

Reconstructing & simulating past climate variability. The Mediterranean

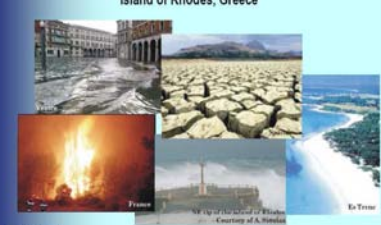
J. Fidel González Rouco

PaIMA Res. Group
Facultad CC. Físicas. UCM
fidelgr@fis.ucm.es
<http://chubasco.fis.ucm.es/~fi>

First MedCLIVAR-ESF Summer School


Climate variability over the Mediterranean area:
atmospheric and oceanic components

17-27 September 2008
Hellenic Centre for Marine Research
Hydrobiological Station and Aquarium of Rhodes
Island of Rhodes, Greece



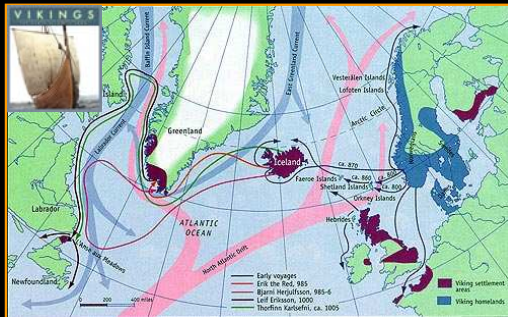
Organizers

Alexander Theroharis Hellenic Centre for Marine Research, Greece	Ricardo Garcia-Herrera University Complutense, Madrid, Spain
Elvira Xoplaki University of Bern, Switzerland	Piero Lionello University of Lecco, Italy
Mike Tompkins National Oceanography Centre, UK	Paola Malanotte-Rizzoli MIT, USA
Andreas Scoufas Hydrobiological Station Rhodes, Greece	Vassilia Zervou University of Aegean, Mytilene, Greece



Hendrick Averkamp
1585-1634





Ivar Bardsson (Norwegian priest in Greenland 1341-1364):
"From Snefellsness in Iceland, to Greenland, the shortest way: two days and three nights. Sailing due west. In... the sea there are reefs called Gunbiernershier. That was the old route, but now the ice is come from the north, so close to the reefs that none can sail by the old route without risking his life." (Ladurie, 1971.)

Reconstructing & simulating past climate variability.

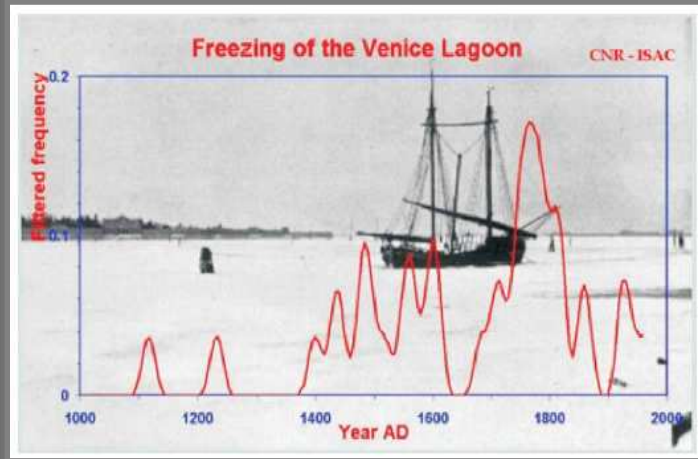
The Mediterranean

J. Fidel González Rouco

PaIMA Res. Group
 Facultad CC. Físicas. UCM
 fidelgr@fis.ucm.es
<http://chubasco.fis.ucm.es/~fi>

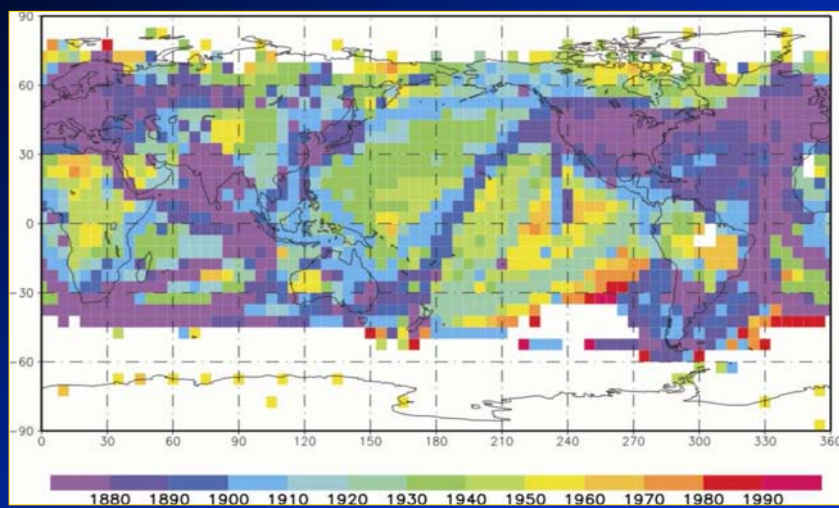
1. Motivation
2. Aproximation to past climate: *proxies & reconstructions*
3. Paleoclimate simulation
4. Simulations & reconstructions: *reality & pseudoreality*
5. Implications for future climate change assessments

1000-yr chronology of the Venice lagoon freezing



Camuffo D.: Clim. Change, 10, 43, 1987

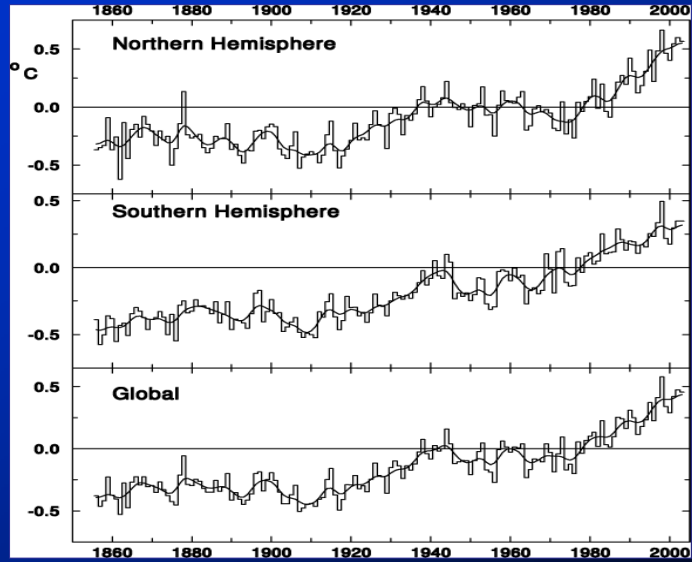
The instrumental period



Instrumental Period

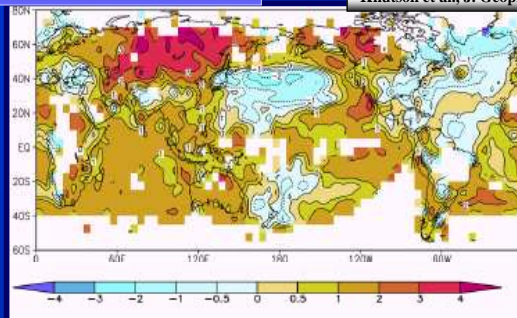
Global & Hemispheric Trends

Jones et al., Rev. Geophys, 37,173-179, 1999

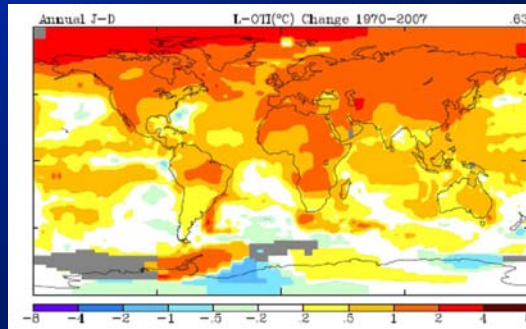


Annual trends T 1949-1997

Knutson et al., J. Geophys. Res., 104, 30981-30996, 1999



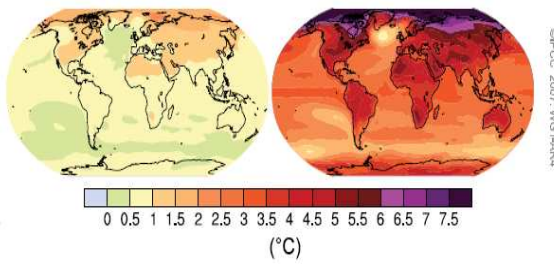
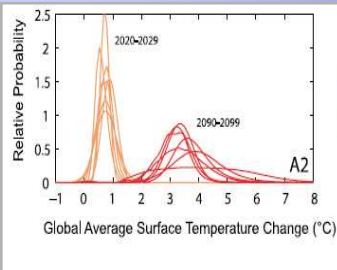
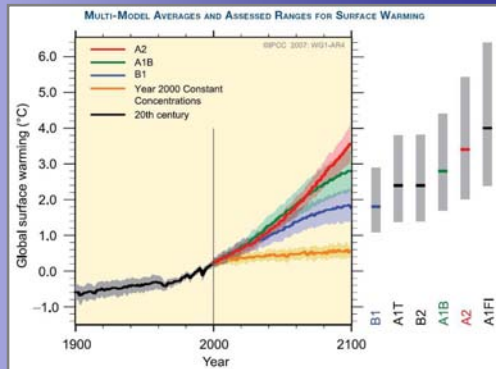
Annual trends



Climate Change

Projections

IPCC 07 WG1-AR4



*"The farther backward you can look,
the farther forward you are likely to see"*

Winston Churchill

Observations

Scenario projections

Reconstructions

Simulation of past scenarios

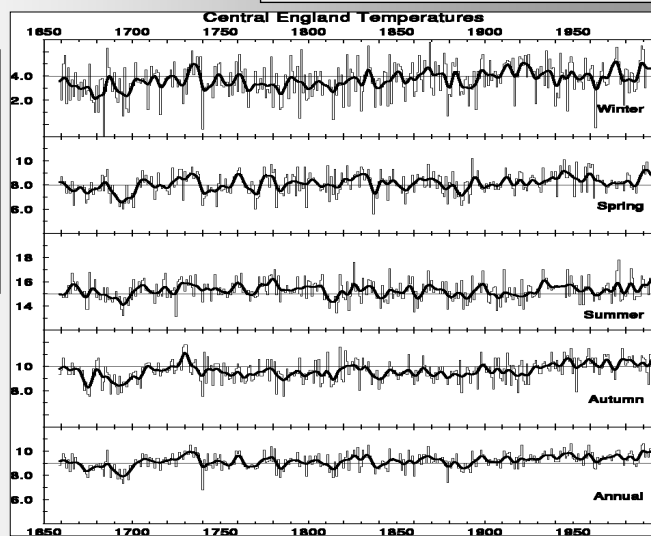
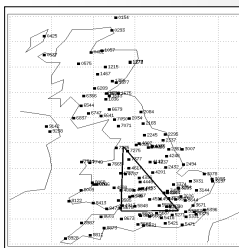


Proxy records & Climate Reconstructions

Early Instrumental

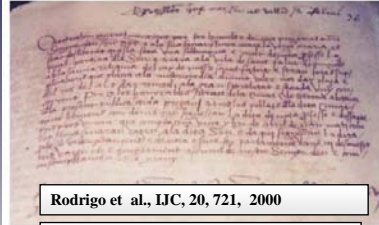
Central England temperature

Manley, QJRMS, 79, 242-261, 1953
Manley, QJRMS, 100, 389-405, 1974
Parker et al, IJC, 12, 317-342, 1992



Proxy sources

Documentary

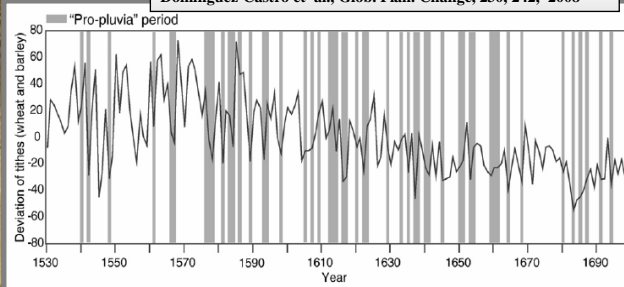


Rodrigo et al., IJC, 20, 721, 2000

Benito et al., Clim. Change, 28, 171, 2003

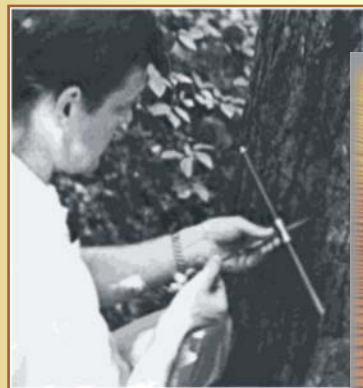
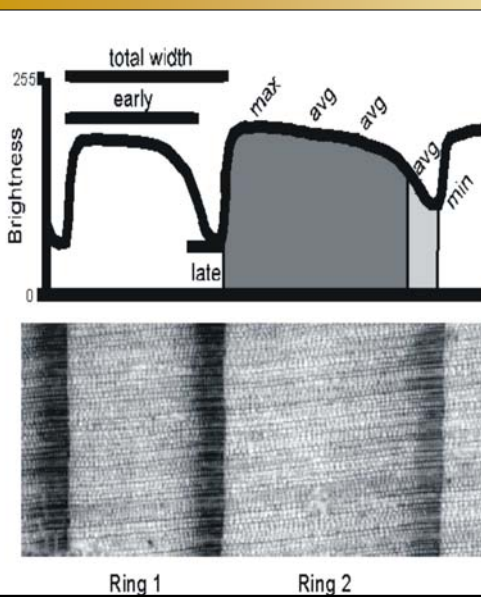


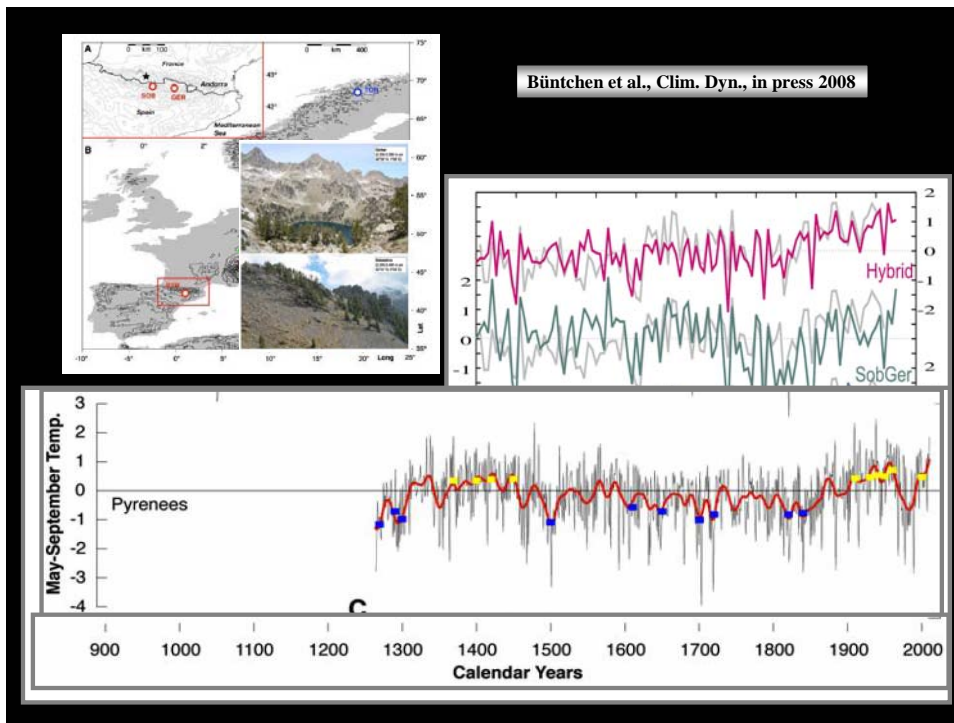
Domínguez-Castro et al., Glob. Plan. Change, 230, 242, 2008



Natural proxy sources

Dendrochronology





Natural proxy sources

Corals

Felis & Patzold, *Paleoce.*, 15, 679-694, 2000

Urban et al, *Nature*, 407, 989-993, 2000

Silenzi et al, *GPC*, 40, 105-114, 2004

Figure showing an underwater photograph of a coral reef, a world map indicating sampling locations for coral proxies, and an inset photograph of a diver using a coring device to collect a sample from the seafloor.

Natural proxy sources

Ice cores

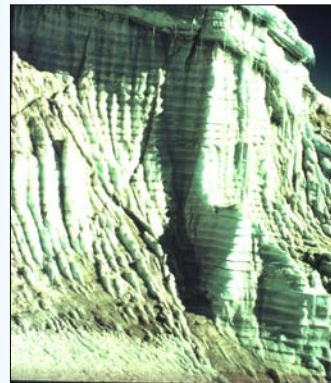


EPICA, *Nature*, 429, 623-628, 2004

Thompson et al, *Science*, 298, 589-593, 1998



GISP2



Natural proxy sources

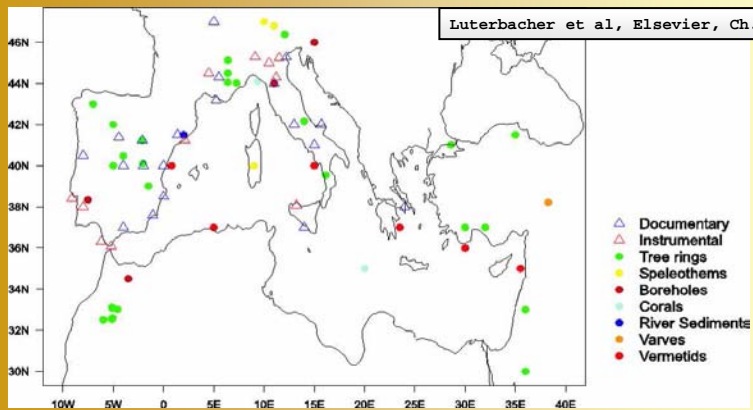
Speleothems

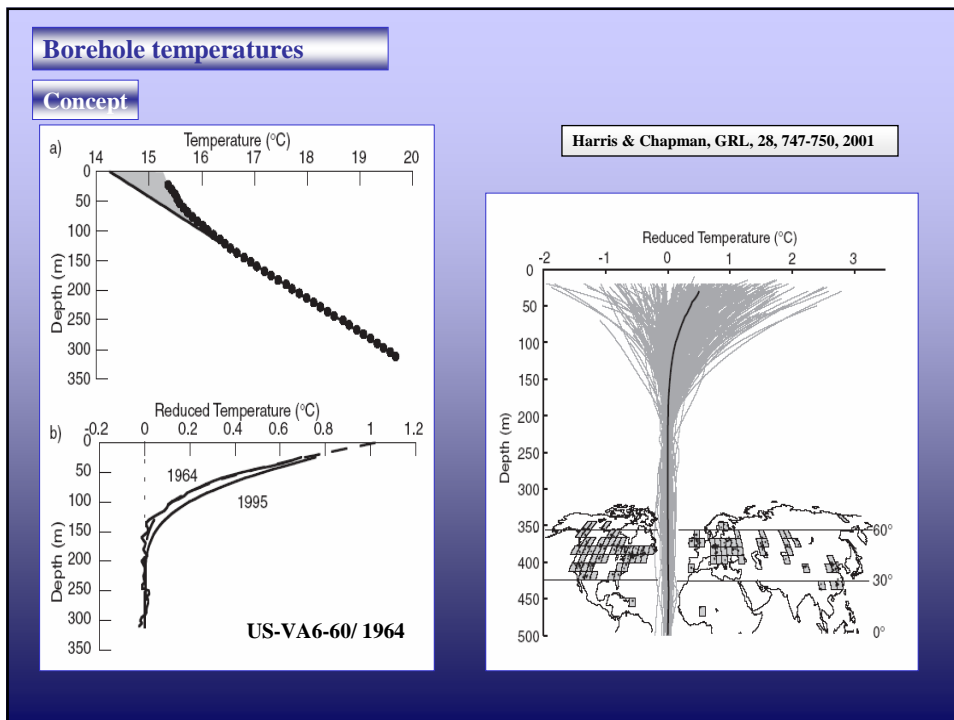
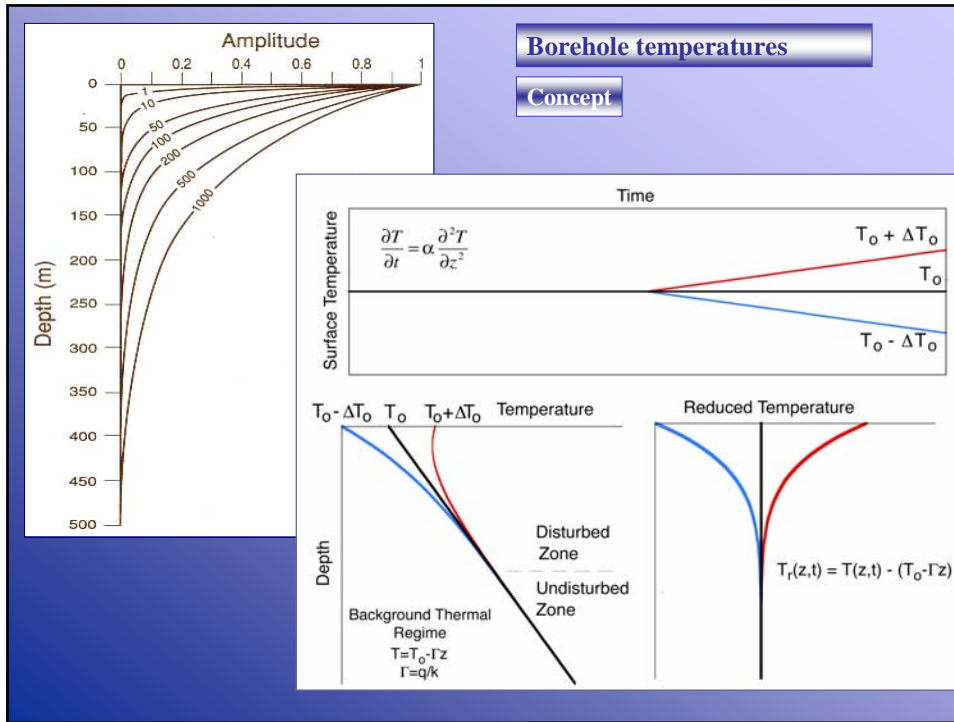


Proctor et al, *Clim. Dyn.*, 16, 815-820, 2000

ONAC et al, *JQC*, 377, 319-327, 2002

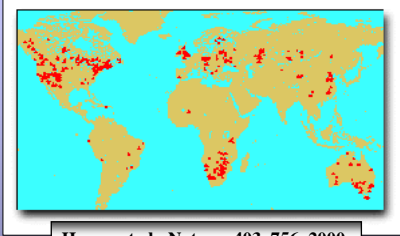
Luterbacher et al, *Elsevier*, Ch. 1, 2006





Borehole temperatures

Concept



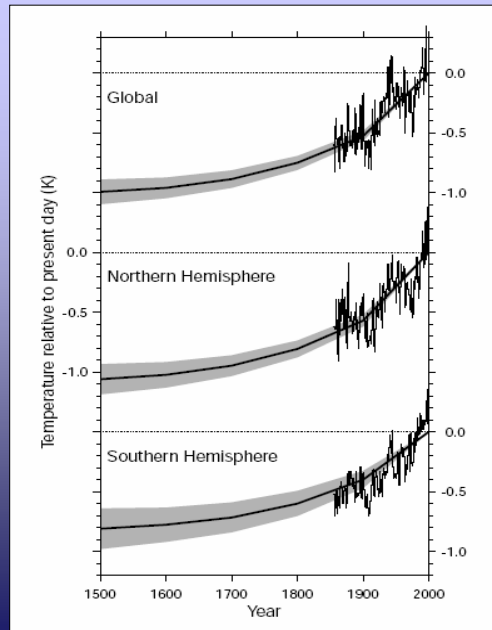
Huang et al., Nature, 403, 756, 2000

Pollack et al, Science, 282, 279-281, 1998

Harris & Chapman, GRL, 28, 747-750, 2001

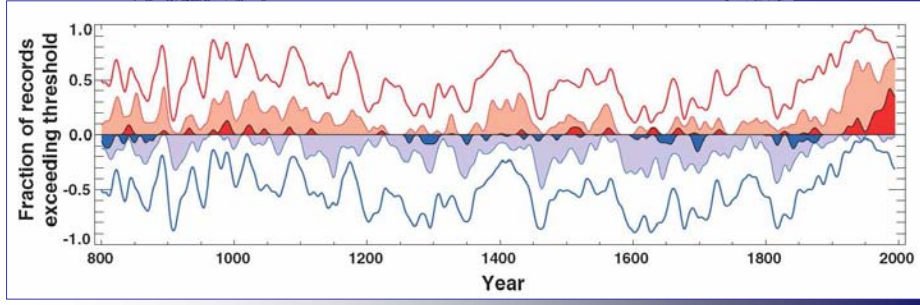
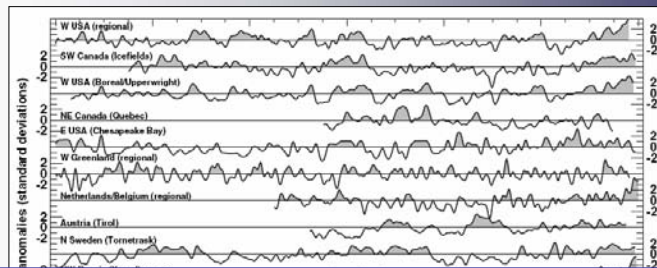
Beltrami & Bourlon, EPSL, 227, 169-177, 2004

Pollack & Smerdon, JGR, 109, D11106, 2004



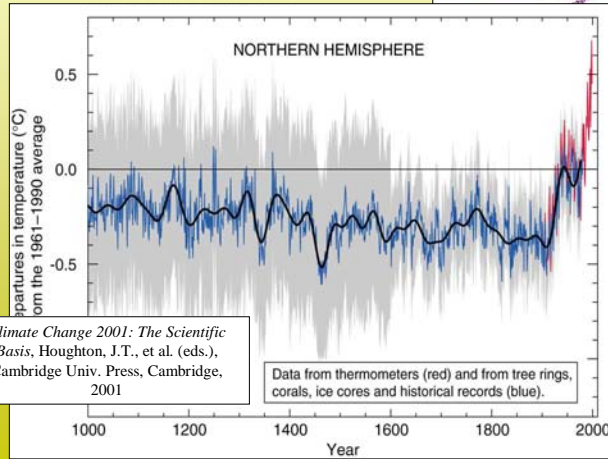
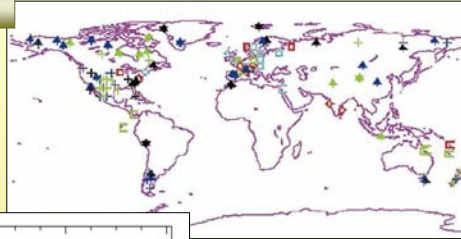
Climate since ~ 1000 AD

Integrated local and regional perspective



Climate (field) reconstructions

Mann et al., GRL, 26,759-762, 1999



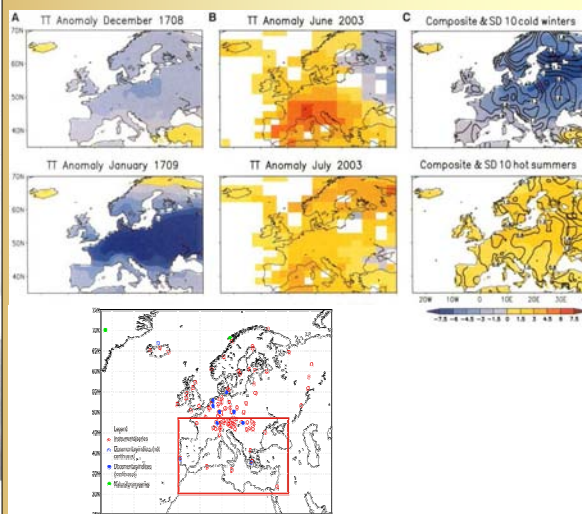
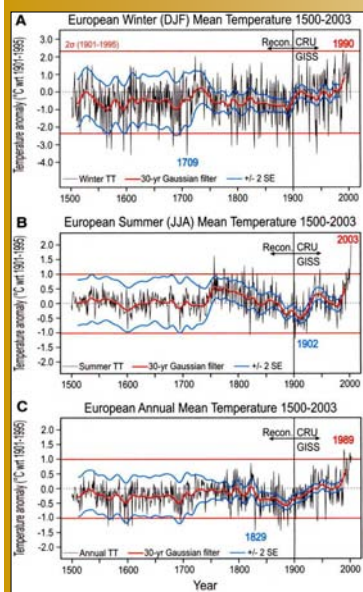
Climate (field) reconstructions

European Temperature 1500-2003

Luterbacher et al.: Science, 303, 1499, 2004

Xoplaki et al.: GRL, 32, L15713, 2005

Pauling



ERROR: syntaxerror
OFFENDING COMMAND: --nostringval--

STACK: