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Trends in intra-seasonal temperature variability in Europe

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While long-term changes in measures of central tendency of climate elements, i. e. mean temperature, are well acknowledged, studies of trends in measures of their variability are much less common. This is despite the fact that trends in variability can have higher effect on climate extremes than trends in mean. Here, three measures of intra-seasonal variability are examined: 1) standard deviation of mean daily temperature 2) mean absolute value of day-to-day temperature change, 3) the range between the 90th and 10th quantile of mean daily temperature. ECA&D daily data from 180 stations and linear regression method are utilized to calculate trends of these characteristics in period from 1961 to 2012. Spatial distribution of trends in individual variability characteristics in Europe together with long-term change in mean and autocorrelation of mean temperature are demonstrated in maps. Significant trends (positive and negative) in all examined variability characteristics were found with substantial differences between seasons as well as between regions. On this basis, Europe is divided into 6 regions and trends are assessed in each region separately. While the most significant decrease in variability is observed in Northern Scandinavia and Iceland in winter, the most substantial increase is detected in Central and Western Europe in spring. Our results are accompanied by comparing the probability density function of daily temperature between periods 1961 – 1986 and 1987 – 2012 in each region showing how the shape of distribution of daily temperature has changed and if it could affect the changing number and value of temperature extremes.