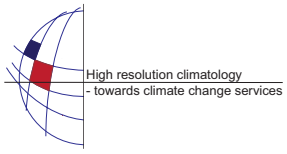
EMS Annual Meeting Abstracts
Vol. 7, EMS2010-293, 2010
10th EMS / 8th ECAC



European climate variability and human susceptibility over the past 2500 years

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Climate variations including droughts in the western US and African Sahel, landfalls of Atlantic hurricanes, and shifts in the Asian monsoon have affected human societies throughout history mainly by modulating water supply and agricultural productivity, health risk and civil conflict. Yet, discriminations of environmental impacts from political, economical and technological drivers of societal shifts are may be hampered by the indirect effects of climate on society, but certainly by the paucity of high-resolution palaeoclimatic evidence. Here we present a tree-ring network of 7284 precipitation sensitive oak series from lower elevations in France and Germany, and a compilation of 1546 temperature responsive conifers from higher elevations in the Austrian Alps, both covering the past 2500 years. Temporal distribution of historical felling dates of construction timber refers to changes in settlement activity that mirror different stages of economic wealth. Variations in Central European summer precipitation and temperature are contrasted with societal benchmarks. Prolonged periods of generally wet and warm summers, favourable for cultural prosperity, appeared during the Roman epoch between ∼200 BC and 200 AD and from ∼700-1000 AD, with the latter facilitating the rapid economic, cultural and political growth of medieval Europe. Unprecedented climate variability from ∼200-500 AD coincides with the demise of the Western Roman Empire and the subsequent Barbarian Migrations. This period was characterized by continental-scale political turmoil, cultural stagnation and socio-economic instability including settlement abandonment, population migration, and societal collapse. Driest and coldest summers of the Late Holocene concurred in the 6th century, during which regional consolidation began. The recent political, cultural and fiscal reluctance to adapt to and mitigate projected climate change reflects the common belief of societal insusceptibility to environmental conditions. The complex climatic interference with agrarian civilizations, however, challenges the sustainability of this attitude.
In addition to the long-term context it provides for instrumentally observed European climate variability, our study reveals critical targets for next-generation climate models to hindcast the temporal footprints and magnitudes of natural fluctuations over the Late Holocene in response to internal dynamics and external forcings.