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Downscaling statistical information: a statistical approach

Rasmus Benestad, Kajsa M. Parding, Abdelkader Mezghani, Andreas Dobler, Oskar A. Landgren, and Julia Lutz
Norwegian Meteorological Institute, Research and Developement, Oslo, Norway (rasmus.benestad@met.no)

If the shape of mathematical curves describing local weather statistics are systematically influenced by large-scale conditions and geographical factors, then it may be possible to downscale this kind of information directly. Such curves may include probability density functions (pdfs) for daily temperature/precipitation or intensity-duration-frequency (IDF) curves for estimating return values of intense sub-daily rainfall. Downscaling the shape of such curves may be referred to as '*downscaling climate*' if we regard 'local climate' as the statistical description of various weather parameters. This approach is distinct from the more traditional approach '*downscaling weather*', where one seeks to estimate particular local states for instance on a day-by-day basis. We present work on downscaling the shapes of pdfs and IDFs involving large multi-model ensembles for the application in climate change adaptation efforts. Our efforts also include an evaluation of both methodology and the global climate models' (GCMs) ability to reproduce observed large-scale climatic variability in terms of the salient spatio-temporal covariance structure. We emphasise that it's important to combine different strategies for downscaling, e.g. regional climate models (RCMs) and empirical-statistical downscaling (ESD) that are based on different assumptions, for getting robust future regional climate projections.