

New confidence in regional temperature projections despite model deficiencies

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How anthropogenic climate change will affect climate in dry and semi-arid regions has important implications for the allocation of water resources and the course of regional development. Here we show that due to a broad agreement among climate models (regional as well as global) to exhibit systematic non-linear warm biases in warm, dry climates, it is likely that present estimates of regional amplification of global warming in such regions could be exaggerated by many climate models. In particular we study Europe as an example, where we have access to the largest amount of model information possible. We have taken the step further and analysed the CMIP3 (and CMIP5) models to explore the generality of the European example. Based on this, we apply a simple bias correction method to correct for individual model deficiencies and find that regions projected to experience intense warming as seen in ensemble mean estimates by state-of-the-art models are partly doing so as a consequence of these deficiencies. We find that it is the non-linear bias behaviour not the bias level itself (i.e. whether the model has a warm bias or not) that is the source of the exaggerated warming. When taking this into consideration, the level of spread (or model uncertainty) of regional temperature projections can be interpreted as a result of different systematic biases between the models. When correcting, we also find that the agreement across models is considerably enhanced .