How early societies adapted to climatic changes

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with

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Climatology, Climate Dynamics & Climate Change

Degroot et al., 2021: Towards a Rigorous Understanding of Societal Responses to Climate Change, *Nature*

Outline

- The scholarship "History of Climate and Society"
- Methodological challenges
- Human responses to climate change; Late Antique Little Ice Age & Little Ice Age
- The five pathways of resilience

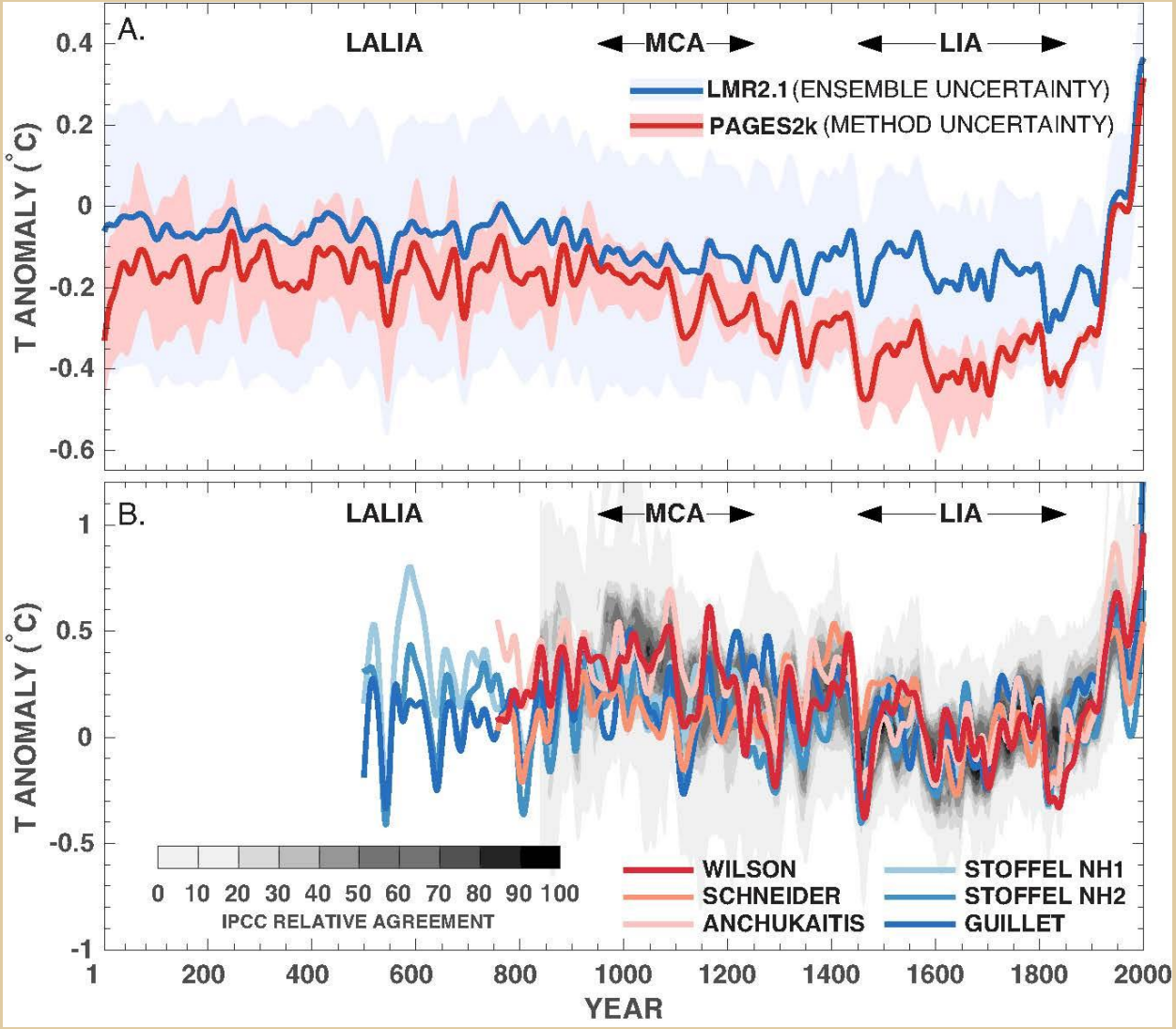
History of Climate and Society

- a large, multidisciplinary scholarship that considers how pre-industrial climate changes influenced human history
- focusing on hydroclimatic anomalies or periods of prolonged cooling
  - disrupted growing seasons, famines, migrations, conflict within or between polities
  - disasters, crisis and collapse

LATE ANTIQUE LITTLE ICE AGE & LITTLE ICE AGE

The volcanic, solar and internal forcings that were primarily responsible for the LALIA (6th century) and LIA (13th-19th century) rendered the climate of those centuries spatially and temporally heterogeneous, and ensured that on large scales cooling never reached even the present-day magnitude of anthropogenic warming.

LALIA: varying duration
LIA: spatial and temporal variability



Methodological challenges / A research framework for HCS

- Four key challenges:
  - interpreting evidence
  - bridging dynamics across scales
  - establishing causal mechanics
  - estimating uncertainty
- integrating data and knowledge between mutually unfamiliar academic disciplines
- form ‘consilient’ teams

Resilience & adaptation

'the capacity of a given system to absorb energy and to redirect or to convert it, without losing the fundamental features and shape of the system as a whole' &

the 'process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities'

Case studies

THE FIVE PATHWAYS OF RESILIENCE

Exploiting new opportunities

Climatic trends helped to make some regional environments easier to exploit for economic or military ends

The success story of Roman Eastern Mediterranean, LALIA

Resilient energy systems

Societies could also prosper if they used sources of energy for subsistence or industry that were resilient to climatic variability

Adapting to the new conditions – innovations

Finland, LIA

Resources of trade and empire

Gradual integration of regional, and global, grain markets buffered grain prices from climate trends and anomalies

Trading acquired grains in diverse ports across the Baltic Sea, Dutch commercial empire, LIA

Political and institutional adaptations

Trade was only one among many tools that authorities used to avoid or recover from climate-related disasters during the LIA

Communal grain reserves

Bologna and Siena LIA

Migration and transformation

Mobility often fostered resilience to climate change

From Ming to Qing Dynasty – the Jurchen polity, China, LIA

Better histories for better futures