

# European and Swiss temperature distribution changes in observations

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Changes in the distribution of seasonal surface temperature are investigated using observations between 1864 and 2004. Focus is given to the temperature distribution in Switzerland and on the Central European continent. A piecewise detrending methodology is used to distinguish between intrinsic and trend-induced variability changes. Mean and interannual variability changes are standardized with the intrinsic variability of the respective dataset.

Within this framework, the strongest temperature changes in mean since 1990 are found for the summer season, both in observations and climate models covering the same period. Estimates for variability changes show a weak increase (decrease) in summer (winter), but these changes are not statistically significant at the 90% level. The autumn season (SON) shows slightly negative changes in mean and no changes in variability.

These results raise issues in the concept of normal period-based anomalies. The widely used WMO 1961-1990 (61-90) standard normal period is compared to other consecutive 30-year normal periods in detail. The temperature trend of the last decades led to an unusually high number of months with positive temperature anomalies relative to the WMO 61-90 standard normal period. Swiss anomalies based on the 61-90 normal are up to 1.25 K higher than those based on the Latest 30-years Running Normal (LRN). The probability to observe a positive temperature anomaly with respect to the 61-90 normal increased from 50% to near 80% for certain months of the year.

Finally the same distributions are then investigated in a set of IPCC climate change simulations (see also Schär et al. 2004). For the 21st century all climate scenario runs suggest large relative increases in mean for all seasons with maximum amplitude in summer. Although changes in relative variability vary substantially between the models, there is a tendency for increasing (decreasing) variability in future summers (winters).

## References

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