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# Mapping the changing pattern of local climate as an observed distribution

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It is at local scales that the impacts of climate change will be felt directly and at which adaptation planning decisions must be made. This requires quantifying the geographical patterns in trends at specific quantiles in distributions of variables such as daily temperature or precipitation. Here we focus on these local changes and on the way observational data can be analysed to inform us about the pattern of local climate change. We present a method[1] for analysing local climatic timeseries data to assess which quantiles of the local climatic distribution show the greatest and most robust trends. We demonstrate this approach using E-OBS gridded data[2] timeseries of local daily temperature from specific locations across Europe over the last 60 years. Our method extracts the changing cumulative distribution function over time and uses a simple mathematical deconstruction of how the difference between two observations from two different time periods can be assigned to the combination of natural statistical variability and/or the consequences of secular climate change. This deconstruction facilitates an assessment of the sensitivity of different quantiles of the distributions to changing climate. Geographical location and temperature are treated as independent variables, we thus obtain as outputs the pattern of variation in sensitivity with temperature (or occurrence likelihood), and with geographical location. We find as an output many regionally consistent patterns of response of potential value in adaptation planning. We discuss methods to quantify and map the robustness of these observed sensitivities and their statistical likelihood. This also quantifies the level of detail needed from climate models if they are to be used as tools to assess climate change impact.

[1] S C Chapman, D A Stainforth, N W Watkins, 2013, On Estimating Local Long Term Climate Trends, Phil. Trans. R. Soc. A, in press

[2] Haylock, M.R., N. Hofstra, A.M.G. Klein Tank, E.J. Klok, P.D.
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