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Complementary to dynamical downscaling: empirical-statistical downscaling

R.E. Benestad

The Norwegian Meteorological Institute (rasmus.benestad@met.no)

The IPCC AR4 report summarised extensively from regional downscaling studies based on regional climate models (RCMs) and little on studies based on empirical-statistical downscaling (ESD) models. It is difficult to provide a good explanation for why there was less reference to ESD-based work, but it is argued here that ESD is (i) an independent and complimentary technique to dynamical downscaling, (ii) is quick to carry out and should be carried out in addition to RCM studies as a default, and (iii) can be used to study extremes events on a microscale. Furthermore, ESD is easily applied to large multi-model ensembles and is quickly carried out for the latest global climate scenarios. Often ESD is more appropriate than RCM results for impact studies, such as cases related to hydrology or where the physiography is complex. In many cases, the RCM results need to be adjusted statistically before they can be used for impact studies. Comparisons between RCM and ESD, methods where ESD is used to downscale PDFs, and a number of examples from various impact studies will be presented. Thus ESD will be able to provide reasonable scenarios in some cases where RCMs are inappropriate, but there are also times where RCMs are superior to ESD. Wherever possible, it's important to use both RCM and ESD and compare the differences to assess the consistency of the results.