

Five centuries of Central European temperature extremes reconstructed from tree-ring density and documentary evidence

G. Battipaglia (1), D. Frank (1), U. Buentgen (1), P. Dobrovolný (2), R. Brázdil (2), C. Pfister (3), and J. Esper (1)

(1) Swiss Federal Research Institute WSL CH-8903 Birmensdorf (giovanna.battipaglia@wsl.ch), (2) Institute of Geography, Masaryk University, 61137 Brno, Czech Republic, (3) Oeschger Centre for Climatic Change Research and Institute of History, University of Bern, Switzerland

In this project three different summer temperature sensitive tree-ring chronologies across the European Alpine region were compiled and analyzed to make a calendar of extreme warm and cold summers. We identified 100 extreme events during the past millennium from the tree ring data, and 44 extreme years during the 1550-2003 period based upon tree-ring, documentary and instrumental evidence. Comparisons with long instrumental series and documentary evidence verify the tree-ring extremes and indicate the possibility to use this dataset towards a better understanding of the characteristics prior to the instrumental period. Potential links between the occurrence of extreme events over Alps and anomalous large-scale patterns were explored and indicate that the average pattern of the 20 warmest summers (over the 1700-2002 period) describes maximum positive anomalies over Central Europe, whereas the average pattern of the 20 coldest summers shows maximum negative anomalies over Western Europe. Challenges with the present approach included determining an appropriate classification scheme for extreme events and the development of a methodology able to identify and characterize the occurrence of extreme episodes back in time. As a future step, our approach will be extended to help verify the sparse documentary data from the beginning of the past millennium and will be used in conjunction with climate models to assess model capabilities in reproducing characteristics of temperature extremes.