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User-relevant, threshold-specific observations of climate change

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Users of climate information look for details of changing climate at local scales (to inform specific activities) and on the geographical patterns of such changes (to prioritise adaptation investments). They often have user-specific thresholds of vulnerability so the changes of interest must refer to such thresholds or to the related quantile of the climatic distribution. A method for providing such information from timeseries of temperature data has recently been published [1] along with maps of changes at thresholds and quantiles [2] derived from the European Observational dataset E-Obs [3].

In this presentation we will do two things. First we will discuss the opportunities to tailor such methods to provide user-specific information through climate services, using illustrations from the existing methodology applied to daily maximum and minimum temperatures [1,2]. Second we will present new results on threshold specific observed changes in precipitation. The methodology for precipitation is related to that which has been applied to temperature but has been developed to handle the characteristics of precipitation distributions. The results identify some regions with systematic increases in precipitation on the seasonally wettest days and others which show drying across all days, on a seasonal basis. We will present the geographic locations and precipitation thresholds where strong signals of changes are seen across Europe. The coherency of such results and the methodology used to process the observational data will be discussed. We will also highlight the justifications for having confidence in the results in some regions and at some thresholds while having a lack of confidence in others. Such information should be an important element of any climate services.

It is worth noting that here "wettest days" refers to events which are uncommon within a season (e.g. one in $\sim$20 wet days). This is in contrast and complementary to, for instance, the one in a hundred year extreme event. Users can be vulnerable to one or the other or both of these event types and climate services are required which are sufficiently flexible to provide tailored information in either situation. It is common to focus on the latter while the former is relatively understudied.

[1] Chapman, S C, Stainforth, D A, Watkins, N W. 2013 On Estimating Local Long Term Climate Trends, Phil. Trans. R. Soc. A, 371 20120287;

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[3] Haylock, M.R., N. Hofstra, A.M.G. Klein Tank, E.J. Klok, P.D. Jones and M. New. 2008: A European daily high-resolution gridded dataset of surface temperature and precipitation. J. Geophys. Res (Atmospheres), 113, D20119