

Climate and Human History

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1. Climate and climate history
2. The Ice Age
3. Farming and City States
4. 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



1790s

Ijsversmaak (“Fun on the Ice”)

Hendrick Avercamp, 1608



Mediaeval Optimum

- Settlements in Iceland (825: Irish monks; ca 870: Vikings) and Greenland (986)
- Vineyards in England
- Agriculture on the summits of the Lammermuir Hills
- Woodlands cleared
- Population growth

	England	France
AD 1200:	1.4 million	6.2 million
AD 1300:	5 million	18 million

The Great Famine 1315-1321

- “Exceedingly great rains descended from the heavens...”
- “Therefore is the anger of the Lord kindled against his people, and he hath stretched forth his hands against them, and hath smitten them” (Chronicle of Malmesbury)
- “There began a dearness of wheat...”

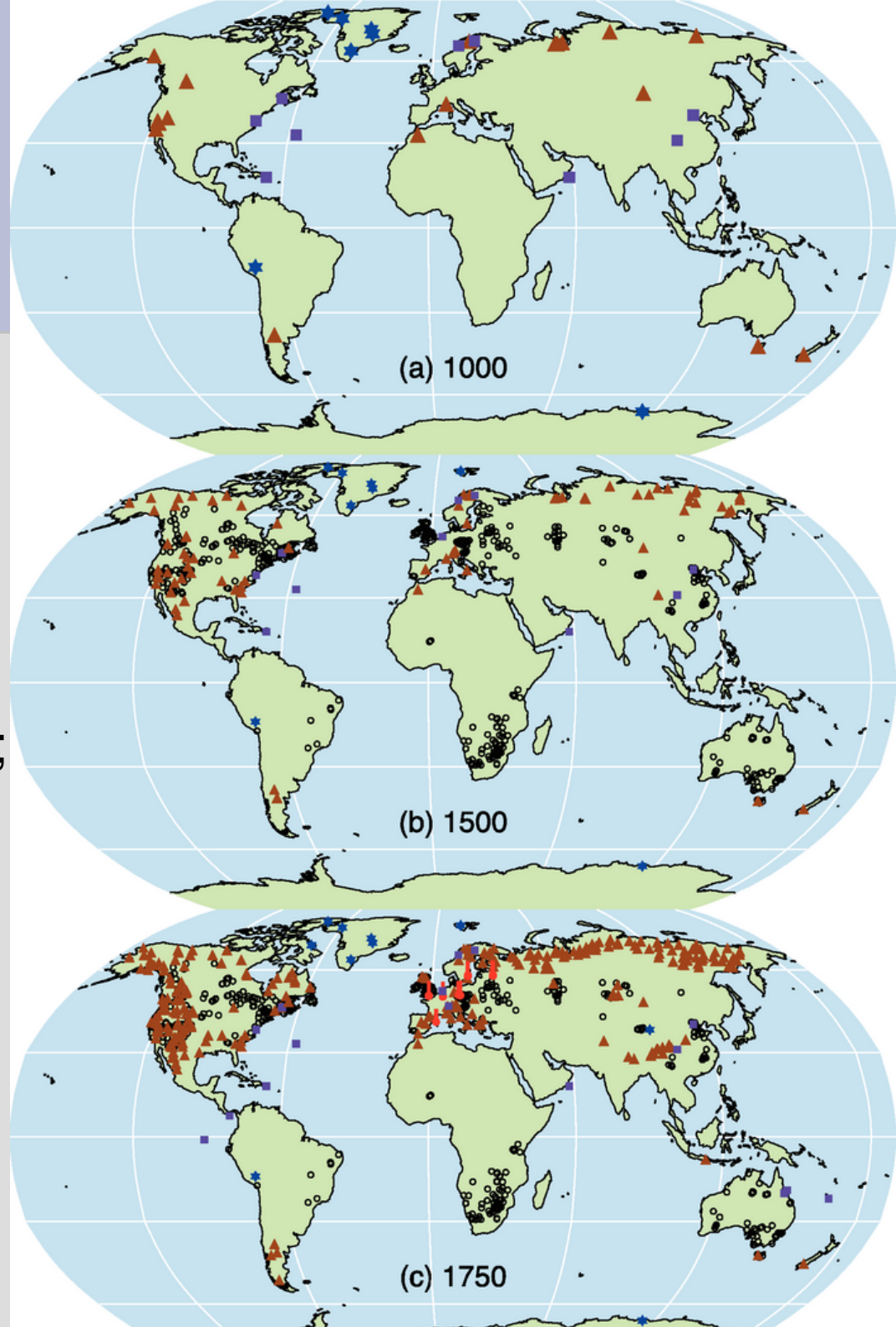
Historical events 1300-1900

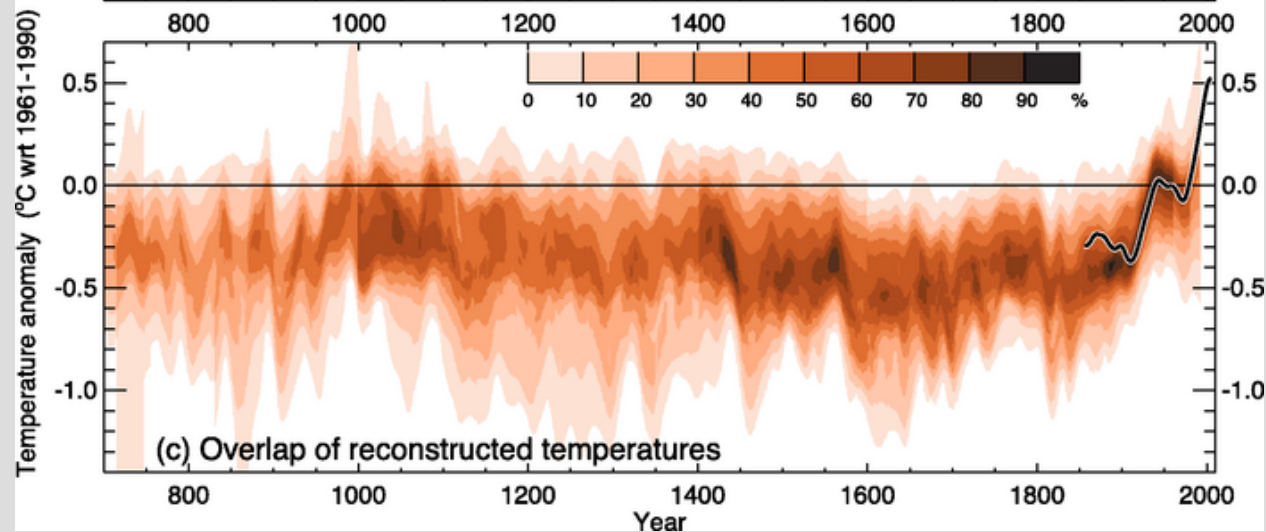
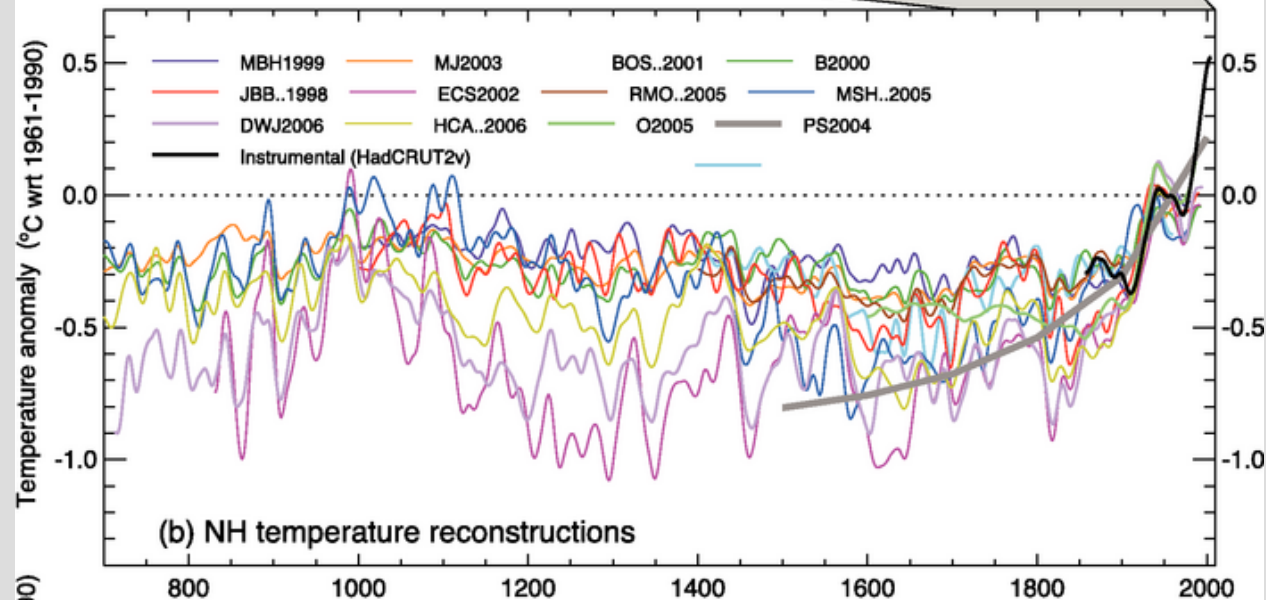
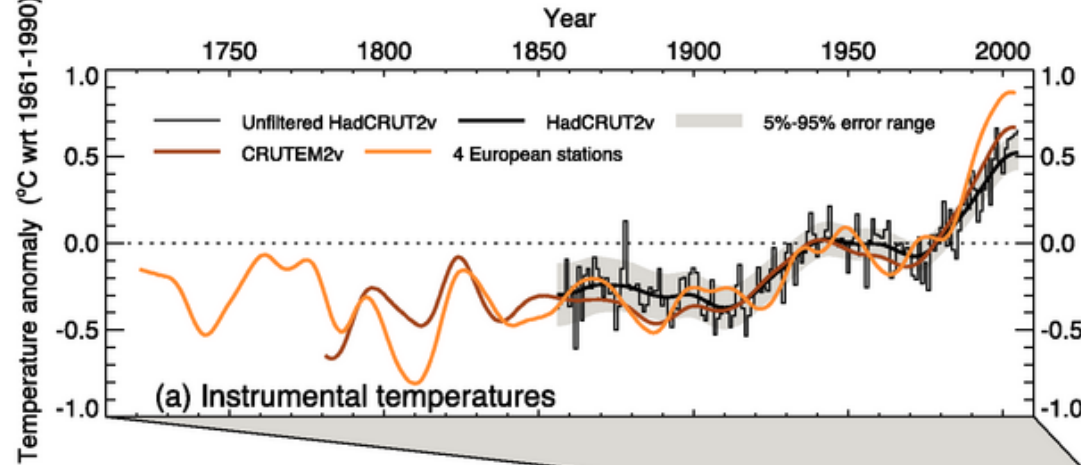
- 1315-1321: The Great Famine
- 1337-1435: Hundred Years War
- 1300+: Rise of the Hanseatic League
- 1348: Black Death
- c. 1350: Greenland Western Settlement abandoned
- 1469: Wine cultivation abandoned in England
- 1492 Columbus
- 1618-1648: Thirty Years War
- 1798-1815: Napoleonic Wars
- 1845-1849: Irish Potato Famine, emigration

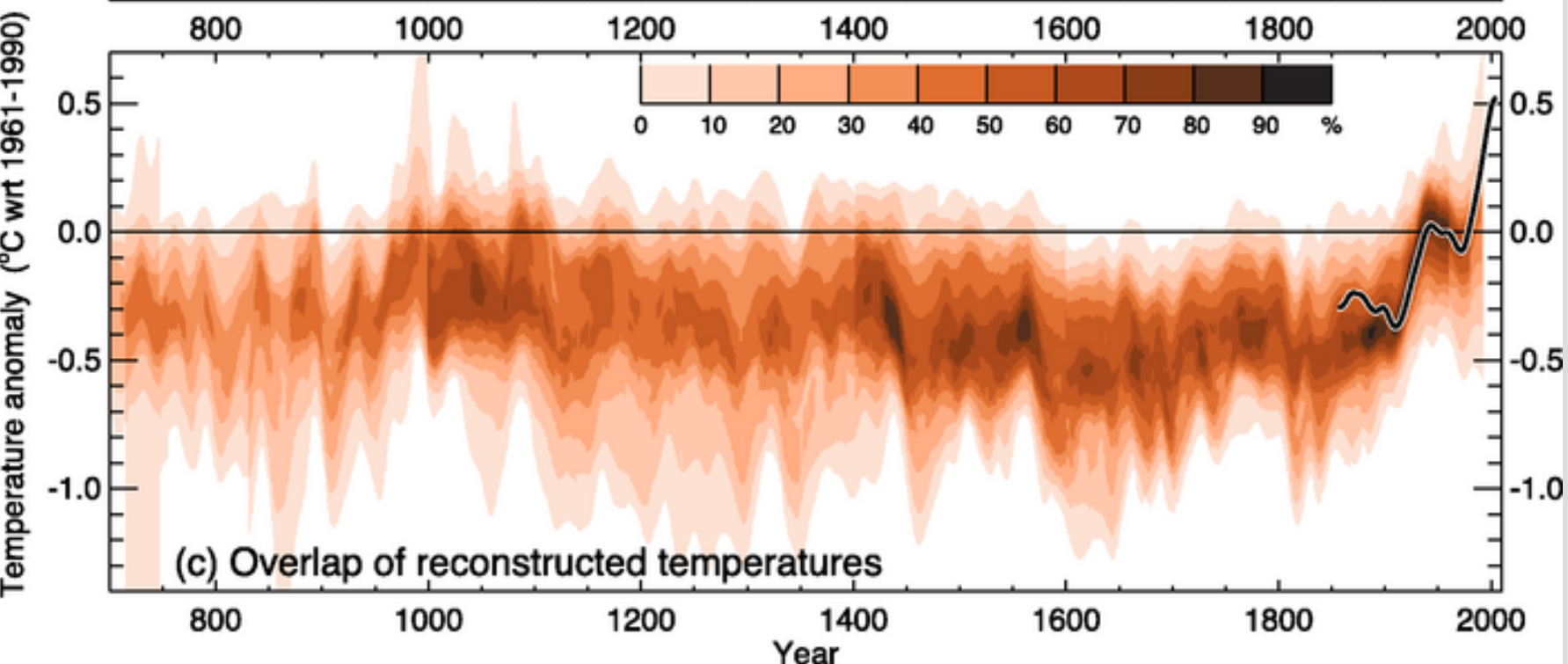
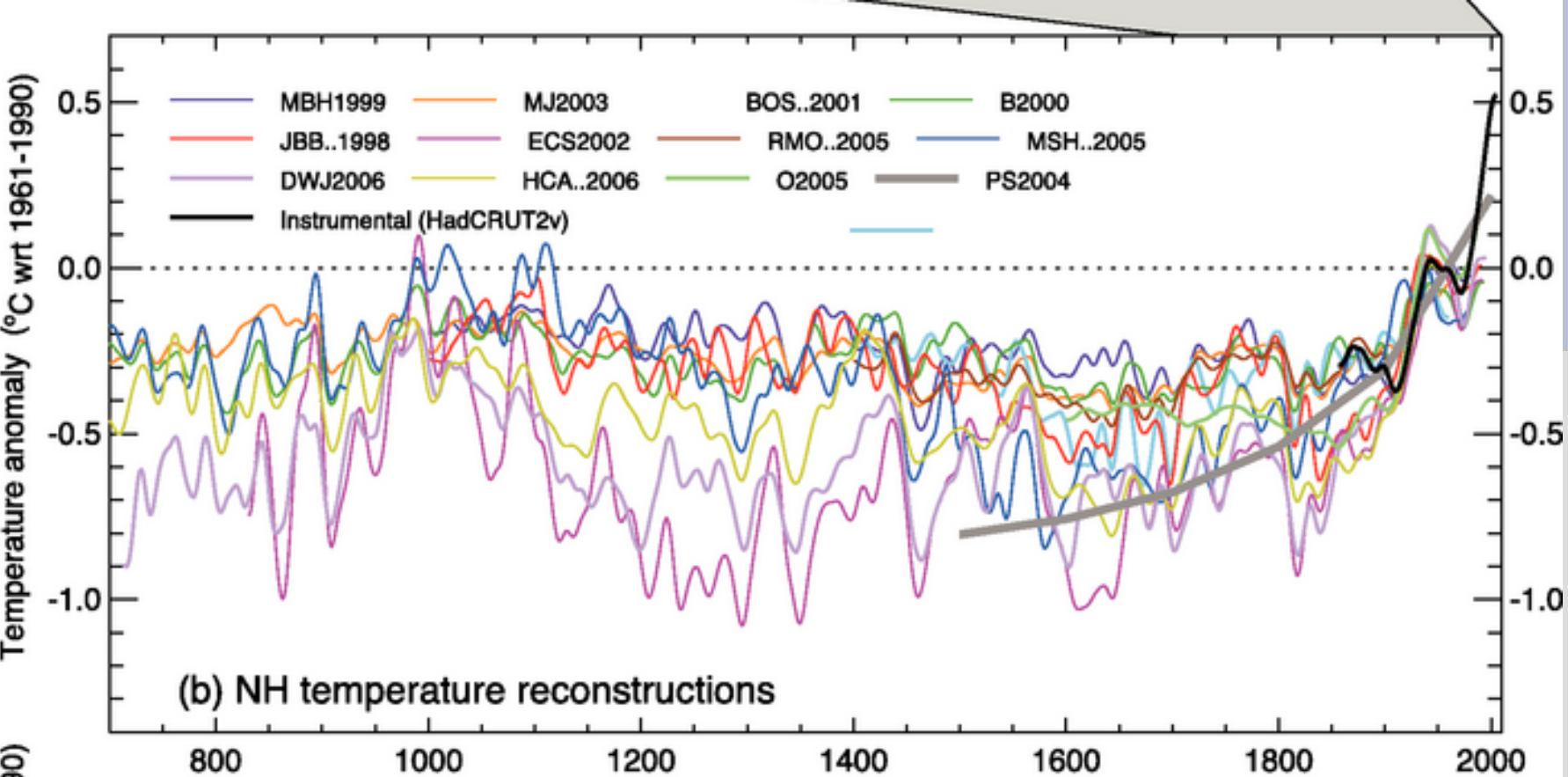
Temperature reconstructions

Locations of proxy records with data back to AD 1000, 1500 and 1750:

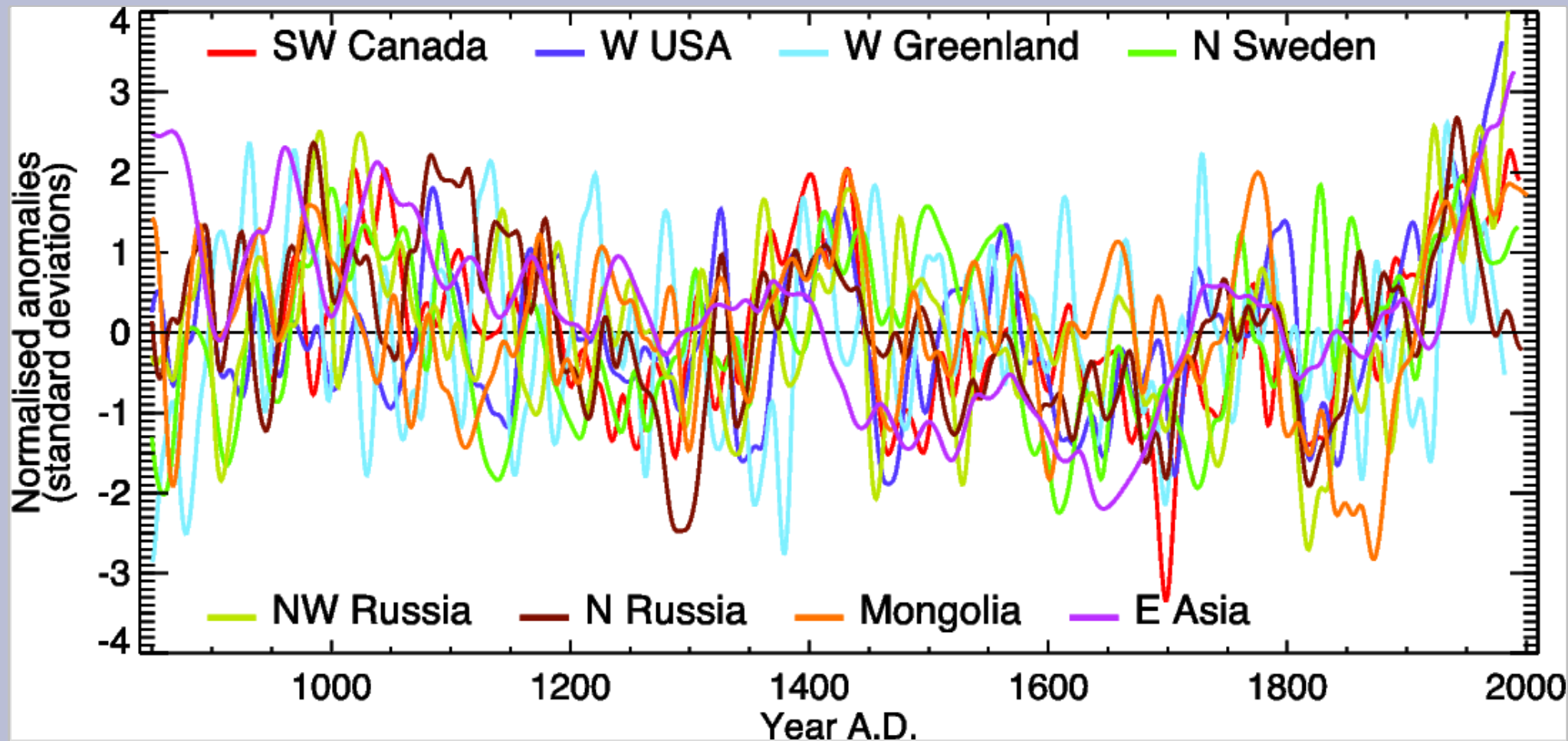
- instrumental: red thermometers;
- tree ring: brown triangles;
- borehole: black circles;
- ice core/ice borehole: blue stars;
- other including low-resolution records: purple squares



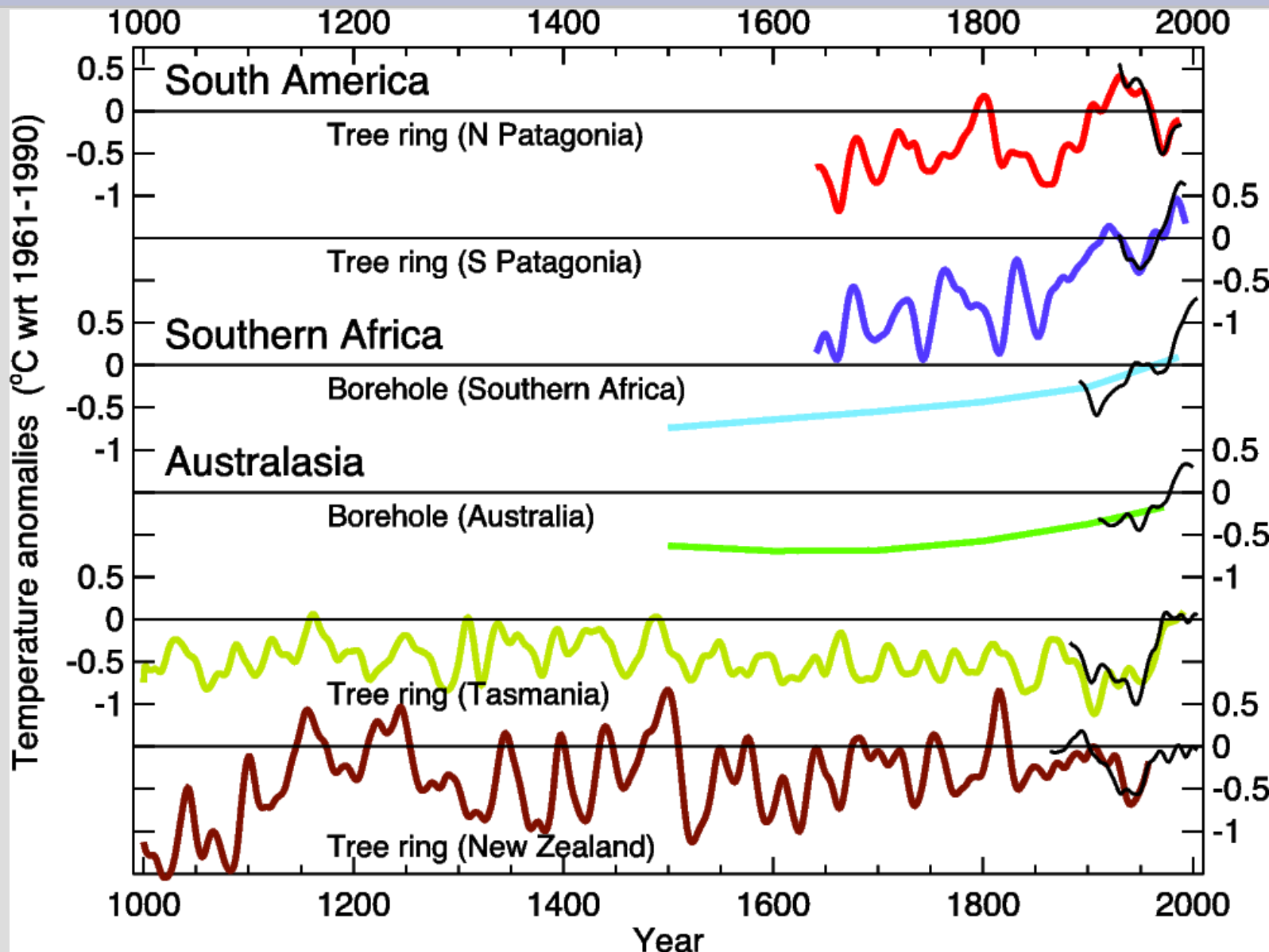




Regional Variability



Southern Hemisphere?

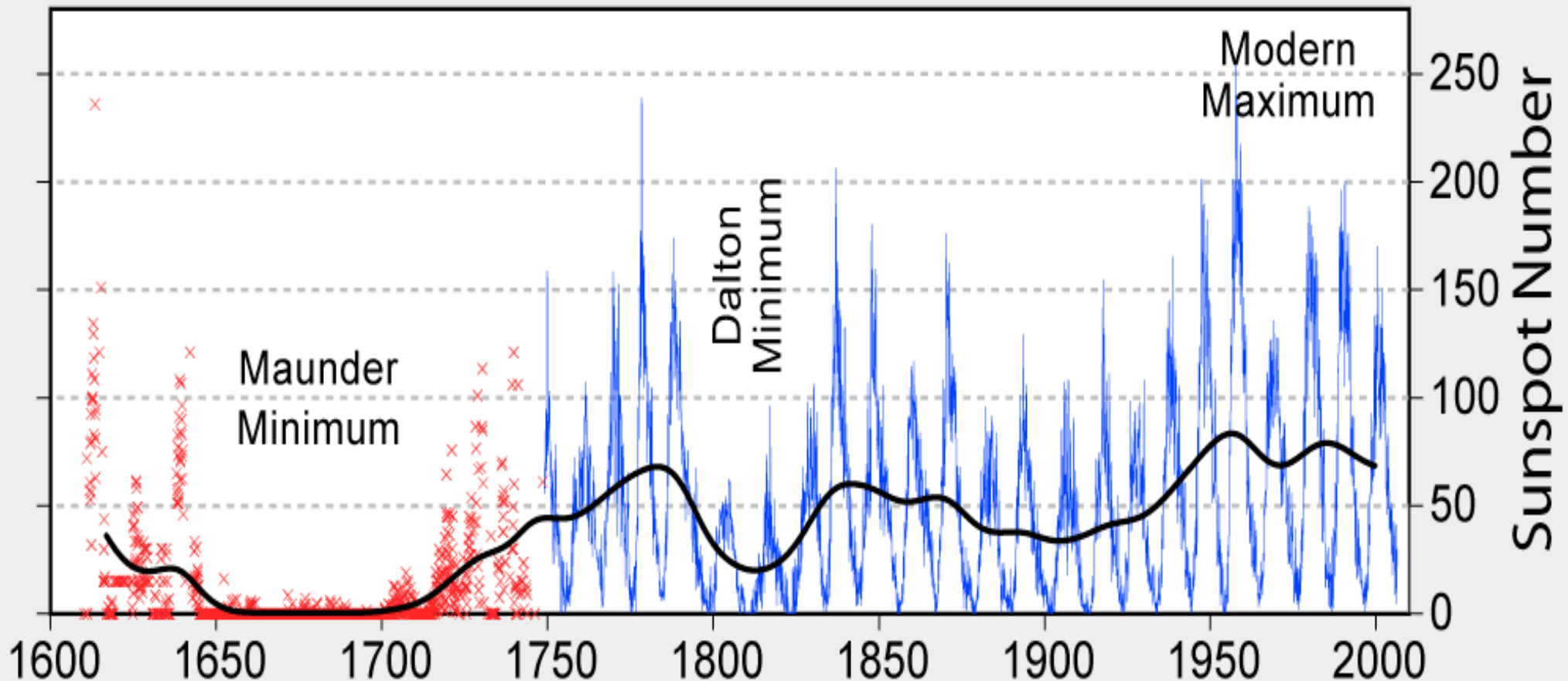


black lines:
instrumental
record for
each region

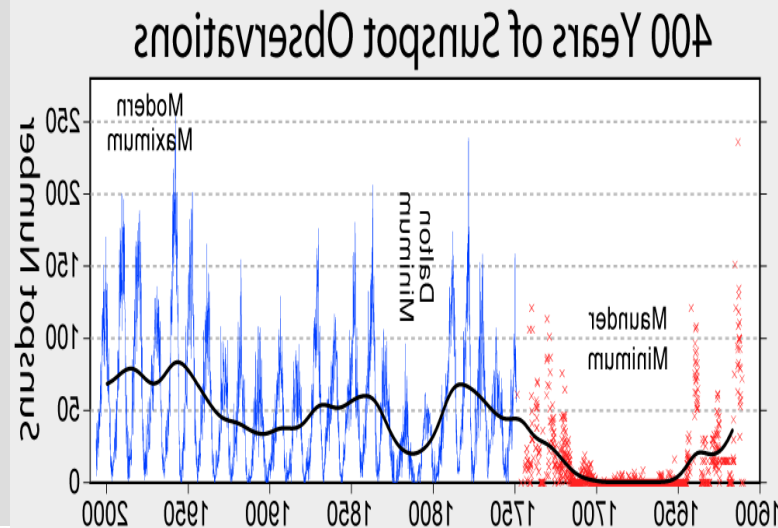
IPCC 2007:
Fig 6.12

Solar Forcing

400 Years of Sunspot Observations



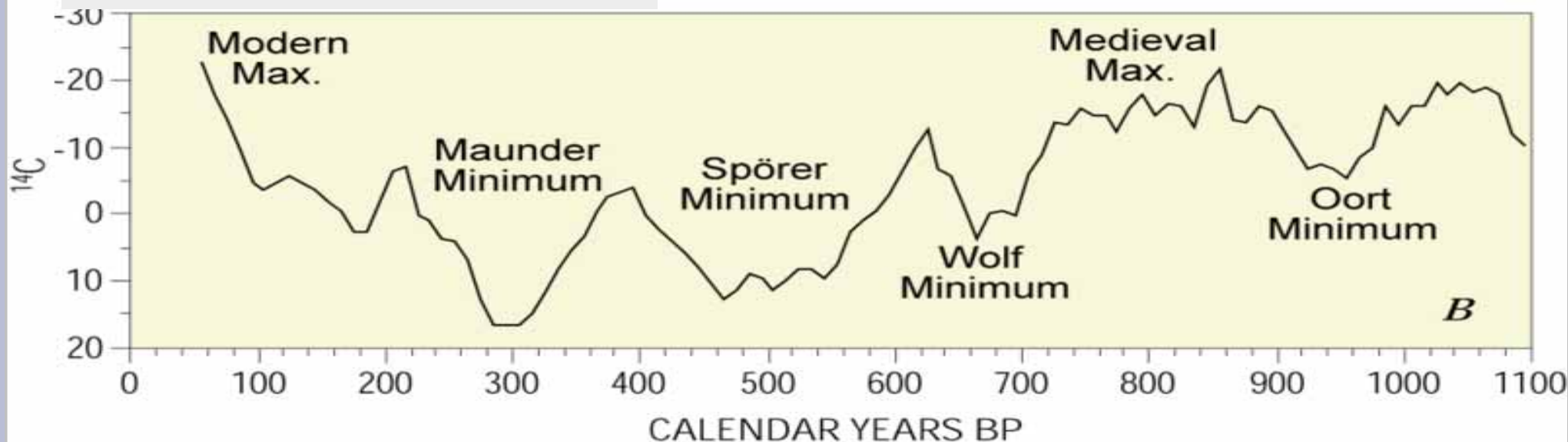
Solar Forcing



C-14 formation in Atmosphere:
hard solar radiation hits atoms and
produces free **neutrons (n)**
Then:

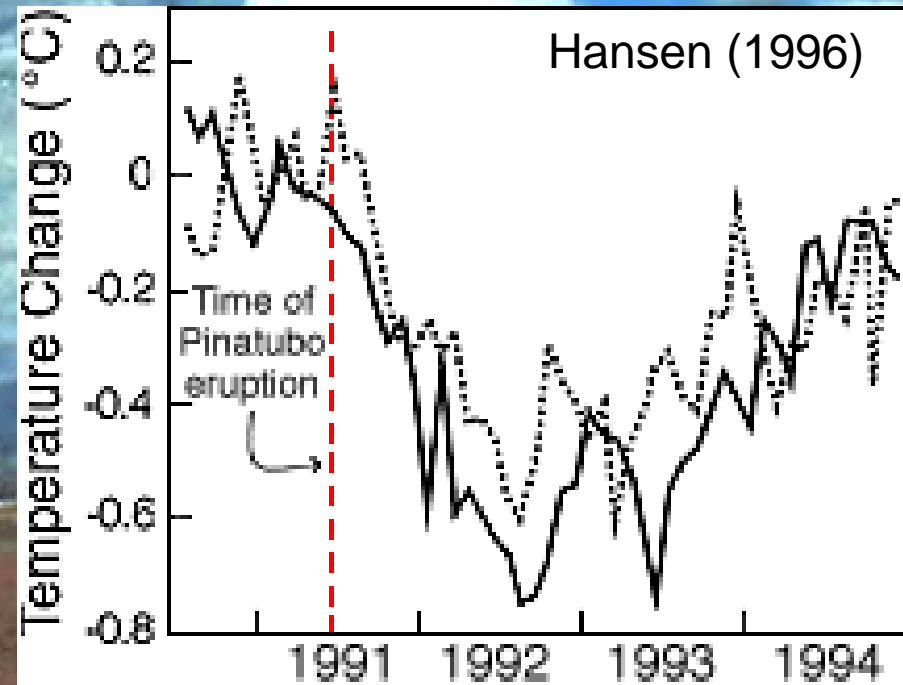


C-14 content of the atmosphere



Volcanic activity

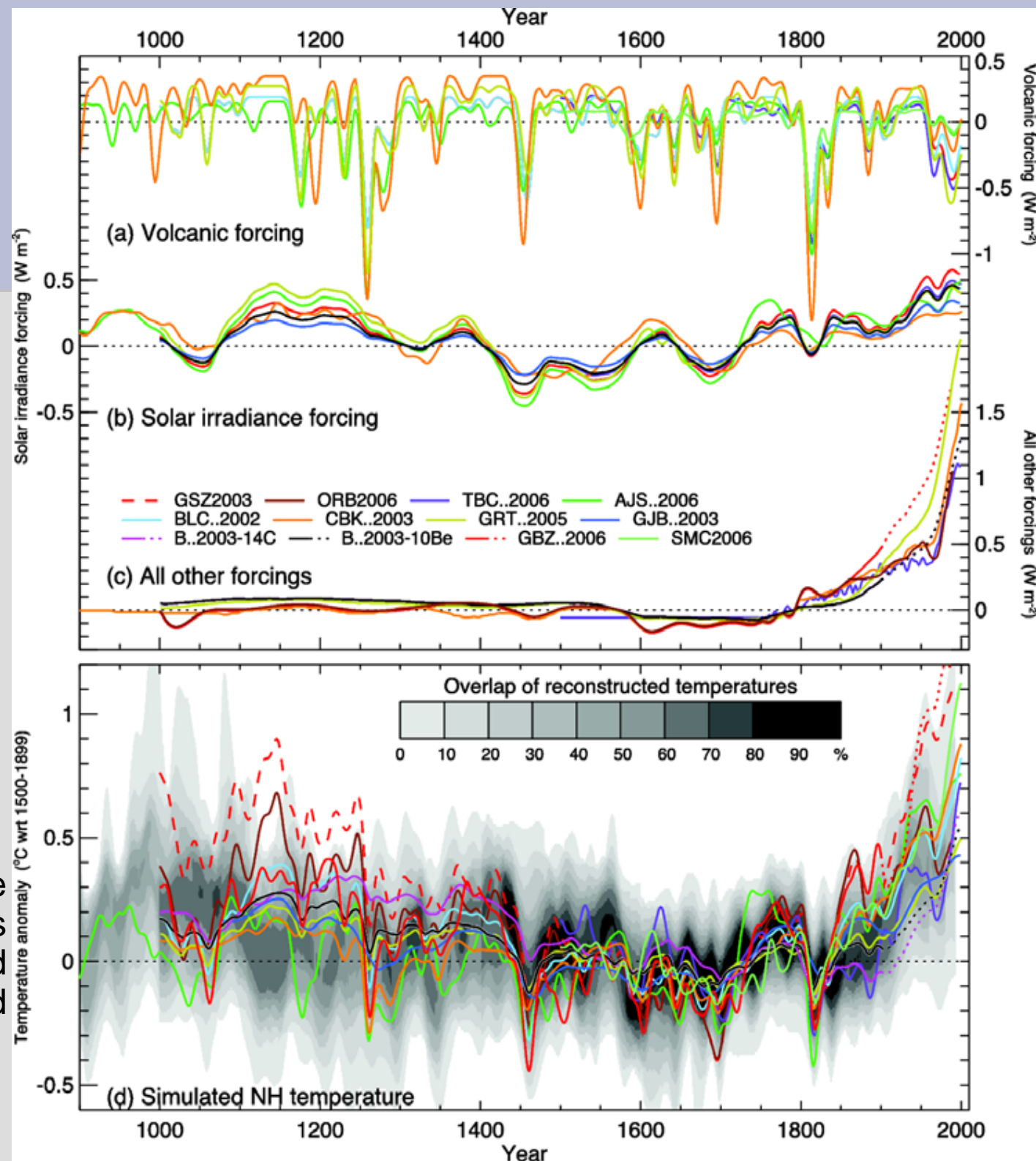
- 1258: unknown location
- 1600: Huaynaputina (Peru)
- 1816: Tambora (Indonesia)
- 1883: Krakatoa



Modelling

Forcings
(W/m²)

Northern Hemisphere
temperatures
lines: simulated
shading: reconstructed



Climate and Wars in China

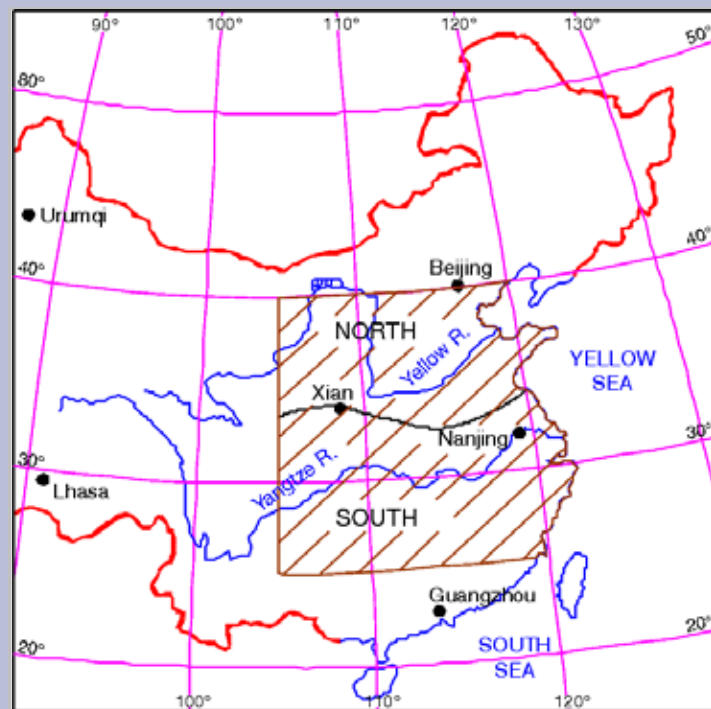
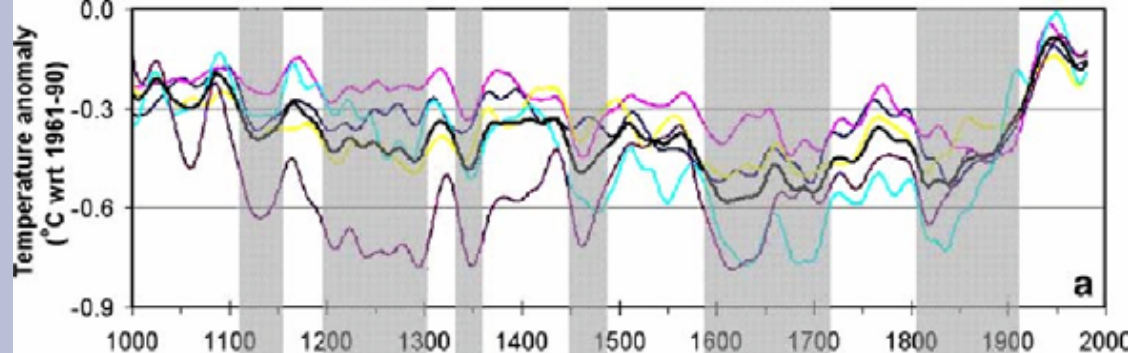
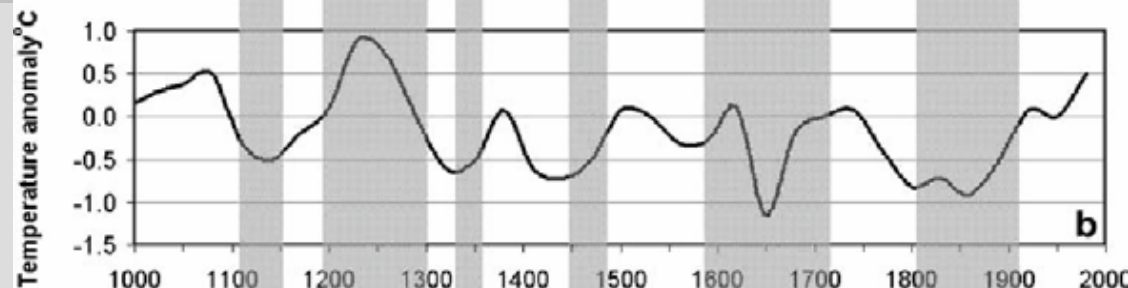


Fig. 1 Physical regionalization of eastern China.

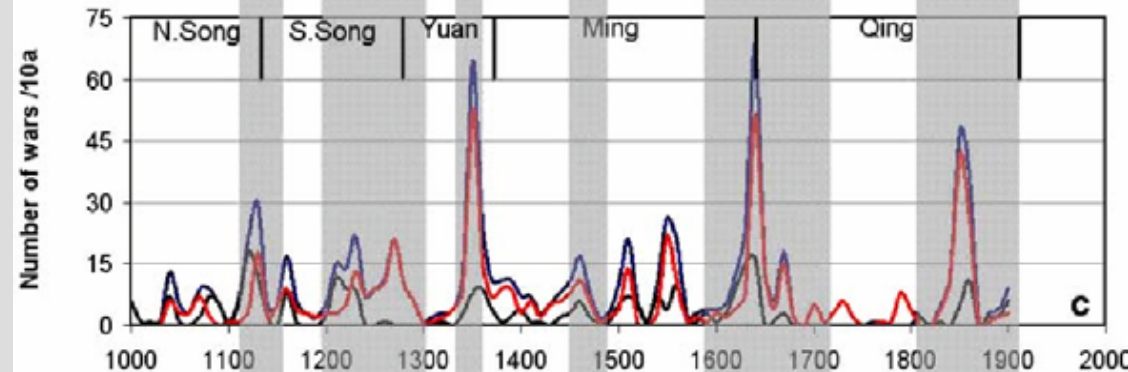
N. Hemisphere



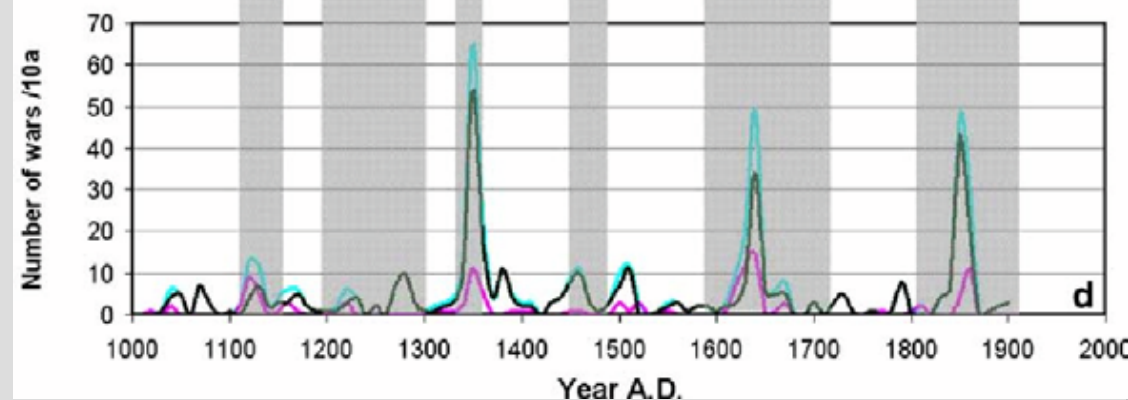
China
Winter



Wars (N/S)



Rebellions (N/S)



Greenland



Brown (2000): Archaeology online feature
<http://www.archaeology.org/online/features/greenland/>



900: Gunnbjörn Úlfsson reports land
 982: Eiríkr inn rauði (Erik the Red) finds land
 983: returns with ca 700 followers

1126: first bishop on Greenland

before 1350: West Settlement abandoned

1378: last bishop in Greenland dies. successor is elected but refuses to leave Norway

1406 last Norwegian trade ship reaches Greenland; contact is lost

1535 dubious reports of people on West coast

1585 John Davis searches for North West passage, no sign of Europeans in Greenland

Archaeology

- Evidence for violence (injuries):
 - Thule?
 - Viking marauders?
- Isotope analysis:
 - seafood consumption rose from 20% to 80%
 - indicates poor agriculture results
- Trade routes to Norway lost – no iron tools
- Population was never huge, maximum ca. 5000
- Thule people (seal&whale hunting) lived ok



reconstructed Norse chapel

A Mediaeval property developer...

That country which is called Greenland, was discovered and colonized from Iceland. Eric the Red [Eirekr enn Rauthi] was the name of the man, an inhabitant of Breidafirth, who went out thither from here, and settled at that place, which has since been called Ericsfirth [Eiriksfiorthr].



Eriksfjord

He gave a name to the country, and called it Greenland, and said that it must persuade men to go thither, if the land had a good name.

*Ari Þorgilsson,
“Íslendingabók”, ca 1120
(transl. Arthur Middleton
Reeves, 1906)*

Literature

- Fagan (2000): The Little Ice Age.
- IPCC (2007): Chapter 6: Paleoclimate. IPCC WG1 AR4 Report
(online: <http://www.ipcc.ch/>)
- Diamond (2005): Collapse. Chapter 6-8
(Greenland Norse expansion and collapse)