

## Tree-ring growth variability in the Austrian Alps: the influence of site, altitude, tree species and climate

Sofia Leal<sup>1, 4</sup>, Thomas M. Melvin<sup>3</sup>, Michael Grabner<sup>2</sup>, Rupert Wimmer<sup>2</sup> Keith R. Briffa<sup>3</sup>

<sup>1</sup>(e-mail: [spleal@yahoo.co.uk](mailto:spleal@yahoo.co.uk)), Institute of Wood Science and Technology, University of Natural Resources and Applied Life Sciences, Peter Jordan Strasse 82, A-1190 Wien, Austria <sup>2</sup>Institute of Wood Science and Technology, University of Natural Resources and Applied Life Sciences; Peter Jordan Strasse, 82, A-1190 Wien, Austria <sup>3</sup>Climatic Research Unit, University of East Anglia, Norwich NR4 7TJ, UK

Correspondence to <sup>4</sup> Departamento de Engenharia Florestal, Instituto Superior de Agronomia, 1349-017 Lisboa, Portugal

### ABSTRACT

We present an extensive new network of ring-width chronologies, comprising data from 100 sites within the Austrian Eastern Alps, made up of multiple tree species. Principal components analysis and cluster analysis were used to identify five separate high-frequency tree-growth signals from these data. Tree-growth variability at these sites is explained by site altitude and species differences that moderate the effects of the annually varying climatic forcing on tree growth. Recently developed, two-century long gridded climate data sets for the Greater Alpine Region were used to assess the relationship between climate and tree growth. Tree growth at low altitudes is controlled mainly by spring-summer moisture availability. At high altitudes precipitation is no longer a limiting factor and growth is mostly determined by summer temperature. In the intermediate altitudinal range, we did not find any direct relationships with specific climatic variables. High-altitude chronologies suitable for reconstructing past temperatures and low-altitude chronologies suitable for reconstructing past precipitation were identified.

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