

# Climate and Human History

## Stephan Matthiesen

1. Climate and climate history
2. The Ice Age
3. Farming and City States
4. Rise and Fall of the Roman Empire
5. Tang and Maya in the 10th century
6. Mediaeval Optimum and Little Ice Age
7. El Niño through the ages
8. Miscellaneous topics
9. Current and future changes
10. Summary and re-cap

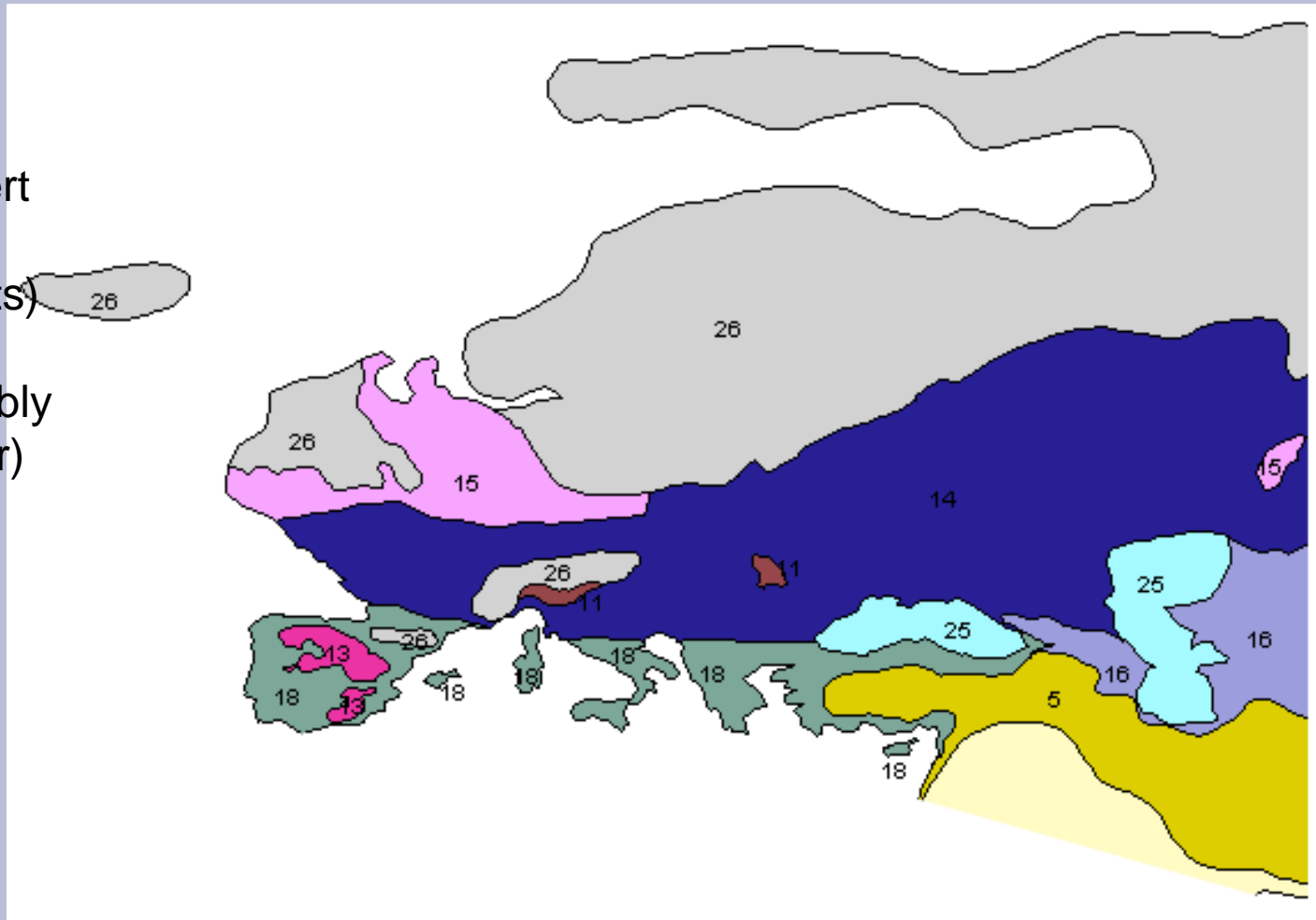
# Europe in the LGM

26: Permanent ice

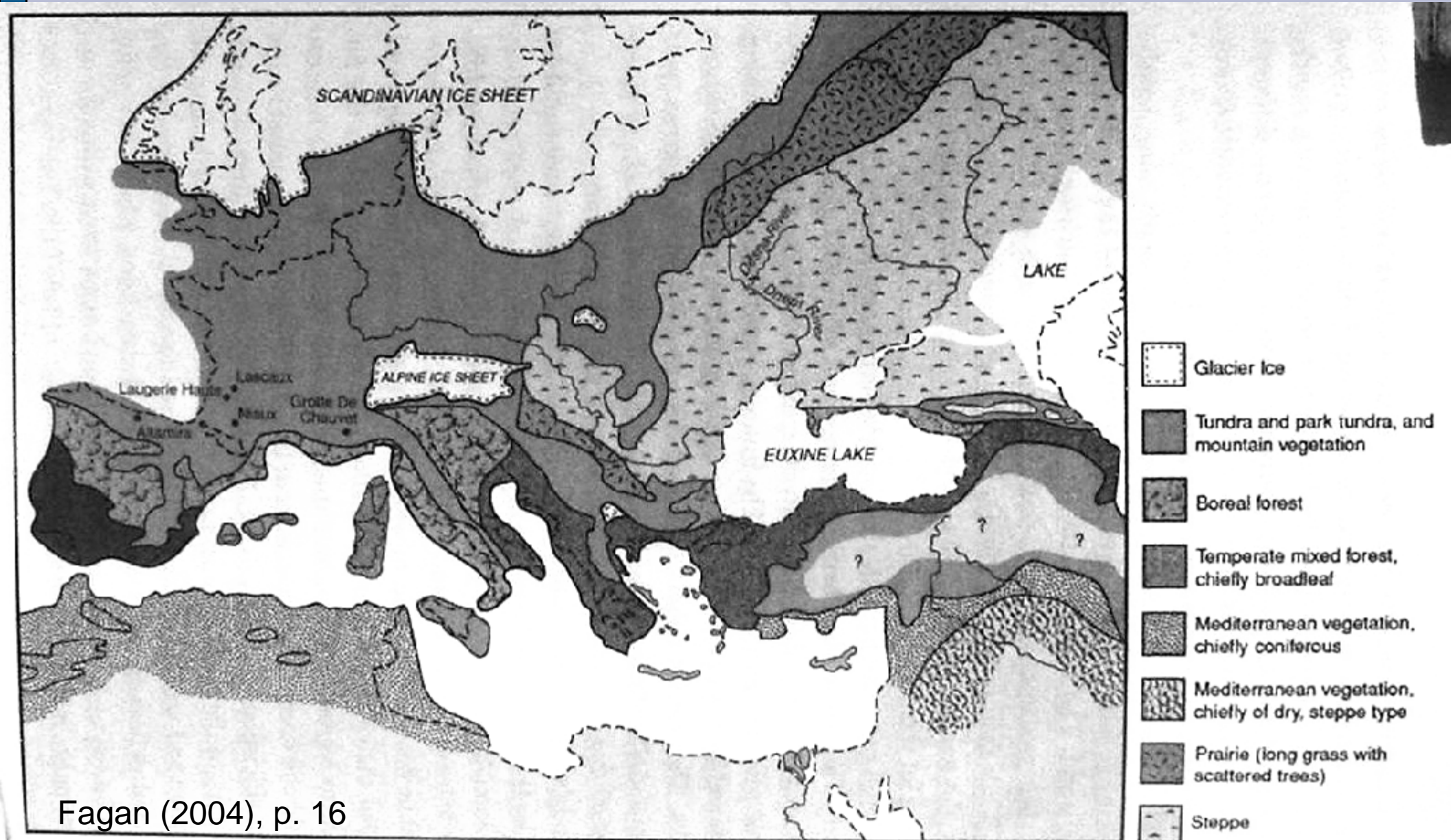
15: Polar and alpine desert  
desert (less than 2%  
covered by vascular plants)

14: Steppe-tundra (probably  
around 50% ground cover)

18: Forest steppe (5-20%  
tree cover)



# Europe in the Last Glacial Maximum (LGM, 18ka BP)

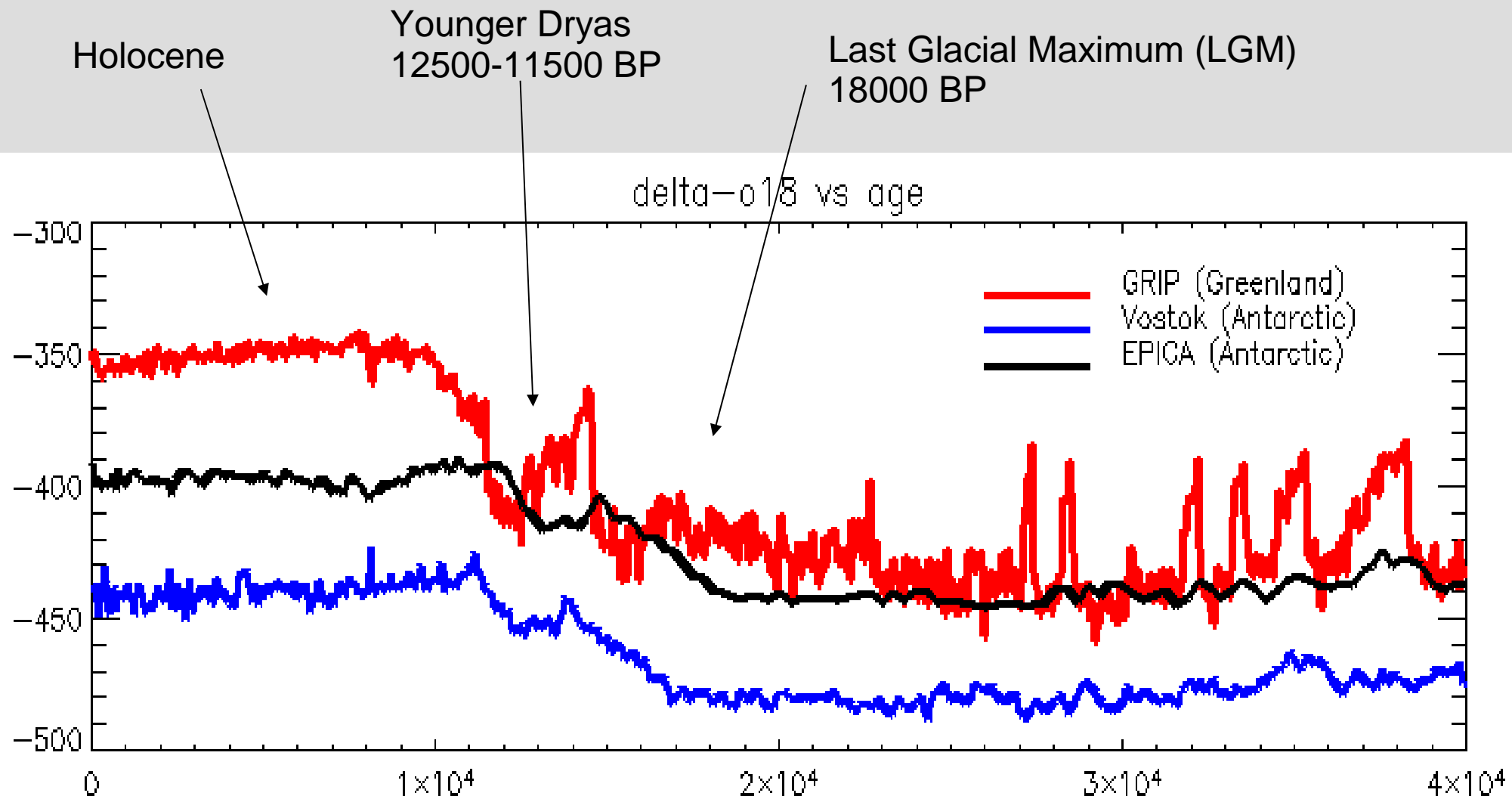


# Britain 10000 BP

Simmons (2001), p.29



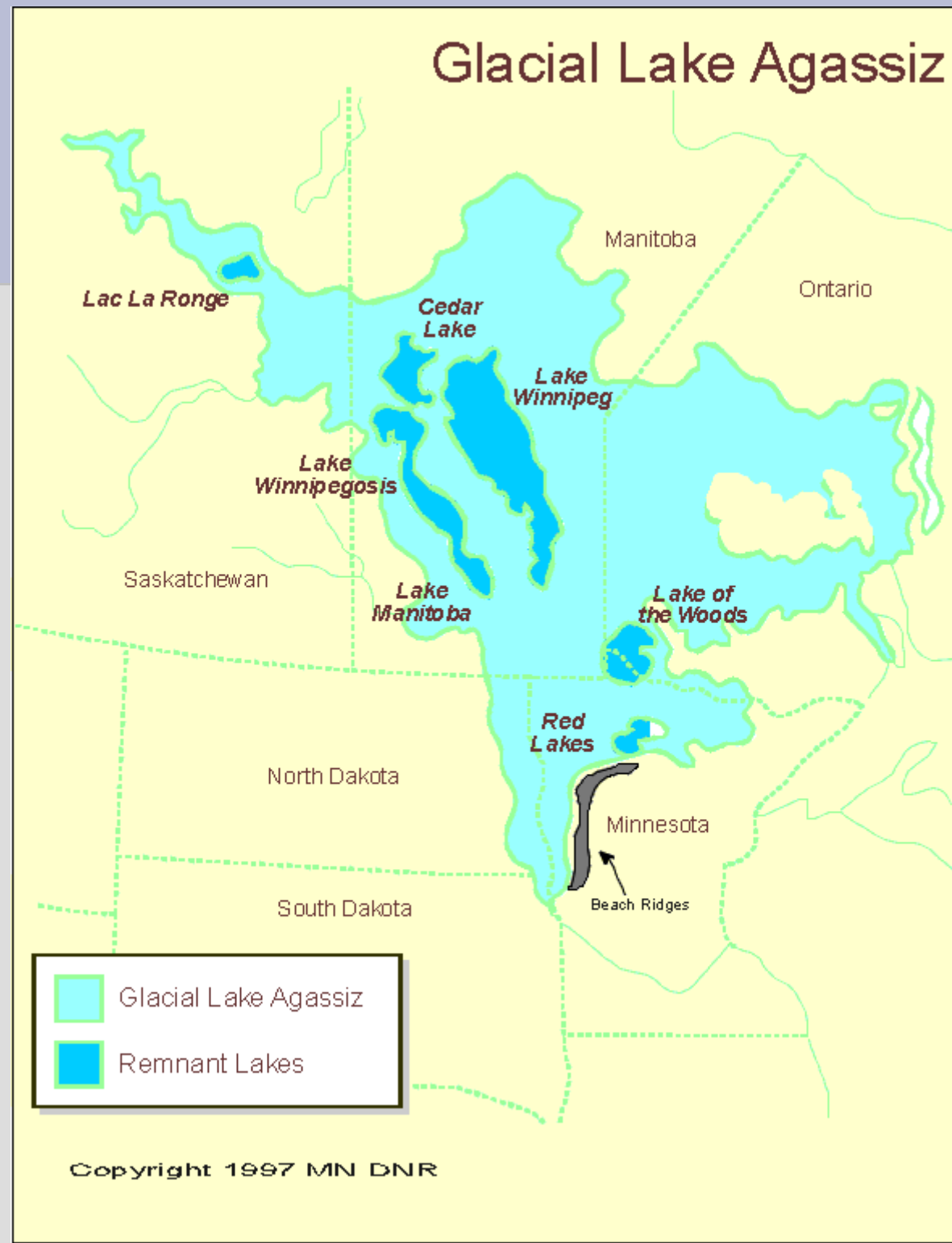
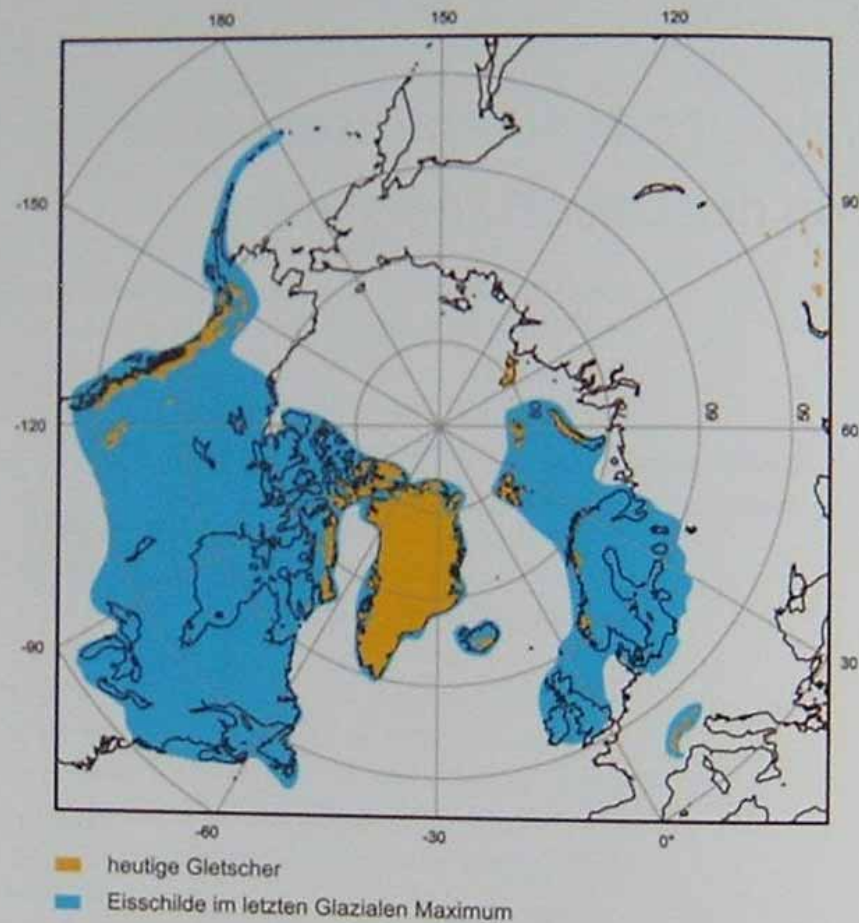
# Pleistocene-Holocene transition



# **Dryas octopetala** **(mountain avens, white dryas)**

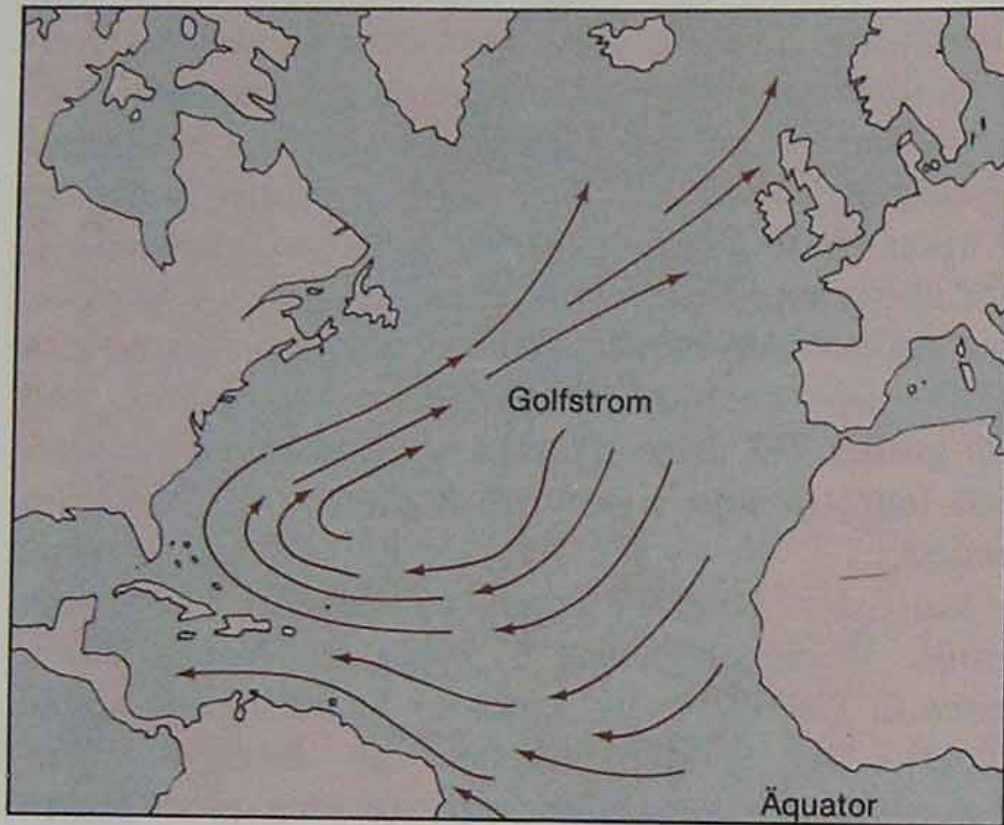


# Lake Agassiz

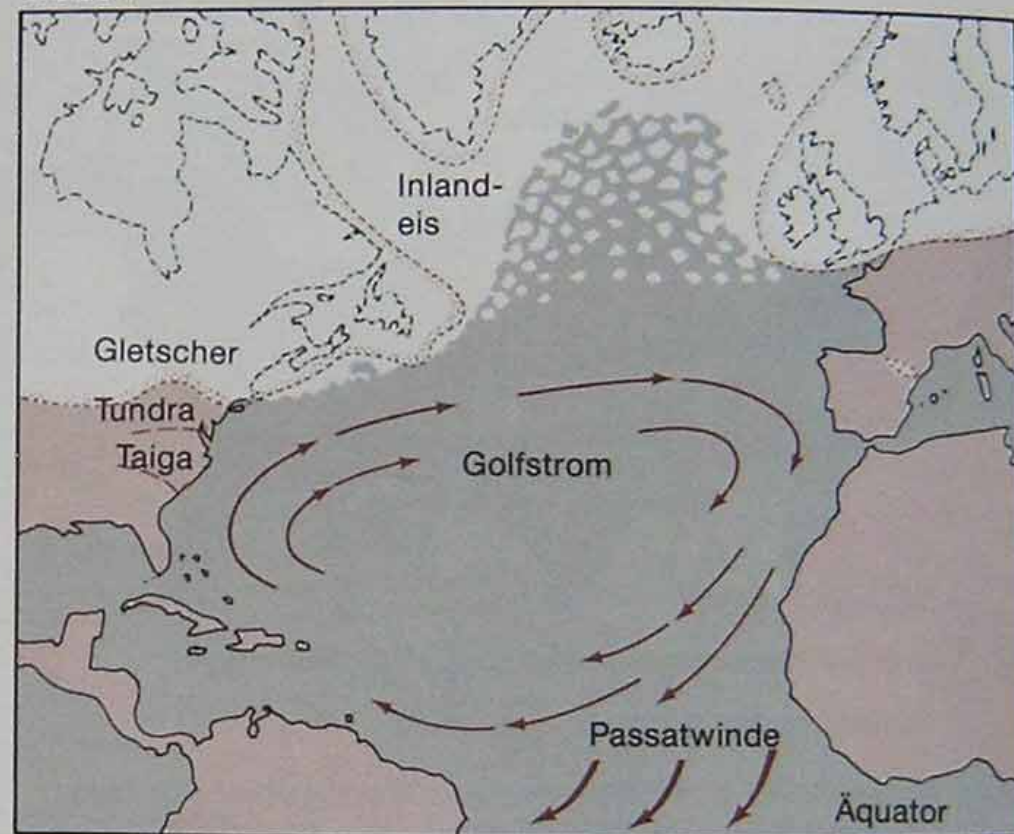


# North Atlantic Circulation

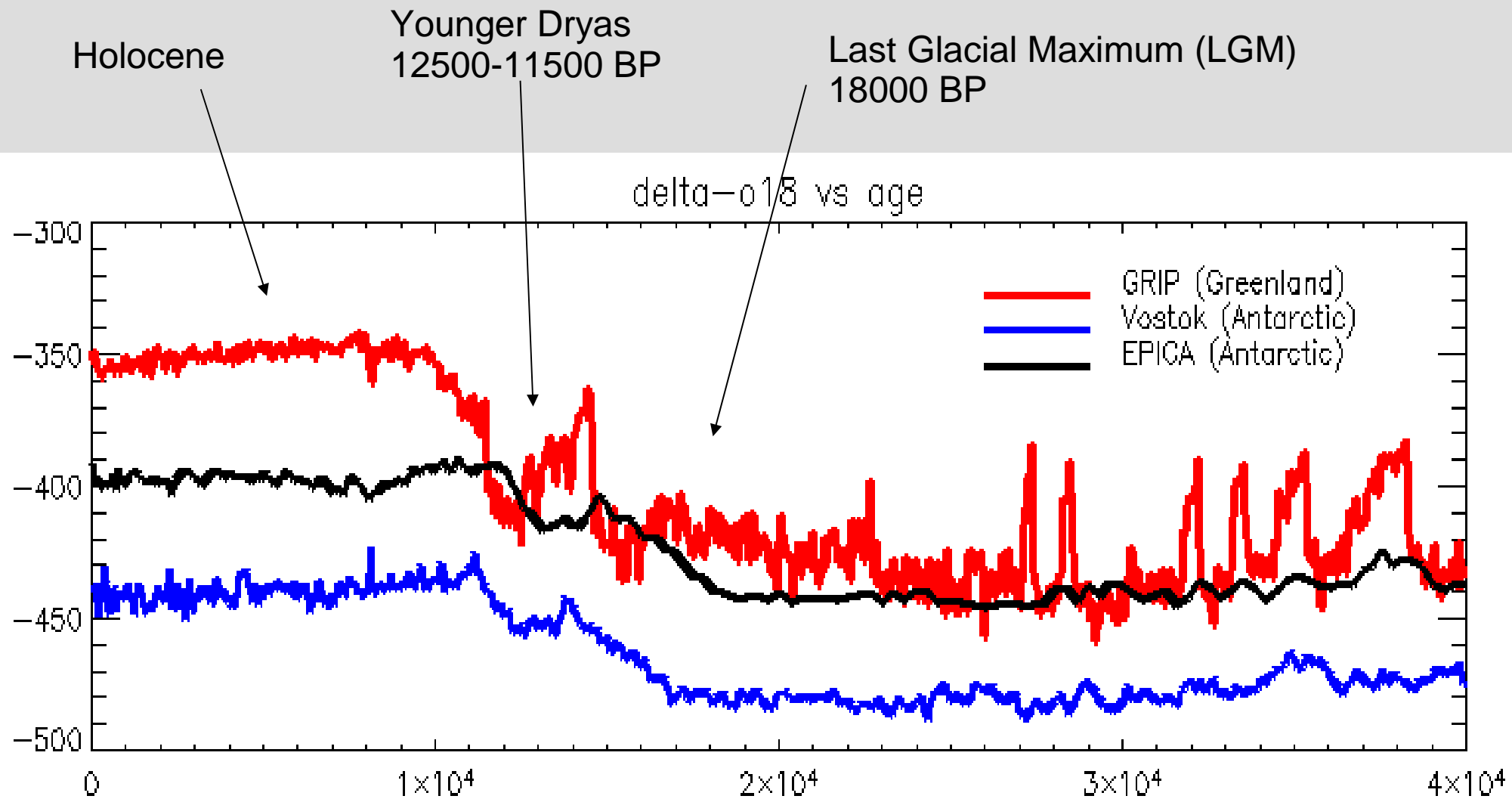
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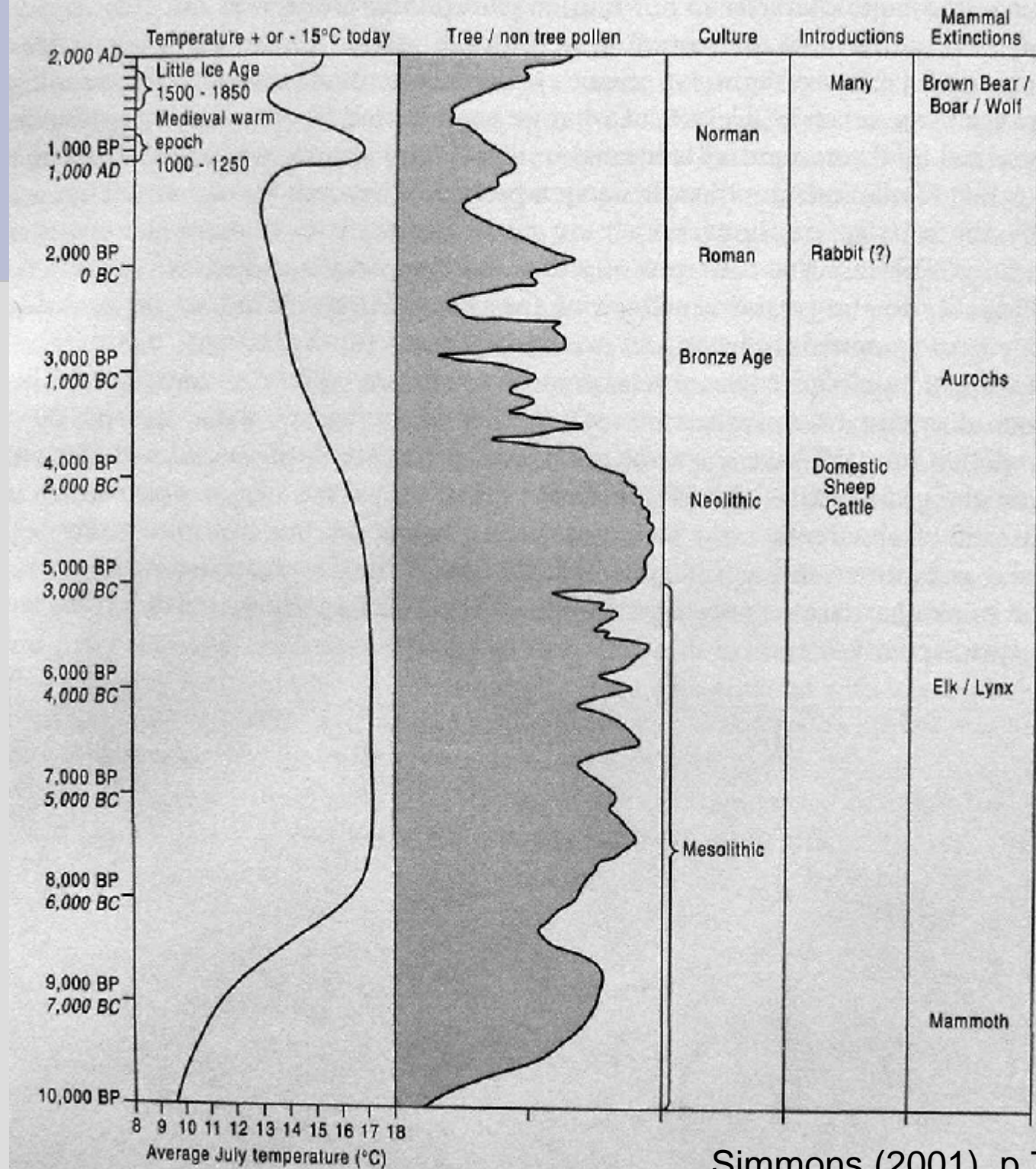


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# Pleistocene-Holocene transition





# The “Neolithic revolution” (“Neolithic bundle”)

- Sedentary lifestyle
- Domestication of Animals and Plants
- Pottery

But – is it so simple?

# Origin of food production

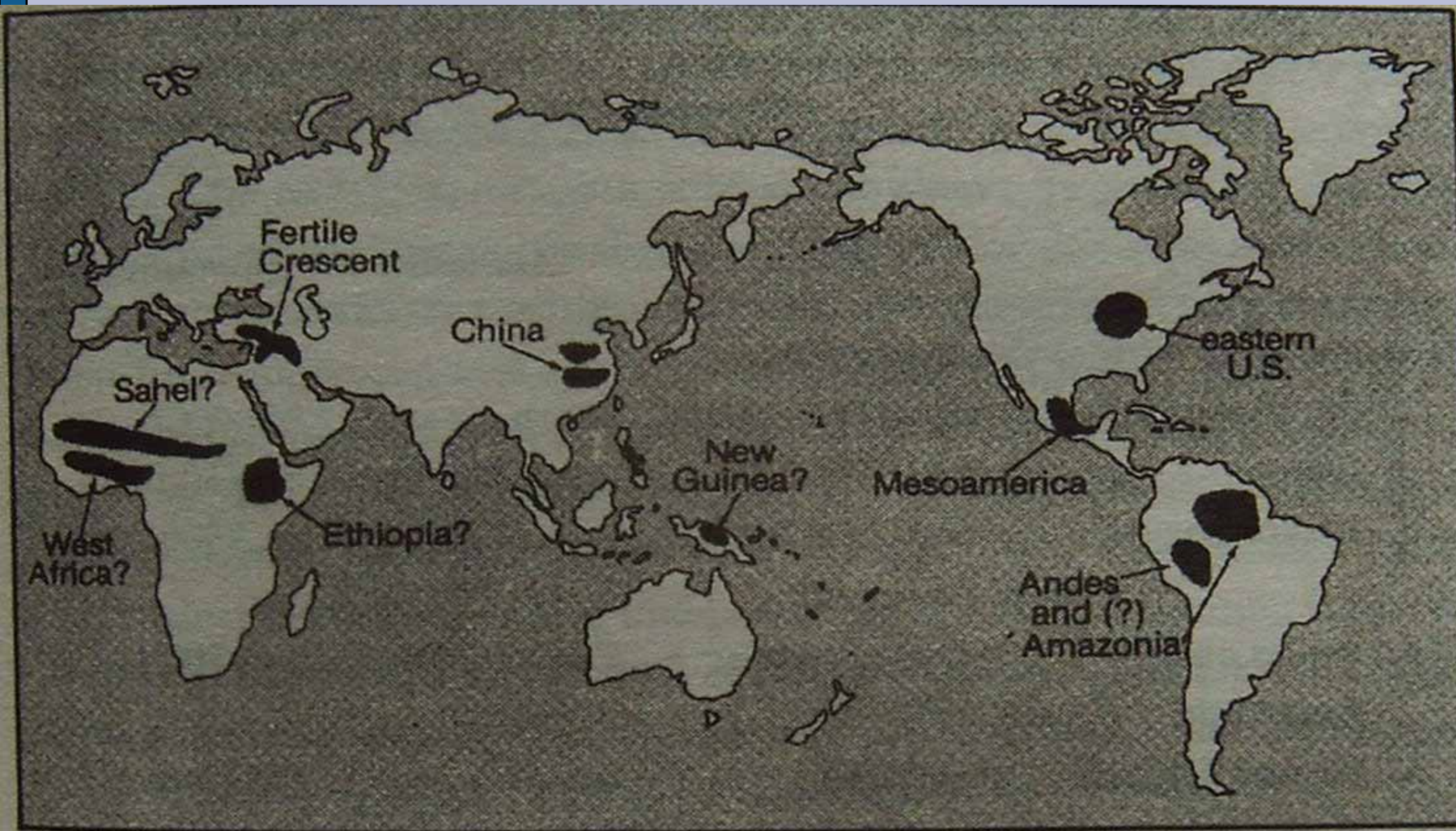


TABLE 5.1 Examples of Species Domesticated in Each Area

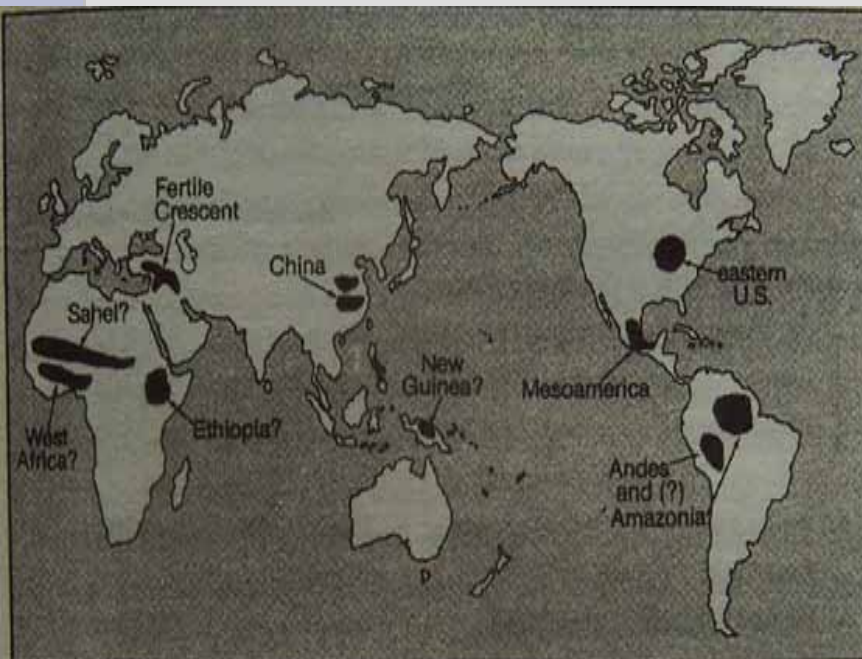
Area	Domesticated		Earliest Attested Date of Domestication
	Plants	Animals	

**Independent Origins of Domestication**

1. Southwest Asia	wheat, pea, olive	sheep, goat	8500 B.C.
2. China	rice, millet	pig, silkworm	by 7500 B.C.
3. Mesoamerica	corn, beans, squash	turkey	by 3500 B.C.
4. Andes and Amazonia	potato, manioc	llama, guinea pig	by 3500 B.C.
5. Eastern United States	sunflower, goosefoot	none	2500 B.C.
? 6. Sahel	sorghum, African rice	guinea fowl	by 5000 B.C.
? 7. Tropical West Africa	African yams, oil palm	none	by 3000 B.C.
? 8. Ethiopia	coffee, teff	none	?
? 9. New Guinea	sugar cane, banana	none	7000 B.C.?

**Local Domestication Following Arrival of Founder Crops from Elsewhere**

10. Western Europe	poppy, oat	none	6000–3500 B.C.
11. Indus Valley	sesame, eggplant	humped cattle	7000 B.C.
12. Egypt	sycamore fig, chufa	donkey, cat	6000 B.C.



# Food for thought:

- Why become a farmer?
- What do you need?
- Advantages, disadvantages?
- How does society change?

# The Fertile Crescent



- 13.500-9500 BC: Protoneolithic (Natufian)
- 9500-8500 BC: Pre-pottery Neolithic A (PPNA)
- 8200-6800 BC: PPNB
- 6500-5500 BC: Pottery Neolithic

# Pre-pottery Neolithic (Natufian, 13500-9500 BC)

## Early Natufian:

- Environment: woodland (oak, pistacia)
- Sedentary lifestyle
- Subsistence: Mostly hunting (gazelle) and gathering (wild grasses)

## Late Natufian:

- During Younger Dryas; Drought in the Levant
- Landscape management (clearing scrubs to encourage cereals)?
- Domestication of drought-resistant crops?

# **Pre-Pottery Neolithic A (PPNA, 9500-8500 BC)**

- Large Settlements
- Hunting (gazelle)

# Pre-Pottery Neolithic A (PPNB, 8200-6800 BC)

- Large Settlements
- Gazelles disappearing
- Domestication of sheep and goat (some evidence for domestication much earlier)



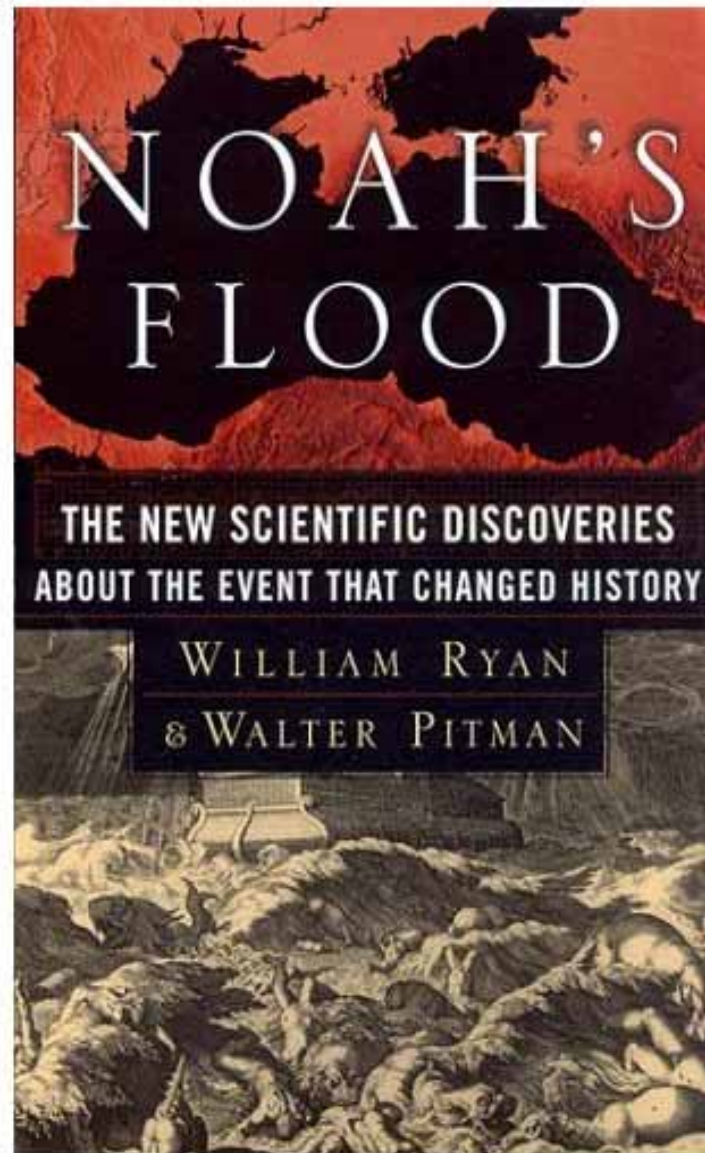
# The first European Farmers

## Bandkeramic culture

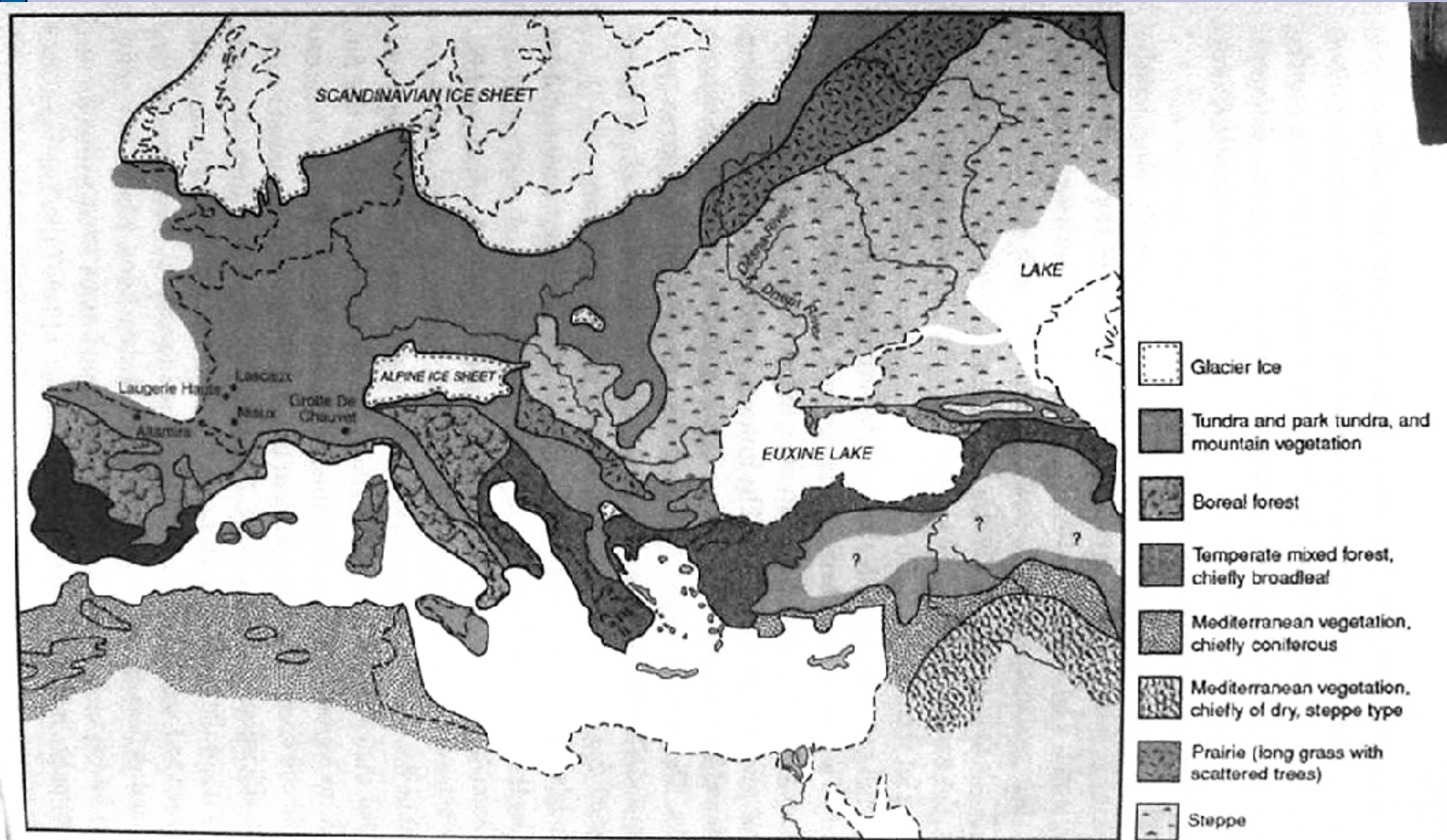
(from ca 5500 BC)



# Agriculture spreading to Europe



# Europe in the Last Glacial Maximum (LGM, 18ka BP)



	Climate Events Vegetation Zones	Human Events	Climate Triggers
9,000 B.C.-	<b>Pre-Boreal</b> <i>(renewed warming)</i>	Farming spreads rapidly in southwestern Asia Abu Hureyra II and Jericho	Moister conditions <i>(circulation resumes)</i>
10,000 B.C.-		Farming begins in southeastern Asia	Drought in southeastern Asia Cold in Europe
11,000 B.C.-	<b>Younger Dryas</b> <i>(cold)</i> Lake Agassiz spills	Abu Hureyra I Clovis in North America	Atlantic circulation shuts down
12,000 B.C.-		Monte Verde / Meadowcroft First settlement of the Americas Cave paintings at Niaux, France	Spread of forests in Europe
13,000 B.C.-	<b>Bolling / Allerod</b> <i>(rapid warming)</i>		Rapid warming
14,000 B.C.-	HEINRICH I EVENT ends	First settlement of northeastern Siberia	
15,000 B.C.-	Some warming variable temperatures	Final Ice Age cultures in Europe	Rapid sea level rise
16,000 B.C.-	<b>Late Ice Age</b> <i>(cold)</i>	Climatic amelioration in Eurasia  Cro-Magnons in Europe	Rapid retreat of ice sheets

	Climate Events Vegetation Zones	Human Events	Climate Triggers
3000 B.C.	Sub-Boreal	Unification of Egypt	
4000 B.C.		Towns appear in Egypt Cities develop in Mesopotamia	Major aridification in the Sahara, Egypt, and Mesopotamia
		Ertebolle culture in Scandinavia	Warm, moist conditions in Europe
5000 B.C.		Cattle herded in the Sahara	Drought in American West
	Atlantic		
6000 B.C.	Mini Ice Age (colder, drier)	Linearbandkeramik farmers move into Central Europe First settlement of southern Mesopotamia Farmers in the Balkans	Euxine lake flooded Sea level rise  Laurentide ice sheet collapses—Atlantic circulation slows
7000 B.C.			
8000 B.C.	Boreal	Farming spreads rapidly in Southwestern Asia	
9000 B.C.	Pre-Boreal	"Broad-spectrum hunter-gatherers" in Northern Europe	Atlantic circulation resumes

# Literature

- Diamond (1998): Guns, Germs and Steel.
- Fagan (2004): The Long Summer
- Simmons (2001): An Environmental History of Great Britain