



# Introduction

Maps in Science and Society

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Winter 2020

# History of the Class

- First taught at UCSB by Waldo Tobler, using materials from George Kish at Michigan
- Paper presented in 1993

## History of Cartography As Taught at UCSB †

History of Cartography Conference, Chicago, June 1993

Waldo Tobler

As background to my course at the University of California, Santa Barbara, I should inform you that my training is in geographical cartography, and my specialties are the subjects of map projections, mathematical and computer cartography, and analytical geographical modeling. I teach courses in all of these areas. My language competence is limited to western tongues.

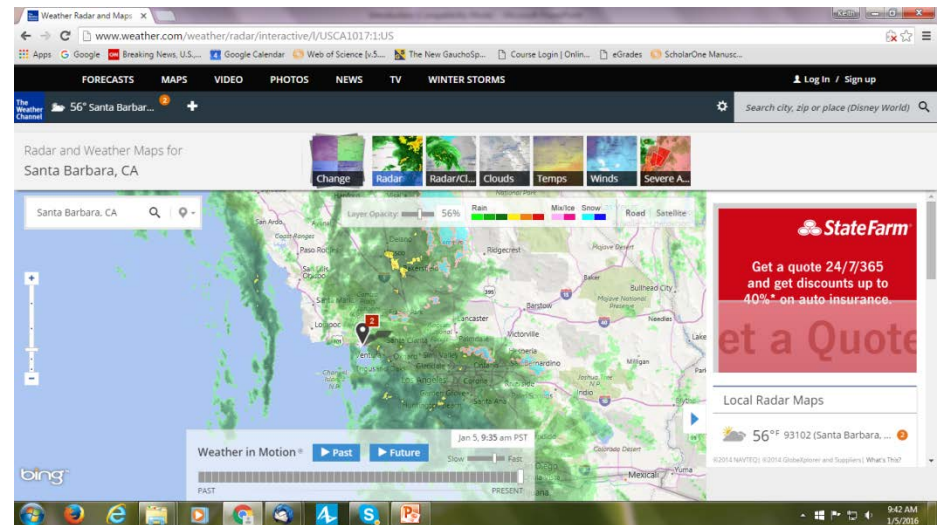
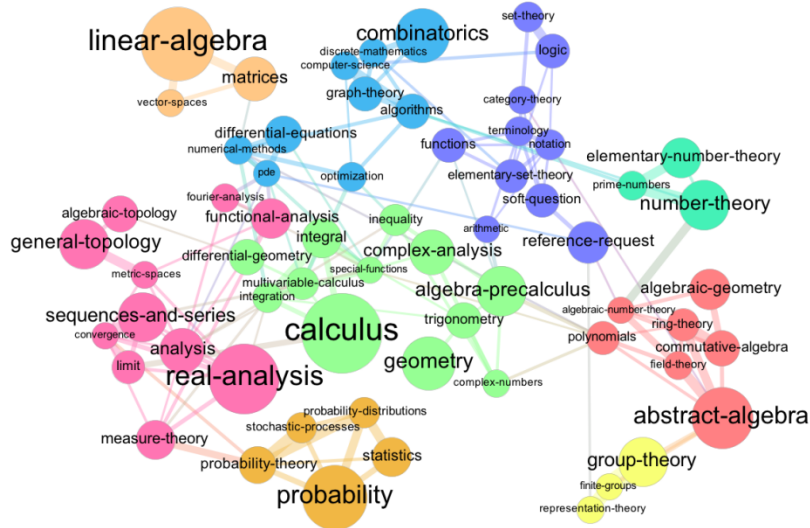
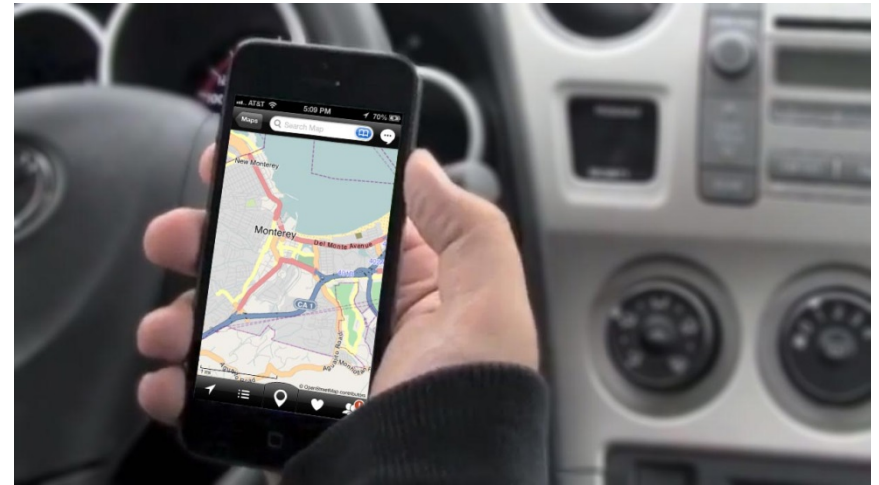
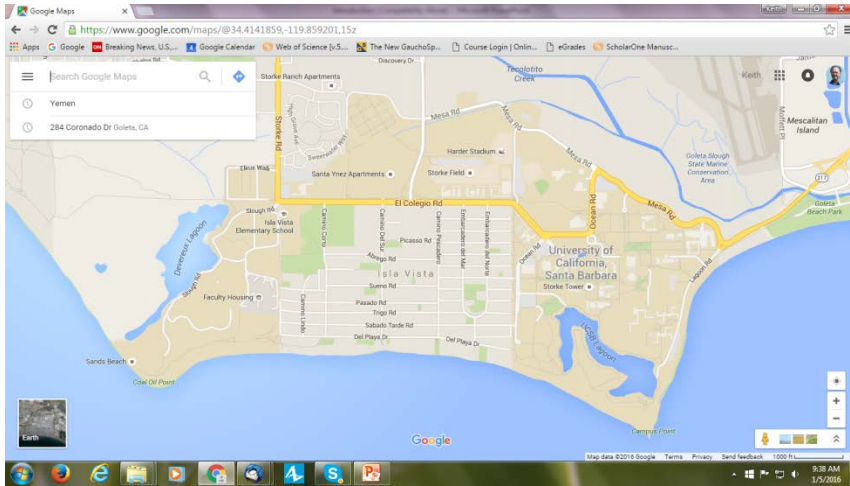
During a ten week quarter I present twenty-five lectures in a once-a-year course called “History of Cartography”. While at the University of Michigan I had the good fortune to audit the comparable course offered by the late Professor George Kish, and I use some slides from his



# Geog 126

- Awarded a Fulbright Distinguished Chair in 2007 at the University of Trieste, Italy
- Used part of the time to build the class
- Chose to change chronology organization to development of mapping science and technology around 6 themes with labs
- Have taught the class since 2008 in alternate years

# Mapping technology today



# Maps in Science and Society

- This class is designed to show how technical and scientific development in cartography produced a series of instruments, practitioners, and ultimately maps that illustrate the strive for cartographic knowledge, accuracy and lucidity.
- In lectures, we will explore history by theme, tracing how developments in methods and ideas went hand in hand.
- In labs, we will build an experience through the analysis, replication and use of historical maps and mapping instruments.

# Assessment

- There will be six laboratory assignments that will make practical the ideas introduced in lecture (each worth 10% of the grade)
- Also a brief paper, discussing a map or mapping method of particular interest to the student encountered during the course.
- The paper should be no longer than six pages, including references and illustrations, suitable for use as a Wiki entry. Worth 30%
- The papers will be reduced to Powerpoint (or equivalent) presentations: each with no more than four slides and lasting five minutes. This will take the place of the final (10%)

# Maps in Science and Society

- TOPIC 1: Geographical Positioning and Maps
- TOPIC 2: Thematic cartography
- TOPIC 3: Exploration and the Expansion of Nation States
- TOPIC 4: Perceptions of Foreign Lands
- TOPIC 5: Toponymy
- TOPIC 6: Maps and Visualization

# Resources

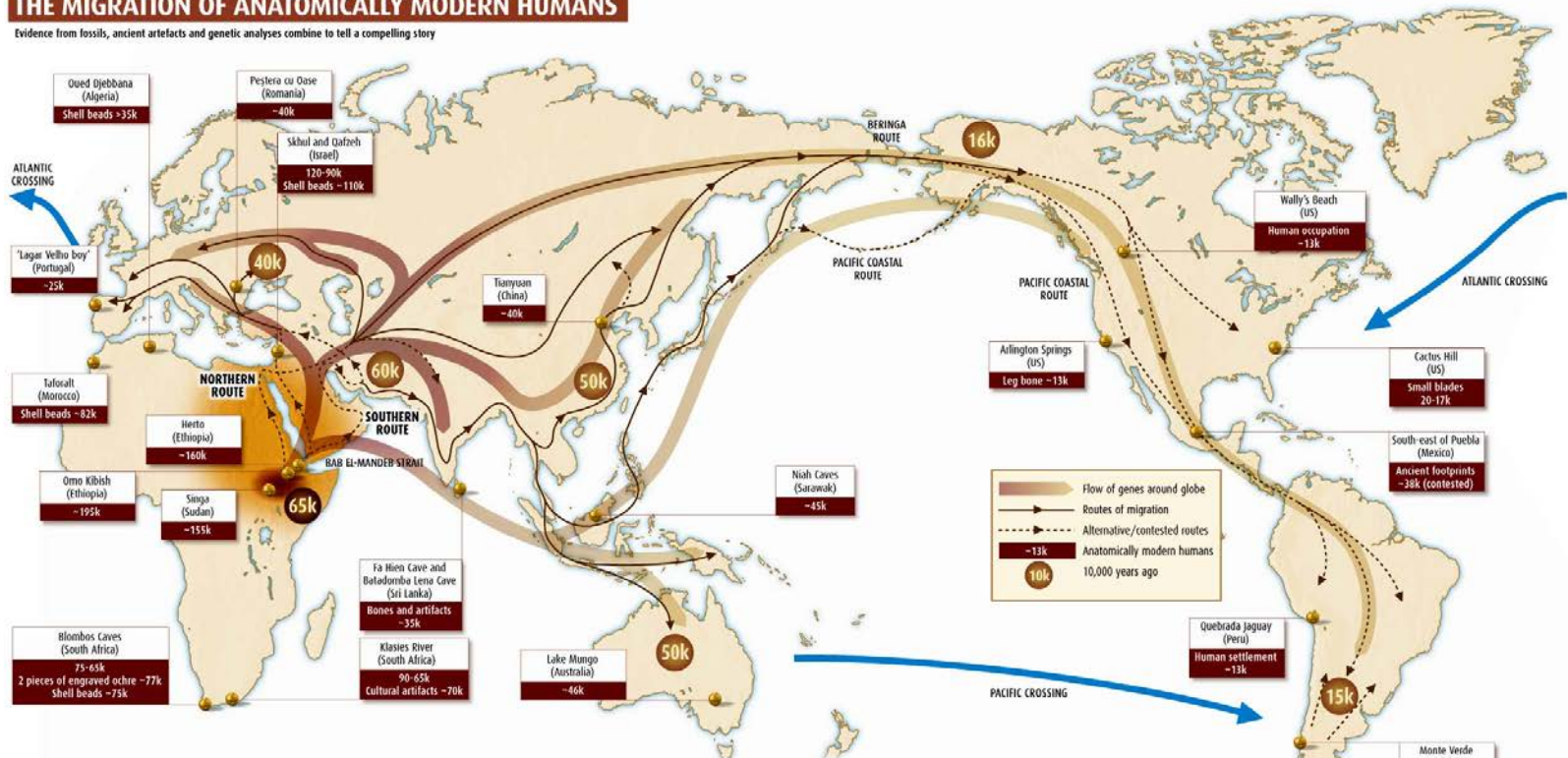
- Lectures
- Videos
- Laboratory exercises
- Web site and links
- Gauchospace
- Discussions
- References



# Human Origins

## THE MIGRATION OF ANATOMICALLY MODERN HUMANS

Evidence from fossils, ancient artefacts and genetic analyses combine to tell a compelling story



Two routes jump out as prime candidates for the human exodus out of Africa. A northern route would have taken our ancestors from their base in eastern sub-Saharan Africa across the Sahara desert, then through Sinai and into the Levant. An alternative southern route may have charted a path from Djibouti or Eritrea in the Horn of Africa across the Bab el-Mandeb Strait and into Yemen and around the Arabian peninsula. The plausibility of these two routes as gateways out of Africa has been studied as part of the UK's Natural Environment Research Council's

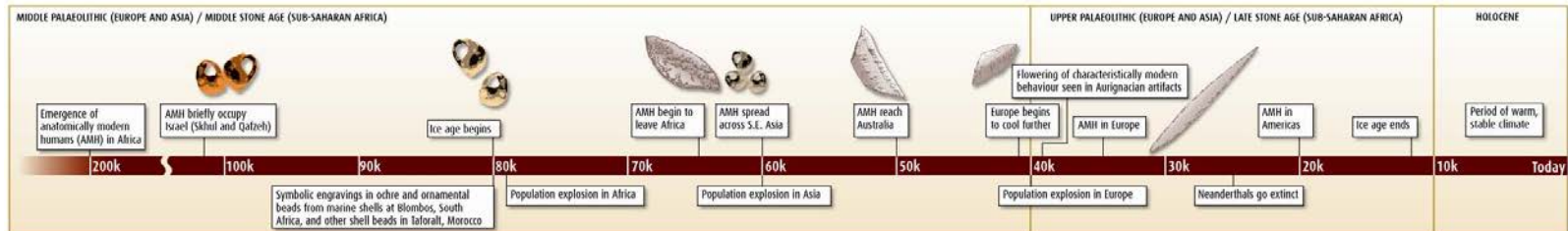
programme "Environmental Factors in the Chronology of Human Evolution & Dispersal" (EFCHEd).

During the last ice age, from about 80,000 to 11,000 years ago, sea levels dropped as the ice sheets grew, exposing large swathes of land now submerged under water and connecting regions now separated by the sea, by reconstructing the ancient shorelines, the EFCHEd team found that the Bab el-Mandeb strait, now around 30 kilometres wide and one of the world's busiest shipping lanes, was then a narrow, shallow channel.

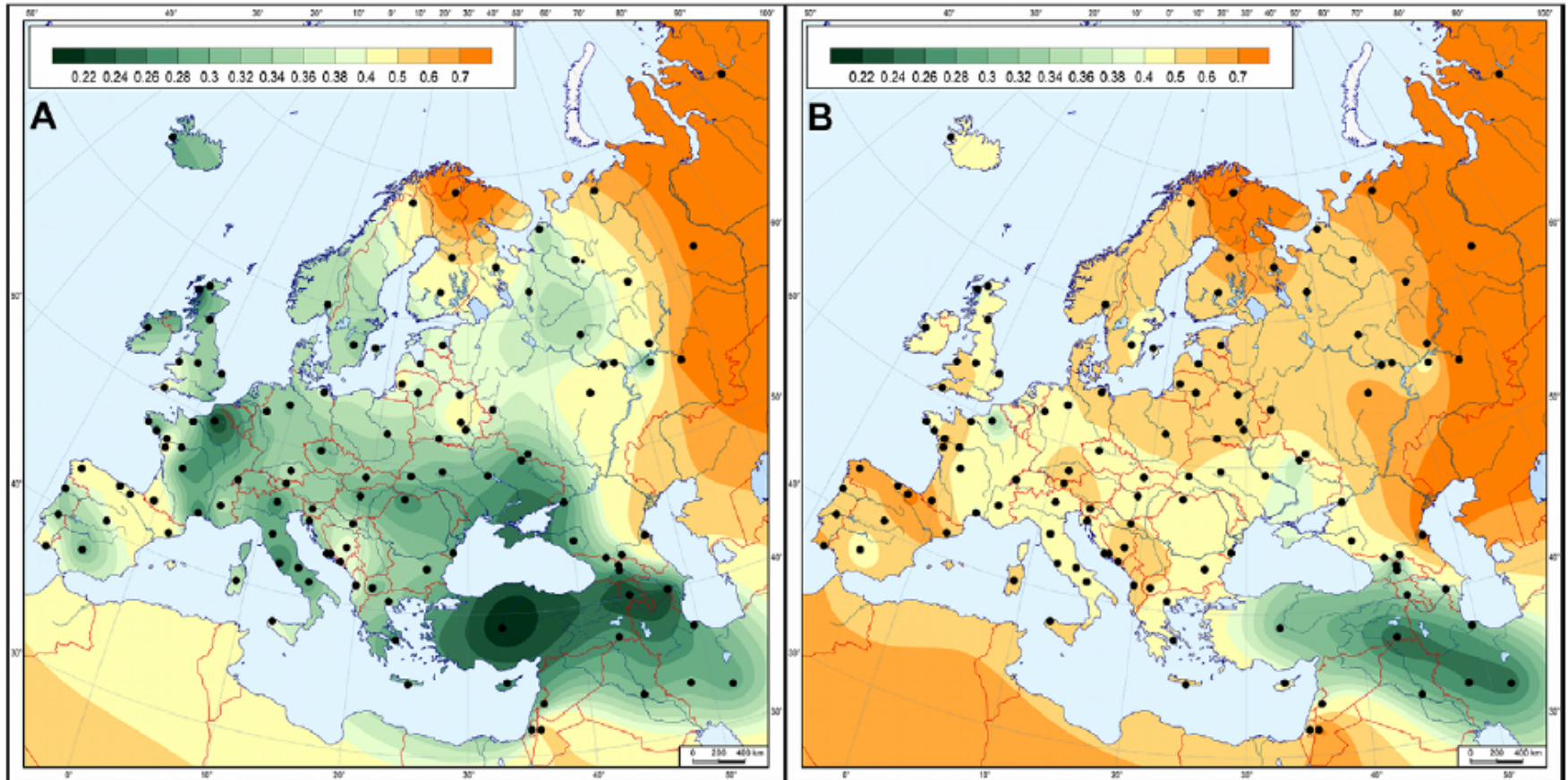
Early humans may have taken the southern route out of Africa. The northern route appears easier, especially given the team's finding that the Suez basin was dry during the last ice age. But crossing the Sahara desert is no small matter. EFCHEd scientist Simon Armitage of the Royal Holloway University of London has found some clues as to how this might have been possible. During the past 150,000 years, North Africa has experienced abrupt switches between dry, arid conditions and a humid climate. During the longer wetter periods huge lakes existed in both Chad and Libya, which would have

provided a "humid corridor" across the Sahara.

Armitage has discovered that these lakes were present around 10,000 years ago, when there is abundant evidence for human occupation of the Sahara, as well as around 115,000 years ago, when our ancestors first made forays into Israel. It is unknown whether another humid corridor appeared between about 65,000 and 50,000 years ago, the most likely time frame for the human exodus. Moreover, accumulating evidence is pointing to the southern route as the most likely jumping-off point.



# DNA Within Europe

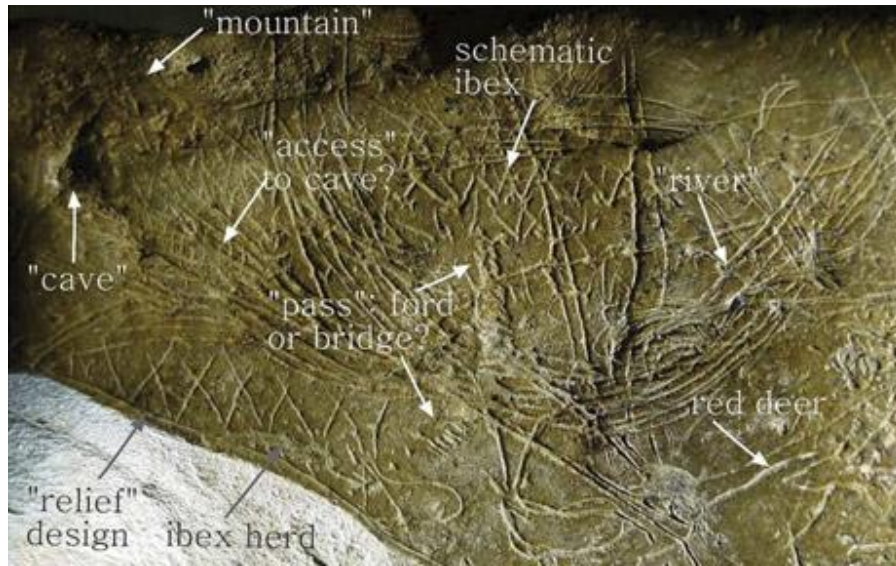


**Figure 3. Genetic matrilineal distances between 55 modern Western Eurasian populations (Table S6) and Neolithic LBK samples.** Mapped genetic distances are illustrated between 55 modern Western Eurasian populations and the total of 42 Neolithic LBK samples (A) or the single graveyard of Derenburg (B). Black dots denote the location of modern-day populations used in the analysis. The coloring indicates the degree of similarity of the modern local population(s) with the Neolithic sample set: short distances (greatest similarity) are marked by dark green and long distances (greatest dissimilarity) by orange, with fainter colors in between the extremes. Note that green intervals are scaled by genetic distance values of 0.02, with increasingly larger intervals towards the “orange” end of the scale.

# My conjecture

- 60000 years ago possibly no more than 200 HS families migrate from Africa to Arabian peninsula
- By 15000BP humans are everywhere on earth (32km/gen)
- Was this exploration possible without maps?
- Extensive ancient knowledge of world
- Then for millennia, people remained in place (with some exceptions)
- Age of Discovery and Exploration during the renaissance: Maps again critical
- Era of mass emigration spreads humanity a second time: Colonization and maps
- Contemporary period: Ubiquitous mapping and navigation

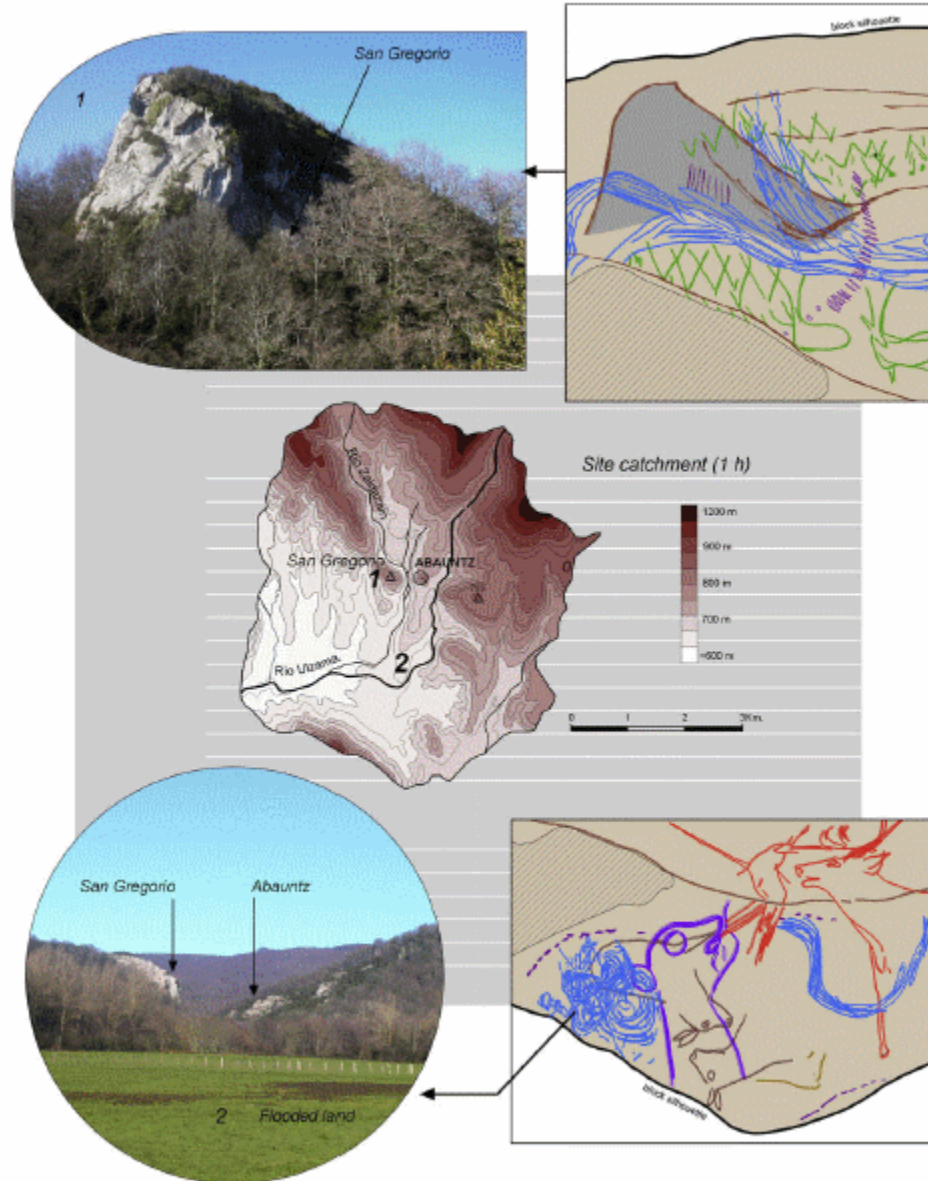
# Earliest evidence 9,000 years before writing:



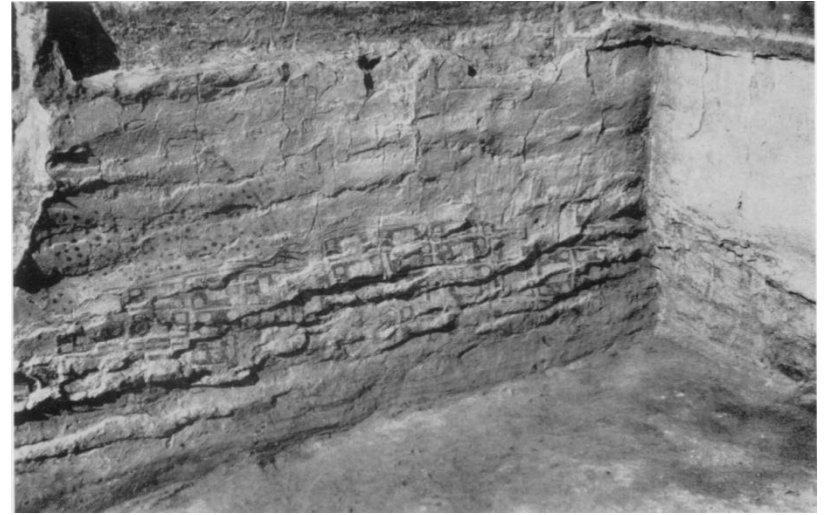
World's oldest stone map. Source: *Journal of Human Evolution*, 2009, Volume 57, Number 2, pp. 99-111.

A team of Spanish archaeologists have matched marks on polished sandstone made 14,000 years ago in Navarre, northern Spain to the landscape in which it was found and claim to have the earliest known map, which appears to be a prehistoric hunting map. The map has depictions of reindeer, a stag and some ibex, plus the shapes of mountains, and the course of a river

# Abauntz Cave, Navarra, Spain



# Some Amazing Maps



# Ulm, Ptolemy (150 AD)



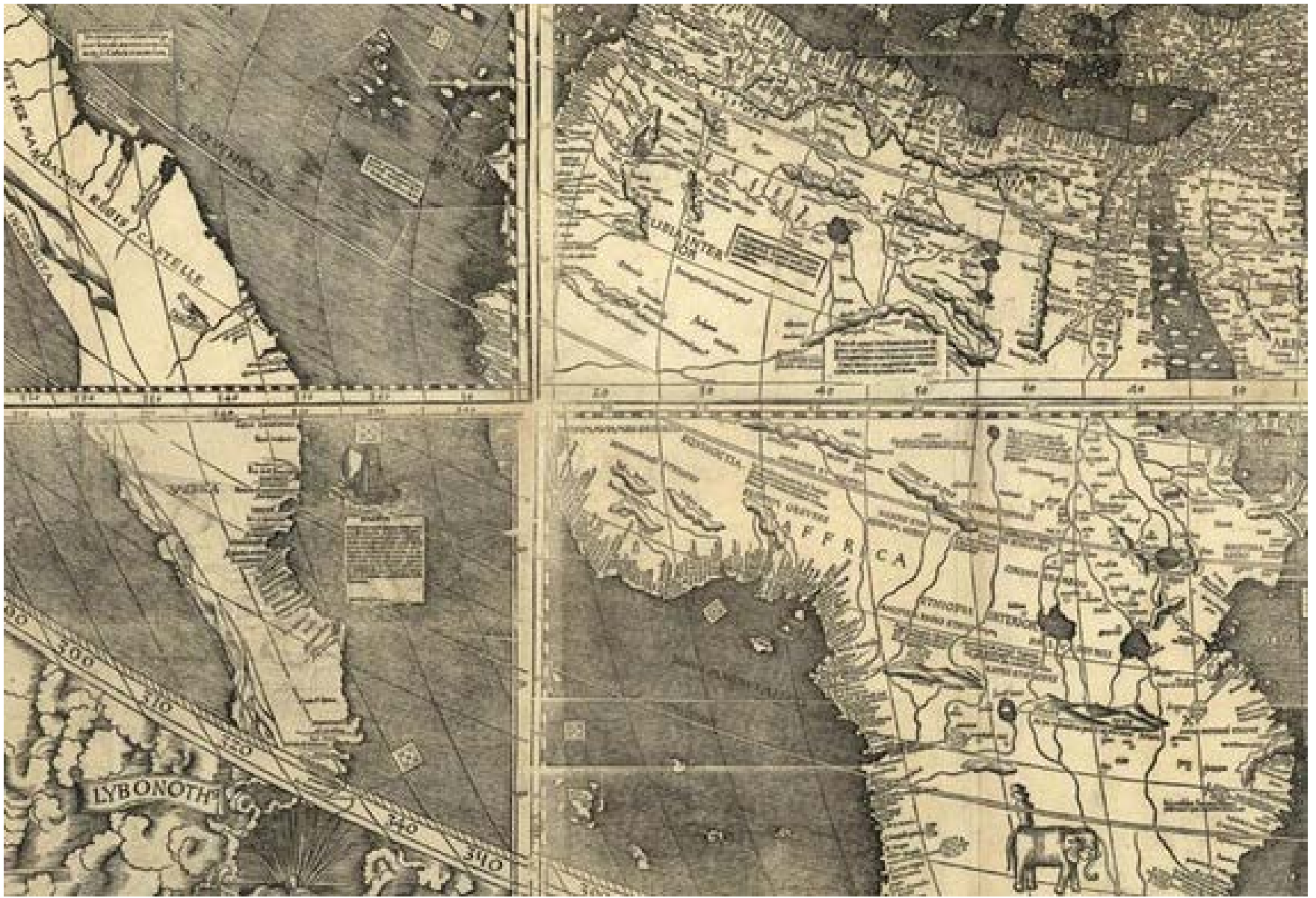
# Hereford Cathedral Mappa Mundi 1300AD





# Kwon Kun's Kangnido Map (1402)

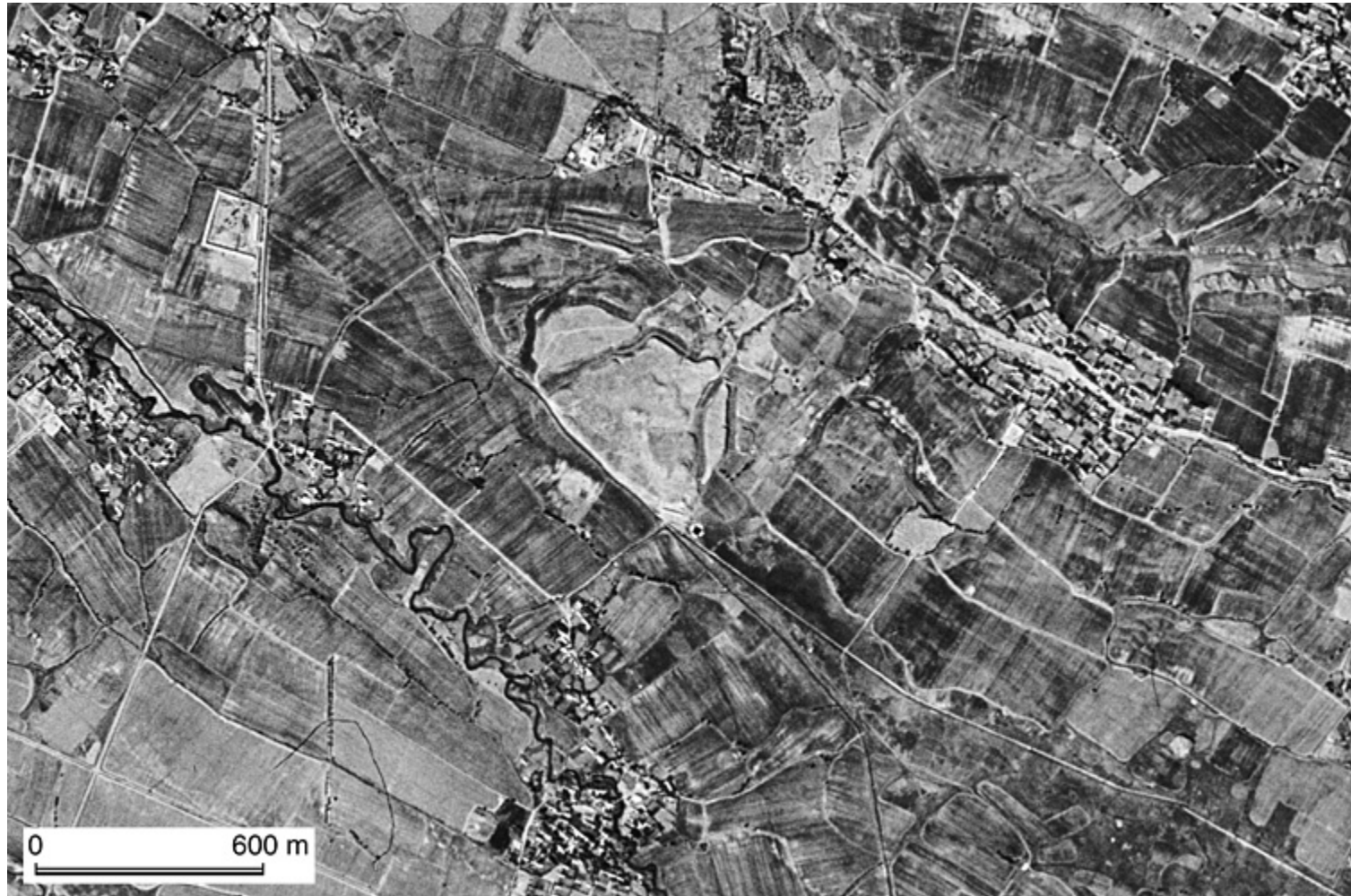




America and Africa in Martin Waldseemüller's 1507 world map

# Early Remote Sensing

Kok Tepa ruins near Samarkand, Uzbekistan  
occupied c 500 BC to 1220 AD



# Harry Beck: London Underground 1933



# London: The Information Capital



## Photogenic Features

Millions of Flickr users capture London's best side.

A sleepy tiger, a blue whale, the Queen's Guards and the arc of the London Eye. To get these shots, leave your guidebook at home and head to spots on this map. Researchers Alexander Kachkaev and Jo Wood at City University London plotted more than 1.5 million pictures taken by 45,000 users on Flickr, the popular photo-sharing site. Like camera flashes in a dark arena, these lines and clusters expose patterns of human activity. Purple dots indicate photographs taken in low light conditions, such as inside a museum or at night; yellow indicates images made in the bright light of day, often in parks and squares or along the Thames, Regent's Canal and The Serpentine. Turn the page to zoom in on Westminster.

Flickr photographs by luminance  
January 2008 - June 2013



SOURCE: FLICKR



Excerpted from *London: The Information Capital* by James Cheshire and Oliver Uberti (Particular Books, 30 October 2014)

# Some questions to ponder

- If maps existed 60K years ago, what did they look like? What functions did they perform?
- Do maps today still serve the same functions?
- How has scientific progress changed map accuracy and function?
- Why do so few truly ancient maps survive?