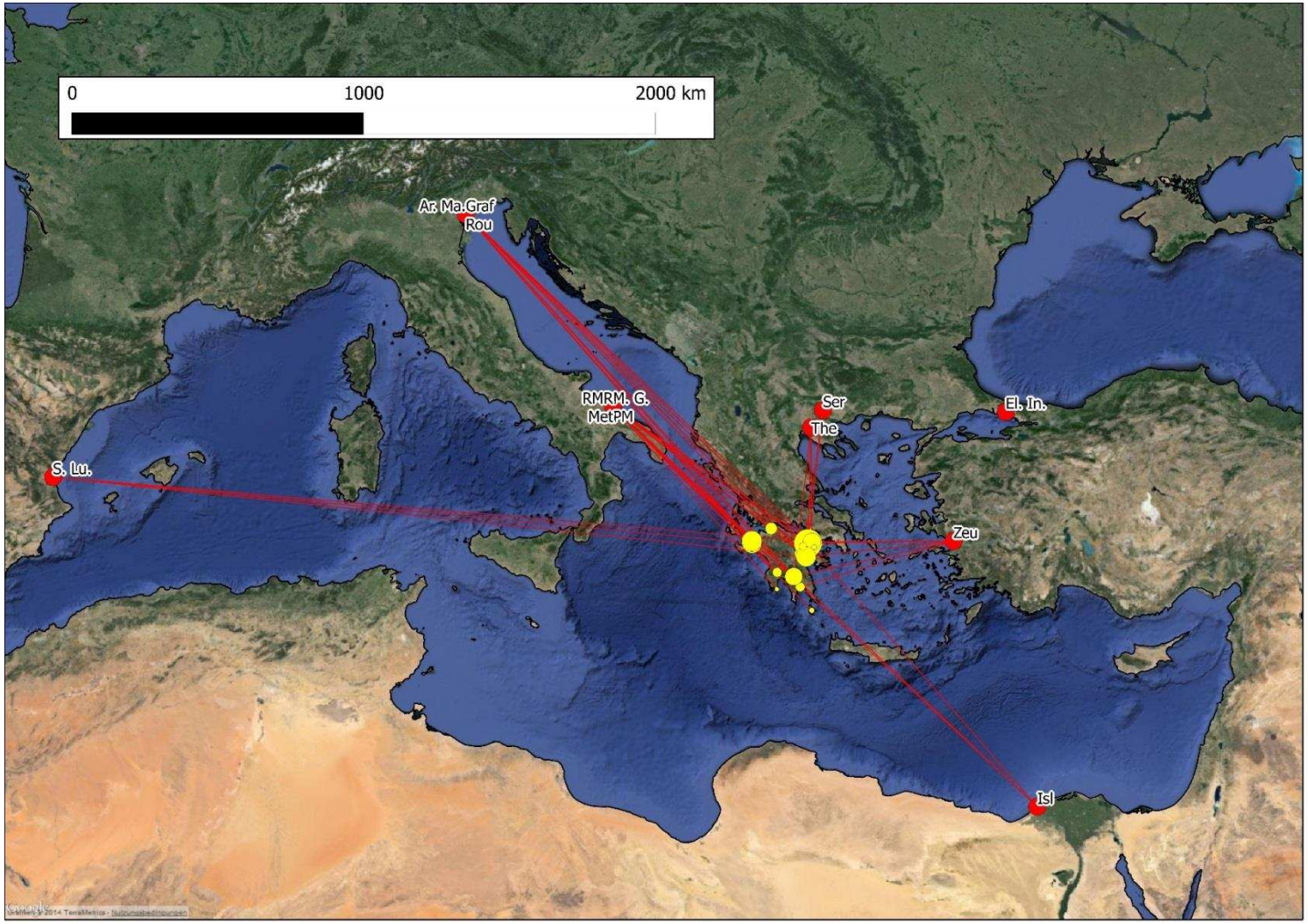
Late medieval Peloponnese, 20 sites resp. survey areas, 9 types of locally produced ceramics and 14 types of imported ceramics (cf. Vroom, 2011, p. 414)

ID	Name	Latitude	Longitude
1	Ay.Stephanos	36.818320	22.629877
2	Andravida	37.905833	21.266667
3	Argos	37.637778	22.727222
4	Berbati-L.	37.713240	22.880162
5	Chlemoutsi	37.89	21.142083
6	Corinth	37.889167	22.869722
7	Isthmia	37.915278	22.9925
8	Glarentza	37.940762	21.138833
9	Kenchreai	37.885	22.9875
10	Kythera	36.24	22.986667
11	Lakonia	36.994427	22.533020
12	Messene	37.175501	21.920439
13	Mystras	37.066389	22.376389
14	Nauplion	37.562222	22.807222
15	Nemea	37.807944	22.711944
16	Nichoria	37.002222	21.914167
17	Patras	38.246389	21.735
18	Sparta	37.073333	22.429722
19	Tsalika	37.793184	23.053449
20	Vasilitsi	36.764454	21.908997

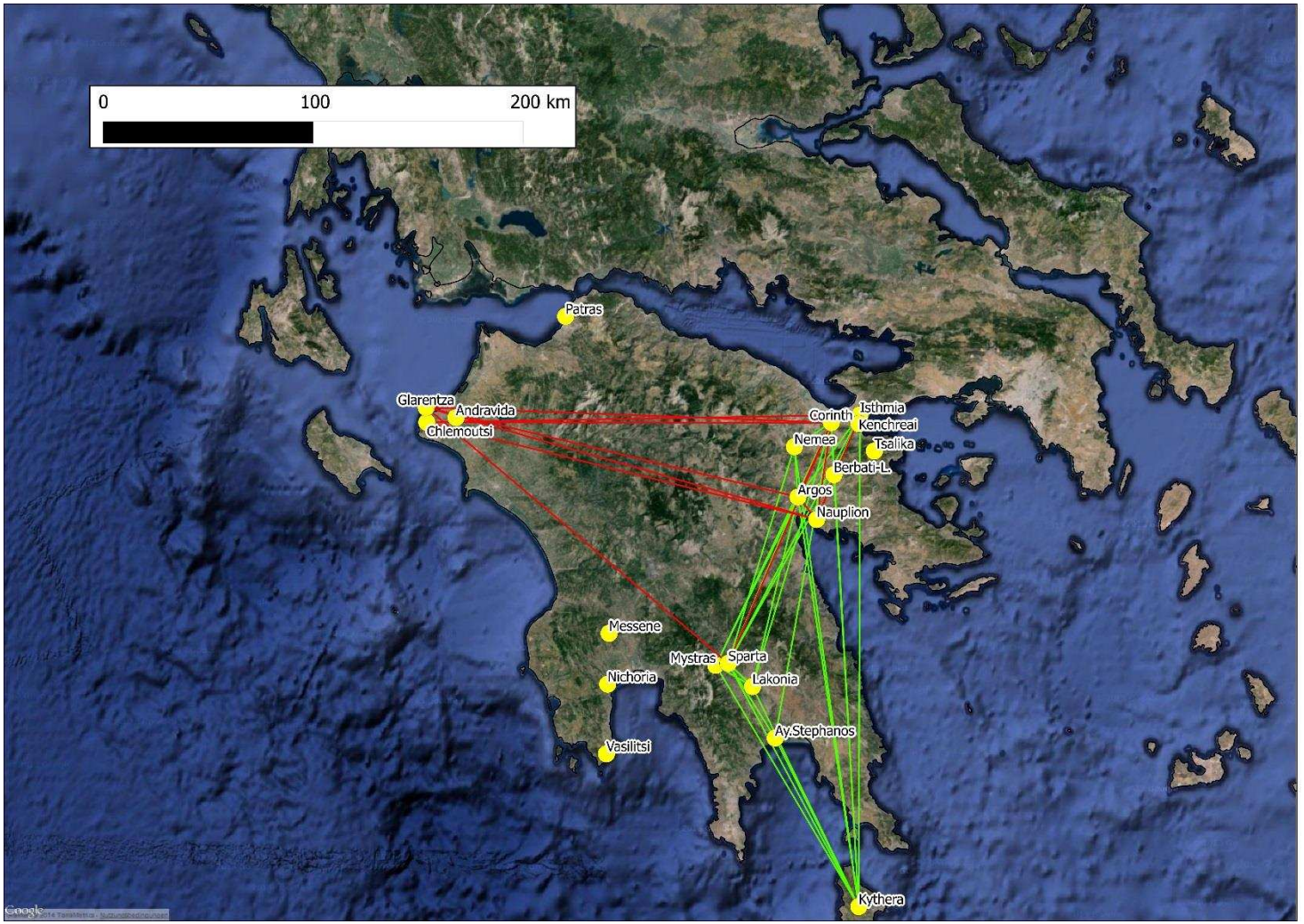
ID	Name	Type
1	Meas	Measles Ware
2	FineSg.	Fine Sgraffito Ware
3	Inc.Sg.	Incised Sgraffito Ware
4	Champ.	Champlevé Ware
5	L.Slip.	Late Slip-painted Ware
6	Mon.Gl.	Monochrome Glazed ware
7	Mon.Sg.	Monochrome Sgraffito Ware
8	Pol.Sg.	Polychrome Sgraffito Ware
9	Zeux.V.	Zeuxippus Ware Variants

ID	Name	Type
1	Ser	Polychrome Sgraffito Ware from Serres
2	The	Monochrome and Polychrome Sgraffito wares from Thessaloniki
3	Zeu	Zeuxippus Ware from Western Asia Minor (?)
4	M. G.	Monochrome Glazed Ware from Southern Italy
5	El. In.	Elaborate Incised Ware from NW-Turkey/N-Greece
6	PM	Proto-Maiolica from Southern Italy
7	RMR	'RMR' Ware from Southern Italy
8	Pai	Polychrome Painted Ware from Southern Italy
9	Met	'Metallic Ware' from Southern Italy
10	Rou	'Roulette Ware' from Northern Italy
11	Ar. Ma.	Archaic Maiolica from Northern Italy
12	Graf	Polychrome Sgraffito Wares ('graffita') from Northern Italy
13	Isl	Islamic Wares
14	S. Lu.	Spanish Lustre Wares

Regions of origin of imported ceramic types on the Peloponnese, 13th-15th cent.



Axes of distribution of for the imported types and for the locally produced types of ceramics



Another wave of epidemics of *Yersinia pestis* starting in the mid-14th cent.

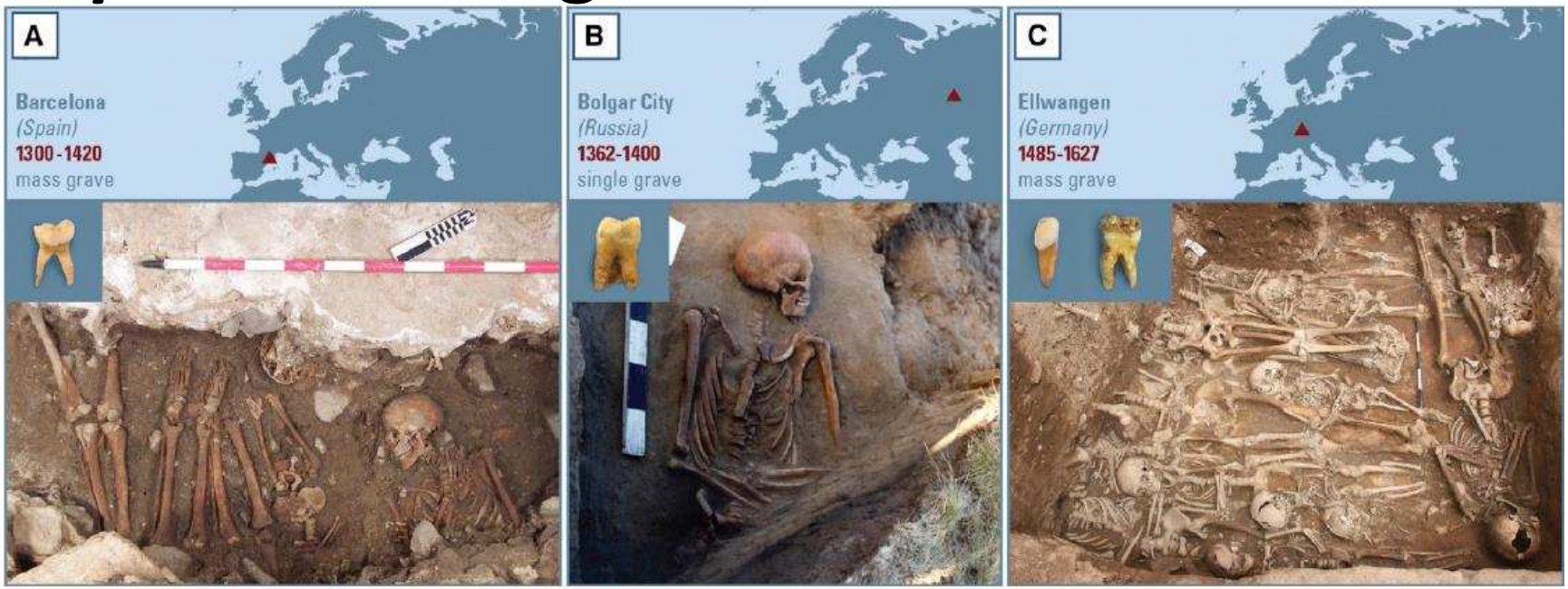


Figure 1. Samples and Their Respective Locations

(A) Tooth sample that was positive for *Y. pestis* (3031) and mass grave

(B) *Y. pestis*-positive tooth sample and picture of infected individual (2

(C) Picture of mass grave in Ellwangen, and two tooth samples from ir

Spyrou et al., 2016, Cell Host & Microbe 19, 874–881

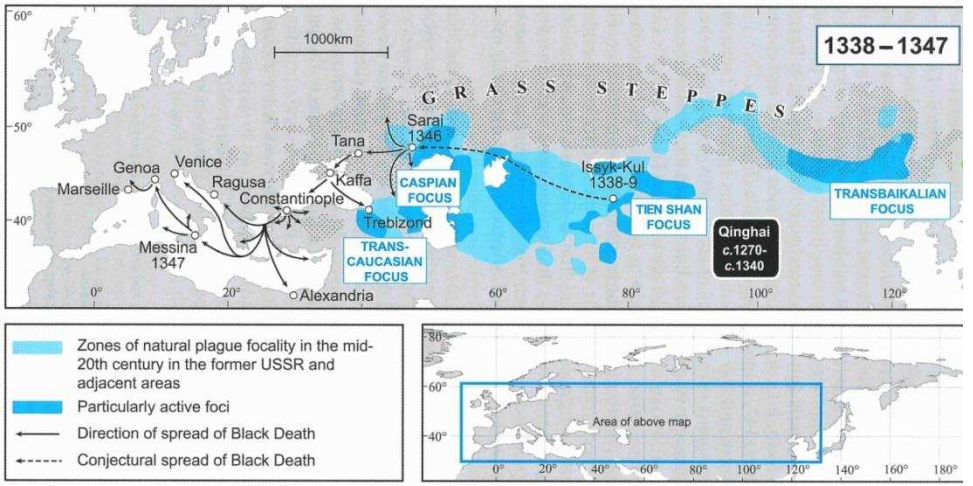


Figure 4.9 The spread of plague from Asia to Europe, 1338–47

Sources: Norris (1977), 12, 20; Benedictow (2004), map 1; Christakos and others (2005), 244–50

From: Campbell 2016

The macro- and micro-dynamics of maritime trade and socio-economic parameters of the *„People of the Blue Glass“*

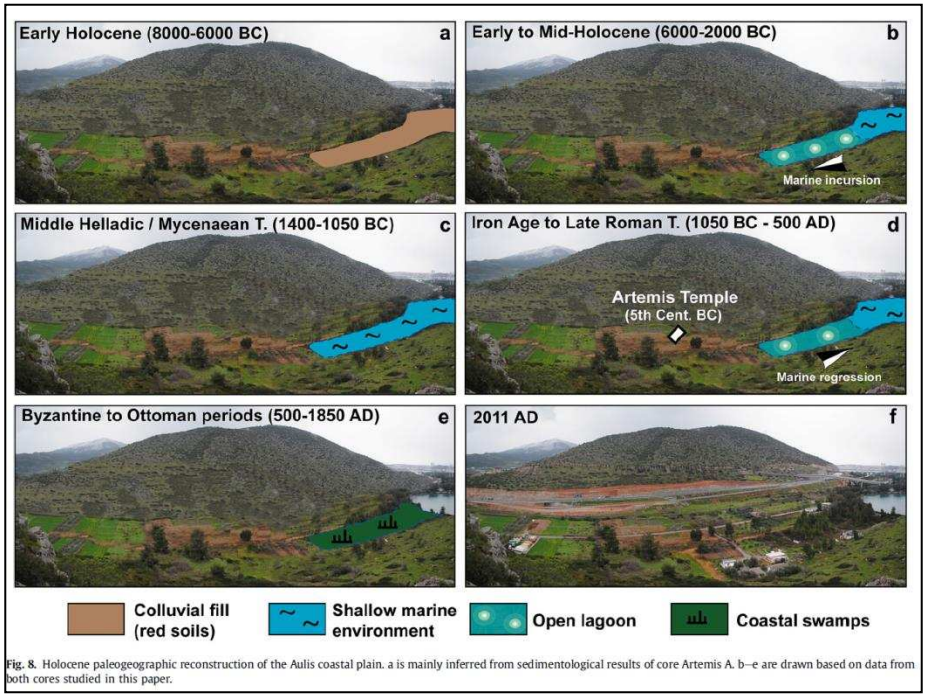


Fig. 8. Holocene paleogeographic reconstruction of the Aulis coastal plain. a is mainly inferred from sedimentological results of core Artemis A. b–e are drawn based on data from both cores studied in this paper.

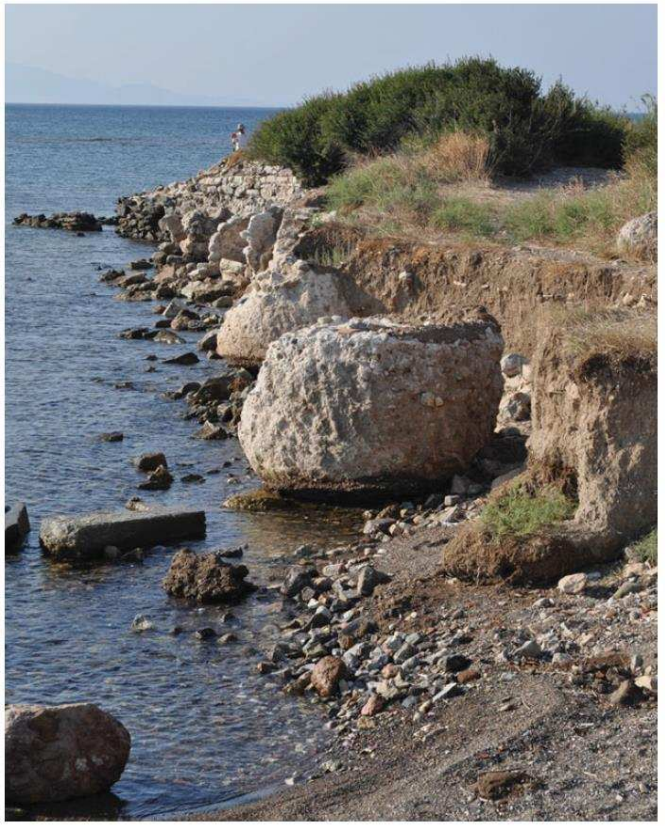
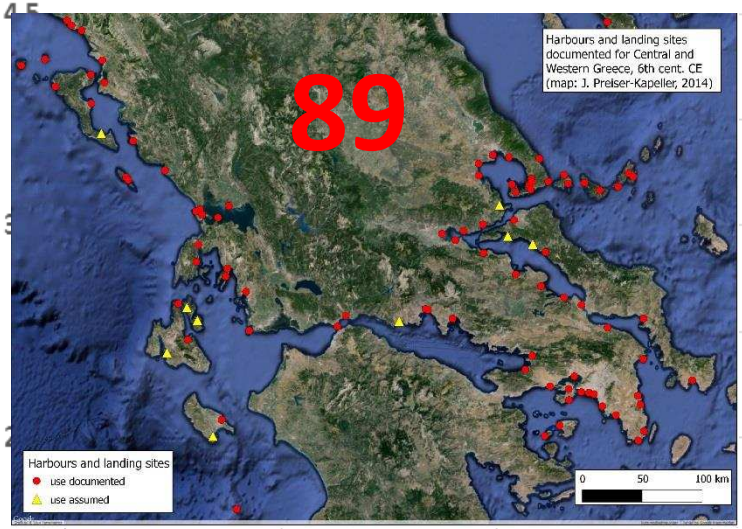
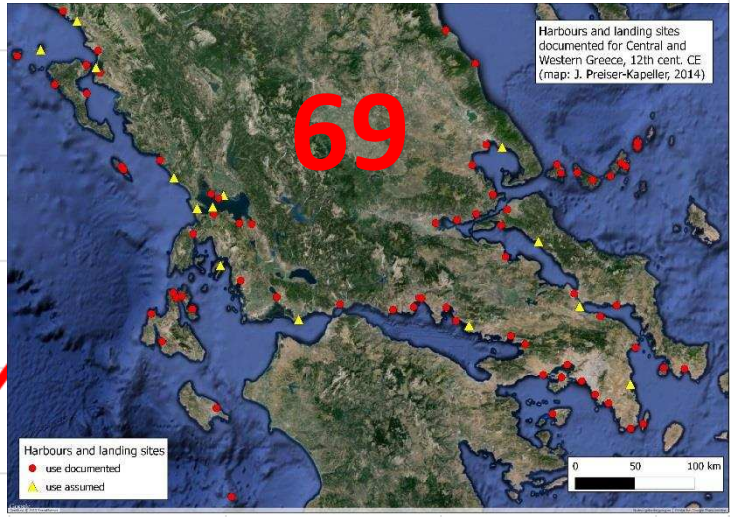
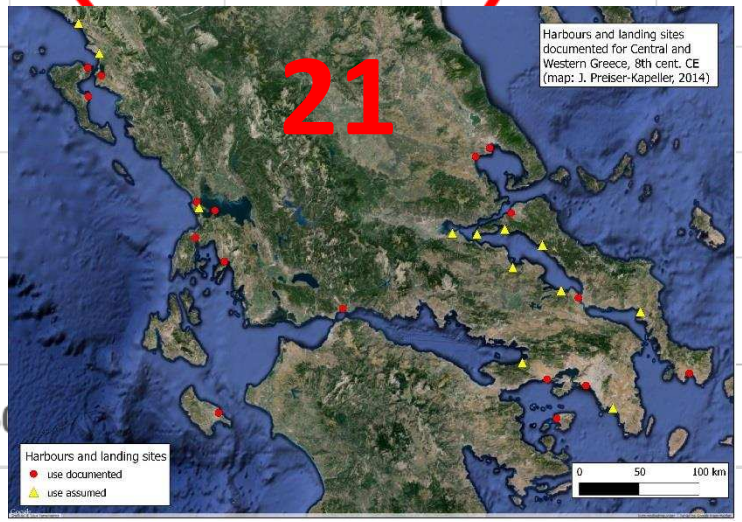


Figure 3. Facilities for production and storage of wine along the south-west edge of Harbour 4 (L4), including large built dolia eroding out of the scarp and a fragmentary wine press visible in the water. (E. S. Greene)

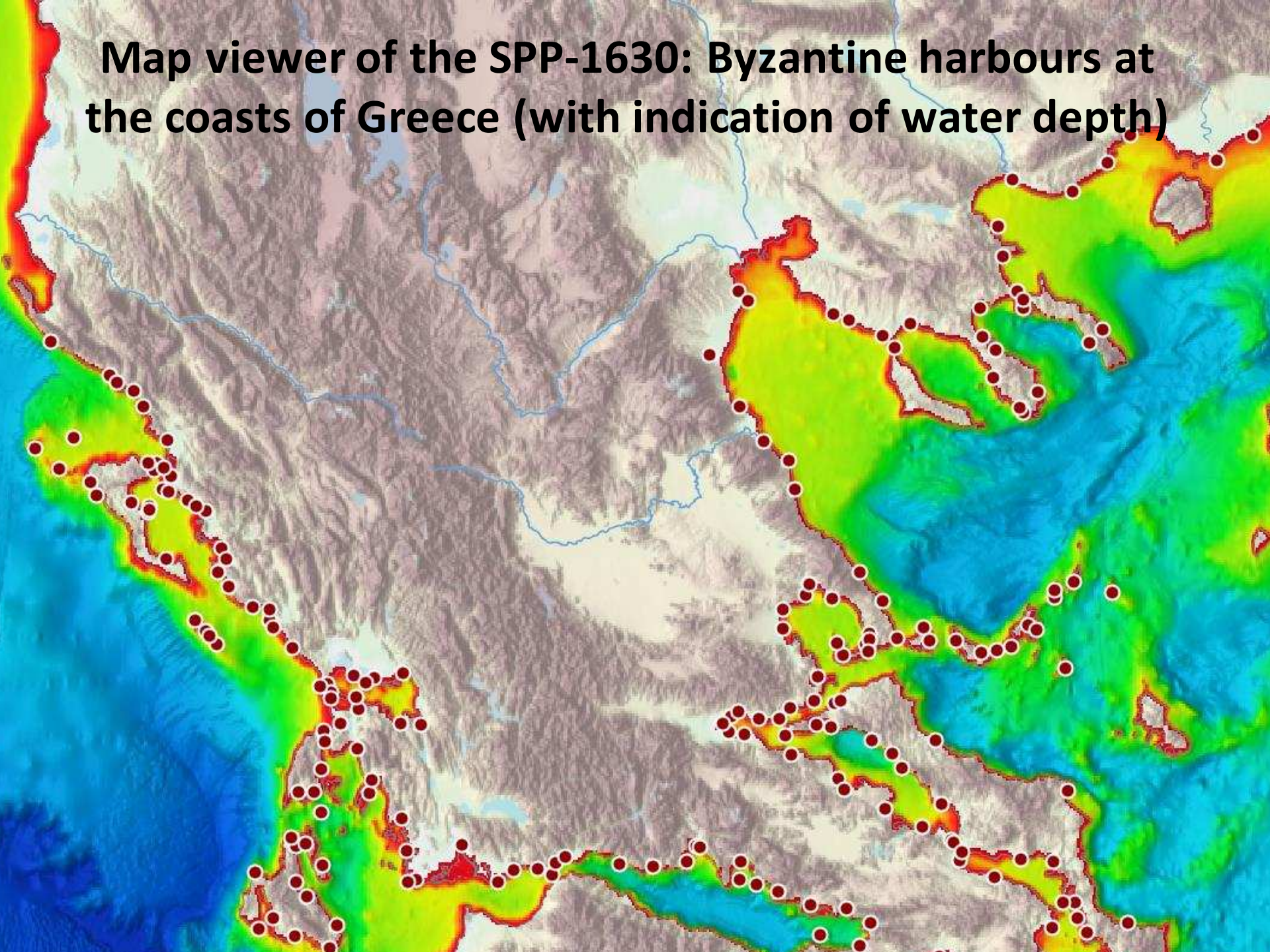
Trendline of Vine pollen in Central Greece (after Izdebski et al. 2016)



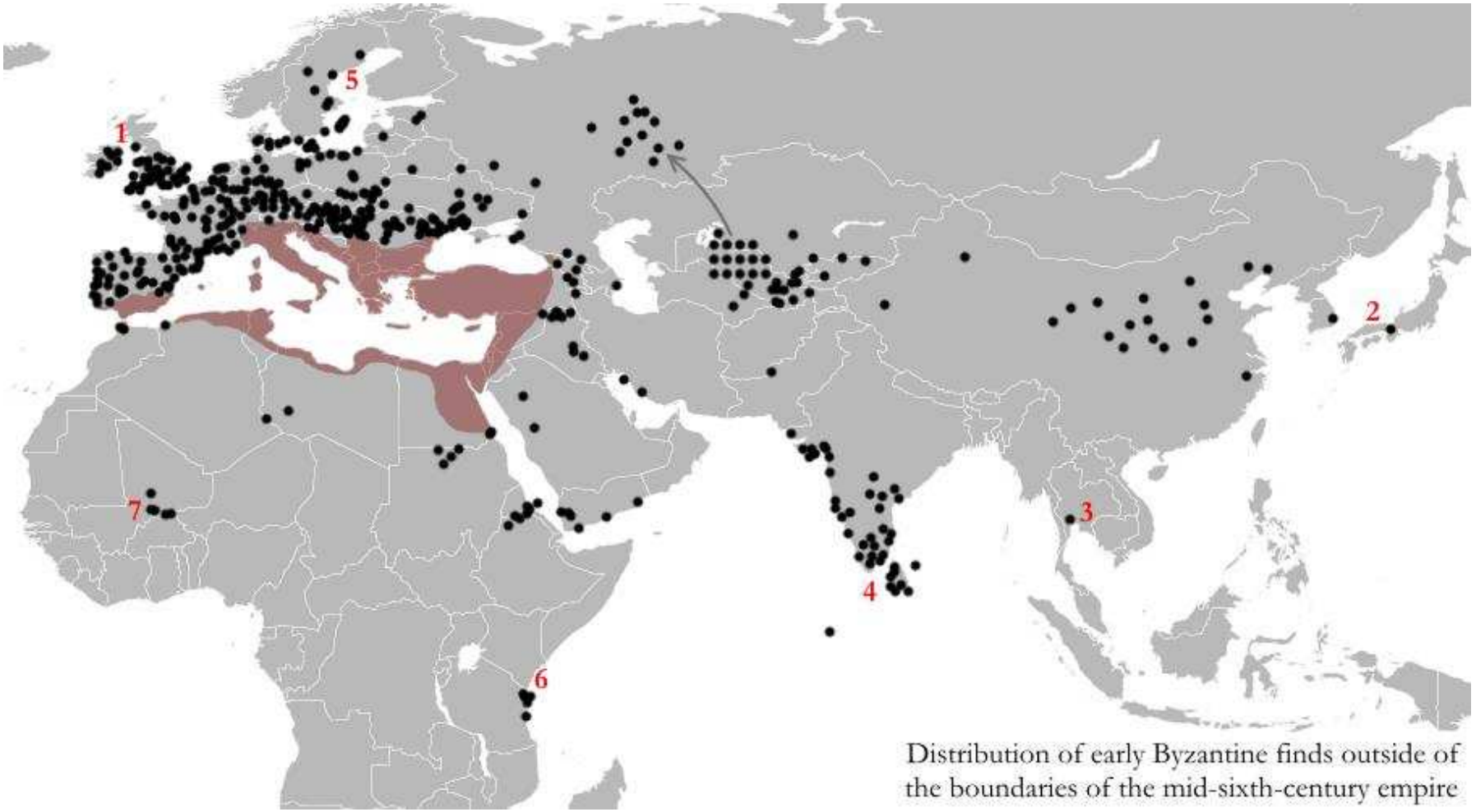




Map viewer of the SPP-1630: Byzantine harbours at the coasts of Greece (with indication of water depth)



The global connectivity of the „People of the Blue Glass“



Distribution of early Byzantine finds outside of the boundaries of the mid-sixth-century empire

http://www.caitlingreen.org/2017/03/a-very-long-way-from-home.html

Dates of publication of studies used for this presentation