



Multi-archive summer temperature reconstruction for the European Alps, AD 1053 – 1996

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In this study, we present a multi-archive summer temperature reconstruction for the Greater Alpine region spanning the period AD 1053 -1996. The reconstruction is based on a set of climate proxies from lake sediments and tree-rings. We put special emphasis on testing the sensitivity of this reconstruction to calibration methodology and proxy selection. Sensitivity analysis allows to test the robustness of climate reconstructions; extending classical error estimation, which is based on information from only the calibration period, it helps to assess uncertainty related to inconsistencies among proxies during the reconstruction period.

Warmest temperatures prior to the 20th century are recorded in the 12th century and are 0.25°C higher than the 20th century mean. Coldest temperatures are recorded at the end of the 16th century and in the 14th century and are 1°C lower than the 20th century mean. In the light of the reconstruction presented in this study the last two decades of the 20th century seem exceptionally warm. This result persists when testing the sensitivity of the reconstruction to calibration methodology and proxy selection. We find an increased reconstruction uncertainty prior to 1400 attributable to proxy selection.

The new Alpine reconstruction is in close agreement with a fully independent, documentary based reconstruction spanning back to 1500. Comparing the summer temperatures to solar and volcanic forcing we find a clear imprint of volcanic eruptions as cold years (e. g. 1258, 1816), and a connection between solar activity and temperatures.